Appendix F

Socioeconomics Technical Report

Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority, 2014–2038

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Table of Contents

Appendices

Tables

Figures

Acronyms

AF	acre-feet
AFY	acre-feet per year
CEQA	California Environmental Quality Act
CVP	Central Valley Project
Delta	Sacramento-San Joaquin River Delta
DWR	California Department of Water Resources
EIS/EIR	Environmental Impact Statement/Report
Exchange Contractors	San Joaquin River Exchange Contractors Water Authority
I-O	input-output
M&I	municipal and industrial
NAICS	North American Industrial Classification System
NEPA	National Environmental Policy Act
SIC	Standard Industrial Classification
SWP	State Water Project

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F.1 Introduction

This technical report evaluates the socioeconomic impacts of the proposed long-term Water Transfer Program (Proposed Program) by the San Joaquin River Exchange Contractors Water Authority (Exchange Contractors). The information presented in this report is summarized in Chapter 8, Socioeconomics (Section 8.1, Affected Environment and Section 8.2, Environmental Consequences) of the Draft Environmental Impact Statement/Report (EIS/EIR).

The Proposed Program covers the transfer of up to 150,000 acre-feet (AF) of substitute[1] water from the Exchange Contractors to other Central Valley Project (CVP) water contractors, San Joaquin Valley wildlife refuges, and/or to State Water Project (SWP) contractors west and south of the Sacramento-San Joaquin River Delta (Delta). The Program would be in place over the 25-year period from 2014 through 2038, extending the existing Program that is set to expire in 2014. The *existing* Program includes the transfer of up to 130,000 acre-feet per year (AFY) of substitute water, consisting of a maximum of 80,000 AF of developed water from conservation measures and a maximum of 50,000 AF of water from temporary land fallowing. The Proposed Program includes potential additional transfers of up to 20,000 AF annually from conserved water, thus a maximum of 100,000 AF of such water, and a maximum of 50,000 AF from fallowing for a total maximum transfer in any year of 150,000 AF.

The Proposed Program's purpose is to permit annual transfers and/or exchanges of CVP water from the Exchange Contractors to continue beyond February 28, 2014; and to allow the delivery of transfer and/or exchange water to additional areas and contractors that were not included in the 10-Year Program EIS/EIR. The recipients of the substitute water would be:

- Interim Water Acquisition Program to acquire water supplies (Incremental Level 4) for San Joaquin Valley wildlife refuges and the Tulare Lake Basin wildlife areas
- Other CVP and SWP contractors to meet demands of agricultural and municipal and industrial (M&I) uses

The Proposed Program's specific objectives include the following:

- Develop supplemental water supplies from willing seller agencies within the Exchange Contractors' service area through water conservation measures/tailwater recovery and crop idling/fallowing activities consistent with agency policies.
- Assist in providing water supplies to the wildlife refuges consistent with Incremental Level 4 water quantities for optimal wildlife habitat development.
- Assist CVP repayment contractors to obtain additional CVP water for the production of agricultural crops or livestock and M&I uses because of water supply shortages or when full contract deliveries cannot otherwise be made.
- Assist SWP (Kern County Water Agency) and CVP agricultural service and M&I contractors (East Bay Municipal Utility District, Contra Costa Water District, Pajaro Valley Water

[1] Substitute water is so named because the Exchange Contractors' water supply from the Delta-Mendota Canal substitutes for surface water diversions from the San Joaquin River in most years.

Management Agency) to obtain supplemental water supplies and promote seasonal flexibility wherein water would be delivered and returned at a later date.

The Proposed Program would provide for the development of up to 150,000 AF of water by the Exchange Contractors annually and for the exchange and/or transfer of that water to any or all of the users mentioned above.

F.1.1 Overview of the Socioeconomic Analysis

Socioeconomic analyses typically include two types of investigations. The first is a social analysis, which focuses on demographic and related parameters that could be affected by a project's alternatives and which typically also includes an evaluation of environmental justice considerations. The second is an evaluation of economic considerations, focusing on a project's monetary benefits and costs. Economic analyses often address regional economic impacts, which measure effects on production (output), employment, and income variables in the study area, typically conducted using regional input-output (I-O) analysis.[2]

To provide context to the Proposed Program's potential socioeconomic impacts, this technical report includes as background a comprehensive description of the local economy principally affected by the Program and the agricultural industry within the Exchange Contractors' service area. The impact analysis focuses on potential benefits and costs attributed to changes in agriculture and other economic considerations associated with the transfer of water from the Exchange Contractors' service area, as well as the regional economic impacts of the Program alternatives. Other social and fiscal effects are evaluated in the Draft EIS/EIR.

The primary types of economic impacts of interest within the Exchange Contractors' service area are changes in agricultural production value and net farm income; revenues and expenditures incurred by the Exchange Contractors' districts; and regional output, income, and employment in the local economy. These economic variables would be affected by both the No Action and action alternatives.

Agricultural production and net farm income is influenced by many factors such as crop acreages and prices, crop yields, government programs, and costs of fertilizers, chemicals, and other production inputs. Under the No Action Alternative, the existing Program currently in place through February 28, 2014, would be discontinued, and no transfers would occur beyond that point. As such, the Exchange Contractors would use within their own operations any water that had been previously transferred under the existing Program. The Exchange Contractors' water supply would increase, leading to an increase in groundwater recharge and a reduction in current groundwater pumping quantities following analysis by Ken Schmidt. Under the existing Program, farmers fallowing land are able to transfer the associated water to other parcels they own in other CVP districts. Under No Action, such transfers would no longer be permitted, and the amount of land fallowed under the existing Program would be reduced. All other factors equal, total cropped land by farmers within the Exchange Contractors' service area would increase, as would gross and net farm income. Under the action alternatives, the potential exists

[2] See Attachment A for a discussion of the I-O methodology used to estimate regional impacts in this study.

for land fallowing to increase resulting in declines in agricultural production. Both the positive and negative effects in the agricultural industry associated with land fallowing must, however, be balanced with the potential changes in water transfer revenues that agricultural landowners may realize under the Proposed Program.

The revenues and costs of the Exchange Contractors are also likely to be affected by the Proposed Program. Under the existing Program, the Exchange Contractors receive revenues from the sale of water to other CVP contractors and wildlife refuges and utilize those funds for ongoing district operations, including operations, maintenance, and replacement of existing capital assets used in the generation of conservation water. Under the No Action Alternative, sales of water to other CVP contractors and wildlife refuges would not continue beyond February 28, 2014, and an ancillary reduction in transfer revenues would occur. Under most of the action alternatives, the Exchange Contractors would continue to receive revenues from the sale of conserved water provided not only to other CVP contractors and wildlife refuges, but also to SWP contractors.

F.1.2 Socioeconomics Study Area

The selection of an appropriate study area is an important consideration for regional economic analyses because it affects the magnitude and extent of impacts being evaluated. The study area should be defined to generate the information most meaningful to a project's stakeholders and decision makers. From an analytical perspective, the study area, at a minimum, should capture the direct economic effects of an action or activity, but should not be so large that a project's effects would be masked by extraneous economic activity. The concept of a "functional economic area" can serve as a guide in identifying the appropriate study area. Conceptually, a functional economic area is a semi-sufficient economic unit. In the context of a project's impacts, it can be based on the location of affected people (e.g., where people live, work, and spend money), as well as affected industries and services.

For this study, the Proposed Program's direct economic impacts, including land fallowing and water district operations, are concentrated in the service areas of the four member districts of the Exchange Contractors: Columbia Canal Company, Central California Irrigation District, Firebaugh Canal Water District, and San Luis Canal Company. The Exchange Contractors' service area consists of approximately 240,000 acres of prime agricultural land east of Interstate 5 and west of the San Joaquin River. The four districts are located within Stanislaus, Merced, Madera, and Fresno counties. This four-county area also captures many of the economic linkages between activities in the Exchange Contractors' service area and the rest of the regional economy, such as a well-established agriculture-support industry and labor force. Accordingly, the study area used for this socioeconomic analysis covers the entire four-county area.

This socioeconomic analysis relates only to the economic impacts of the proposed transfer within the Exchange Contractors' service area. Economic impacts, if any, in the geographic areas of the districts receiving the transferred water are not included in this technical report.

F.2 Baseline Socioeconomic Conditions

This chapter begins with a demographic overview of the four-county area, including measures of population, employment, and income. It also includes a review of agriculture within the Exchange Contractors' service area, as well as the entire four-county region.

F.2.1 Demographics

This section provides an overview of the demographic characteristics of the four-county study area, focusing on population, income, and race/ethnicity. Demographic parameters that represent economic indicators of social well being, such as per-capita income, poverty rates, and unemployment, are addressed within the related topics of income and employment as part of the discussion of the region's economic base. Other demographic characteristics, such as age and gender, are not pertinent to the Proposed Program and, therefore, are not discussed here.

F.2.1.1 Population

The four-county study area represents a substantial component of the Central Valley's population base. As shown in Table F-1, nearly 1.9 million people were living within these four counties in 2010 (California Department of Finance 2007a, 2010a). Most of this population is concentrated in the northern (Stanislaus County) and southern (Fresno County) portions of the study area. By population, Fresno County is the largest of the four counties, at approximately 954,000 people, and accounting for 51 percent of the study area total. It is followed by Stanislaus County (530,600), Merced County (258,500), and Madera County (153,700).

Population in the four-county area grew by 21 percent between 1990 and 2000, with Madera County growing the fastest at 39 percent, followed by Stanislaus County (20 percent), Fresno County (19 percent), and Merced County (17 percent). More recently, between 2000 and 2010, population in the study area expanded by approximately 21 percent. Madera County continued to outpace the other counties, growing 25 percent over the 10-year period, followed closely by Merced County (23 percent), Fresno County (20 percent), and Stanislaus County (19 percent).

Each county contains several incorporated cities in proximity to agricultural activity in the study area. The principal incorporated cities in Fresno County proximate to the study area include Firebaugh and Mendota; in Merced County, they are Dos Palos and Los Banos; in Madera County, it is Madera; and in Stanislaus County, they are Modesto and Turlock. Population data for these cities are included in Table F-1.

Table F-1 Population and Population Growth in the Four-County Area (1990–2010)

County/Area	Population			Population Growth (%)	
	1990	2000	2010	1990–2000	2000–2010
Fresno County	667,490	796,187	953,761	19.3%	19.8%
Firebaugh	4,429	5,579	6,941	26.0%	24.4%
Mendota	6,821	7,848	9,966	15.1%	27.0%
Merced County	178,403	209,522	258,495	17.4%	23.4%
Dos Palos	4,196	4,384	5,041	4.5%	15.0%
Los Banos	14,519	25,365	36,421	74.7%	43.6%
Madera County	88,090	122,629	153,655	39.2%	25.3%
Madera	29,283	43,089	58,243	47.1%	35.2%
Stanislaus County	370,522	444,967	530,584	20.1%	19.2%
Modesto	164,746	187,816	211,536	14.0%	12.6%
Turlock	42,224	55,395	71,181	31.2%	28.5%
Service Area (Total)	1,304,505	1,573,305	1,896,495	20.6%	20.5%

Sources: California Department of Finance (Demographic Research Unit) 2007a, 2010a.

Population projections through 2040[3] for counties in the study area are shown in Table F-2. Regional population growth in the four-county area is projected at 88.3 percent between 2010 and 2040, with population increasing from nearly 1.9 million in 2010 to 3.6 million in 2040 (California Department of Finance 2007b, 2010a). The rate of population growth is expected to decrease over time, with the greatest amount of growth, on a percentage basis, expected to occur between 2010 and 2020 (29.8 percent). Among counties, Madera and Merced are projected to experience the most growth with population more than doubling through 2040 relative to year 2010 conditions. Population growth in the other counties is expected to be more modest, ranging from 75 percent in Fresno County to 91 percent in Stanislaus County.

Table F-2 Population Projections in the Four-County Area (2020–2040)

County/Area	Population			Population Growth (%)		
	2020	2030	2040	2010–2020	2020–2030	2030-2040
Fresno	1,201,792	1,429,228	1,670,542	26.0%	18.9%	16.9%
Merced	348,690	439,905	541,161	34.9%	26.2%	23.0%
Madera	212,874	273,456	344,455	38.5%	28.5%	26.0%
Stanislaus	699,144	857,893	1,014,365	31.8%	22.7%	18.2%
Service Area (Total)	2,462,500	3,000,482	3,570,523	29.8%	21.8%	19.0%

Sources: California Department of Finance (Demographic Research Unit) 2007b, 2010a

[3] Year 2040 represents the end of the approximately 25-year period through which water transfers would be made for this analysis.

F.2.1.2 Race & Ethnicity

Race and ethnicity of affected populations are important considerations for evaluating the Proposed Program's potential environmental justice-related effects.[4] The racial and ethnic composition of the four-county study area is presented in Table F-3. The two predominant racial groups in the study area are Whites (Caucasian) and Hispanics, together comprising about 86 percent of the region's population (U.S. Census Bureau 2010). The relatively large proportion of Hispanics living and working in the study area is characteristic of most Central Valley counties, where agriculture supports a large Hispanic workforce. The other racial groups, combined, represent only 14.2 percent of the regional population. Asians account for 7.1 percent, Black/African Americans for 3.9 percent, and other groups for approximately 3 percent of the total population.

Variation is little in the racial composition among study area counties. Stanislaus County has the highest White population at 46.7 percent and the lowest Hispanic population at 41.9 percent. Fresno County appears to be the most racially diverse county in the study area, with nearly 4.8 percent Black/African American and 9.3 percent Asian residents. The largest Hispanic population in the study area is in Merced County (54.9 percent), which is only slightly higher than that in Madera County.

Table F-3 Race/Ethnicity in the Four-County Area (2008)

	Race (Percent of Total Population)						
County/Area	White	Black/ African American	American Indian/ Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Multi-Race	Hispanic/ Latino
Fresno	32.7%	4.8%	0.6%	9.3%	0.1%	2.0%	50.3%
Merced	31.9%	3.4%	0.4%	7.1%	0.2%	2.0%	54.9%
Madera	38.0%	3.3%	1.2%	1.7%	0.1%	2.0%	53.7%
Stanislaus	46.7%	2.5%	0.6%	4.8%	0.6%	2.9%	41.9%
Service Area (Total)*	37.0%	3.9%	0.6%	7.1%	0.3%	2.3%	48.9%

* Represents an average for the study area counties, weighted by population.

Source: U.S. Census Bureau (Census 2010) 2010

F.2.2 Economic Base

This section describes the current economic base in the study area, which may be potentially affected by the Proposed Program under consideration. These effects could include changes in employment across a range of economic sectors and associated effects on earnings and income.

[4] Environmental justice (EJ) is defined as the fair treatment and meaningful involvement of all people regardless of race, color, sex, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Potential effects related to environmental justice will be based on the demographic and social characteristics of the four-county study area and an evaluation of whether the Proposed Program's socioeconomic impacts would disproportionately affect minority and/or low-income populations.

The following section builds on this discussion, focusing on baseline economic conditions attributed directly to agricultural activity that is supported, in part, by water supplies delivered by the Exchange Contractors.

F.2.2.1 Employment and Major Industries

Data on total and industry employment provide important insights into the size, strength, and diversity of a local economy. Total employment across the four counties in the study area is presented in Table F-4. In total, the study area counties had 827,400 part- and full-time jobs in 2008, which represents growth of approximately 10.7 percent (or nearly 80,000 jobs) since 2000 (Bureau of Economic Analysis 2010a). This growth rate is slower (on an annual basis) than that between 1990 and 2000, when total employment grew by nearly 121,000 jobs (or 19.3 percent). Overall, the largest concentration of jobs in 2008 was in Fresno County, while the smallest was in Madera County. However, between 1990 and 2000, Madera County had the largest job growth rate among the four counties, at 47 percent. Between 2000 and 2008, the job growth rate again was the highest in Madera County at 15.6 percent, with the other three counties experiencing growth rates ranging between 7.9 and 11.4 percent over that period.

Table F-4 Employment and Employment Growth in the Four-County Area (1990–2008)

	Employment (Jobs)			Employment Growth (%)	
County/Area	1990	2000	2008	1990–2000	2000–2008
Fresno	342,583	404,091	450,031	18.0%	11.4%
Merced	76,728	83,870	93,314	9.3%	11.3%
Madera	35,423	52,075	60,184	47.0%	15.6%
Stanislaus	171,839	207,403	223,870	20.7%	7.9%
Service Area (Total)	626,573	747,439	827,399	19.3%	10.7%

Source: Bureau of Economic Analysis 2010a

Employment by industry under current conditions[5] for the four-county study area is presented in Table F-5. Generally, the economy in the study area is diverse. Overall, the largest sector in 2008 was Services, which employed over 320,000 people and accounted for nearly 39 percent of the regional job base[6] (Bureau of Economic Analysis 2010b). Other leading sectors in the regional economy included Federal and state/local government (15.6 percent of the total job base) and

[5] The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies to categorize business establishments for use in the collection, analysis, and publication of statistical data on U.S. businesses. NAICS was implemented in 1997 as a replacement for the older Standard Industrial Classification (SIC) system. Because the NAICS and SIC classifications do not overlap completely, comparisons between 2008 NAICS data and 2000 and earlier SIC data are not possible; therefore, historical trends at the industry level are not presented.

[6] This figure could be higher based on undisclosed data at the county level – see Table 5.

Wholesale and Retail Trade (13.4 percent[7]). In 2008, farm employment in the study area provided over 42,000 jobs or 5.1 percent of the study area total.

At the county level, Fresno County provided the greatest number of farm jobs (about 20,300, or 4.5 percent of total employment); however, on a proportional basis, farming in Merced and Madera counties was more important, accounting for 8.3 and 7.9 percent of the county job totals, respectively. Within parts of the Exchange Contractors' service area, the figures are substantially higher because of the agricultural concentration of those subregions. Indirectly, agriculture also provides numerous jobs in those industries that supply inputs to farming operations (e.g., farm machinery and fertilizers) and industries that are reliant on agricultural commodities (e.g., food processing plants); these economic linkages are discussed in greater detail below.

Table F-5 Employment by Industry in the Four-County Area (2008)

Industry/Sector[1]	Jobs (by County) [2]				Total [3]	Percent of Total
	Fresno	Merced	Madera	Stanislaus		
Farm/Agriculture	20,301	7,766	4,728	9,324	42,119	5.1%
Natural Resources and Mining	30,847	4,277	(D)	6,784	*<41,908>*	*<5.1%>*
Construction	24,484	4,171	3,151	13,272	45,078	5.4%
Manufacturing	28,861	9,832	3,627	22,928	65,248	7.9%
Wholesale and Retail Trade	60,770	10,092	6,083	34,157	*<111,102>*	*<13.4%>*
Transportation, Warehousing, and Utilities	16,858	(D)	1,783	(D)	*<18,641>*	*<2.3%>*
Finance and Insurance	18,991	2,576	1,218	7,339	30,124	3.6%
Services	178,507	30,990	19,339	92,300	*<321,136>*	*<38.8%>*
Government	70,412	17,335	11,739	29,269	128,755	15.6%
Federal Government	11,583	1,167	559	1,728	15,037	1.8%
State/Local Government	58,829	16,168	11,180	27,541	113,718	13.7%
Total	450,031	93,314	60,184	223,870	827,399	100.0%

[1] Industry/sectors based on a summary of NAICS industry classifications.

[2] (D) = Estimate not available to avoid disclosure of confidential information. Values included in county totals.

[3] Italicized numbers in brackets represent partial totals based on available data at the county level and exclude values that were not available due to disclosure issues (see Footnote 2). Missing data are included in the totals.

Source: Bureau of Economic Analysis 2010b

Unemployment

Local unemployment figures are a common indicator of social and economic well-being within a community. Information on the size of the labor force and average annual unemployment rates in the study area since 1990 is presented in Table F-6. Unemployment in the study area has fluctuated since 1990, falling from 12 percent in 1990 to 9.4 percent in 2000 and subsequently rising to 17.2 percent in 2010 (California Employment Development Department 2010a). These historical patterns in the study area hold across individual counties and the state; however,

[7] This figure could be higher based on undisclosed data at the county level – see Table 5.

regional unemployment has been substantially higher than statewide averages. For example, the unemployment rate in the study area in 2010 was 17.2 percent, but 12.4 percent statewide; such differences were even greater in previous periods (California Employment Development Department 2010b). In 2010, Merced County had the highest unemployment rate of the four counties at 18.9 percent, while unemployment was lowest in Madera County at 15.6 percent.

Table F-6 Unemployment in the Four-County Area (1990–2010) [1]

	1990		2000		2010	
County/Area	Labor Force	Unemp. Rate	Labor Force	Unemp. Rate	Labor Force	Unemp. Rate
Fresno	328,900	11.7%	388,300	10.4%	438,400	16.8%
Merced	76,900	12.9%	90,300	9.6%	107,300	18.9%
Madera	41,600	13.5%	54,900	8.7%	66,900	15.6%
Stanislaus	180,600	11.9%	207,800	7.8%	237,300	17.4%
Service Area (Total) [2]	628,000	12.0%	741,300	9.4%	849,900	17.2%

[1] Annual unemployment rates are based on nonseasonally adjusted monthly unemployment data.

[2] Unemployment rates represent an average for the study area counties, weighted by population.

Source: California Employment Development Department 2010a

F.2.2.2 Income

Total personal income[8] levels across the counties, which include the study area, between 1990 and 2008[9] are presented in Table F-7. Total personal income in the four-county study area in 2008 was $40.2 billion (Bureau of Economic Analysis 2010a). In real terms, total income in the study area counties increased by more than 14 percent between 1990 and 2008. The rate of income growth was positive in earlier years (1990 to 2000) and negative in recent years. Among the study area counties, Fresno had the highest personal income in 2008 ($20.7 billion) and Madera County had the lowest ($2.7 billion). After a nearly 28 percent gain in income between 1990 and 2000, the four-county study area experienced a decline in total personal income from 2000 to 2008. Stanislaus County had the greatest decline during that period, at -12.7 percent, followed by Fresno County at -10.4 percent. Among the 58 counties in California, personal income in Fresno County in 2005 was the 13th largest, Stanislaus was 21st, Merced was 30th, and Madera was 35th (California Department of Finance 2007c).

8 Personal income is defined as the income that is received by persons from participating in production, from both government and business transfer payments, and from government interest (which is treated like a transfer payment). It is calculated as the sum of wage and salary disbursements, other labor income, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend and interest income, and transfer payments to persons, less personal contributions for social insurance (Bureau of Economic Analysis 2011).

9 Similar to employment, historical trends in total income are presented at the county and study area level, while information on income by economic sector is presented for current (2008) conditions only.

Table F-7 Total Personal Income and Income Growth in the Four-County Area (1990–2008) [1,2]

County/Area	Income ($000)			Income Growth (%)	
	1990	2000	2008	1990–2000	2000–2008
Fresno	$18,339,987	$23,044,105	$20,651,377	25.6%	-10.4%
Merced	$4,439,105	$5,301,262	$4,943,734	19.4%	-6.7%
Madera	$2,159,672	$2,933,328	$2,725,002	35.8%	-7.1%
Stanislaus	$10,228,996	$13,646,991	$11,919,892	33.4%	-12.7%
Service Area (Total)	$35,167,760	$44,925,687	$40,240,005	27.7%	-10.4%

[1] Values in thousands ($1,000) of dollars.

[2] Values presented in the tables are in constant 2008 dollars (adjusted based on Consumer Price Index).

Source: Bureau of Economic Analysis 2010a

Table F-8 presents 2008 earnings by industry (a component of total personal income) in the study area. The measure of earnings by industry is more relevant than total personal income for evaluating the Proposed Program's potential impacts on the local economy because it focuses on wages/salaries of employees and proprietor's (or business) income. In addition, the measure of earnings by industry excludes factors such as transfer payments that are unlikely to be affected by the Program. Following patterns similar to employment, the Government sector had the highest level of earnings with over $8.0 billion, which accounted for over 21 percent of all earnings in the study area (Bureau of Economic Analysis 2010c). Other sectors with relatively high proportions of employment earnings in the study area included Health Care and Social Assistance (12.7 percent), Manufacturing (10.1 percent), and Retail Trade (7.5 percent). Farm-related earnings accounted for 6.0 percent of the study area total.

Table F-8 Earnings by Industry in the Four-County Area (2008)[1]

Industry/Sector [2]	Personal Income (by County) [3]				Total [4]	Percent of Total
	Fresno	Merced	Madera	Stanislaus		
Farm Earnings	$909,714	$600,374	$270,435	$458,581	$2,239,104	6.0%
Nonfarm Earnings	$19,404,549	$3,687,083	$2,362,761	$9,899,033	$35,353,426	94.0%
Forestry, fishing, and related activities	$831,453	$157,423	(D)	$243,591	*<$1,232,467>*	*<3.3%>*
Mining	$20,943	$354	(D)	$4,040	*<$25,337>*	*<0.1%>*
Utilities	$246,033	(D)	$19,494	(D)	*<$265,527>*	*<0.7%>*
Construction	$1,425,902	$257,027	$156,411	$709,957	$2,549,297	6.8%
Manufacturing	$1,657,239	$504,482	$195,465	$1,456,386	$3,813,572	10.1%
Wholesale trade	$954,116	(D)	$51,377	$404,165	*<$1,409,658>*	*<3.7%>*
Retail trade	$1,464,489	$313,154	$192,510	$862,871	$2,833,024	7.5%
Transportation and warehousing	$731,484	(D)	$70,865	(D)	*<$802,349>*	*<2.1%>*
Information	$367,907	$59,980	$39,102	$106,442	$573,431	1.5%
Finance and insurance	$860,962	$78,822	$39,284	$316,057	$1,295,125	3.4%

Industry/Sector [2]	Personal Income (by County) [3]				Total [4]	Percent of Total
	Fresno	Merced	Madera	Stanislaus		
Real estate and rental and leasing	$248,415	$47,986	$25,919	$152,785	$475,105	1.3%
Professional and technical services	$1,004,944	$93,495	(D)	$396,225	*<$1,494,664>*	*<4.0%>*
Management of companies/enterprises	$204,239	$52,553	(D)	$145,619	*<$402,411>*	*<1.1%>*
Administrative and waste services	$676,223	$73,871	$68,875	$331,605	$1,150,574	3.1%
Educational services	$144,766	$2,753	$5,567	$37,120	$190,206	0.5%
Health care and social assistance	$2,506,389	$398,641	$381,381	$1,470,821	$4,757,232	12.7%
Arts, entertainment, and recreation	$110,071	$19,092	$11,195	$46,713	$187,071	0.5%
Accommodation and food services	$531,545	$89,713	$56,149	$292,318	$969,725	2.6%
Other services, except public administration	$964,657	$192,703	$114,193	$481,546	$1,753,099	4.7%
Government	$4,452,772	$997,916	$679,707	$1,876,377	$8,006,772	21.3%
Federal	$857,973	$88,443	$35,570	$107,356	$1,089,342	2.9%
State	$695,795	$101,688	$204,727	$118,946	$1,121,156	3.0%
Local	$2,899,004	$807,785	$439,410	$1,650,075	$5,796,274	15.4%
Total	$20,314,263	$4,287,457	$2,633,196	$10,357,614	$37,592,530	100.0%

[1] Values in thousands ($1,000) of dollars.

[2] Industry/sectors based on NAICS industry classifications.

[3] (D) = Estimate not available to avoid disclosure of confidential information. Values included in county totals.

[4] Italicized numbers in brackets represent partial totals based on available data at the county level and exclude values that were not available due to disclosure issues (see Footnote 3). Missing data are included in the totals.

Source: Bureau of Economic Analysis 2010c

Income-Related Measures of Social Well-Being

As derivatives of total personal income, per-capita and median household income and poverty rates represent other economic indicators of social well-being. These three measures are discussed below.

In 2008, per-capita personal income in the four-county study area (on a weighted average basis) was $30,502. Across counties, per-capita income levels were $31,111 in Fresno County, $28,003 in Merced County, $26,880 in Madera County, and $31,673 in Stanislaus County (Bureau of Economic Analysis 2010a). Per-capita income for the state averaged $43,853 in 2008.

Based on 2010 American Community Survey data for the period 2005–2009, the weighted average median household income in the study area was $47,376 (2009 dollars), which is about 22 percent lower than the statewide figure of $60,392. Median household income by county was

highest in Stanislaus ($51,529), followed by Fresno ($46,230), Madera ($46,083), and Merced County ($43,848) (U.S. Census Bureau, American Community Survey 2010).

Poverty rates represent the percentage of an area's total population living at or below the poverty threshold established by the U.S. Census Bureau.[10] Based on 2010 American Community Survey data using average income data for the period 2005–2009, the weighted poverty rate in the study area was about 19.1 percent, which is higher than the statewide rate of 13.2 percent. The poverty rate in individual counties was highest in Merced (21.1 percent), followed by Fresno (20.9 percent), Madera (18.0 percent), and Stanislaus (15.1 percent).

F.2.3 Agricultural Production and Values

Agriculture is one of the primary economic sectors within the Exchange Contractors' service area and has been so for over a century. Agriculture is important in providing crops for final consumption in the local area and other national and international markets, supporting the local dairy and food processing industries, and for generating overall local economic activity. Existing agricultural production and values,[11] as well as the regional economic activity generated from agriculture, are presented below. Information is presented for the four-county area within which the Exchange Contractors' service area is located and the Exchange Contractors' service area itself.

F.2.3.1 Agriculture in the Four-County Area

Current cropping patterns and related agricultural production values in the four-county study area are presented in Table F-9. On average, nearly 4.7 million acres of land were in crop production in the four-county area over the years 2005–2009. The majority of crop production (52.3 percent) was in pasture/hay/forage. The individual shares of permanent crops (i.e., fruit, nuts, trees, and vines), other field crops, vegetables, alfalfa hay, and seed crops each ranged from 5.3 to 19.9 percent of total acreage. Melon crops accounted for less than 1 percent of the total. In terms of production value, however, pasture/hay/forage, which represented over half of the production acreage, only accounted for about 1.6 percent of production value. Permanent crops and vegetables had the highest values, at $4.4 billion and $1.6 billion, respectively (in 2011 dollars); together, these two crop groups accounted for nearly 82 percent of the total production value in the four-county area, which averaged almost $7.3 billion from 2005–2009. The average production value in the four-county area was $1,552 per acre.

[10] Poverty thresholds used by the U.S. Census Bureau vary and are based on a range of factors, including money income, size of family, and age of family members.

[11] Agricultural values represent the farmgate values of cultivated products, which is the net value of the product when it leaves the farm.

Table F-9 Average Crop Acreage and Value in the Four-County Area, 2005–2009*

Crop Group	Acres	Percent of Total Acres	Total Production Value	Percent of Total Value	Value per Acre
Alfalfa hay and seed	249,246	5.3%	$314,531,599	4.3%	$1,262
Cotton	184,690	3.9%	$288,203,811	4.0%	$1,560
Other field crops	445,689	9.5%	$347,248,693	4.8%	$779
Fruits, nuts, trees, vines	931,613	19.9%	$4,393,198,451	60.3%	$4,716
Melons	36,950	0.8%	$191,352,374	2.6%	$5,179
Vegetables	302,309	6.4%	$1,570,512,248	21.6%	$5,195
Grains	87,117	1.9%	$61,989,434	0.9%	$712
Pasture/hay/forage	2,453,924	52.3%	$115,789,840	1.6%	$47
Total [4]	4,691,537	100.0%	$7,282,826,451	100.0%	$1,552

Sources: National Agricultural Statistics Service 2006–2010 (for the period 2005-2009)

*Monetary values presented in 2011 dollars

F.2.3.2 Agriculture within the Exchange Contractors' Service Area

The primary crops grown within the Exchange Contractors' service area are cotton, melons, alfalfa hay, grains, vegetables, field crops, fruits and nuts (orchards), and grapes (vineyards). All crops are irrigated because of the limited rainfall characterizing the entire San Joaquin Valley. The service area is large, no single crop is dominant, and agricultural production is diversified. Within certain subareas, some crops are more common than others because of climate, water, and soil variations.

Over time, agriculture in the service area has evolved to intensively farmed crops and away from land-extensive livestock and grain production. Moreover, a comprehensive infrastructure of businesses has developed in support of production agriculture. These businesses include suppliers of inputs such as feed, seed, chemicals, irrigation equipment, and farm machinery; financial institutions; and transportation and shipping companies. They also include cotton gins, storage businesses, food processors, shippers, and other businesses that handle or use products after they leave farms. Each of these sectors purchases from and sells to many other businesses. Consequently, changes in agricultural production have widespread ripple effects throughout the regional economy; these effects are described in more detail below.

Within the service area, the total amount of land in agricultural crop production under existing conditions has averaged approximately 230,700 acres annual excluding fallowed land (Table F-10). [12] The largest acreage is in alfalfa hay and seed (nearly 28 percent), followed by grains, cotton, vegetables, and fruit, nuts, trees, and vines. The total annual value of crops grown in the Exchange Contractors' service area under current conditions (and based on average production values from 2005–2009) is estimated at $397.5 million, or $1,723 per acre. The acres and per-acre values of crops grown in the service area vary substantially. For example, fruits,

[12] The data represent average acreage for 2006–2010 to smooth out normal annual variations due to crop rotations and other influences.

nuts, trees, and vines account for 8.2 percent of acreage, but 21.8 percent of value. Similarly, vegetables account for 10.2 percent of land in production, but 18.9 percent of value. On the other hand, grains account for 23.5 percent of acreage, but only 11.4 percent of total value. The differences have important implications for the regional economic impacts of producing various crops, as discussed below.

Farms in the Exchange Contractors' service area are primarily family operations of typical size from 200-600 acres. They provide employment for many families and also for hired labor. Agriculture is the primary or only industrial sector present in parts of the service area.

The cropping patterns within the Exchange Contractors' service area differ importantly from the patterns for the total four-county area within which the service area is located. For example, fruit, nuts, trees, and vine crops account for 8.2 percent of acreage within the service area and 19.9 percent in the total four-county area. In addition, alfalfa hay and seed crops account for 27.6 percent of service area land and 5.3 percent of the four-county area. Cropping patterns for vegetables are more similar, accounting for 10.2 percent of service area land and 6.4 percent of the four-county area.

Cropping patterns in the Exchange Contractors' service area have changed over time. Some of the factors accounting for changes include crop prices and supplies, consumer demands, surface water availability, and the development of crop varieties suitable for different soil and climate conditions.

Table F-10 Average Cropping Patterns and Values in the Exchange Contractors' Service Area, 2006–2010[1,2,3,4]

Crop Group	Acres	Percent of Total Acres	Total Production Value	Percent of Total Value	Value per Acre
Alfalfa hay and seed	64,534	27.6%	$80,965,425	20.4%	$1,255
Cotton	44,715	19.1%	$70,965,236	17.9%	$1,587
Other field crops	10,586	4.5%	$10,427,655	2.6%	$985
Fruits, nuts, trees, vines	19,143	8.2%	$86,706,971	21.8%	$4,530
Melons	5,007	2.1%	$25,928,916	6.5%	$5,179
Vegetables	23,929	10.2%	$75,181,276	18.9%	$3,142
Grains	54,968	23.5%	$45,486,143	11.4%	$827
Pasture/hay/forage	7,828	3.3%	$1,814,880	0.5%	$232
Fallow	3,007	1.3%	$0	0.0%	$0
Total (with fallowed land)	233,717	100.0%	$397,476,502	100.0%	$1,701
Total (excluding fallowed land)	230,709	--	--	--	$1,723

Sources: Exchange Contractors 2011; National Agricultural Statistics Service 2006–2010

1 Monetary values presented in 2011 dollars

2 Based on average annual agricultural production between 2006 and 2010 in the service area.

3 Does not include value of crops in other areas to which water from fallowed land is applied.

4 Excludes acreage/value attributed to ponds/ducks

F.2.3.3 Regional Economic Benefits of Existing Agricultural Production

Changes in agricultural production set in motion a series of "ripple effects" throughout the local economy based on interindustry linkages, which collectively affect local output, employment, and income levels. These linkages are frequently quantified by the use of I-O models, which are discussed in Attachment A. Regional economic impacts of existing agricultural production in the four-county study area and the Exchange Contractors' service area are discussed below.

F.2.3.4 Regional Economic Benefits of Agriculture in the Four-County Area

As shown in Table F-11, the direct output (or farmgate value) of agricultural crop production in the four-county area averaged approximately $7.3 billion annually between 2005 and 2009 (reported in 2011 dollars). Based on interindustry linkages (indirect effects) and household spending patterns (induced effects), this level of production generated an additional $2.8 billion in output in the four-county regional economy for a total of nearly $10.1 billion per year. The direct labor income supported by existing agricultural production is an estimated $1.7 billion, and over $2.8 billion in total. The direct and total employment effects of existing agricultural production in the four-county area are approximately 40,200 and 72,200 jobs, respectively. As these numbers demonstrate, the agricultural industry represents a key economic driver in the study area.

Table F-11 Regional Economic Impacts – Existing Agricultural Production in the Four-County Study Area (2005–2009) [1,2,3]

Economic Measure	Type of Effect			Total Effect
	Direct	Indirect	Induced	
Output ($ Million)	$7,282.8	$1,420.3	$1,378.9	$10,082.1
Labor Income ($ Million)	$1,655.9	$719.3	$434.8	$2,810.0
Employment (Jobs)	40,154	21,033	11,000	72,187

[1] Values represent effects in the four-county study area (Fresno, Madera, Merced, and Stanislaus) based on IMPLAN modeling.

[2] Values reported in 2011 dollars.

[3] Existing agricultural production is calculated based on average annual values between 2005 and 2009.

Source: IMPLAN modeling conducted by Cardno ENTRIX

F.2.3.5 Regional Economic Benefits of Agriculture in the Exchange Contractors' Service Area

Farmers in the Exchange Contractors' service area purchase large amounts of seed, feed, fertilizer, chemicals, farm machinery, and other inputs for their operations. These inputs are produced both within and outside the four-county region. Farmers also utilize such specialized services as soil testing, planting, harvesting, and farm management. All of these factors of production and input services are attributable to and a reflection of the size and importance of the economy that has built up around agricultural production in the Exchange Contractors' service area. As a result, the regional economic effects attributable to crop production in the service area are substantial. Between 2006 and 2010, agricultural production within the service area, on average, generated $397.5 million and $546.5 million in direct and total output, $74.8 million and $131.7 million in direct and total labor income, and 2,073 and 3,620 direct and total jobs, respectively, in the four-county study area (see Table F-12).

Table F-12 Regional Economic Impacts – Existing Agricultural Production in the Exchange Contractors' Service Area [1,2,3]

Economic Measure	Type of Effect			Total Effect
	Direct	Indirect	Induced	
Output ($ Million)	$397.5	$84.1	$64.9	$546.5
Labor Income ($ Million)	$74.8	$36.5	$20.5	$131.7
Employment (Jobs)	2,073	1,030	517	3,620

[1] Values represent effects in the four-county study area (Fresno, Madera, Merced, and Stanislaus) based on IMPLAN modeling.

[2] Values reported in 2011 dollars.

[3] Existing agricultural production is calculated based on average annual conditions between 2006 and 2010.

Source: IMPLAN modeling conducted by Cardno ENTRIX

F.3 Socioeconomic Impact Analysis

This section describes the socioeconomic impacts of the Proposed Program implemented by the Exchange Contractors. It covers the estimated economic impacts under the existing Water Transfer Program (set to expire in 2014), the No Action Alternative, and four action alternatives that would extend the Program over the 25-year Program timeframe (2014–2038). The information presented in this report provides the basis to measure the relative economic impacts and benefits among the Program alternatives for the purposes of National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) compliance.

Proposed water transfers would involve both water made available via conservation actions[13] and land fallowing, and each would generate a range of direct economic impacts affecting local agricultural landowners and operations of the Exchange Contractors' districts. In the context of land fallowing, the actions incorporated in the alternatives would affect crop production, consumption, and investment decisions in agriculture and related industries. The Program would also affect farm-level income based on Program-related expenses and water transfer revenues. Water transfers accommodated by conservation activities would affect operating revenues at the individual district level based on transfer revenues and capital investment requirements.

The direct effects described above would have "ripple" effects throughout the regional economy based on changes in the final demand for the goods and services and economic linkages and interdependencies among industries. The changes in final demands are utilized to compute regional economic impacts, measured by indirect and induced changes in economic output (or production), labor income, and employment. Regional economic effects would be concentrated primarily in the agricultural production sector; however, other sectors would also be affected, including agriculture-support industries that provide inputs from goods and services to farms in the Exchange Contractors' service area. In addition, economic impacts would be realized by various water-related industries that support the implementation of conservation projects and ongoing district operations.

[13] Conserved water is made available from tailwater recapture, canal lining, improved irrigation practices, spill reductions, and reductions in percolation to saline sinks.

In this section, the direct and regional economic impacts of the various alternatives are presented. For each alternative, the direct economic impacts attributed to land fallowing are presented first. The analysis of land fallowing impacts considers two scenarios regarding the structure of agricultural water transfers: (1) landowner-to-landowner (as is the case currently) and (2) water transfer sales to outside parties. For each scenario, effects on agricultural production, water transfer revenues, and fallowing-related expenses are evaluated. Next, the economic impacts associated with conservation-related transfer revenues and capital investments are analyzed. Last, the regional economic impacts associated with each alternative are presented based on the results generated by a county-level economic model.

F.3.1 Methodology and Key Assumptions

The economic analysis covers a range of potential effects each with its own methodology and assumptions outlined below. More generally, the focus of the socioeconomic analysis is on potential effects within the Exchange Contractors' service area, which represents the source of transfer water, and the surrounding four-county area (for the regional economic analysis). The analysis does not cover socioeconomic impacts in the service areas of districts and agencies that would receive the transferred water (i.e., "receiving areas"). The receiving areas include refuges located in Merced, Fresno, Tulare, and Kern counties; SWP/CVP contractors in the Central Valley (i.e., Stanislaus, San Joaquin, Merced, Madera, Fresno, Tulare, Kern, and Kings counties); and SWP/CVP contractors in the East Bay and Central Coast (i.e., San Benito, Santa Clara, Contra Costa, Alameda, Monterey, and Santa Cruz counties). It is assumed that the economic impacts of water uses accommodated by proposed water transfers and/or exchanges are covered in the environmental compliance documents prepared for the respective long-term water contract renewals. At this point, it is not possible to predict which receiving areas would negotiate water transfers with the Exchange Contractors' districts over the Program timeframe, and they could include water agencies located within the four-county area being evaluated in this study. Because the effects in the receiving areas are not being evaluated here, the potential socioeconomic impacts of the Proposed Program may overstate or understate the overall regional economic effects in the four-county study area. For example, land fallowing in the Exchange Contractors' service area may be partially offset by agricultural production benefits associated with transferred water elsewhere in the four-county area.

In addition, the socioeconomic effects presented here represent average *annual* impacts that could occur over the 25-year Program timeframe (beginning in 2014) and are based on maximum volumes of water that could be developed for transfer and/or exchange (hereafter called just "transfer") under the Proposed Program. The actual volume of water that would be developed in any 1 year is unknown and may be significantly less than permitted volumes; therefore, the impact estimates in this report represent theoretical maximum values. Although the Program would extend over 25 years, for this analysis, no discounting of future benefits occurred and all monetary values are reported in constant 2011 dollars.

F.3.1.1 Agricultural Production – Land Fallowing

Estimates of changes in the value of agricultural production due to land fallowing are based on the volume of water to be transferred from fallowing, average water application rates per acre in the Exchange Contractors' service area, and representative crops and production values that

would be subject to fallowing. All of the action alternatives would develop and transfer up to 50,000 AF of water from land fallowing. For this analysis, it is assumed that the standard application rate for irrigation water is 2.5 AF per acre. Based on these figures, up to 20,000 acres could be fallowed under any of the action alternatives.

Agricultural land fallowing would likely occur on lower-value annual crops grown in the Exchange Contractors' service area. For this analysis, the top five annual crops (measured by average annual acreage between 2005 and 2009) were selected as proxy crops that would be fallowed under the Proposed Program. The five crops are:

- Alfalfa (64,195 acres)
- Corn (26,022 acres)
- Cotton (44,715 acres)
- Oats (15,755 acres)
- Tomatoes (20,012 acres)

Together, these five crops accounted for approximately 72 percent (170,700 acres) of total agricultural production in the service area (about 236,000 acres). It is further assumed that relative proportion of fallowing among these five crops would follow historical production patterns based on the acreages presented above.

The production (or farmgate) value of these five proxy crops is based on regional values presented in the county agricultural commissioner reports for Fresno, Madera, Merced, and Stanislaus counties over the period 2005 to 2009 (updated to 2011 dollars). Based on these data, the average production value for the various crops is as follows: alfalfa ($1,254/acre); corn ($1,018/acre); cotton ($1,587 acre); oats ($606/acre); and tomatoes ($2,964/acre). The weighted average production value across all crops is $1,446/acre.

F.3.1.2 Revenues from Conservation and Land Fallowing Water Transfers

The effective price of transferred water would be negotiated on a case-by-case basis with individual water districts. For this study, representative water prices are based on existing water transfer agreements administered by the Exchange Contractors under its existing Program (Exchange Contractors 2010). For transfers to agricultural and Reclamation for the wildlife refuges, the pricing structure varies based on the CVP agricultural service allocation percentage (as of June 15 of every year) and distinct price schedules for initial flex water (for the first 20,000 AF) and remaining flex water (greater than 20,000 AF). For M&I water transfers, the price is constant. A cost escalator is built into the price schedule to adjust prices over the duration of the contract to account for inflation. Because this analysis is based on real 2011 dollars, no price adjustments are necessary. Table F-13 shows the water price structure used in this analysis, which reflects the weighted price to both agricultural, refuge and M&I transferees, for existing conditions (88,000 AFY) and action alternatives (50,000-150,000 AFY).

Table F-13 Water Transfer Price Schedule (Blended Rates, $/AF)

AG Service Allocation on June 15th*	Existing Conditions	Alternative A	Alternative B	Alternative C	Alternative D
0	$329.56	$296.98	$329.56	$343.42	$347.29
5	$316.80	$287.07	$316.80	$329.44	$332.97
10	$304.05	$277.17	$304.05	$315.48	$318.68
15	$291.30	$267.26	$291.30	$301.51	$304.37
20	$278.54	$257.36	$278.54	$287.55	$290.06
25	$265.79	$247.46	$265.79	$273.59	$275.76
30	$253.04	$237.56	$253.04	$259.62	$261.46
35	$240.28	$227.65	$240.28	$245.65	$247.15
40	$227.53	$217.75	$227.53	$231.69	$232.85
45	$214.77	$207.84	$214.77	$217.72	$218.54
50	$202.02	$197.94	$202.02	$203.76	$202.24
55	$189.28	$188.05	$189.28	$189.80	$189.94
60	$176.51	$178.14	$176.51	$175.82	$175.63
65	$163.76	$168.24	$163.76	$161.86	$161.33
70	$151.01	$158.33	$151.01	$147.90	$147.03
75	$138.25	$148.43	$138.25	$133.93	$132.72
80+	$125.51	$138.53	$125.51	$119.97	$118.42

* Percent of total contract supply

As explained above, the pricing schedule is dependent on future agricultural service allocations of contract water supply. It is difficult to predict future allocations over the Program timeframe. However, publicly available data show frequency of CVP South-of-Delta agricultural allocations (California Department of Water Resources [DWR] 2010). Although focused on SWP operations, the DWR report had to include assumptions regarding CVP operations for the CVP. The key assumption in the DWR study is the interpretation of requirements for the 2009 Biological Opinion for Delta smelt, which significantly reduced reliability to the CVP and SWP; this assumption is subject to pending litigation.

This analysis uses the "frequency" (exceedance probability) across the range of CVP agricultural service allocations for South of Delta to estimate average water prices over the Program's timeframe (see Figure F-1). Using the 50 percent exceedance level, the data show that CVP agricultural allocations would be at approximately the 40 percent level. Note that these projections are sensitive to a range of assumptions, which are driving a low reliability for allocations. If water supply reliability improves because of a relaxation to the Biological Opinion requirements, reliability would improve and the estimated price ($/AF) for transferred water would likely decrease and revenues from transfers would fall.

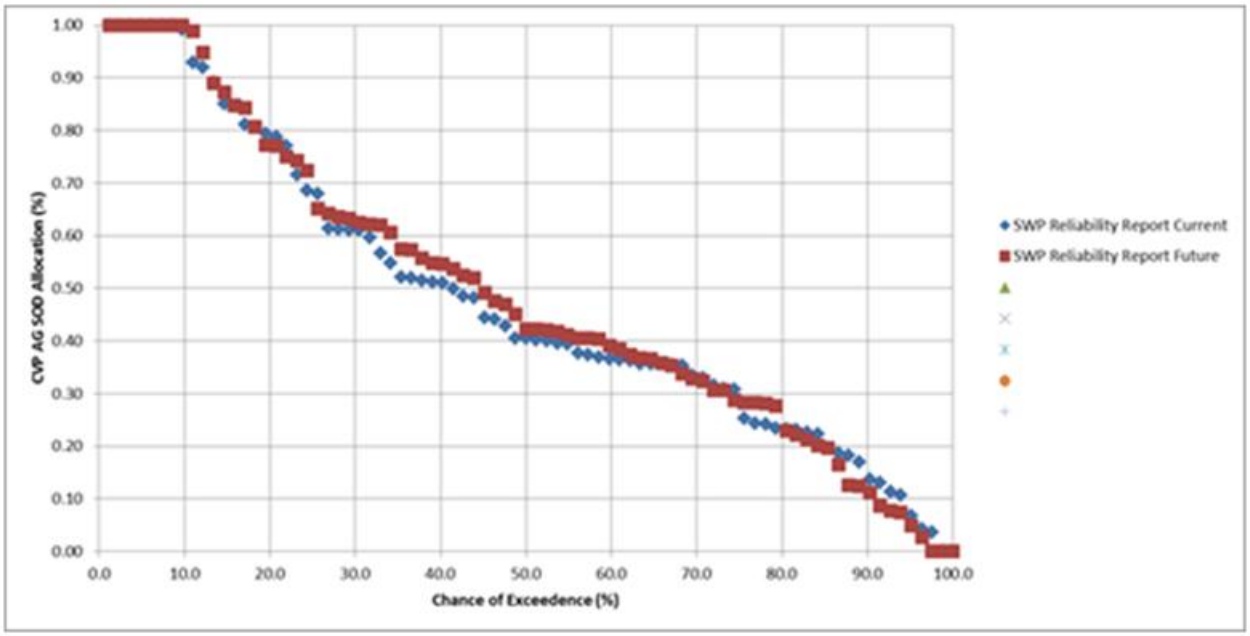

Figure F-1 Projected CVP Agricultural Water Service Allocations

Table F-14 presents the estimated water transfer prices based on the assumed 40 percent agricultural service allocation, historical proportion of agricultural/refuge transfers (97.3 percent of total transfer volume) and M&I transfers (2.7 percent), and transfer volumes permitted under each alternative. The blended water price across action alternatives ranges between $218/AF under Alternative A and $233/AF under Alternative D. These water transfer prices are used to calculate gross revenues realized by Exchange Contractors' districts when transferring conservation water.

Table F-14 Estimated Water Transfer Prices*

Alternative	Water Transfer Volume (AF)	Transfers to Agricultural and Refuge Users			M&I Price ($/AF)	Weighted Price ($/AF)
		Initial Flex Price ($/AF)	Remaining Flex Price ($/AF)	Blended Price ($/AF)		
Existing Conditions	88,000	$179.38	$237.61	$224.37	$339.43	$227.53
No Action	0	--	--	--	--	--
Alternative A	50,000	$179.38	$237.61	$214.31	$339.43	$217.75
Alternative B	88,000	$179.38	$237.61	$224.37	$339.43	$227.53
Alternative C	130,000	$179.38	$237.61	$228.65	$339.43	$231.69
Alternative D	150,000	$179.38	$237.61	$229.84	$339.43	$232.85

* Based on a projected 40 percent agricultural service allocation.

In addition, the economic impacts associated with losses in production value attributed to land fallowing may be offset in part by water transfer revenues realized by farmers participating in the Program. Under existing conditions, all water transfers from fallowing land are considered

"landowner-to landowner" transfers whereby an agricultural landowner in the Exchange Contractors' service area fallows land and transfers the water to himself/herself in another district. In this case, no sale of the water occurs and no money exchanges hands except for typical land fallowing expenses discussed below in Section 3.1.3. Landowner-to-landowner transfers would be covered by the Proposed Program and are administered through the individual Exchange Contractors' districts. Alternatively, the Proposed Program would also allow for water transfer "sales" where water derived from land fallowing could be transferred to interests in the receiving areas based on agreed sales price. Such sales would be administered by the Exchange Contractors and receiving area districts, although the net revenues (after fallowing expenses) would be passed through to the landowner fallowing his/her land. These types of transactions would bring new money into the region in the form of personal income at the farm level. The analysis presented here considers both of these scenarios.

It is anticipated that water transfers involving land fallowing would require higher prices to provide an incentive to landowners to participate in the Program. Therefore, for this analysis, it is assumed that prices for water derived by land fallowing would need to be at the high end of the price schedule outlined above (i.e., 0 percent CVP agricultural allocation). Using this approach, water prices for *land fallowing* transfers only would be $296.98/AF (Alternative A), $329.56/AF (Alternative B), $343.42 (Alternative C), and $347.29 (Alternative D). These water transfer prices are used to calculate gross revenues realized by agricultural landowners participating in the Water Transfer Program.

F.3.1.3 Land Fallowing Expenditures

Agricultural landowners that elect to fallow land under the Proposed Program are also subject to various costs that must be accounted for to estimate net revenues representing household income. Under the existing Program (landowner-to-landowner transfers), land fallowing costs generally include (1) payment for the water to the respective water district at the applicable water rate, (2) consultant costs to calculate the amount of water the fallowing generates, (3) fees to the Exchange Contractors for transporting/conveying the water, and (4) transportation/conveyance charges incurred by the receiving district. In addition, landowners typically undertake active land management activities on fallowed land, such as disking for noxious weed control, to ensure the continued viability of the land and minimize soil erosion. These costs are noted here, but they have not been quantified as part of this cost analysis.

Water rates vary across the Exchange Contractors' districts from about $6/AF to $20/AF. Using the standard allocation percentages across districts, the weighted average water rate across the entire Exchange Contractors' service area is estimated at $9.05/AF.

Cost estimates for the other categories are based on information provided directly by the Exchange Contactors (White, pers. comm., 2011). The cost for consultants to estimate water yields on fallowed land is estimated at $5,000 and assuming a 1,000-acre plot, the average cost is approximately $5/AF. Fees to the Exchange Contactors for transporting the water are about $10/AF. Conveyance charges in the receiving district fluctuate significantly from year to year depending on their base water allocation from Reclamation, e.g., if the allocation is low, then the charge is higher. The range in conveyance charges in receiving districts is $45/AF to $100/AF depending on which district the water is transferred to. For this analysis, the approximate mid-

point of this range is used, $70/AF, which was validated with discussions by Panoche Water District (Falaschi, pers. comm., 2011).

In addition, administrative costs associated with the Proposed Program would be covered by landowners participating in the Program. It is estimated that costs would be $3/AF to $5/AF to administer that Program. For this analysis, administrative costs are assumed to be $5/AF, which is incremental to the other costs outlined above.

In total, average fallowing costs are an estimated $99.05/AF. Of this total, $9.05/AF represents payments for the water being transferred and $90/AF accounts for all other incidental costs.

F.3.1.4 Investment in Conservation Projects

The yield from existing conservation activities implemented by the Exchange Contractors is about 80,000 acre-feet per year (AFY). Accordingly, only Alternative D would require additional investments in conservation projects to generate an additional 20,000 AFY to achieve the maximum 100,000 AFY from conservation water. Representative projects would include installation of drip irrigation and regulating reservoirs to more efficiently manage water deliveries. Based on cost estimates developed by Exchange Contractors' districts, it is estimated that the cost of conservation projects under consideration is about $905/AF. Accordingly, it would costs about $18.1 million to generate the incremental 20,000 AF required under Alternative D. Further, it is anticipated that capital investment in conservation projects would occur over an approximate 10-year period, resulting in average annual investment cost of $1.8 million.

F.3.1.5 Regional Economic Effects

The Proposed Program's regional economic effects are estimated based on an I-O model developed for the study area using IMPLAN software and data. For more information on I-O analysis and IMPLAN, refer to Attachment A.

For this study, a four-county IMPLAN model was developed for Fresno, Madera, Merced, and Stanislaus counties using the 2008 dataset. Each of the direct effects outlined above represents a driver of regional economic impacts evaluated with the IMPLAN model. For each type of impact, the inputs to the appropriate IMPLAN sectors were quantified and assumptions were developed regarding the extent of local expenditures as described below.

Regional economic impacts attributed to land fallowing are based on changes in production values, which represent direct impacts on economic output in the region. These values were input to the appropriate IMPLAN sector based on the types of crops that are likely to be fallowed: alfalfa and oats (Sector 10, *All other crop farming*); corn (Sector 2, *Grain farming*); cotton (Sector 8, *Cotton farming*); and tomatoes (Sector 3, *Vegetable and melon farming*). Because agricultural production impacts evaluated in IMPLAN include losses in proprietor's income (i.e., farm profits), the net revenues realized by farmers with water transfer sales were modeled separately as described below. In addition, because the production functions for agricultural sectors in IMPLAN account for inputs to production, including purchases of water supplies, a separate analysis was conducted to account for the regional impacts of water rate payments

because payments for water would not change with land fallowing; these effects were modeled using Sector 33, *Water, sewage, and other treatment and delivery systems*.

The regional impacts generated by water transfer revenues for land fallowing were also evaluated, which serve to offset part of the agricultural production losses; these benefits do not apply to landowner-to-landowner transfers. The net revenue (profit) from water transfers were calculated using the maximum transfer prices shown in Table F-13, accounting for all applicable land fallowing costs. It is unknown how these revenues would be used by farmers, although it is likely that they would reinvest a portion back into the farming enterprise and treat the remainder as ordinary income. Accordingly, net revenues from land fallowing water transfers were input equally between *Sector 203, Farm machinery and equipment manufacturing* (evaluated at the wholesale level) and a household income change using Sector 10006, *Households 50-75K*.

Expenditures associated with land fallowing transfers would also affect regional economic activity; these effects vary based on whether it is a landowner-to-landowner transfer or water transfer sale. In the case of landowner-to-landowner transfers, water transportation costs paid to the receiving districts represents money exported outside the region, resulting in reduced income levels for agricultural landowners in the Exchange Contractors' service area. These effects were evaluated as household income changes using Sector 10006, *Households 50-75K*. However, in the case of water transfer sales, these transportation payments are deducted from gross transfer revenues and retained by the receiving district. Because no exports from the region would occur, these expenditures are excluded from the analysis.

Treatment is also different for other types of land fallowing expenditures. In the case of landowner-to-landowner transfers, expenditures related to local water transportation costs to the Exchange Contractors, consultant costs, and administrative expenses simply represent a transfer from the agricultural landowner to other entities within the region. Although minor differences in multiplier effects may occur, it is assumed that the regional economic effects would be negligible and have not been modeled. In the case of water transfer sales, however, these expenses are covered by the gross revenue generated by the transfers, which represents new money coming into the region from the receiving districts and, therefore, would result in regional economic benefits. Transportation costs and administrative expenses paid to the Exchange Contractors were input into Sector 33, *Water, sewage, and other treatment and delivery systems*, while consultant costs were inputs to Sector 375, *Environmental and other technical consulting services*.

Similar to land fallowing transfers, conservation water transfers would generate new revenue that is paid from outside the region into the Exchange Contractors' service area. It is assumed that the Exchange Contractors would fully expend these revenues as part of district operations, payment for previously implemented conservation projects, and new capital investment for conservation projects (under Alternative D only). These effects were modeled using Sector 33, *Water, sewage, and other treatment and delivery systems.*

Only one action alternative, Alternative D, would require new capital investment in conservation projects because target conservation levels (100,000 AFY) exceed the capacity of existing conservation projects (80,000 AFY). In total, an estimated $18.1 million in new conservation projects would be spent over an approximate 10-year period, or $1.8 million annually. Because

this level of capital expenditure would be covered by conservation water transfer revenues described above, it is excluded from the regional analysis to avoid double-counting of benefits.

F.3.2 Economic Impacts under Existing Conditions and Alternatives

A comprehensive description of the Program alternatives is provided in Section 2 of this Draft EIS/EIR. This analysis based primarily on the volume of water that would be transferred under each alternative and the source of that water. Under the No Action Alternative, the Exchange Contractors would not transfer water generated by conservation or land fallowing activities beyond February 28, 2014. For the action alternatives, the volume of water that would be generated from conservation and/or land fallowing activities would vary:

- Under Alternative A, up to 50,000 AF would be generated annually by fallowing up to 20,000 acres of cropland in the Exchange Contractors' service area; no conservation water would be transferred.
- Under Alternative B, up to 80,000 AF would be generated annually from conservation activities and up to 50,000 AF would be from fallowing for a combined total of 88,000 AF annually; for this analysis, it is assumed that the 50,000 AF would come from land fallowing and 38,000 AF would come from conservation.
- Under Alternative C, up to 130,000 AF of water would be generated annually, up to 80,000 AF from conservation activities and up to 50,000 AF from fallowing.
- Under Alternative D, up to 100,000 AF would be generated annually from conservation activities and up to 50,000 AF would be generated from fallowing. Only Alternative D would require new capital investment in conservation projects to generate the additional 20,000 AF required to meet the maximum level of demand.

The economic effects associated with the existing Program, No Action, and action alternatives are presented separately below. A comparative summary of economic effects across Program alternatives, including existing conditions and No Action, is presented in Section F.3.3 (Table F-23a and Table F-23b).

F.3.2.1 Existing Conditions (2005–2014 Water Transfer Program)

The Proposed Program must be considered in the context of existing conditions, which includes an active Water Transfer Program that is set to expire in 2014. Under the existing Program, up to approximately 88,000 AF has been transferred annually between 2006 and 2010. Of this total, up to 49,600 AF has gone to wildlife refuges and up to 69,400 AF has been transferred to South-of-Delta CVP agricultural users and M&I users. The source of transferred water has primarily been from existing conservation projects (e.g., tailwater recovery, irrigation systems, facility lining, and pumping and conveyance improvements), which have generated up to 80,000 AF annually for water transfers over the last 5 years. Existing water yield from conservation projects is near capacity, estimated at 80,000 AF annually. Agricultural land fallowing has provided the remaining 8,000 AF available for water transfers.

Agricultural Production – Land Fallowing

Based on the transfer of approximately 8,000 AFY from land fallowing and the assumed value of 2.5 AF of irrigation water required per acre, it is estimated that on average about 3,200 acres of farmland have been fallowed annually under the existing Program. This represents about 1.9 percent of the principally affect crop acreage and 1.4 percent of all cropland in the Exchange Contractors' service area. Currently, land fallowing has been occurring primarily in drainage-impaired areas, including the Camp 13 area and portions of the Firebaugh Canal Water District. The value of reduced crop output associated with existing land fallowing is estimated at over $4.6 million per year, which is input into the regional economic model as a reduction in final demand for agriculture. A summary of land fallowing activity and agricultural production values under existing conditions and Program alternatives is presented in Table F-15.

Table F-15 Agricultural Land Fallowing and Gross Production Value [1]

Crop	Total Acres	Fallowed Acres [2]			Gross Production Value (per acre) [3]	Production Value Losses on Fallowed Land		
		Existing Cond.	No Action	Alts. A-D		Existing Cond.	No Action	Alts. A-D
Alfalfa	64,195	1,203	0	7,521	$1,254	-$1,508,628	$0	-$9,428,925
Corn	26,022	488	0	3,049	$1,018	-$496,489	$0	-$3,103,057
Cotton	44,715	838	0	5,239	$1,587	-$1,330,348	$0	-$8,314,673
Oats	15,755	295	0	1,846	$606	-$179,030	$0	-$1,118,938
Tomatoes	20,012	375	0	2,345	$2,964	-$1,112,030	$0	-$6,950,190
Total	170,699	3,200	0	20,000	$1,446	-$4,626,525	$0	-$28,915,783

[1] Monetary values reported in 2011 dollars.

[2] Assumes an irrigation application rate of 2.5 AF/acre.

[3] Based on agricultural commissioner reports for the four-county area as presented by the National Agricultural Statistics Service, California Field Office (2005–2009).

Sources: National Agricultural Statistics Service, California Field Office 2006–2010; Exchange Contractors 2011

Revenues from Land Fallowing Water Transfers

Under existing conditions, all water transfers involving agricultural land fallowing are landowner-to-landowner transfers, which do not involve exchange of money. Therefore, no revenues are generated by land fallowing water transfers under existing conditions. However, landowners that fallow land and transfer water under existing conditions are still responsible for other water transfer costs outlined in Section 3.2.1.3. Table F-16 summarizes land fallowing water transfer revenues under all Program alternatives.

Table F-16 Revenues from Land Fallowing Water Transfers (Water Transfer Sales Only) [1,2]

Alternative	Fallowed Acres	Transferred Water (AF) [3]	Water Transfer Price ($/AF)	Gross Revenue	Fallowing Expenses [4]	Net Revenue
Existing Conditions	3,200	8,000	N/A	N/A	$720,000	-$720,000
No Action	0	0	N/A	N/A	N/A	N/A
Alt. A	20,000	50,000	$297	$14,848,820	$4,500,000	$10,348,820
Alt. B	20,000	50,000	$330	$16,478,218	$4,500,000	$11,978,218
Alt. C	20,000	50,000	$343	$17,170,877	$4,500,000	$12,670,877
Alt. D	20,000	50,000	$347	$17,364,382	$4,500,000	$12,864,382

[1] Monetary values reported in 2011 dollars.

[2] Excludes foregone revenues on fallowed land.

[3] Transferred water quantities represent maximum allowed under each action alternative.

[4] Excludes costs associated with water rates as these costs are paid irrespective of land fallowing.

N/A = not applicable

Other Land Fallowing Expenditures

Table F-16 also summarizes ancillary costs associated with land fallowing water transfers. These costs include payments for water that is transferred (at the applicable water rate in each district); consultant costs to quantify water yields on fallowed land, water transportation costs to the Exchange Contractors and receiving districts, and Program administration costs. It is estimated that the average cost/fees incurred by landowners participating in the land fallowing program is about $99/AF, which includes payment for the water and covers the cost to have the applicable Exchange Contractors' district implement the water transfer. Under existing conditions, the costs associated with transferring 8,000 AF of irrigation water annually total approximately $720,000 (excluding water rate payments), which represents a reduction in net revenue realized at the farm level. The majority of these costs, approximately $560,000, is attributed to payments to receiving water districts to transport the water, which represents money leaving the local economy. The other costs are directly or indirectly paid to Exchange Contractors' districts and/or other local industries, thereby representing a transfer from one local entity to another with little effect on regional economic activity.

Revenues from Conservation Water Transfers

The Exchange Contractors earn revenues based on the transfer of conservation water as summarized in Table F-17. Under existing conditions, approximately 80,000 AF of conservation water is transferred from the Exchange Contractors' service area. Based on estimated average prices for transferred water, about $228/AF under existing conditions, the Exchange Contractors realize about $18.2 million in total revenues for water transfers. Theoretically, this money is used to fund ongoing district operations, including repayment of capital on previously implemented conservation projects. It is assumed that all of water transfer revenue is expended locally generating additional benefits in the regional economy.

Table F-17 Revenues from Conservation Water Transfers [1]

Alternative	Conserved Water Transfers (AF) [2]	Water Transfer Price ($/AF)	Total Revenue
Existing Conditions	80,000	$228	$18,202,796
No Action	0	N/A	$0
A	0	N/A	$0
B	38,000	$228	$8,646,328
C	80,000	$232	$18,535,442
D	100,000	$233	$23,285,465

[1] Values reported in 2011 dollars.

[2] Transferred water quantities represent maximum allowed under each alternative.

Investment in Conservation Projects

Within the Exchange Contractors' service area, existing conservation projects can yield up to about 80,000 AF of water for transfer, which is roughly equivalent to current demand (approximately 80,000 AF) under existing conditions.

Regional Economic Effects

The regional economic effects of the existing Program are based primarily on reductions in crop production associated with land fallowing, which are input into the I-O model as a reduction in final demand for the crops fallowed. The direct and total regional economic effects of the existing Program are presented in Table F-18. The direct economic effects attributed to land fallowing (i.e., reductions in crop production and water rate payments) include losses of almost $4.6 million in agricultural output, $753,000 in labor income, and 22 jobs. These direct effects generate total economic losses within the four-county economy of $6.2 million in output, $1.4 million in labor income, and 39 jobs. Under existing conditions, where all water transfers from land fallowing are landowner-to-landowner, no offsetting economic benefits are associated with water transfer revenues. In fact, additional economic impacts are associated with water transportation costs (paid to receiving water districts) that leave the region, resulting in reductions in household spending levels in the local economy. Specifically, payments of approximately $560,000 in transportation costs to receiving districts yields an addition decline of about $387,000 in total output, $122,000 in labor income, and three jobs. These adverse impacts on the regional economy would continue until the existing Water Transfer Program expires in 2014.

Conversely, the revenues generated by conservation water transfers generate substantial economic benefits in the four-county economy. It is estimated that the existing Program brings in approximately $18.2 million in new revenues that would be expended locally by the Exchange Contractors' districts. The $18.2 million in direct output generates total output of nearly $26.7 million as these expenditures ripple through the economy. Similarly, direct and total effects on labor income are $7.9 million and $10.9 million, respectively, and 124 direct jobs and 190 total jobs are supported by water transfer revenues.

In summary, the existing Program yields net economic benefits to the regional economy based on the magnitude of benefits (from transfer revenues) relative to impacts (from agricultural production losses). From a regional perspective, the total economic benefits generated in the four-county economy are $20.1 million in output value, $9.4 million in labor income, and about 148 total jobs annually.

Table F-18 Regional Economic Effects: Existing Conditions[1,2]

Parameter	Annual Output ($ Million)		Annual Labor Income ($ Million)		Employment (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture Landowner-to-Landowner Transfers						
▪ Land Fallowing: Agricultural Production	-$4.554	-$6.238	-$0.753	-$1.375	-22	-39
▪ Land Fallowing: Transfer Revenues	$0.000	$0.000	$0.000	$0.000	0	0
▪ Land Fallowing: Expenditures	$0.000	-$0.387	$0.000	-$0.122	0	-3
Agriculture Water Transfer Sales						
▪ Land Fallowing: Agricultural Production	N/A	N/A	N/A	N/A	N/A	N/A
▪ Land Fallowing: Transfer Revenues	N/A	N/A	N/A	N/A	N/A	N/A
▪ Land Fallowing: Expenditures	N/A	N/A	N/A	N/A	N/A	N/A
Conservation						
▪ Conservation: Water Transfer Revenues	$18.203	$26.695	$7.872	$10.865	124	190
Total						
▪ Program: Landowner-to-Landowner	$13.649	$20.070	$7.119	$9.369	102	148
▪ Program: Sales	N/A	N/A	N/A	N/A	N/A	N/A

[1] Values represent average annual effects within the regional four-county economy (reported in absolute terms).

[2] Monetary values reported in 2011 dollars.

Source: IMPLAN modeling conducted by Cardno ENTRIX

F.3.2.2 No Action / No Project Alternative

For the No Action Alternative, the economic impacts are based on termination of the existing Water Transfer Program and the associated physical changes to agricultural activity in the Exchange Contractors' service area. For purposes of the Draft EIS/EIR, these effects are compared relative to existing conditions (as presented in Section 8.1, Environmental Setting, and Section F.3.2.1 above).

Under No Action, no water transfers from the Exchange Contractors' service area to receiving areas would occur. Accordingly, no land fallowing would occur and no new conservation actions would be implemented to develop water to accommodate the demand for water transfers within current contract supplies. In addition, conservation water from existing projects and programs would not be used for water transfers, but instead would increase water supply reliability within the Exchange Contractors' service area. Generally, the economic costs and benefits described above for the existing Water Transfer Program would not be realized under No Action.

With no land fallowing under No Action, the cropland that has been historically fallowed would be placed back into production generating additional farmgate value relative to existing conditions. No change in income levels for agricultural households would occur because all land fallowing transfers to date have been landowner-to-landowner with no exchange of funds. In addition, agricultural operators would continue to make payments for water serving land that was historically fallowed, but returned to production, resulting in no net change. Under No Action, however, the other expenses incurred by farmers for land fallowing (i.e., consultant costs, transportation costs, and administrative costs) would no longer apply. In the context of regional economic activity, most of these costs represent transfer of money from local landowners to other local entities, including Exchange Contractors' districts; therefore, changes in regional economic activity would be negligible. The exception is the payment from local landowners to receiving areas to cover water transportation costs, which causes money to leave the local economy. Under No Action, these payments would cease, thereby generating an incremental increase in money that is retained in the local economy compared to existing conditions.

In addition, the Exchange Contractors' districts would not engage in transfer of conservation water, thereby resulting in a reduction in transfer revenues. As a result, member districts would have less money to fund ongoing operations and maintenance activities resulting in less localized spending and a decrease in regional economic benefits associated with such expenditures. Further, no additional capital investment in conservation projects would occur.

F.3.2.3 Alternative A

Under Alternative A, up to 50,000 AFY would be transferred from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges. All of the water would be derived from agricultural land fallowing. Anticipated economic impacts associated with Alternative A include the following:

- Agricultural production losses on lands that are fallowed
- Revenues paid to farmers for water transferred from fallowed land and related expenditures in the local economy (applies only to water transfer sales)
- Payments from farmers to Exchange Contractors' districts to cover costs associated with transferring water from land fallowing
- Payments from farmers to receiving area districts to cover costs associated with transporting water
- Regional economic effects in the four-county study area, including changes in output, labor income, and employment

Agricultural Production – Land Fallowing

It is estimated that up to approximately 20,000 acres of farmland would be fallowed under all of the action alternatives, including Alternative A, which represents about 8.5 percent of all cropland in the Exchange Contractors' service area. The annual crops that would be fallowed consist primarily of alfalfa, corn, cotton, oats, and tomatoes. The fallowed land would be rotated across the Exchange Contractors' service area such that the same land would not be fallowed consecutively for more than 3 years. The remaining cropland in the service area would remain in

agricultural production subject to typical crop rotations and cropping patterns. The value of reduced crop output associated with land fallowing is estimated at over $28.9 million per year, which would have ripple effects throughout the regional economy. These regional effects are offset slightly by continued payments for water from landowner to individual districts. A summary of land fallowing activity and agricultural production values under existing conditions and Program alternatives is presented in Table F-15.

Revenues from Land Fallowing Water Transfers (Sales Only)

Water transfers supported by land fallowing can occur as landowner-to-landowner transfers, where no transfer revenues would occur as part of the transaction, or as a sale of transferred water, which would provide direct revenues to agricultural landowners. For this analysis, it is assumed that farmers would fallow their land voluntarily if the price was sufficient to at least offset average net profits they receive for the crops grown on the land. More likely, a higher price would be required to provide an incentive to participate in the land fallowing program. This price is assumed to be set at the highest transfer price under existing contracts (corresponding to a 0 percent agricultural service allocation). Under Alternative A, this price is about $297/AF. Based on these values, gross revenues to farmers are estimated to be about $14.8 million annually over the Program's life (see Section F.3.2.1, Table F-16). Taking into account fallowing-related expenses of approximately $4.5 million per year, net revenues associated with land fallowing are an estimated $10.3 million annually (excluding water rate payments) and $9.9 million (including payments for water).

It is uncertain how farmers would utilize the net revenues they realize for fallowing; however, it is reasonable to assume that at least part of those funds would be reinvested in the farming enterprise. For the regional economic analysis, it is assumed the land fallowing revenues are divided equally between outlays for farm machinery and equipment (50 percent) and household consumption (50 percent).

Other Land Fallowing Expenditures

As described in Section 3.1.3, costs associated with land fallowing water transfers are common to all of the action alternatives. These costs are estimated at approximately $99/AF, which include about $90/AF for fallowing-related expenses and $9/AF for water rate payments, which are paid irrespective of land fallowing. Based on the maximum volume of water transfers from land fallowing under all action alternatives (50,000 AFY), fallowing-related expenses are an estimated $4.5 million annually. This amount represents a relative decrease in net revenue realized at the farm level compared to conditions without the Program.

These costs have varying effects on regional economic activity. Payments to receiving water districts for the transport of water, approximately $3.5 million annually, represent money leaving the local economy and would result in a reduction in economic activity. This reduction applies to both landowner-to-landowner transfers and water transfer sales. In the landowner-to-landowner scenario, the other fallowing costs represent transfer payments within the local economy with negligible regional economic impacts. However, in the case of water transfer sales, these costs are in effect paid by the receiving area districts as they are deducted by the Exchange Contractors prior to compensating landowners. As such, these costs represent new money coming into the region and would generate regional economic benefits in the four-county economy.

Revenues from Conservation Water Transfers

Alternative A has no conservation water transfers. As a result, the Exchange Contractors would not realize any revenues associated with conservation water and no additional benefits would occur in the regional economy.

Investment in Conservation Projects

Under Alternative A, all water transfers would be accommodated from agricultural land fallowing. Water yields from existing conservation projects would serve to augment water supply reliability in the Exchange Contractors' service area. No new capital investment in conservation projects would be required.

Regional Economic Effects

The direct and total economic effects in the Proposed Program's regional economy under Alternative A are presented in Table F-19. The direct economic effects attributed to land fallowing under Alternative A include losses of $28.5 million in economic output, $4.7 million in labor income, and 139 jobs. Considering the ripple effects of declining agricultural production in the four-county economy, the total impacts of land fallowing include a decline of $39.0 million in output, $8.6 million in labor income, and 244 jobs.

Under the scenario where land fallowing water transfers are landowner-to-landowner, no offsetting economic benefits are associated with water transfer revenues. However, regional economic benefits would occur in the case of water transfer sales where revenues would accrue to landowners. It is assumed that these revenues would be reinvested in farm machinery and would also augment household income and spending levels. The total economic benefits of land fallowing transfer revenues under Alternative A include $5.4 million in annual output, $1.6 million in annual labor income, and about 36 jobs.

Land fallowing costs also generate regional economic benefits and costs. Under the landowner-to-landowner transfer scenario, the net regional effects include annual losses of $2.4 million in output, $764,000 in labor income, and 19 jobs. These impacts are primarily due to the payments for water transportation costs that leave the region. However, in the case of water transfer sales, land fallowing expenditures generate regional economic benefits due to new money coming into the region from receiving areas. These benefits include an estimated increase of $1.4 million in total annual output, $559,000 in total annual labor income, and 10 jobs.

Unlike the existing Program or other action alternatives, no conservation water transfer revenues would be generated under Alternative A and no related effects on regional economic conditions would occur.

In summary, Alternative A would have an adverse effect on the regional economy due primarily to losses in agricultural production. Water transfer revenues help to offset some of these impacts, but the net effect is negative. In the four-county economy, the total economic impacts include annual losses of $41.4 million in output, $9.4 million in labor income, and 263 jobs in the case of landowner-to-landowner transfers. In the case of water transfer sales, the total effects in the four-county economy are annual losses of $32.1 million in output, $6.4 million in labor income, and 197 jobs.

Table F-19 Regional Economic Effects: Alternative A[1,2]

Parameter	Annual Output ($ Million)		Annual Labor Income ($ Million)		Employment (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture Landowner-to-Landowner Transfers						
▪ Land Fallowing: Agricultural Production	-$28.463	-$38.986	-$4.708	-$8.591	-139	-244
▪ Land Fallowing: Transfer Revenues	$0.000	$0.000	$0.000	$0.000	0	0
▪ Land Fallowing: Expenditures	$0.000	-$2.420	$0.000	-$0.764	0.0	-19
Agriculture Water Transfer Sales						
▪ Land Fallowing: Agricultural Production	-$28.463	-$38.986	-$4.708	-$8.591	-139	-244
▪ Land Fallowing: Transfer Revenues	$1.471	$5.444	$0.359	$1.619	5	36
▪ Land Fallowing: Expenditures	$0.940	$1.399	$0.399	$0.559	7	10
Conservation						
▪ Conservation: Water Transfer Revenues	$0.000	$0.000	$0.000	$0.000	0	0
Total						
▪ Program: Landowner-to-Landowner	-$28.463	-$41.406	-$4.708	-$9.355	-139	-263
▪ Program: Sales	-$26.052	-$32.143	-$3.950	-$6.412	-127	-197

[1] Values represent average annual effects within the regional four-county economy (reported in absolute terms).

[2] Monetary values reported in 2011 dollars.

Source: IMPLAN modeling conducted by Cardno ENTRIX

F.3.2.4 Alternative B

Up to 88,000 AFY would be transferred from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges under Alternative B. It is assumed that 50,000 AF would be derived from agricultural land fallowing and 38,000 AF would come from conservation activities. Anticipated economic impacts associated with Alternative B include the following:

- Agricultural production losses on lands that are fallowed
- Revenues paid to farmers for water transferred from fallowed land and related expenditures in the local economy (applies only to water transfer sales)
- Payments from farmers to Exchange Contractors' districts to cover costs associated with transferring water from land fallowing
- Payments from farmers to receiving area districts to cover costs associated with transporting water
- Revenues paid to the Exchange Contractors for the transfer of conservation water and related expenditures in the local economy to support ongoing district operations and repayment of capital investment costs for previous water conservation projects
- Regional economic effects in the four-county study area, including changes in output, labor income, and employment

Agricultural Production – Land Fallowing

Under all action alternatives, up to 20,000 acres could be fallowed resulting in a reduction in cropland and agricultural production values. The direct economic impacts under Alternative B would be the same as those described for Alternative A (see Section 3.2.3.1 and Table F-15 above).

Revenues from Land Fallowing Water Transfers (Sales Only)

In the case where water transfers involving land fallowing are sales rather than landowner-to-landowner transfers, agricultural landowners participating in the Program would earn revenues based on the volume and price of water transferred. Under Alternative B, the price of transfer water from land fallowing is assumed to be $330/AF, which would generate $16.5 million in gross revenue, $12.0 million in net revenue after deducting fallowing-related costs, and $11.5 million accounting for water rate payments (see Table F-16 above). For all alternatives, it is assumed that net revenues from fallowing would be split equally among reinvestment in farm machinery and equipment and household consumption.

Other Land Fallowing Expenditures

The economic impacts associated with land fallowing expenditures under Alternative B would be the same as those presented for Alternative A (see Section 3.2.3.3).

Revenues from Conserved Water Transfers

Revenues from conservation water transfers accrue directly to the Exchange Contractors. Under Alternative B, it is assumed that 38,000 AF of conservation water is transferred from the Exchange Contractors' service area annually at an average price of $228/AF. Based on these values, the Exchange Contractors would realize approximately $8.6 million in water transfer revenues (see Table F-17). This money would likely be used to fund ongoing district operations, including repayment of capital on previously implemented conservation projects, which would generate additional benefits in the regional economy.

Investment in Conservation Projects

Under Alternative B, it is assumed that conservation water would account for about 38,000 AF of the total transfer amount permitted under this alternative (88,000 AF). Water yields from existing conservation projects are sufficient to cover water conservation targets under this alternative; therefore, no new capital investment in conservation projects would be required.

Regional Economic Effects

The direct and total economic effects in the regional economy under Alternative B are presented in Table F-20. The regional economic effects associated with losses in agricultural production due to land fallowing are the same under all of the action alternatives and have been described under Alternative A (see Section 3.2.3.6).

No offsetting economic benefits are associated with landowner-to-landowner water transfers from land fallowing. However, regional economic benefits would occur in the case of water transfer sales where revenues would accrue to landowners, which differ among alternatives due

to differences in assumed water prices. The total economic benefits of land fallowing transfer revenues under Alternative B include $6.3 million in annual output, $1.9 million in annual labor income, and 42 jobs.

Land fallowing costs also generate regional economic benefits and costs. Under both the landowner-to-landowner and water sale transfer scenarios, the net regional effects associated with land fallowing expenditures are the same under all of the action alternatives and have been described under Alternative A (see Section 3.2.3.6)

Under Alternative B, the revenues generated by conservation water transfers generate economic benefits in the four-county economy due to local expenditures by the Exchange Contractors' districts. It is estimated that conservation water transfer revenues generate $12.7 million total annual output and $5.2 million in total labor income, and support 90 total jobs.

Alternative B would have a net adverse effect on the regional economy. In the four-county economy, the total economic impacts include annual losses of $28.7 million in output, $4.2 million in labor income, and 173 jobs considering landowner-to-landowner transfers only. In the case of water transfer sales, the total effects in the four-county economy include annual losses of $18.6 million in output, $984,000 in labor income, and 101 jobs.

Table F-20 Regional Economic Effects: Alternative B[1,2]

Parameter	Annual Output ($ Million)		Annual Labor Income ($ Million)		Employment (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture Landowner-to-Landowner Transfers						
▪ Land Fallowing: Agricultural Production	-$28.463	-$38.986	-$4.708	-$8.591	-139	-244
▪ Land Fallowing: Transfer Revenues	$0.000	$0.000	$0.000	$0.000	0	0
▪ Land Fallowing: Expenditures	$0.000	-$2.420	$0.000	-$0.764	0	-19
Agriculture Water Transfer Sales						
▪ Land Fallowing: Agricultural Production	-$28.463	-$38.986	-$4.708	-$8.591	-139	-244
▪ Land Fallowing: Transfer Revenues	$1.713	$6.340	$0.418	$1.886	6	42
▪ Land Fallowing: Expenditures	$0.940	$1.399	$0.399	$0.559	7	10
Conservation						
▪ Conservation: Water Transfer Revenues	$8.646	$12.680	$3.739	$5.161	59	90
TOTAL						
▪ Program: Landowner-to-Landowner	-$19.817	-$28.726	-$0.969	-$4.194	-80	-173
▪ Program: Sales	-$17.164	-$18.567	-$0.152	-$0.984	-67	-101

[1] Values represent average annual effects within the regional four-county economy (reported in absolute terms).

[2] Monetary values reported in 2011 dollars.

Source: IMPLAN modeling conducted by Cardno ENTRIX

F.3.2.5 Alternative C

Under Alternative C, a total of up to 130,000 AFY would be transferred from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges from a combination of land fallowing and conservation. Specifically, up to 50,000 AF and 80,000 AF would come from agricultural land fallowing and conservation activities, respectively. Anticipated economic impacts associated with Alternative C include the following:

- Agricultural production losses on lands that are fallowed
- Revenues paid to farmers for water transferred from fallowed land and related expenditures in the local economy (applies only to water transfer sales)
- Payments from farmers to Exchange Contractors' districts to cover costs associated with transferring water from land fallowing
- Payments from farmers to receiving area districts to cover costs associated with transporting water
- Revenues paid to the Exchange Contractors for the transfer of conservation water and related expenditures in the local economy to support ongoing district operations and repayment of capital investment costs for previous water conservation projects
- Regional economic effects in the four-county study area, including changes in output, labor income, and employment

Agricultural Production – Land Fallowing

Under all action alternatives, up to 20,000 acres could be fallowed resulting in a reduction in cropland and agricultural production values. The direct economic impacts under Alternative C would be the same as those described for Alternative A (see Section 3.2.3.1 and Table F-15 above).

Revenues from Land Fallowing Water Transfers (Sales Only)

In the case where water transfers involving land fallowing are sales rather than landowner-to-landowner transfers, agricultural landowners participating in the Program would earn revenues based on the volume and price of water transferred. Under Alternative C, the price of transfer water from land fallowing is assumed to be $343/AF, which would generate $17.2 million in gross revenue, $12.7 million in net revenue after deducting fallowing-related costs, and $12.2 million accounting for water rate payments (see Table F-16 above). For all alternatives, it is assumed that net revenues from fallowing would be split equally among reinvestment in farm machinery and equipment and household consumption.

Other Land Fallowing Expenditures

The economic impacts associated with land fallowing expenditures under Alternative C would be the same as those presented for Alternative A (see Section 3.2.3.3).

Revenues from Conserved Water Transfers

Alternative C calls for up to 80,000 AF of conservation water transfers. Assuming an average price of $232/AF, the Exchange Contractors would realize approximately $18.5 million in water transfer revenues (see Table F-17). This money would likely be used to fund ongoing district operations, including repayment of capital on previously implemented conservation projects, which would generate additional benefits in the regional economy.

Investment in Conservation Projects

Under Alternative C, approximately 80,000 AF of conservation water would be made available for transfer, which is equivalent to the water yield from existing conservation projects. No new capital investment in conservation projects would be required.

Regional Economic Effects

The direct and total economic effects in the regional economy under Alternative C are presented in Table F-21. The regional economic effects associated with losses in agricultural production due to land fallowing are the same under all of the action alternatives and have been described under Alternative A (see Section 3.2.3.6).

No offsetting economic benefits are associated with landowner-to-landowner water transfers from land fallowing. However, regional economic benefits would occur in the case of water transfer sales where revenues would accrue to landowners, which differ among alternatives due to differences in assumed water prices. The total economic benefits of land fallowing transfer revenues under Alternative C include $6.7 million in annual output, $2.0 million in annual labor income, and 45 jobs.

Land fallowing expenditures also generate regional economic benefits and costs. Under both the landowner-to-landowner and water sale transfer scenarios, the net regional effects associated with land fallowing expenditures are the same under all of the action alternatives and have been described under Alternative A (see Section 3.2.3.6)

Under Alternative C, the revenues generated by conservation water transfers generate economic benefits in the four-county economy due to local expenditures by the Exchange Contractors' districts. It is estimated that conservation water transfer revenues generate $27.2 million total annual output and $11.1 million in total labor income, and support 194 total jobs.

In the four-county economy, the total economic impacts under Alternative C, considering landowner-to-landowner transfers only, include annual losses of $14.2 million in output and 69 jobs; however, total labor income would increase by $1.7 million annually. In the case of water transfer sales, the total effects in the four-county economy include annual losses of $3.7 million in output, but an increase of $5.0 million in labor income and 5 jobs.

Table F-21. Regional Economic Effects: Alternative C[1,2]

Parameter	Annual Output ($ Million)		Annual Labor Income ($ Million)		Employment (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture Landowner-to-Landowner Transfers						
▪ Land Fallowing: Agricultural Production	-$28.463	-$38.986	-$4.708	-$8.591	-139	-244
▪ Land Fallowing: Transfer Revenues	$0.000	$0.000	$0.000	$0.000	0	0
▪ Land Fallowing: Expenditures	$0.000	-$2.420	$0.000	-$0.764	0	-19
Agriculture Water Transfer Sales						
▪ Land Fallowing: Agricultural Production	-$28.463	-$38.986	-$4.708	-$8.591	-139	-244
▪ Land Fallowing: Transfer Revenues	$1.816	$6.721	$0.443	$1.999	7	45
▪ Land Fallowing: Expenditures	$0.940	$1.399	$0.399	$0.559	7	10
Conservation						
▪ Conservation: Water Transfer Revenues	$18.535	$27.183	$8.016	$11.064	126	194
Total						
▪ Program: Landowner-to-Landowner	-$9.928	-$14.223	$3.308	$1.709	-13	-69
▪ Program: Sales	-$7.171	-$3.683	$4.150	$5.032	1	5

[1] Values represent average annual effects within the regional four-county economy (reported in absolute terms).

[2] Monetary values reported in 2011 dollars.

Source: IMPLAN modeling conducted by Cardno ENTRIX

F.3.2.6 Alternative D

Alternative D would provide up to 150,000 AFY for transfer from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges from a combination of land fallowing and conservation. Up to 50,000 AF would come from agricultural land fallowing. The remaining 100,000 AF would come from conservation activities, including new conservation projects that would yield an additional 20,000 AFY of conservation water to achieve conservation targets. Anticipated economic impacts associated with Alternative D include the following:

- Agricultural production losses on lands that are fallowed
- Revenues paid to farmers for water transferred from fallowed land and related expenditures in the local economy (applies only to water transfer sales)
- Payments from farmers to Exchange Contractors' districts to cover costs associated with transferring water from land fallowing
- Payments from farmers to receiving area districts to cover costs associated with transporting water
- Revenues paid to the Exchange Contractors for the transfer of conservation water and related expenditures in the local economy to support ongoing district operations and repayment of capital investment costs for previous water conservation projects

- Expenditures of funds received by the Exchange Contractors for conservation projects and infrastructure
- Regional economic effects in the four-county study area, including changes in output, labor income, and employment

Agricultural Production – Land Fallowing

Under all action alternatives, up to 20,000 acres could be fallowed resulting in a reduction in cropland and agricultural production values. The direct economic impacts under Alternative D would be the same as those described for Alternative A (see Section 3.2.3.1 and Table F-15 above).

Revenues from Land Fallowing Water Transfers (Sales Only)

In the case where water transfers involving land fallowing are sales rather than landowner-to-landowner transfers, agricultural landowners participating in the Program would earn revenues based on the volume and price of water transferred. Under Alternative D, the price of transfer water from land fallowing is assumed to be $347/AF, which would generate almost $17.4 million in gross revenue, $12.9 million in net revenue after deducting fallowing-related costs, and $12.4 million accounting for water rate payments (see Table F-16 above). For all alternatives, it is assumed that net revenues from fallowing would be split equally among reinvestment in farm machinery and equipment and household consumption.

Other Land Fallowing Expenditures

The economic impacts associated with land fallowing expenditures under Alternative D would be the same as those presented for Alternative A (see Section 3.2.3.3).

Revenues from Conserved Water Transfers

Under Alternative D, up to 100,000 AF of conservation water would be made available for transfer. The average price for water transfer is $233/AF under this alternative, which would generate approximately $23.3 million in water transfer revenues for the Exchange Contractors (see Table F-17). This money would likely be used to fund ongoing district operations, including repayment of capital on previously implemented conservation projects, which would generate additional benefits in the regional economy.

Investment in Conservation Projects

The conservation water target under Alternative D is 100,000 AFY, which exceeds the water yield from existing conservation projects by about 20,000 AF. As a result, the Exchange Contractors' districts would need to invest in new conservation projects to meet this target. As described in Section 3.1.4, the estimated total investment in new conservation projects is about $18.1 million, which would be expended over an approximate 10-year timeframe, or about $1.8 million per year. It is anticipated that revenues from conservation water transfers (about $23.3 million per year) would be sufficient to cover all capital investment requirements.

Regional Economic Effects

Table F-22 presents the direct and total economic effects in the regional economy under Alternative D. The regional economic effects associated with losses in agricultural production due to land fallowing are the same under all of the action alternatives and have been described under Alternative A (see Section 3.2.3.6).

No offsetting economic benefits are associated with landowner-to-landowner water transfers from land fallowing. However, regional economic benefits would occur in the case of water transfer sales where revenues would accrue to landowners, which differ among alternatives due to differences in assumed water prices. The total economic benefits of land fallowing transfer revenues under Alternative D include $6.8 million in annual output, $2.0 million in annual labor income, and 45 jobs.

Land fallowing costs also generate regional economic benefits and costs. Under both the landowner-to-landowner and water sale transfer scenarios, the net regional effects associated with land fallowing expenditures are the same under all of the action alternatives and have been described under Alternative A (see Section 3.2.3.6)

Under Alternative D, the revenues generated by conservation water transfers generate economic benefits in the four-county economy due to local expenditures by the Exchange Contractors' districts. It is estimated that conservation water transfer revenues generate $34.1 million total annual output and $13.9 million in total labor income, and support 243 total jobs.

Alternative D would have varying effects on the regional economy depending whether water transfers are landowner-to-landowner of sales. The total economic impacts include an annual loss of $7.3 million in total output and 20 jobs, but an increase in $6.6 million in labor income, considering landowner-to-landowner transfers only. In the case of water transfer sales, the total effects in the four-county economy include annual increases of $3.4 million in output, $7.9 million in labor income, and 55 jobs.

Table F-22 Regional Economic Effects: Alternative D[1,2]

Parameter	Annual Output ($ Million)		Annual Labor Income ($ Million)		Employment (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture Landowner-to-Landowner Transfers						
▪ Land Fallowing: Agricultural Production	-$28.463	-$38.986	-$4.708	-$8.591	-139	-244
▪ Land Fallowing: Transfer Revenues	$0.000	$0.000	$0.000	$0.000	0	0
▪ Land Fallowing: Expenditures	$0.000	-$2.420	$0.000	-$0.764	0	-19
Agriculture Water Transfer Sales						
▪ Land Fallowing: Agricultural Production	-$28.463	-$38.986	-$4.708	-$8.591	-139	-244
▪ Land Fallowing: Transfer Revenues	$1.845	$6.827	$0.450	$2.031	7	45
▪ Land Fallowing: Expenditures	$0.940	$1.399	$0.399	$0.559	7	10
Conservation						
▪ Conservation: Water Transfer Revenues	$23.285	$34.149	$10.070	$13.899	159	243

Parameter	Annual Output ($ Million)		Annual Labor Income ($ Million)		Employment (Jobs)	
Total						
▪ Program: Landowner-to-Landowner	-$5.178	-$7.257	$5.362	$4.545	20	-20
▪ Program: Sales	-$2.393	$3.390	$6.211	$7.899	33	55

[1] Values represent average annual effects within the regional four-county economy (reported in absolute terms).

[2] Monetary values reported in 2011 dollars.

Source: IMPLAN modeling conducted by Cardno ENTRIX

F.3.3 Summary of Regional Economic Effects

The tables below compare the regional economic impacts of the existing Water Transfer Program under existing conditions, the No Action Alternative, and the four action alternatives. Table F-23a considers landowner-to-landowner transfers only and Table F-23b covers water transfer sales associated with land fallowing.

Table F-23a Summary of Regional Economic Effects (Landowner-Landowner Transfers)[1,2]

Alternative	Annual Output ($ Million)		Annual Labor Income ($ Million)		Employment (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Existing Conditions	$13.649	$20.070	$7.119	$9.369	102	148
No Action Alternative	$0.000	$0.000	$0.000	$0.000	0	0
Alternative A	-$28.463	-$41.406	-$4.708	-$9.355	-139	-263
Alternative B	-$19.817	-$28.726	-$0.969	-$4.194	-80	-173
Alternative C	-$9.928	-$14.223	$3.308	$1.709	-13	-69
Alternative D	-$5.178	-$7.257	$5.362	$4.545	20	-20

[1] Values represent average annual effects within the regional four-county economy (reported in absolute terms).

[2] Monetary values reported in 2011 dollars.

Source: IMPLAN modeling conducted by Cardno ENTRIX

Table F-23b Summary of Regional Economic Effects (Water Transfer Sales)[1,2]

Alternative	Annual Output ($ Million)		Annual Labor Income ($ Million)		Employment (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Existing Conditions[3]	$13.649	$20.070	$7.119	$9.369	102	148
No Action Alternative	$0.000	$0.000	$0.000	$0.000	0	0
Alternative A	-$26.052	-$32.143	-$3.950	-$6.412	-127	-197
Alternative B	-$17.164	-$18.567	-$0.152	-$0.984	-67	-101
Alternative C	-$7.171	-$3.683	$4.150	$5.032	1	5
Alternative D	-$2.393	$3.390	$6.211	$7.899	33	55

[1] Values represent average annual effects within the regional four-county economy (reported in absolute terms).

[2] Monetary values reported in 2011 dollars.

[3] Existing conditions reflecting landowner-to-landowner fallowing water transfers.

Source: IMPLAN modeling conducted by Cardno ENTRIX

Generally, land fallowing and conservation water transfers have distinct effects on regional economy. Land fallowing generates adverse economic effects due to the lost production value on fallowed lands, which indirectly affects agriculture-support industries, farm labor, and other related sectors. These effects are mitigated to some extent in the case of water transfer sales, which brings money back into the regional economy in the form of income to agricultural landowners. These offsetting effects are highest under Alternative D, where transfer prices are assumed to be the highest. Conversely, conservation transfers bring new revenues into the regional economy and generate economic benefits to those industries and labor that support water district operations. In all alternatives, except Alternative D, investment in conservation projects is sufficient to meet the Program's conservation needs; therefore, no additional capital outlays are necessary. In Alternative D, new capital investment would be required, but would be funded through conservation transfer revenues.

The economic tradeoff between land fallowing and conservation water transfers is evident in the Program alternatives. The greatest adverse effects on the regional economy occur in Alternative A where all transfers would be from land fallowing. When conservation transfers are considered in the other alternatives, these adverse effects are offset partially. In fact, the Program is expected to result in net overall benefits on the regional economy in Alternatives C and D, as measured by income and employment levels (in the case of water transfer sales). In the case of landowner-to-landowner transfer, no alternatives generate regional economic benefits. With Alternatives C and D, conservation transfers are significantly greater than land fallowing transfers and are a primary driver of regional economic benefits. In all alternatives, the analysis conservatively assumed maximum land fallowing of 20,000 acres (50,000 AFY), for the purposes of NEPA/CEQA, so that the potential adverse economic impacts are not understated. In cases where land fallowing plays a smaller role in the water supply portfolio for transfers, the adverse economic effects would be minimized.

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Attachment A

Regional Impact Estimation and Input-Output Analysis

The socioeconomics technical report focuses on the Proposed Program's regional economic impacts. Regional economic analysis recognizes the distinctness of a geographical area in terms of its resources, industries, and tradeflows with other areas. In general, smaller regional economies are more dependent on trade with other regions for "imports" and "exports" of goods and services than are larger regions. Economic growth within a region is enhanced by the outputs of its export industries. In the four-county study area being evaluated for this Program, agriculture and sectors dependent on the agricultural industry export many of their products outside the region and are consequently important contributors to growth in the region.

Input-output (I-O) analysis provides the framework to measure the regional impacts of the No Action and action alternatives being considered for the Water Transfer Program. The I-O framework measures the flow of commodities and services among industries, institutions, and final consumers within an economy to be measured. I-O models capture all monetary market transactions related to the demands for goods and services, accounting for interindustry linkages and availability of regionally produced goods and services, i.e., the interdependence among economic sectors. For example, each sector not only produces its own goods and services, but also purchases goods and services for use as inputs to the production process. To the extent that these inputs to production are purchased locally, additional economic benefits are generated. Regional I-O analysis is based on a framework developed for the national economy and modified to reflect regional differences in production processes. A set of I-O accounts can be thought of as a snapshot of the economic structure of an area at one point in time.

The I-O model for this study was developed using IMPLAN software and data. IMPLAN is a widely used and accepted regional economic modeling system that can measure the effect of projects or policies on local economic conditions. It was originally developed by the U.S. Department of Agriculture, Forest Service in the late 1970s to assist in land and resource management planning, but its role has expanded to serve clients in Federal, state, and local governments, universities, and the private sector. IMPLAN data are developed annually, using information collected at the national, state, and county levels for a wide variety of measures. National technical relationships among industries form the basis for the model, but can be adjusted to account for unique regional conditions when local information is available. For agricultural applications, an IMPLAN model can be modified easily to incorporate local production practices.

IMPLAN was used to develop a model of the four-county economy within which the Exchange Contractors' service area is located – Fresno, Madera, Merced, and Stanislaus counties. The model was developed for the four-county area because of the extensive interindustry linkages among these counties. For example, farmers in Fresno and Merced counties purchase inputs, such as machinery, chemicals, and seed from suppliers throughout the four-county region. Further, farm laborers working on farms in one county often reside in neighboring counties, and agricultural products are commonly shipped, brokered, and processed in all four counties. The regional economic model was developed using the 2008 IMPLAN dataset.

The primary inputs to the IMPLAN model are based on the Proposed Program's direct effects described in Section 3.0 (Socioeconomic Impact Analysis) of this report. The Program's direct effects are translated into changes in "final demand," which is defined as the dollar change in purchases of products or services for final use. Changes in final demand changes drive I-O

models. Industries respond to meet demands directly or indirectly (by supplying goods and services to industries responding directly to final demand changes). Under the Water Transfer Program, direct effects include anticipated impacts at both the farm- and district-level based on the source(s) of substitute water (i.e., land fallowing vs. conservation); revenues for water transferred to other CVP/SWP contractors, and Exchange Contractors' outlays for conservation activities. For water transfers derived from land fallowing, regional economic impacts result from changes agricultural production and related demand for inputs from agriculture-support industries.

IMPLAN estimates the total economic impacts within an economy based on several key economic metrics. The primary output variables are predicted changes in economic output[1] (or production), labor income, and employment for the affected industries within the study area. Total economic effects for any given parameter represent the sum of direct,[2] indirect,[3] and induced[4] impacts. The measurement of total economic effects is based on the concept of a multiplier, which results in "ripple" effects within the regional economy. A multiplier is a single number that quantifies the total regional economic effects, which arise from direct changes in economic activity. Different multipliers are generated by an I-O model and each is associated with a specific industry. For example, an output multiplier of 2.5 for vegetable production indicates that a $100,000 decline in output from this industry (due to crop yield declines and/or land idling) would lead to an overall output decline of $250,000 in the regional economy, including the initial $100,000 loss to the farm production sector. An employment multiplier of 2.0 for vegetable production indicates that a loss of 100 jobs in this sector would lead to an additional loss of 100 jobs in other industries for a total loss of 200 jobs throughout the regional economy.

1 Economic output refers to the value of goods and services produced in a region.

2 Direct effects represent the impacts for the expenditures and/or production values specified as direct final demand changes.

3 Indirect economic effects refer to changes in output, income, and employment resulting from the iterations of industries purchasing from other industries caused by the direct economic effects.

4 Induced economic effects refer to changes in output, income, and employment caused by the expenditures associated with new household income generated by direct and indirect economic effects.

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