Appendix Q Regional Economics Technical Appendix

This appendix documents the regional economics technical analysis to support the impact analysis in the Environmental Impact Statement (EIS).

Q.1 Background Information

This section presents regional economic conditions and economic information relevant to the specific industries in which potential economic effects could occur, such as municipal and industrial (M&I) water uses, agriculture, and fishing.

Q.1.1 Regional Economics

Q.1.1.1 *Trinity River Region*

The Trinity River Region includes Trinity, Humboldt, and Del Norte Counties.

Q.1.1.1.1 Employment, Labor Income, and Output

Table Q.1-1, Summary of 2017 Regional Economy in Trinity River Region, presents employment, labor income, and output by industry for the combined regional economies of the Trinity River Region in 2017. This data is compiled using Impact Planning and Analysis (IMPLAN) data files from a variety of sources, including, but not limited to, the United States Bureau of Economic Analysis, the United States Bureau of Labor, and the United States (U.S.) Census Bureau. This section presents IMPLAN data and results for economic output, employment, and labor income. Output is the dollar value of industry production. Employment is measured as the number of jobs. Labor income is the dollar value of total payroll (including benefits) for each industry plus income received by self-employed individuals.

In 2017, services provided the most jobs (40,955 jobs) in the region, followed by government (18,557 jobs) and trade (11,975 jobs). Services also had the highest output ($4,905 million) of all industries in the region, followed by government ($1,905 million) and trade ($1,346 million). Services and government were the top industries in terms of labor income in 2017.

Table Q.1-1. Summary of 2017 Regional Economy in Trinity River Region

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	3,144	$477	$72
Mining	237	$34	$4
Construction	5,413	$993	$125
Manufacturing	3,746	$1,163	$144
Transportation, Information, Power, and Utilities (TIPU)	5,367	$992	$116
Trade	11,975	$1,346	$378

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Service	40,955	$4,905	$1,154
Government	18,557	$1,905	$1,348
Total	**89,393**	**$11,817**	**$3,340**

Source: IMPLAN 2018.
All costs in 2017 dollars
Employment is measured in number of jobs.
Income is the dollar value of total payroll for each industry includes employee compensation and proprietor income.
Output represents the dollar value of industry production.
TIPU = Transportation, Information, Power, and Utilities

Table Q.1-2, Summary of 2017 Unemployment Statistics in Trinity River Region Counties, presents the civilian labor force unemployment and the unemployment rate for counties in the Trinity River Region.

Table Q.1-2. Summary of 2017 Unemployment Statistics in Trinity River Region Counties

Area	Civilian Labor Force Unemployment in 2007	Civilian Labor Force Unemployment in 2017	Unemployment Rate in 2007	Unemployment Rate in 2017
Trinity County	525	301	10.4%	6%
Humboldt County	3,507	2,639	5.9%	4.2%
Del Norte County	830	629	7.5%	6.4%
Trinity River Region[1]	4,862	3,569	6.5%	4.6%
STATE OF CALIFORNIA	961,496	918,883	5.4%	5%

Source: Bureau of Labor Statistics (BLS) 2018.
[1] Calculated sum of unemployed labor force in Trinity River Region counties

Q.1.1.1.2 Household Income

Table Q.1-3, 2013–2017 Trinity River Region Household and Per Capita Income, presents median and mean household income and per capita income in Trinity River Region counties relative to California. Median, mean, and per capita income for all three Trinity River Region counties is lower than the state average.

Table Q.1-3. 2013–2017 Trinity River Region Household and Per Capita Income

Area	Median Household Income	Mean Household Income	Per Capita Income
Trinity County	$36,563	$52,189	$23,575
Humboldt County	$43,718	$60,394	$25,208
Del Norte County	$41,287	$55,899	$20,809
Trinity River Region[1]	**$40,523**	**$56,161**	**$23,197**
STATE OF CALIFORNIA	**$67,169**	**$96,104**	**$33,128**

Source: U.S. Census Bureau 2017.
All costs in 2017 dollars.
[1] Calculated average of median, mean, and per capital income for Trinity River Region counties

Q.1.1.2 *Sacramento Valley Region*

The Sacramento Valley Region includes Butte, Colusa, El Dorado, Glenn, Nevada, Placer, Plumas, Shasta, Sutter, Tehama, and Yuba Counties. Sacramento, Solano, and Yolo Counties are discussed under the Delta Region.

Q.1.1.2.1 Employment, Labor Income, and Output

Table Q.1-4, Summary of 2017 Regional Economy in Sacramento Valley Region, presents employment, labor income, and output by industry for the combined regional economies of the Sacramento Valley Region in 2017.

In 2017, services provided the most jobs (377,349) in the area, followed by trade (97,314) and government (93,104). Services also had the highest output ($50,883 million) of all industries in the region, followed by trade ($11,758 million) and manufacturing ($11,334 million). Services and government were the top industries in terms of labor income in 2017.

Table Q.1-4. Summary of 2017 Regional Economy in Sacramento Valley Region

Industry	Employment (jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	36,284	$3,944	$810
Mining	2,815	$454	$56
Construction	51,303	$9,438	$2,069
Manufacturing	29,605	$11,334	$1,740
TIPU	26,181	$7,612	$1,518
Trade	97,314	$11,758	$3,373
Service	377,349	$50,883	$14,157
Government	93,104	$11,153	$7,773
Total	**713,955**	**$106,574**	**$31,495**

Source: IMPLAN 2018.
All costs in 2017 dollars
Employment is measured in number of jobs.
Income is the dollar value of total payroll for each industry includes employee compensation and proprietor income.
Output represents the dollar value of industry production.
TIPU = Transportation, Information, Power, and Utilities

Table Q.1-5, Summary of 2017 Unemployment Statistics in Sacramento Valley Counties, presents the civilian labor force unemployment and the unemployment rate for the counties in the Sacramento Valley.

Table Q.1-5. Summary of 2017 Unemployment Statistics in Sacramento Valley Counties

County	Civilian Labor Force Unemployment in 2007	Civilian Labor Force Unemployment in 2017	Unemployment Rate in 2007	Unemployment Rate in 2017
Butte County	6,739	5,916	6.7%	5.7%
Colusa County	1,202	1,543	11.8%	14.3%
El Dorado County	4,675	3,920	5.2%	4.4%
Glenn County	1,054	963	8.8%	7.5%
Nevada County	2,406	1,998	4.8%	4.1%

County	Civilian Labor Force Unemployment in 2007	Civilian Labor Force Unemployment in 2017	Unemployment Rate in 2007	Unemployment Rate in 2017
Placer County	8,231	7,004	4.8%	3.8%
Plumas County	849	692	8.5%	8.9%
Shasta County	6,190	4,321	7.5%	5.8%
Sutter County	3,965	3,935	9.7%	8.6%
Tehama County	1,798	1,630	7.2%	6.4%
Yuba County	2,532	2,125	9.3%	7.4%
Sacramento Valley[1]	**39,641**	**34,047**	**6.4%**	**5.4%**
STATE OF CALIFORNIA	**961,496**	**918,883**	**5.4%**	**5%**

Source: BLS 2018.
[1] Calculated sum of unemployed labor force in Sacramento Valley Region counties

Q.1.1.2.2 Household Income

Table Q.1-6, 2013–2017 Sacramento Valley Region Household and Per Capita Income, presents household income and per capita income in Sacramento Valley counties relative to California. All counties except Placer and El Dorado Counties within the Sacramento Valley Region have lower median household, mean household, and per capita incomes than the state average.

Table Q.1-6. 2013–2017 Sacramento Valley Region Household and Per Capita Income

County	Median Household Income	Mean Household Income	Per Capita Income
Butte County	$46,516	$66,251	$26,304
Colusa County	$56,481	$75,868	$25,676
El Dorado County	$74,885	$99,817	$38,156
Glenn County	$46,260	$58,822	$21,029
Nevada County	$60,610	$83,616	$35,581
Placer County	$80,488	$104,490	$39,734
Plumas County	$50,266	$68,728	$32,056
Shasta County	$47,258	$65,004	$26,455
Sutter County	$54,347	$72,302	$24,849
Tehama County	$42,512	$58,732	$22,631
Yuba County	$51,776	$64,398	$22,814
Sacramento Valley[1]	**$55,582**	**$74,366**	**$28,662**
STATE OF CALIFORNIA	**$67,169**	**$96,104**	**$33,128**

Source: U.S. Census Bureau 2017.
All costs in 2017 dollars.
[1] Calculated average median, mean and per capital income for all Sacramento Valley Region counties

Q.1.1.3 *San Joaquin Valley Region*

The San Joaquin Valley Region includes Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern Counties. San Joaquin County is discussed under the Delta Region. Changes in Central Valley Project (CVP) and State Water Project (SWP) operations are not anticipated to affect Calaveras, Mariposa, and Tuolumne Counties and are not discussed in this section.

Q.1.1.3.1 Employment, Labor Income, and Output

Table Q.1-7, Summary of 2017 Regional Economy in San Joaquin Valley Region (in 2017 Dollars), presents employment, labor income, and output by industry for the combined regional economies of the San Joaquin Valley Region in 2017. In 2017, services provided the most jobs (643,256) in the region, followed by government (253,031) and agriculture (234,825). Services also had the highest output ($83,096 million) of all industries in the region, followed by manufacturing ($52,204 million) and government ($28,917 million). Services and government were the top industries in terms of labor income in 2017.

Table Q.1-7. Summary of 2017 Regional Economy in San Joaquin Valley Region (in 2017 Dollars)

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	234,825	$28,019	$7,481
Mining	15,042	$4,195	$1,386
Construction	72,389	$12,382	$3,047
Manufacturing	100,094	$52,204	$6,223
TIPU	74,550	$16,231	$4,045
Trade	199,383	$24,962	$7,131
Service	643,256	$83,096	$23,292
Government	253,031	$28,917	$21,738
Total	**1,592,569**	**$250,006**	**$74,341**

Source: IMPLAN 2018.
All costs in 2017 dollars.
Employment is measured in number of jobs.
Income is the dollar value of total payroll for each industry includes employee compensation and proprietor income.
Output represents the dollar value of industry production.
TIPU = Transportation, Information, Power, and Utilities

Table Q.1-8, Summary of 2017 Unemployment Statistics in San Joaquin Valley Counties, presents the civilian labor force unemployment and the unemployment rate for counties in the San Joaquin Valley.

Table Q.1-8. Summary of 2017 Unemployment Statistics in San Joaquin Valley Counties

County	Civilian Labor Force Unemployment in 2007	Civilian Labor Force Unemployment in 2017	Unemployment Rate in 2007	Unemployment Rate in 2017
Stanislaus County	19,687	18,165	8.7%	7.5%
Madera County	4,745	4,949	7.5%	8.1%
Merced County	10,046	10,801	10.1%	9.3%
Fresno County	35,790	38,070	8.6%	8.5%
Tulare County	17,713	21,401	9.2%	10.4%
Kings County	4,974	5,119	8.7%	8.9%
Kern County	28,228	35,442	8.2%	9.2%
San Joaquin Valley[1]	**121,183**	**133,947**	**8.6%**	**8.8%**
STATE OF CALIFORNIA	**961,496**	**918,883**	**5.4%**	**5%**

Source: BLS 2018.
[1] Calculated average median, mean, and per capital income for all San Joaquin Valley Region counties

Q.1.1.3.2 Household Income

Table Q.1-9, San Joaquin Valley Region Household and Per Capita Income, presents household income and per capita income in San Joaquin Valley Region counties relative to California. All counties in the San Joaquin Valley Region have median household, mean household, and per capita incomes lower than the state average.

Table Q.1-9. San Joaquin Valley Region Household and Per Capita Income

County	Median Household Income	Mean Household Income	Per Capita Income
Stanislaus County	$54,260	$72,388	$24,007
Madera County	$48,210	$65,121	$19,975
Merced County	$46,338	$64,445	$20,120
Fresno County	$48,730	$68,620	$22,234
Tulare County	$44,871	$62,325	$18,962
Kings County	$49,742	$66,431	$19,835
Kern County	$50,826	$69,236	$21,716
San Joaquin Valley[1]	**$48,997**	**$66,938**	**$20,978**
STATE OF CALIFORNIA	**$67,169**	**$96,104**	**$33,128**

Source: U.S. Census Bureau 2017.
All costs in 2017 dollars.
[1] Calculated average median, mean and per capital income for all San Joaquin Valley Region counties

Q.1.1.4 *Delta Region*

The Delta Region in this analysis includes Sacramento, Yolo, Solano, San Joaquin, and Contra Costa Counties.

Q.1.1.4.1 Employment, Labor Income, and Output

Table Q.1-10, Summary of 2017 Regional Economy in Delta Region, presents employment, labor income, and output by industry for the combined regional economies of the Delta Region in 2017.

In 2017, services provided the most jobs (1,106,322) in the area, followed by government (333,027) and trade (255,098). Services also had the highest output ($165,711 million) of all industries in the region, followed by manufacturing ($71,321 million) and government ($44,627 million). Services and government were the top industries in terms of labor income in 2017.

Table Q.1-10. Summary of 2017 Regional Economy in Delta Region

Industry	Employment (jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	37,685	$4,610	$1,166
Mining	3,113	$528	$95
Construction	119,520	$22,905	$6,429
Manufacturing	80,411	$71,321	$7,375
TIPU	140,061	$36,173	$7,888
Trade	255,098	$33,886	$10,717

Industry	Employment (jobs)	Output (million dollars)	Labor Income (million dollars)
Service	1,106,322	$165,711	$51,459
Government	333,027	$44,627	$35,591
Total	**2,075,237**	**$379,760**	**$120,720**

Source: IMPLAN 2018.
All costs in 2017 dollars.
Employment is measured in number of jobs.
Income is the dollar value of total payroll for each industry includes employee compensation and proprietor income.
Output represents the dollar value of industry production.
TIPU = Transportation, Information, Power, and Utilities

Table Q.1-11, Summary of 2017 Unemployment Statistics in Delta Region Counties, presents the civilian labor force unemployment and the unemployment rate for counties in the Delta Region.

Table Q.1-11. Summary of 2017 Unemployment Statistics in Delta Region Counties

Area	Civilian Labor Force Unemployment in 2007	Civilian Labor Force Unemployment in 2017	Unemployment Rate in 2007	Unemployment Rate in 2017
Contra Costa County	24,097	21,418	4.7%	3.8%
Sacramento County	36,725	32,580	5.4%	4.6%
San Joaquin County	23,359	22,612	8.1%	7%
Solano County	10,982	9,942	5.3%	4.8%
Yolo County	5,590	5,402	5.7%	5%
Delta Region [1]	**100,753**	**91,954**	**5.6%**	**4.8%**
STATE OF CALIFORNIA	**961,496**	**918,883**	**5.4%**	**5%**

Source: BLS 2018.
[1] Calculated average median, mean and per capital income for all Delta Region counties

Q.1.1.4.2 Household Income

Table Q.1-12, 2013-2017 Delta Region Household and Per Capita Income, presents household income and per capita income in the Delta Region relative to California. Contra Costa and Solano Counties have higher median compared to the state average.

Table Q.1-12. 2013-2017 Delta Region Household and Per Capita Income

County	Median Household Income	Mean Household Income	Per Capita Income
Contra Costa County	$88,456	$120,800	$42,898
Sacramento County	$60,239	$80,705	$29,693
San Joaquin County	$57,813	$76,851	$24,694
Solano County	$72,950	$90,972	$31,934
Yolo County	$61,621	$86,723	$30,615
Delta Region Subtotal	**$68,216**	**$91,210**	**$31,967**
STATE OF CALIFORNIA	**$67,169**	**$96,104**	**$33,128**

Source: U.S. Census Bureau 2017.
All costs in 2017 dollars.
[1] Calculated average of median, mean and per capital income for all Delta Region counties

Q.1.1.5 *San Francisco Bay Area Region*

The San Francisco Bay Area Region includes Alameda, Napa, Santa Clara, and San Benito Counties within the CVP and SWP service areas.

Q.1.1.5.1 Employment, Labor Income, and Output

Table Q.1-13, Summary of 2017 Regional Economy for Counties in the San Francisco Bay Area Region, presents employment, labor income, and output by industry for the combined regional economies of the San Francisco Bay Area Region in 2017. In 2017, services provided the most jobs (1,499,825) in the area, followed by trade (289,220) and manufacturing (271,216). Services also had the highest output ($273,065 million) of all industries in the region, followed by manufacturing ($200,891 million) and Transportation, Information, Power, and Utilities (TIPU) ($99,131 million). Services and manufacturing were the top industries in terms of labor income in 2017.

Table Q.1-13. Summary of 2017 Regional Economy for Counties in the San Francisco Bay Area Region

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	17,504	$1,324	$569
Mining	2,841	$415	$61
Construction	128,594	$27,555	$8,774
Manufacturing	271,216	$200,891	$48,782
TIPU	204,400	$99,131	$39,044
Trade	289,220	$54,929	$20,220
Service	1,499,825	$273,065	$111,390
Government	223,302	$29,581	$24,552
Total	**2,636,903**	**$686,891**	**$253,391**

Source: IMPLAN 2018.
All costs in 2017 dollars.
Employment is measured in number of jobs.
Income is the dollar value of total payroll for each industry includes employee compensation and proprietor income.
Output represents the dollar value of industry production.
TIPU = Transportation, Information, Power, and Utilities

Table Q.1-14, Summary of 2017 Unemployment Statistics in San Francisco Bay Area Region, presents the civilian labor force unemployment and the unemployment rate for the counties in the San Francisco Bay Area Region.

Table Q.1-14. Summary of 2017 Unemployment Statistics in San Francisco Bay Area Region

Area	Civilian Labor Force Unemployment in 2007	Civilian Labor Force Unemployment in 2017	Unemployment Rate in 2007	Unemployment Rate in 2017
Alameda County	35,054	30,902	4.7%	3.6%
Santa Clara County	39,560	33,415	4.7%	3.2%
San Benito County	1,736	1,765	7.2%	5.8%
Napa County	2,946	2,701	4%	3.7%
San Francisco Bay Area[1]	**79,296**	**68,783**	**4.7%**	**3.5%**

STATE OF CALIFORNIA	**961,496**	**918,883**	**5.4%**	**5%**

Source: BLS 2018.
[1] Calculated average median, mean and per capital income for all San Francisco Bay Area Region counties

Q.1.1.5.2 Household Income

Table Q.1-15, 2013–2017 San Francisco Bay Area Region Household and Per Capita Income (in 2017 Dollars), presents household income and per capita income in the San Francisco Bay Area Region relative to California. The mean and median household incomes for all counties in the San Francisco Bay Area Region are higher than the state average.

Table Q.1-15. 2013–2017 San Francisco Bay Area Region Household and Per Capita Income (in 2017 Dollars)

County	Median Household Income	Mean Household Income	Per Capita Income
Alameda County	$85,743	$114,330	$41,363
Santa Clara County	$106,761	$143,191	$48,689
San Benito County	$80,760	$97,131	$30,012
Napa County	$79,637	$111,168	$40,632
San Francisco Bay Area	**$88,225**	**$116,455**	**$40,174**
STATE OF CALIFORNIA	**$67,169**	**$96,104**	**$33,128**

Source: U.S. Census Bureau 2017.
All costs in 2017 dollars.
[1] Calculated average of median, mean and per capital income for all Delta Region counties

Q.1.1.6 *Central Coast Region*

The Central Coast Region includes San Luis Obispo and Santa Barbara Counties served by the SWP.

Q.1.1.6.1 Employment, Labor Income, and Output

Table Q.1-16, Summary of 2017 Regional Economy for Counties in Central Coast Region, presents employment, labor income, and output by industry for the combined regional economies of the Central Coast Region in 2017. In 2017, services provided the most jobs (238,038) in the area, followed by government (61,203) and trade (51,340). Services also had the highest output ($31,281 million) of all industries in the region, followed by manufacturing ($8,815 million) and government ($7,524 million). Services and government were the top industries in terms of labor income in 2017.

Table Q.1-16. Summary of 2017 Regional Economy for Counties in Central Coast Region

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	30,831	$2,907	$979
Mining	2,133	$769	$220
Construction	24,663	$4,474	$973
Manufacturing	22,648	$8,815	$1,645
TIPU	17,386	$6,621	$1,486
Trade	51,340	$6,616	$1,966
Service	238,038	$31,281	$8,624
Government	61,203	$7,524	$5,455

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Total	**448,241**	**$69,006**	**$21,347**

Source: IMPLAN 2018.
All costs in 2017 dollars.
Employment is measured in number of jobs.
Income is the dollar value of total payroll for each industry includes employee compensation and proprietor income.
Output represents the dollar value of industry production.
TIPU = Transportation, Information, Power, and Utilities

Table Q.1-17, Summary of 2017 Unemployment Statistics in Central Coast Region, presents the civilian labor force unemployment and the unemployment rate for the counties in the Central Coast Region.

Table Q.1-17. Summary of 2017 Unemployment Statistics in Central Coast Region

Area	Civilian Labor Force Unemployment in 2007	Civilian Labor Force Unemployment in 2017	Unemployment Rate in 2007	Unemployment Rate in 2017
San Luis Obispo County	5,750	5,089	4.3%	3.6%
Santa Barbara County	9,310	9,741	4.4%	4.5%
Central Coast Region[1]	**15,060**	**14,830**	**4.3%**	**4.1%**
STATE OF CALIFORNIA	**961,496**	**918,883**	**5.4%**	**5%**

Source: BLS 2018.
[1] Calculated average median, mean and per capital income for all Southern California Region counties

Q.1.1.6.2 Household Income

Table Q.1-18, 2013–2017 Southern California Region Household and Per Capita Income (in 2017 Dollars), presents household income and per capita income in the Southern California Region relative to California.

Table Q.1-18. 2013–2017 Southern California Region Household and Per Capita Income (in 2017 Dollars)

County	Median Household Income	Mean Household Income	Per Capita Income
San Luis Obispo County	$67,175	$87,933	$33,972
Santa Barbara County	$68,023	$97,025	$32,872
Central Coast Region	**$67,599**	**$92,479**	**$33,422**
STATE OF CALIFORNIA	**$67,169**	**$96,104**	**$33,128**

Source: U.S. Census Bureau 2017.
All costs in 2017 dollars.
[1] Calculated average of median, mean and per capital income for all Delta Region counties

Q.1.1.7 *Southern California Region*

The Southern California Region includes Ventura, Los Angeles, Orange, San Diego, Riverside, and San Bernardino Counties.

Q.1.1.7.1 Employment, Labor Income, and Output

Table Q.1-19, Summary of 2017 Regional Economy for Counties in the Southern California Region (in 2017 Dollars), presents employment, labor income, and output by industry for the combined regional economies of the Southern California Region in 2017.

In 2017, services provided the most jobs (7,952,744) in the area, followed by trade (1,742,128) and government (1,502,445). Services also had the highest output ($1,150,474 million) of all industries in the region, followed by manufacturing ($347,541 million) and TIPU ($317,862 million). Services and government were the top industries in terms of labor income in 2017.

Table Q.1-19. Summary of 2017 Regional Economy for Counties in the Southern California Region (in 2017 Dollars)

Industry	Employment (Jobs)	Output (million dollars)	Labor Income (million dollars)
Agriculture	67,735	$5,963	$1,826
Mining	24,188	$4,961	$880
Construction	634,346	$114,689	$29,755
Manufacturing	769,544	$338,726	$66,849
TIPU	924,908	$311,242	$69,039
Trade	1,690,788	$250,042	$78,902
Service	7,714,706	$1,119,193	$343,769
Government	1,441,242	$201,471	$141,822
Total	**13,267,457**	**$2,346,286**	**$732,843**

Source: IMPLAN 2018.
All costs in 2017 dollars.
Employment is measured in number of jobs.
Income is the dollar value of total payroll for each industry includes employee compensation and proprietor income.
Output represents the dollar value of industry production.
TIPU = Transportation, Information, Power, and Utilities

Table Q.1-20, Summary of 2017 Unemployment Statistics in Southern California Region, presents the civilian labor force unemployment and the unemployment rate for counties in the Southern California Region.

Table Q.1-20. Summary of 2017 Unemployment Statistics in Southern California Region

Area	Civilian Labor Force Unemployment in 2007	Civilian Labor Force Unemployment in 2017	Unemployment Rate in 2007	Unemployment Rate in 2017
Ventura County	20,666	19,140	4.9%	4.5%
Los Angeles County	249,384	240,293	5.1%	4.7%
Orange County	62,474	56,627	3.9%	3.5%
San Diego County	69,004	63,465	4.6%	4%
Riverside County	54,429	56,252	6%	5.2%
San Bernardino County	48,324	46,582	5.6%	4.9%
Southern California Region[1]	**504,281**	**482,359**	**5.0%**	**4.5%**

STATE OF CALIFORNIA	**961,496**	**918,883**	**5.4%**	**5%**

Source: BLS 2018.
[1] Calculated average median, mean and per capital income for all Southern California Region counties

Q.1.1.7.2 Household Income

Table Q.1-21, 2013–2017 Southern California Region Household and Per Capita Income (in 2017 Dollars), presents household income and per capita income in the Southern California Region relative to California.

Table Q.1-21. 2013–2017 Southern California Region Household and Per Capita Income (in 2017 Dollars)

County	Median Household Income	Mean Household Income	Per Capita Income
Ventura County	$81,972	$107,872	$35,771
Los Angeles County	$61,015	$89,855	$30,798
Orange County	$81,851	$111,775	$37,603
San Diego County	$70,588	$96,153	$34,350
Riverside County	$60,807	$80,056	$25,700
San Bernardino County	$57,156	$74,105	$22,867
Southern California Region	**$68,898**	**$93,303**	**$31,182**
STATE OF CALIFORNIA	**$67,169**	**$96,104**	**$33,128**

Source: U.S. Census Bureau 2017.
All costs in 2017 dollars.
[1] Calculated average of median, mean and per capital income for all Delta Region counties

Q.1.2 Agricultural Economics

California is the highest producer (by value) of agricultural commodities in the United States. California produced up to 400 agricultural commodities and accounted for over 13% of the nation's total agricultural value in 2017 (California Department of Food and Agriculture 2018). In 2017, the San Joaquin Valley Region counties accounted for approximately 55% ($32.4 million) of the agricultural produce (by value) in California. Southern California counties accounted for approximately 10% ($5.8 million) followed by Sacramento Valley and Delta counties at 7% ($4.1 million) and 6.5% ($3.8 million).

Table Q.1-22, 2012 Farm and Farm Tenure Characteristics by Region, summarizes farm and farm tenure characteristics by region in 2017.

Table Q.1-22. 2012 Farm and Farm Tenure Characteristics by Region

	Trinity River	Sacramento Valley	San Joaquin Valley	Delta	San Francisco Bay Area	Central Coast	Southern California
Number of farms	1,298	13,185	21,744	7,405	3,768	4,263	13,686
Median farm size (acres)	100	520	342	125	88	60	36
Land in farms (acres)	769,545	3,494,595	8,364,366	2,029,450	1,265,414	2,039,913	1,076,013

Total cropland (acres)	31,629	1,353,147	4,399,483	1,146,722	160,278	387,701	501,115
Irrigated land (acres)	27,894	1,205,320	3,278,506	959,463	84,431	178,331	347,768
Full owners	933	10,206	16,440	5,332	3,005	3,238	11,928
Part owners	214	1,736	3,353	1,122	373	408	610
Tenants	151	1,243	1,951	951	390	617	1,148

Source: USDA 2014.

In response to changes in CVP and SWP water operations, growers could idle fields or increase agricultural production. Table Q.1-23, Summary of 2017 Regional Economy for Select Farming Sectors, presents key regional economics for the crop sectors that would be impacted by changes in CVP and SWP operation.

Table Q.1-23. Summary of 2017 Regional Economy for Select Farming Sectors

Industry	Trinity River	Sacramento Valley	San Joaquin Valley	Delta	San Francisco Bay Area	Central Coast	Southern California
Grain Sector							
Employment (Jobs)	1	1,071	98	111	5	5	8
Output (thousand dollars)	$325	$578,734	$107,065	$87,921	$1,616	$3,196	$3,517
Labor Income (thousand dollars)	$17	$54,886	$10,165	$7,777	$103	$255	$162
Vegetables and melon farming							
Employment (Jobs)	35	1,106	6,985	2,086	1,712	3,161	5,024
Output (thousand dollars)	$4,677	$187,889	$1,945,862	$514,838	$205,374	$718,979	$794,853
Labor Income (thousand dollars)	$1,011	$62,321	$603,742	$149,781	$92,321	$237,809	$253,048
Fruit farming							
Employment (Jobs)	224	7,609	49,390	12,212	5,647	12,086	31,212
Output (thousand dollars)	$15,152	$518,285	$5,797,560	$1,288,296	$416,043	$1,108,040	$2,147,743
Labor Income (thousand dollars)	-$1,084	$150,944	$2,057,731	$379,949	$136,096	$418,661	$834,234
All other crop farming							
Employment (Jobs)	171	2,365	4,699	2,102	350	294	2,488
Output (thousand dollars)	$3,799	$80,074	$549,888	$154,284	$10,879	$13,165	$118,724
Labor Income (thousand dollars)	$669	$28,258	$200,606	$51,887	$5,856	$3,278	$45,944

Source: IMPLAN 2018.
All costs in 2017 dollars.
Employment is measured in number of jobs.
Income is the dollar value of total payroll for each industry includes employee compensation and proprietor income.
Output represents the dollar value of industry production.

Q.1.3 Commercial and Recreational Fisheries Economics

The commercial and recreational ocean salmon fisheries along the Southern Oregon/Northern California Coast (SONCC) are affected by the population of salmon that rely upon the Northern California rivers, including the Sacramento and San Joaquin Rivers. Changes in CVP and SWP water operations would affect the flow patterns and water quality of the Sacramento and San Joaquin Rivers and the survivability of the salmon that use those rivers for habitat, as described in *Appendix O, Aquatic Resources Technical Appendix*. This technical appendix discusses the economic contributions of the Pacific Coast salmon fishery.

Management of the California ocean salmon fishery is a combined effort of the California Department of Fish and Wildlife (CDFW) and the Pacific Fishery Management Council (PFMC), a regional council of the National Oceanic and Atmospheric Administration (NOAA). CDFW manages salmon harvest from the shoreline to 3 nautical miles off the California coast. From 3 nautical miles to 200 nautical miles offshore is managed by PFMC. PFMC is responsible for developing the Pacific Coast Salmon Fishery Management Plan (FMP) that guides management of the ocean commercial and recreational fishery in California, Oregon, and Washington (PFMC 2014). The annual ocean salmon fishery regulations promote the maximum amount of harvest while ensuring that suitable population levels are maintained (NOAA 2014).

Q.1.3.1 *Commercial Salmon Fishery along the Southern Oregon and Northern California Coasts*

Ocean salmon fishing plays a large role in the overall California commercial ocean fishery industry. Chinook Salmon (*Oncorhynchus tshawytscha*) ranked within the top 10 commercially harvested ocean species in 7 of the last 10 years. In 2008 and 2009, commercial and recreational salmon fishing along the coast of California and portions of Oregon were restricted in response to low Sacramento River Fall-Run Chinook Salmon and Coho Salmon (*Oncorhynchus kisutch*) numbers.

The economic contribution of the California commercial ocean salmon fishery extends beyond the revenues received by fishermen. Supporting industries include fish processors, boat manufacturers, repair, and maintenance. The economic contribution of the commercial ocean salmon fishery to support industries can be estimated using Input-Output models. When the commercial fishery is reduced or absent, the net impact on local communities will depend on the economic base of the community and on people's responses to the reduced fishery. These economic contributions are estimated by PFMC using the Input-Output model for Pacific Coast Fisheries (IO-PAC). As summarized in Table Q.1-24, Estimated Economic Impacts to Commercial Fishery Support Industries by Management Area (in 2018 Dollars), economic impacts from reduced commercial ocean salmon fisheries were estimated by management area.

Q.1-24. Estimated Economic Impacts to Commercial Fishery Support Industries by Management Area (in 2018 Dollars)

Year	Klamath Management Zone, Oregon (in thousand dollars)[1]	Klamath Management Zone, California (in thousand dollars)[2]	Fort Bragg (in thousand dollars)	San Francisco (in thousand dollars)	Monterey (in thousand dollars)	Total (in thousand dollars)
2001-2005	$1,068	$945	$7,145	$17,221	$4,645	$31,024
2011	$317	$260	$1,593	$3,203	$598	$5,971
2012	$271	$490	$4,358	$2,761	$672	$8,552
2013	$368	$718	$4,004	$12,675	$3,830	$21,595

2014	$640	$1,901	$10,448	$20,269	$2,057	$35,315
2015	$1,239	$892	$6,678	$9,893	$582	$19,284
2016	$541	$402	$4,607	$4,826	$889	$11,265
2017	$136	$60	$1,643	$4,733	$993	$7,565
2013	$84	$39	$379	$5,486	$1,211	$7,199
2018[3]	$372	$707	$920	$8,499	$1,103	$11,601

Source: PFMC 2019.

[1] Klamath Management Zone, Oregon represents the area from Humbug Mountain to the Oregon-California Border, and includes landings at the Brookings port and season length and quota values for the entire area including Chetco River Ocean Terminal Area between Twin Rocks and the Oregon-California border. Data for Brookings, Oregon include values from landings outside of the Klamath Management Zone.

[2] Klamath Management Zone, California represents the area from Oregon-California Border to Humboldt South Jetty and includes landings at the Crescent City and Eureka ports.

[3] Preliminary prices

Q.1.3.2 *Recreational Salmon Fishery along the Southern Oregon and Northern California Coasts*

PFMC and CDFW also manage the recreational (ocean sport) fishery. The economic contribution of the ocean sport salmon fishery can be estimated using Input-Output models. Economic contributions are estimated by PFMC using IO-PAC, as summarized in Table Q.1-25, Estimated Economic Impacts to Recreation Fisheries Support Industries by Management Area.

Q.1-25. Estimated Economic Impacts to Recreation Fisheries Support Industries by Management Area

Year	Klamath Management Zone, Oregon (in thousand dollars)[1]	Klamath Management Zone, California (in thousand dollars)[2]	Fort Bragg (in thousand dollars)	San Francisco (in thousand dollars)	Monterey (in thousand dollars)	Total (in thousand dollars)
2001-2005	$803	$1,073	$2,163	$9,620	$3,874	$17,533
2011	$351	$531	$766	$2,932	$1,215	$5,795
2012	$365	$1,746	$2,158	$7,323	$3,705	$15,297
2013	$1,106	$3,731	$2,174	$12,906	$6,056	$25,973
2014	$1,226	$3,614	$2,616	$15,537	$3,844	$26,837
2015	$1,027	$2,548	$2,622	$12,553	$3,590	$22,340
2016	$525	$1,156	$1,739	$10,758	$1,875	$16,053
2017	$244	$1,123	$1,351	$9,901	$949	$13,568
2013	$117	$0	$623	$12,389	$1,719	$14,848
2018[3]	$408	$896	$1,478	$15,162	$1,653	$19,597

Source: PFMC 2019.

All costs in 2018 dollars.

[1] Klamath Management Zone, Oregon represents the area from Humbug Mountain to the Oregon-California Border, and includes landings at the Brookings port and season length and quota values for the entire area including Chetco River Ocean Terminal Area between Twin Rocks and the Oregon-California border. Data for Brookings, Oregon include values from landings outside of the Klamath Management Zone.

[2] Klamath Management Zone, California represents the area from Oregon-California Border to Humboldt South Jetty and includes landings at the Crescent City and Eureka ports.

[3] Preliminary prices

Q.2 Evaluation of Alternatives

This section presents the evaluation of environmental consequences associated with the CVP/SWP alternatives and the No Action Alternative.

Q.2.1 Methods and Tools

The regional economic effects include changes to employment, income, or output that could result from implementation of the project alternatives. The analysis uses quantitative and qualitative methods to evaluate potential regional economic effects.

Q.2.1.1 *Municipal and Industrial Water Supply Effects*

Regional economic effects from changes to M&I water supply was evaluated quantitatively using California Water Economics Spreadsheet Tool (CWEST) and IMPLAN models.

CWEST is a regional model that considers the economic costs to M&I water users including the cost of CVP and SWP water supplies, regional surface water supplies (including recycled water), conveyance costs, shortage costs, and changes in groundwater pumping costs. The model operates on an annual time step. Annual supplies are calculated for each water user based upon annual CVP and SWP water supplies, local surface water and groundwater supplies, surface water and groundwater storage, wastewater effluent and stormwater recycling water treatment, and desalination water treatment. The amount of supplies and costs are based upon information presented in 2010 Urban Water Management Plans developed by the CVP and SWP contractors. Attachment 2, *CWEST Model Documentation*, presents detailed discussion on the CWEST Model and Modeling Methodology.

The CalSim II hydrologic model simulated CVP and SWP water supply deliveries in 2030, which were input to the CWEST model for the 81-year hydrologic period. The CWEST model analyzes the changes in annual conditions over the 81-year long-term condition and averages annual costs for each alternative over the 81-year long-term condition. The CWEST model evaluates responses to changes in CVP and SWP water supplies for different water year types (wet, above normal, below normal, dry and critical dry year types).

The CWEST model is intended to minimize the cost for the water providers and end-users to meet 2030 water demand. In years when the combination of average existing water supplies (either for the wetter or drier conditions) is greater than the 2030 water demand, the CWEST model assumes any overage water amount would be placed into surface water or groundwater storage, if available. If storage is not available, groundwater pumping would be reduced so that the other available supplies can be utilized. The CWEST model assumes that local surface water, other imported water supplies, recycled water use, and desalinated water use would not be reduced. However, during wet years, total CVP and SWP water deliveries may not be delivered if groundwater pumping is reduced to zero and local storage facilities are full.

In years when annual supplies are less than the 2030 water demand, the model assumes that water users with local surface water and groundwater storage would first fully utilize those supplies and participate in temporary water transfers or a similar annual option if necessary. If shortage and transfer costs occur frequently, the model can select to purchase additional fixed-yield supplies, such as additional recycled water, desalination water treatment, or groundwater capacity. The model optimizes these long-term supply decisions to provide the lowest-cost water supply portfolio to meet 2030 demands throughout the 81-year hydrologic period.

The lowest-cost water supply portfolio estimated using CWEST is inputted into the IMPLAN model to analyze changes in regional economics. IMPLAN is an input-output software and data package, which calculates the economic impacts of a change in value of production. Attachment 1, *IMPLAN Modeling Documentation*, presents detailed discussion on the IMPLAN Model and Modeling Methodology. As described in detail in Attachment 1, *IMPLAN Modeling Documentation*, this analysis assumes that increased costs of water supply estimated from CWEST could be passed on to regional water users. Consequently, regional water users would reduce their spending by an amount equal to the water supply cost increase. This reduction in spending is distributed over regional industries according to coefficients provided by IMPLAN. It should be noted that this is a conservative assumption and water agencies may not pass on cost increases to water customers and could find other ways to fund water supply cost increase. If water supply cost increases are not passed on to water customers, this would result in lower impacts to the regional economy.

IMPLAN estimates effects of various economic measures, including employment, labor income, and total value output. Employment is the number of jobs, including full-time, part-time, and seasonal. Labor income consists of employee compensation and proprietor's income. Value of output is the dollar value of production. IMPLAN estimates effects on an annual basis. The 2017 IMPLAN data sets were used for this analysis.

Q.2.1.2 *Agricultural Water Supply Effects*

Regional economic effects from changes to agricultural water supply were evaluated quantitatively using the Statewide Agricultural Production (SWAP) and IMPLAN models. SWAP is a regional model of irrigated agricultural production and economics that simulates the decisions of producers (farmers) in the Central Valley Region (includes Sacramento River and San Joaquin River Regions). Attachment 3, *SWAP Model Documentation*, presents detailed discussion on the SWAP Model and Modeling Methodology. The model selects the crops, water supplies, and other inputs that maximize profit subject to constraints on water and land, and subject to economic conditions regarding prices, yields, and costs. The SWAP model incorporates CVP and SWP water supplies, other local water supplies represented in the CalSim II model, and groundwater. As water supply conditions change within a SWAP subregion (i.e., the quantity of available project water supply declines), the model optimizes production by adjusting the crop mix, water sources and quantities used, and other inputs. The model also fallows land when that appears to be the most cost-effective response to resource conditions. The analysis only reduces groundwater withdrawals based upon an optimization of agricultural production costs. The analysis does not restrict groundwater withdrawals based upon groundwater overdraft or groundwater quality conditions.

Changes to agricultural production estimated using SWAP are inputted into the IMPLAN model to analyze changes in regional economics. IMPLAN is used to estimate the regional effects of crop production in the regions. Direct, indirect, and induced effects from an industry change are analyzed. Direct effects would occur in the agricultural sectors. Expenditures of affected regional industries, including purchases of inputs, cause indirect effects. Expenditure of household income causes induced effects. Attachment 1, *IMPLAN Modeling Documentation*, presents detailed discussion on the IMPLAN Model and Modeling Methodology.

Regional economic effects from changes to agricultural water supply to regions outside the SWAP model area of analysis (i.e., Delta Region, San Francisco Bay Area Region, Central Coasts Region and Southern California Region) were evaluated qualitatively.

Q.2.1.3 *Fisheries Effects*

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

Q.2.1.4 *Construction and Habitat Restoration Effects*

Construction actions under the action alternatives would create jobs and generate additional economic activity within the region during the period of construction. Habitat restoration action under the action alternatives have the potential to remove some land from agriculture permanently. These impacts are evaluated qualitatively.

Q.2.2 No Action Alternative

The No Action Alternative discussed in this section analyzes CVP/SWP water supplies under existing conditions and future water demands (i.e., 2030 water demands). Under the No Action Alternative, there would be an increase in demand due to population growth but CVP/SWP water supplies would not change. For M&I contractors, this could result in an increase in water supply costs as they would need develop alternate water supplies to meet their increase in demand. For agricultural contractors, this could result in an increase in groundwater pumping.

Q.2.3 Alternative 1

Q.2.3.1 *Project-Level Effects*

Q.2.3.1.1 **Potential M&I-related changes to the regional economies**

Trinity River Region

There are no M&I CVP or SWP water service contractors in the Trinity River Region. Therefore, there would be no changes to CVP and SWP water supplies in the Trinity River Region. Consequently, there would be no impacts to regional economy related to changes in M&I water supply in the Trinity River Region under Alternative 1.

Sacramento River Region

Alternative 1 would increase water supplies to M&I water contractors in the Sacramento River Region on average by approximately 2,000 acre-feet per year (AFY) compared to the No Action Alternative. These increases in CVP and SWP water supplies would help meet 2030 water demands without development of other alternative water supplies. Additionally, increased water supplies under Alternative 1 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-1, Sacramento River Region M&I Water Supply Costs under Alternative 1, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $127,000 under Alternative 1 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions under Alternative 1. Reduced reliance on groundwater is also expected to decrease groundwater pumping costs compared to the No Action Alternative. Typically, water supply cost increases are passed on to water

customers through water rate increases. Under Alternative 1, there would be a reduction in water supply costs and consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposal income and could result in more spending in the regional economy.

Table Q.2-1. Sacramento River Region M&I Water Supply Costs under Alternative 1

	Alternative 1 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	2
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$42
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$0
Transfer Costs (thousand dollars)[7]	-$108
Shortage Costs (thousand dollars)[8]	$0
Groundwater Pumping Costs (thousand dollars)[9]	-$34
Excess Water Costs (thousand dollars)[10]	-$27
Average Annual Changes in Water Supply Costs (thousand dollars)	-$127

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-2, Sacramento River Region M&I Water Supply Related Regional Economic Effects under Alternative 1 compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result in an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-2. Sacramento River Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$71	$193
Mining	0	$12	$87

Construction	0	$918	$2,301
Manufacturing	0	$141	$1,210
TIPU	0	$1,478	$6,015
Trade	<1	$4,440	$12,786
Service	<1	$13,238	$50,083
Government	<1	$8,532	$10,889
Total	<1	$28,828	$83,564

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

San Joaquin River Region

Alternative 1 would increase water supplies to M&I water contractors in the San Joaquin River Region on average by approximately 21,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, San Joaquin River Region M&I contractors would not need to invest in alternate water supplies under Alternative 1, which is 1,000 acre-feet less than the alternative supplies developed under No Action Alternative. Additionally, increased water supplies under Alternative 1 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-3, San Joaquin River Region M&I Water Supply Costs under the Alternative 1 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $490,000 under Alternative 1 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions and development of alternate water supplies. Reduced reliance on groundwater is also expected to decrease groundwater pumping costs under Alternative 1. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 1, water supply costs would reduce compared to the No Action Alternative and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposal income and could result in more spending in the regional economy.

Table Q.2-4, San Joaquin River Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-3. San Joaquin River Region M&I Water Supply Costs under the Alternative 1 Compared to the No Action Alternative

	Alternative 1 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	21
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$1,976
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	-1
Annualized Alternate Supply Costs (thousand dollars)[4]	-$267
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	-$4
Transfer Costs (thousand dollars)[7]	-$307

	Alternative 1 compared to No Action Alternative
Shortage Costs (thousand dollars)[8]	-$3
Groundwater Pumping Costs (thousand dollars)[9]	-$74
Excess Water Costs (thousand dollars)[10]	-$1,812
Average Annual Changes in Water Supply Costs (thousand dollars)	-$490

All costs in 2018 dollars
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-4. San Joaquin River Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars	Output (in dollars)
Agriculture	0	$764	$2,199
Mining	0	$138	$477
Construction	0	$1,969	$5,440
Manufacturing	0	$1,214	$11,651
TIPU	<1	$6,293	$21,722
Trade	<1	$17,926	$49,731
Service	1	$41,916	$167,096
Government	<1	$19,578	$26,531
Total	**2**	**$89,798**	**$284,848**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Bay-Delta Region

Alternative 1 would increase water supplies to M&I water contractors in the Bay-Delta Region on average by approximately 200 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Bay-Delta Region M&I contractors would not need to invest in alternate water supplies. Additionally, increased water supplies under Alternative 1 would reduce reliance on water transfers in the region. There would also be some reduction in groundwater pumping in the region under Alternative 1.

Table Q.2-5, Bay-Delta Region M&I Water Supply Costs under the Alternative 1 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period

for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $755,000 under Alternative 1 compared to the No Action Alternative. Cost reductions are mostly because of transfer cost reductions. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 1, there would be reduction in water supply costs compared to the No Action Alternative, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-6, Bay-Delta Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-5. Bay-Delta Region M&I Water Supply Costs under the Alternative 1 Compared to the No Action Alternative

	Alternative 1 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	<1
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$29
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$321
Lost Water Sales Revenues (thousand dollars)[6]	-$92
Transfer Costs (thousand dollars)[7]	-$1,001
Shortage Costs (thousand dollars)[8]	-$31
Groundwater Pumping Costs (thousand dollars)[9]	$1
Excess Water Costs (thousand dollars)[10]	$18
Average Annual Changes in Water Supply Costs (thousand dollars)	-$755

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-6. Bay-Delta Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$443	$1,171
Mining	0	$33	$143
Construction	<1	$3,876	$9,712
Manufacturing	0	$2,206	$21,075
TIPU	<1	$10,399	$43,154
Trade	<1	$25,465	$68,783
Service	2	$83,665	$305,881
Government	<1	$49,067	$60,676
Total	**3**	**$175,153**	**$510,596**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

San Francisco Bay Area Region

Alternative 1 would increase water supplies to M&I water contractors in the San Francisco Bay Area Region on average by approximately 32,000 AFY compared to the No Action Alternative. Though there is an overall increase in CVP and SWP supplies, it is estimated that there would be reductions in CVP and SWP supplies during some water year types. Therefore, contractors would need to invest in alternate water supply projects such as desalination for shortage years. This would result in an increase in alternative water supply costs; however, the overall increase in CVP and SWP supplies would result in a reduction in water transfers and groundwater pumping in the region.

Table Q.2-7, San Francisco Bay Area Region M&I Water Supply Costs under the Alternative 1 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $3.1 million under Alternative 1 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions and lost water sales revenue under Alternative 1. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 1, there would be reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-8, San Francisco Bay Area Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area may increase spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-7. San Francisco Bay Area Region M&I Water Supply Costs under the Alternative 1 Compared to the No Action Alternative

	Alternative 1 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	32
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$1,156
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	7
Annualized Alternate Supply Costs (thousand dollars)[4]	$4,251
Water Storage Costs (thousand dollars)[5]	$1,026
Lost Water Sales Revenues (thousand dollars)[6]	-$2,339
Transfer Costs (thousand dollars)[7]	-$5,793
Shortage Costs (thousand dollars)[8]	-$841
Groundwater Pumping Costs (thousand dollars)[9]	-$570
Excess Water Costs (thousand dollars)[10]	-$89
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$3,199**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-8. San Francisco Bay Area Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$1,141	$2,263
Mining	0	$137	$874
Construction	<1	$21,610	$49,684
Manufacturing	<1	$12,308	$67,179
TIPU	<1	$51,566	$169,664
Trade	2	$108,524	$255,558
Service	6	$333,997	$1,052,677
Government	2	$256,545	$289,800
Total	**10**	**$785,828**	**$1,887,698**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Central Coast Region

Alternative 1 would increase water supplies to M&I water contractors in the Central Coast Region on average by approximately 3,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Central Coast Region M&I contractors would not need to invest in alternate water supplies under Alternative 1.

Table Q.2-9, Central Coast Region M&I Water Supply Costs Under the Alternative 1 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to increase by approximately $37,000 under Alternative 1 compared to the No Action Alternative. Cost increases are primarily due to the increase in delivery costs for the increased CVP and SWP water supplies to the region. Water supply cost increases are passed on to water customers through water rate increases. This would result in a decrease in disposal income and could result in less spending in the regional economy.

Table Q.2-10, Central Coast Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from increased water supply costs and decreased disposable income to CVP and SWP M&I contractors. Decreases in disposable income in the area would result in spending decreases in the region. Decreases in spending would primarily occur in the services sector.

Table Q.2-9. Central Coast Region M&I Water Supply Costs Under the Alternative 1 Compared to the No Action Alternative

	Alternative 1 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	3
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$535
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$0
Transfer Costs (thousand dollars)[7]	$25
Shortage Costs (thousand dollars)[8]	$0
Groundwater Pumping Costs (thousand dollars)[9]	$40
Excess Water Costs (thousand dollars)[10]	-$562
Average Annual Changes in Water Supply Costs (thousand dollars)	**$37**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages

[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-10. Central Coast Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	-$31	-$69
Mining	0	-$28	-$102
Construction	0	-$262	-$666
Manufacturing	0	(-$32	-$381
TIPU	0	-$477	-$1,877
Trade	0	-$1,546	-$3,966
Service	<1 job lost	-$4,906	-$17,257
Government	0	-$2,958	-$3,655
Total	<1 job lost	-$10,240	-$27,973

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Southern California Region

Alternative 1 would increase water supplies to M&I water contractors in the Southern California Region on average by approximately 263,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Southern California Region M&I contractors would not need to invest in alternate water supplies under Alternative 1. Additionally, increased water supplies under Alternative 1 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-11, Southern California Region M&I Water Supply Costs Under the Alternative 1 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $25.6 million under Alternative 1 compared to the No Action Alternative. Cost reductions are mostly due to reduction in groundwater pumping and increased reliability of water supplies under Alternative 1. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 1, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This could result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-12, Southern California Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-11. Southern California Region M&I Water Supply Costs Under the Alternative 1 compared to the No Action Alternative

	Alternative 1 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	263
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$38,019
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	-58
Annualized Alternate Supply Costs (thousand dollars)[4]	-$21,299
Water Storage Costs (thousand dollars)[5]	-$393
Lost Water Sales Revenues (thousand dollars)[6]	-$7,825
Transfer Costs (thousand dollars)[7]	-$4,088
Shortage Costs (thousand dollars)[8]	-$8,984
Groundwater Pumping Costs (thousand dollars)[9]	-$19,126
Excess Water Costs (thousand dollars)[10]	-$1,886
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$25,583**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-12. Southern California Region M&I Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	<1	$14,522	$38,948
Mining	<1	$6,801	$25,630
Construction	2	$126,021	$331,500
Manufacturing	2	$173,348	$1,198,642
TIPU	6	$490,815	$1,865,251
Trade	18	$863,324	$2,297,933
Service	64	$3,182,368	$10,179,839
Government	12	$1,375,786	$1,721,235
Total	104	$6,232,986	$17,658,979

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Q.2.3.1.2 Potential agriculture-related changes to the regional economy

Trinity River Region

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 1. Consequently, there would be no impacts to regional economy from changes to water supply to agricultural contractors in the Trinity River Region under Alternative 1.

Sacramento River Region

Alternative 1 is expected to increase average annual agricultural water supply deliveries by 25,000 AFY during average conditions and 26,000 AFY under dry conditions. As summarized in Table Q.2-13, Sacramento River Region Agricultural Water Supply Costs under the Alternative 1 Compared to the No Action Alternative, this increase in CVP or SWP deliveries could reduce groundwater usage in the Sacramento River Region under dry conditions. Consequently, operation costs associated with crop production would be lower and would result in increased profitability to the growers. Increased deliveries in the Sacramento River Region are very small and are not expected to change irrigated acreage or agricultural revenue in the region. Therefore, the regional economic effects from water supply increases would be minimal.

Table Q.2-13. Sacramento River Region Agricultural Water Supply Costs under the Alternative 1 Compared to the No Action Alternative

	Alternative 1 compared to No Action Alternative
Average Conditions[1]	
Average Annual CVP/SWP Deliveries (TAF)	25
Annual Groundwater Pumping (TAF)	0
Groundwater Pumping Cost (million dollars)	$0
Irrigated Acreage (thousand acres)	0
Agricultural Revenue (million dollars)	$0
Dry Conditions[2]	
Average Annual CVP/SWP Deliveries (TAF)	26
Annual Groundwater Pumping (TAF)	-21
Groundwater Pumping Cost (million dollars)	-$2
Irrigated Acreage (thousand acres)	0
Agricultural Revenue (million dollars)	$0

All costs in 2018 dollars
TAF = thousand acre-feet
[1] Average Conditions refers to an average of all year types in the 81-year simulation period.
[2] Dry Conditions refer to an average of dry years only, using Sacramento River Index.

San Joaquin River Region

Alternative 1 is expected to increase average annual agricultural water supply deliveries by 309,000 AFY during average conditions and by 195,000 AFY during dry conditions in the San Joaquin River Region. Therefore, Alternative 1 reduces the occurrences of water supply shortages to agricultural contractors during all year types. Consequently, agricultural contractors would reduce their reliance on groundwater

supplies in lieu of increased surface water deliveries. Table Q.2-14 summarizes the projected groundwater pumping volumes and groundwater pumping costs under Alternative 1 compared to the No Action Alternative. Overall groundwater pumping volumes under Alternative 1 would be lower than under the No Action Alternative because of increased surface water deliveries. Reduction in groundwater pumping would result in reduced groundwater pumping costs. Consequently, operation costs associated with crop production would be lower and could result in increased profitability to the growers.

As summarized in Table Q.2-14, San Joaquin River Region Agricultural Water Supply Costs under the Alternative 1 Compared to the No Action Alternative, San Joaquin River Region Agricultural Water Supply Costs under the Alternative 1 Compared to the No Action Alternative, SWAP model estimates an increase in irrigated acreage under Alternative 1. This increase in irrigated acreage would result in increased agricultural revenues for the growers as summarized in Table Q.2-14. Additionally, this would affect businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing. Table Q.2-15, San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative under Average Conditions, and Table Q.2-16, San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative under Dry Conditions, summarize the regional economic effects on employment, labor income, and revenue from increased CVP and SWP deliveries to agricultural contractors. Regional economic effects were analyzed by distributing revenue changes under Grain, Field, Forage, Vegetable, and Fruit Farming sectors.

Table Q.2-14. San Joaquin River Region Agricultural Water Supply Costs under the Alternative 1 Compared to the No Action Alternative

	Alternative 1 compared to No Action Alternative
Average Conditions[1]	
Average Annual CVP/SWP Deliveries (TAF)	309
Annual Groundwater Pumping (TAF)	-231
Groundwater Pumping Cost (million dollars)	-$50
Irrigated Acreage (thousand acres)	3
Agricultural Revenue (million dollars)	$10
Dry Conditions[2]	
Average Annual CVP/SWP Deliveries (TAF)	195
Annual Groundwater Pumping (TAF)	-111
Groundwater Pumping Cost (million dollars)	-$30
Irrigated Acreage (thousand acres)	24
Agricultural Revenue (million dollars)	$50

All costs in 2018 dollars
TAF = thousand acre-feet
[1] Average Conditions refers to an average of all year types in the 81-year simulation period.
[2] Dry Conditions refer to an average of dry years only, using Sacramento River Index.

Table Q.2-15. San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative under Average Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	105	$4,511,275	$11,620,587

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Mining	<1	$10,693	$44,763
Construction	1	$59,627	$162,427
Manufacturing	<1	$45,214	$483,685
TIPU	2	$151,601	$431,678
Trade	6	$262,280	$787,861
Service	21	$895,936	$2,924,692
Government	<1	$64,076	$184,607
Total	136	$6,000,702	$16,640,300

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Table Q.2-16. San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 1 Compared to the No Action Alternative under Dry Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	330	$17,494,773	$57,553,572
Mining	<1	$80,465	$351,341
Construction	5	$298,805	$813,170
Manufacturing	3	$267,379	$2,973,589
TIPU	12	$834,642	$2,319,951
Trade	29	$1,342,282	$4,159,685
Service	98	$4,195,798	$14,121,972
Government	4	$334,992	$964,803
Total	482	$24,849,136	$83,258,083

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Bay-Delta Region

Alternative 1 is expected to increase average annual agricultural water supply deliveries in the Bay-Delta Region. Effects from increased water supply to agricultural contractors in the Bay-Delta Region are evaluated under Sacramento and San Joaquin River Region analysis. Increases in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the region economy as it would increase employment, labor income, and output for sectors that support farming activities.

San Francisco Bay Area Region

Alternative 1 is expected to increase average annual agricultural water supply deliveries in the San Francisco Bay Area Region by 9,000 AFY under average conditions and by 6,000 AFY under dry conditions. Increase in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the region economy.

Central Coast Region

There are no agricultural lands irrigated with CVP and SWP water supplies in the Central Coast Region. Therefore, there would be no changes in irrigated lands under Alternative 1. Consequently, there would be no impacts to regional economy from changes in deliveries to agricultural contractors in the Central Coast Region under Alternative 1.

Southern California Region

Alternative 1 is expected to increase average annual agricultural water supply deliveries in the Southern California Region by 1,000 AFY under average conditions and by 500 AFY under dry conditions. Increase in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the region economy.

Q.2.3.1.3 Potential fisheries-related changes to the regional economy

The commercial and recreational (ocean sports) ocean salmon fishery along the SONCC are affected by the population of salmon that rely upon the Northern California rivers, including the Sacramento and San Joaquin Rivers. Appendix O describes changes in CVP and SWP water operations would affect the flow patterns and water quality of the Sacramento and San Joaquin Rivers, and the survivability of the salmon that use those rivers for habitat. Appendix O also describes that the population of salmon along the SONCC would be higher under all action alternatives compared to No Action Alternative. Increase in salmon population could potentially increase commercial and recreational ocean salmon harvest. Increase in commercial ocean salmon harvest would increase revenues received by fisherman. Ocean fisheries support industries such as fish processors, boat manufacturers, repair and maintenance would also see an increase in revenue. Overall increased fisheries under Alternative 1 would be beneficial to the regional economy.

As discussed in Appendix O, flows under Alternative 1 could reduce coho salmon habitat in the Trinity River Region. Additionally, water temperatures under Alternative 1 could negatively affect some Coho life stages during some months but may be offset by temperature improvements during other times of year. Overall, Alternative 1 is not likely to have an adverse effect on salmon population in the Trinity River Region. These salmon populations are extremely important to the Yurok Tribe and Hoopa Valley Tribe as part of their lives, cultural traditions, ceremonies, and community health (Reclamation 2012). Fifty percent of the total available salmon in the Trinity River is the federally protected harvest for the Yurok and Hoopa Valley tribes (U.S. Department of the Interior 1993). Each tribe determines the use of the harvest. Changes in salmon population in the Trinity River would change salmon landings by the Yurok and Hoopa Valley tribe. The tribe would sell a portion or all of their landings which would affect revenues and disposable incomes to the tribe. Since salmon population would not be adversely affected under Alternative 1, salmon landings would not be adversely affected. Therefore, there would be no adverse effects to revenue and disposable incomes. Consequently, there would be no adverse effects to the regional economy.

Q.2.3.2 *Program-Level Effects*

Q.2.3.3 Potential changes to the regional economy

Alternative 1 includes several program actions that would require construction, such as American River Drought Temperature Facility Improvements, Tracy Fish Collection Facility Improvements, Skinner Fish Facility Improvements, Delta Fish Species Conservation Hatchery, Upper Sacramento Small Screen Program, Upper Sacramento Cold Water Management Tools, and Juvenile Trap and Haul Programs in the

Sacramento River. Construction could occur in Shasta, Sacramento, San Joaquin, and Contra Costa Counties. Construction activities associated with program actions would temporarily increase construction-related employment and spending in the regions with construction sites. Construction would temporarily benefit the regional economy by increasing employment, labor income, and revenue during the construction period.

Alternative 1 would also include habitat restoration projects along the upper reaches of Sacramento River, American River, Stanislaus River, and Lower San Joaquin River and an additional 8,000 acres of tidal habitat restoration projects. Some of these habitat restoration projects could remove agricultural lands or grazing lands out of production. These impacts could reduce irrigated acreage and agricultural revenues which would adversely affect growers and businesses and individuals who support farming activities. Tidal restoration projects would mainly occur in the Delta Region and could improve recreational fishing and day use opportunities in the long-term. These impacts could be beneficial to the region as it could increase visitors from within and outside the region. Visitors from outside the region would generate new economic activity in the region due to increased spending in the region. This would be beneficial to the regional economy.

Q.2.4 Alternative 2

Q.2.4.1 *Project-Level Effects*

Q.2.4.1.1 Potential M&I-related changes to the regional economy

Trinity River Region

There are no M&I CVP or SWP water service contractors in the Trinity River Region. Therefore, there would be no changes to CVP and SWP water supplies in the Trinity River Region. Consequently, there would be no impacts to regional economy related to M&I water supplies in the Trinity River Region under Alternative 2.

Sacramento River Region

Alternative 2 would increase water supplies to M&I water contractors in the Sacramento River Region on average by approximately 2,000 AFY compared to the No Action Alternative. These increases in CVP and SWP water supplies would help meet 2030 water demands without development of other alternative water supplies. Additionally, increased water supplies under Alternative 2 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-17, Sacramento River Region M&I Water Supply Costs Under the Alternative 2 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $60,000 under Alternative 2 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions under Alternative 2. Reduced reliance on groundwater is also expected to decrease groundwater pumping costs. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 2, there would be a reduction in water supply costs compared to the No Action Alternative, and consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-18, Sacramento River Region M&I Water Supply Related Regional Economic Effects Under Alternative 2 Compared to the No Action Alternative, summarizes the regional economic effects to

employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the restaurant sector.

Table Q.2-17. Sacramento River Region M&I Water Supply Costs Under the Alternative 2 Compared to the No Action Alternative

	Alternative 2 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	2
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$43
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$0
Transfer Costs (thousand dollars)[7]	-$44
Shortage Costs (thousand dollars)[8]	$0
Groundwater Pumping Costs (thousand dollars)[9]	-$28
Excess Water Costs (thousand dollars)[10]	-$31
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$60**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-18. Sacramento River Region M&I Water Supply Related Regional Economic Effects Under Alternative 2 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$33	$91
Mining	0	$5	$41
Construction	0	$432	$1,084
Manufacturing	0	$66	$570
TIPU	0	$696	$2,833
Trade	<1	$2,091	$6,023

Service	<1	$6,236	$23,592
Government	0	$4,019	$5,130
Total	**<1**	**$13,580**	**$39,364**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

San Joaquin River Region

Alternative 2 would increase water supplies to M&I water contractors in the San Joaquin River Region on average by approximately 50,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, San Joaquin River Region M&I contractors would not need to invest in alternate water supplies under Alternative 2, which is 1,000 AF less than the alternative supplies developed under No Action Alternative. Additionally, increased water supplies under Alternative 2 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-19, San Joaquin River Region M&I Water Supply Costs under the Alternative 2 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $4.1 million under Alternative 2 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions and development of alternate water supplies under Alternative 2. Reduced reliance on groundwater is also expected to decrease groundwater pumping costs under Alternative 2 compared to the No Action Alternative. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 2, water supply costs would be reduced, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposal income and could result in more spending in the regional economy.

Table Q.2-20, San Joaquin River Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the restaurant sector.

Table Q.2-19. San Joaquin River Region M&I Water Supply Costs under the Alternative 2 compared to the No Action Alternative

	Alternative 2 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	50
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$4,706
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	-1
Annualized Alternate Supply Costs (thousand dollars)[4]	-$286
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	-$38
Transfer Costs (thousand dollars)[7]	-$3,667
Shortage Costs (thousand dollars)[8]	-$14
Groundwater Pumping Costs (thousand dollars)[9]	-$1,248
Excess Water Costs (thousand dollars)[10]	-$3,465

	Alternative 2 compared to No Action Alternative
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$4,012**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-20. San Joaquin River Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	<1	$6,268	$18,052
Mining	0	$1,134	$3,914
Construction	<1	$16,162	$44,653
Manufacturing	<1	$9,965	$95,626
TIPU	<1	$51,648	$178,289
Trade	4	$147,130	$408,180
Service	9	$344,038	$1,371,485
Government	2	$160,692	$217,762
Total	16	$737,038	$2,337,960

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Bay-Delta Region

Alternative 2 would increase water supplies to M&I water contractors in the Bay-Delta Region on average by approximately 10,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Bay-Delta Region M&I contractors would not need to invest in alternate water supplies under Alternative 2. Additionally, increased water supplies under Alternative 2 would reduce reliance on water transfers in the region.

Table Q.2-21, Bay-Delta Region M&I Water Supply Costs Under the Alternative 2 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $1.3 million under Alternative 2 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions under Alternative 2. Typically, water supply cost increases are passed on to water

customers through water rate increases. Under Alternative 2, there would be reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposal income and could result in more spending in the regional economy.

Table Q.2-22, Bay-Delta Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the restaurant sector.

Table Q.2-21. Bay-Delta Region M&I Water Supply Costs Under the Alternative 2 Compared to the No Action Alternative

	Alternative 2 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	10
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$146
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	-$523
Lost Water Sales Revenues (thousand dollars)[6]	-$284
Transfer Costs (thousand dollars)[7]	-$485
Shortage Costs (thousand dollars)[8]	-$95
Groundwater Pumping Costs (thousand dollars)[9]	$50
Excess Water Costs (thousand dollars)[10]	-$147
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$1,338**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-22. Bay-Delta Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$762	$2,011
Mining	0	$56	$246
Construction	<1	$6,656	$16,680
Manufacturing	0	$3,789	$36,197
TIPU	<1	$17,860	$74,117
Trade	1	$43,736	$118,134
Service	3	$143,694	$525,350
Government	1	$84,272	$104,211
Total	5	$300,825	$876,947

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

San Francisco Bay Area Region

Alternative 2 would increase water supplies to M&I water contractors in the San Francisco Bay Area Region on average by approximately 54,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, San Francisco Bay Area Region M&I contractors would not need to invest in alternate water supplies under Alternative 2. Additionally, increased water supplies under Alternative 2 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-23, San Francisco Bay Area Region M&I Water Supply Costs Under the Alternative 2 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $9.1 million under Alternative 2 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions and lost water sales revenue. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 2, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-24, San Francisco Bay Area Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-23. San Francisco Bay Area Region M&I Water Supply Costs Under the Alternative 2 Compared to the No Action Alternative

	Alternative 2 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	54
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$1,960
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	-3
Annualized Alternate Supply Costs (thousand dollars)[4]	-$526
Water Storage Costs (thousand dollars)[5]	$252
Lost Water Sales Revenues (thousand dollars)[6]	-$2,891
Transfer Costs (thousand dollars)[7]	-$6,000
Shortage Costs (thousand dollars)[8]	-$965
Groundwater Pumping Costs (thousand dollars)[9]	-$411
Excess Water Costs (thousand dollars)[10]	-$449
Average Annual Changes in Water Supply Costs (thousand dollars)	-$9,029

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-24. San Francisco Bay Area Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	<1	$3,903	$7,740
Mining	0	$468	$2,988
Construction	<1	$73,903	$169,911
Manufacturing	<1	$42,092	$229,741
TIPU	2	$176,347	$580,222
Trade	4	$371,134	$873,967
Service	20	$1,142,215	$3,599,988
Government	7	$877,342	$991,070
Total	35	$2,687,405	$6,455,628

All costs in 2018 dollars

TIPU = Transportation, Information, Power, and Utilities

Central Coast Region

Alternative 2 would increase water supplies to M&I water contractors in the Central Coast Region on average by approximately 12,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Central Coast Region M&I contractors would not need to invest in alternate water supplies under Alternative 2.

Table Q.2-25, Central Coast Region M&I Water Supply Costs under the Alternative 2 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $417,000 under Alternative 2 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions and lost water sales revenue under Alternative 2. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 2, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-26, Central Coast Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-25. Central Coast Region M&I Water Supply Costs under the Alternative 2 Compared to the No Action Alternative

	Alternative 2 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	12
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$2,258
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$0
Transfer Costs (thousand dollars)[7]	$0
Shortage Costs (thousand dollars)[8]	$0
Groundwater Pumping Costs (thousand dollars)[9]	-$884
Excess Water Costs (thousand dollars)[10]	-$1,791
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$417**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates

[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-26. Central Coast Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$340	$769
Mining	0	$308	$1,140
Construction	0	$2,923	$7,418
Manufacturing	0	$361	$4,242
TIPU	<1	$5,316	$20,914
Trade	<1	$17,233	$44,204
Service	1	$54,679	$192,335
Government	<1	$32,966	$40,741
Total	**2**	**$114,126**	**$311,765**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Southern California Region

Alternative 2 would increase water supplies to M&I water contractors in the Southern California Region on average by approximately 518,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Southern California Region M&I contractors would not need to invest in alternate water supplies under Alternative 2. Additionally, increased water supplies under Alternative 2 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-27, Southern California Region M&I Water Supply Costs Under the Alternative 2 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $65.1 million under Alternative 2 compared to the No Action Alternative. Cost reductions are mostly due to reduction in groundwater pumping and increased reliability of water supplies. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 2, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-28, Southern California Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an

increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-27. Southern California Region M&I Water Supply Costs Under the Alternative 2 Compared to the No Action Alternative

	Alternative 2 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	518
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$74,165
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	-73
Annualized Alternate Supply Costs (thousand dollars)[4]	-$25,145
Water Storage Costs (thousand dollars)[5]	-$3,483
Lost Water Sales Revenues (thousand dollars)[6]	-$22,967
Transfer Costs (thousand dollars)[7]	-$13,813
Shortage Costs (thousand dollars)[8]	-$28,004
Groundwater Pumping Costs (thousand dollars)[9]	-$39,856
Excess Water Costs (thousand dollars)[10]	-$5,951
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$65,054**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-28. Southern California Region M&I Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	<1	$32,415	$86,935
Mining	<1	$15,181	$57,208
Construction	4	$281,290	$739,936
Manufacturing	5	$386,928	$2,675,474
TIPU	14	$1,095,541	$4,163,403
Trade	40	$1,927,014	$5,129,186
Service	142	$7,103,322	$22,722,285
Government	26	$3,070,873	$3,841,946

Total	233	$13,912,565	$39,416,373

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Q.2.4.1.2 Potential agriculture-related changes to the regional economy

Trinity River Region

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 2. Consequently, there would be no impacts to regional economy in the Trinity River Region under Alternative 2.

Sacramento River Region

Alternative 2 is expected to increase average annual agricultural water supply deliveries by 24,000 AFY during average conditions and by 15,000 AFY during dry conditions. As summarized in Table Q.2-29, Sacramento River Region Agricultural Water Supply Costs under the Alternative 2 Compared to the No Action Alternative, this increase in CVP or SWP deliveries could reduce groundwater usage in the Sacramento River Region under dry conditions. Consequently, operation costs associated with crop production would be lower and would result in increased profitability to the growers. Increased deliveries in the Sacramento River Region are very small and are not expected to change irrigated acreage or agricultural revenue in the region. Therefore, the regional economic effects from water supply increases would be minimal.

Table Q.2-29. Sacramento River Region Agricultural Water Supply Costs under the Alternative 2 Compared to the No Action Alternative

	Alternative 2 compared to No Action Alternative
Average Conditions[1]	
Average Annual CVP/SWP Deliveries (TAF)	24
Annual Groundwater Pumping (TAF)	0
Groundwater Pumping Cost (million dollars)	$0
Irrigated Acreage (thousand acres)	0
Agricultural Revenue (million dollars)	$0
Dry Conditions[2]	
Average Annual CVP/SWP Deliveries (TAF)	15
Annual Groundwater Pumping (TAF)	-13
Groundwater Pumping Cost (million dollars)	-$1
Irrigated Acreage (thousand acres)	0
Agricultural Revenue (million dollars)	$0

All costs in 2018 dollars
TAF = thousand acre-feet
[1] Average Conditions refers to an average of all year types in the 81-year simulation period.
[2] Dry Conditions refer to an average of dry years only, using Sacramento River Index.

San Joaquin River Region

Alternative 2 is expected to increase average annual agricultural water supply deliveries by 662,000 AFY during average conditions and by 432,000 AFY during dry conditions in the San Joaquin River Region. Therefore, Alternative 2 reduces the occurrences of water supply shortages to agricultural contractors during all year types. Consequently, agricultural contractors would reduce their reliance on groundwater supplies in lieu of increased surface water deliveries. Table Q.2-28 summarizes the projected groundwater pumping volumes and groundwater pumping costs under Alternative 2 compared to the No Action Alternative. Overall groundwater pumping volumes under Alternatives 2 would be lower than under the No Action Alternative due to increased surface water deliveries. Reduction in groundwater pumping would result in reduced groundwater pumping costs. Consequently, operation costs associated with crop production would be lower and could result in increased profitability to the growers.

As summarized in Table Q.2-30, San Joaquin River Region Agricultural Water Supply Costs under the Alternative 2 Compared to the No Action Alternative, SWAP model estimates an increase in irrigated acreage under Alternative 2 compared to the No Action Alternative. This increase in irrigated acreage would result in increased agricultural revenues for the growers as summarized in Table Q.2-30. Additionally, this would affect businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing. Table Q.2-31, San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative under Average Conditions, and Table Q.2-32, San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative under Dry Conditions, summarize the regional economic effects on employment, labor income, and revenue from increased CVP and SWP deliveries to agricultural contractors.

Table Q.2-30. San Joaquin River Region Agricultural Water Supply Costs under the Alternative 2 Compared to the No Action Alternative

	Alternative 2 compared to No Action Alternative
Average Conditions[1]	
Average Annual CVP/SWP Deliveries (TAF)	662
Annual Groundwater Pumping (TAF)	-523
Groundwater Pumping Cost (million dollars)	-$106
Irrigated Acreage (thousand acres)	5
Agricultural Revenue (million dollars)	$14
Dry Conditions[2]	
Average Annual CVP/SWP Deliveries (TAF)	432
Annual Groundwater Pumping (TAF)	-222
Groundwater Pumping Cost (million dollars)	-$57
Irrigated Acreage (thousand acres)	56
Agricultural Revenue (million dollars)	$121

All costs in 2018 dollars
TAF = thousand acre-feet
[1] Average Conditions refers to an average of all year types in the 81-year simulation period.
[2] Dry Conditions refer to an average of dry years only, using Sacramento River Index.

Table Q.2-31. San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative under Average Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	140	$6,050,353	$16,466,642
Mining	<1	$17,389	$73,980
Construction	1	$85,558	$232,988
Manufacturing	1	$67,413	$731,135
TIPU	3	$221,378	$626,709
Trade	9	$374,841	$1,134,787
Service	29	$1,259,684	$4,147,279
Government	1	$92,019	$264,944
Total	184	$8,168,634	$23,678,462

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Table Q.2-32. San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 2 Compared to the No Action Alternative under Dry Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	1087	$47,760,839	$141,319,845
Mining	2	$180,491	$781,873
Construction	12	$737,105	$2,006,678
Manufacturing	8	$620,888	$6,882,473
TIPU	28	$1,987,809	$5,585,191
Trade	73	$3,265,512	$9,996,170
Service	249	$10,723,949	$35,760,960
Government	9	$810,794	$2,333,691
Total	1467	$66,087,387	$204,666,881

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Bay-Delta Region

Alternative 2 is expected to increase average annual agricultural water supply deliveries in the Bay-Delta Region. Impacts from increased water supply to agricultural contractors in the Bay-Delta Region are evaluated under Sacramento and San Joaquin River Region analysis. Increase in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the regional economy as it would impact businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing.

San Francisco Bay Area Region

Alternative 2 is expected to increase average annual agricultural water supply deliveries in the San Francisco Bay Area Region by 15,000 AFY under average conditions and by 10,000 AFY under dry conditions. Increase in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the regional economy as it would impact businesses and individuals who support farming activities, such as farm

workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing.

Central Coast Region

There are no agricultural lands irrigated with CVP and SWP water supplies in the Central Coast Region. Therefore, there would be no changes in irrigated lands under Alternative 2. Consequently, there would be no impacts to the regional economy in the Central Coast Region under Alternative 2.

Southern California Region

Alternative 2 is expected to increase average annual agricultural water supply deliveries in the Southern California Region by 2,000 AFY under average conditions and by 2,000 AFY under dry conditions. Increase in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the region economy as it would affect businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing.

Q.2.4.1.3 Potential fisheries-related changes to the regional economy

Under Alternative 2, population of salmon along the SONCC would be lower compared to the No Action Alternative. Decreases in salmon population could potentially decrease commercial and recreational ocean salmon harvest. This could have a detrimental impact to fishermen and other ocean fisheries support industries such as fish processors and boat manufacturers. Overall, decreased fisheries under Alternative 2 would be detrimental to the regional economy.

Similar to Alternative 1, Alternative 2 would not adversely affect salmon population in the Trinity River Region and salmon landings would not be adversely affected. Therefore, there would be no adverse effects to revenue and disposable incomes. Consequently, there would be no adverse effects to the regional economy.

Q.2.4.2 *Program-Level Effects*

Q.2.4.2.1 Potential changes to the regional economy

Alternative 2 does not have any components considered at a program level. Therefore, there would be no program level effects to the regional economy.

Q.2.5 Alternative 3

Q.2.5.1 *Project-Level Effects*

Q.2.5.1.1 Potential M&I-related changes to the regional economy

Trinity River Region

There are no M&I CVP or SWP water service contractors in the Trinity River Region. Therefore, there would be no changes to CVP and SWP water supplies in the Trinity River Region. Consequently, there would be no impacts to regional economy in the Trinity River Region under Alternative 3.

Sacramento River Region

Alternative 3 would increase water supplies to M&I water contractors in the Sacramento River Region on average by approximately 2,000 AFY compared to the No Action Alternative. These increases in CVP and SWP water supplies would help meet 2030 water demands without development of other alternative water supplies. Additionally, increased water supplies under Alternative 3 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-33, Sacramento River Region M&I Water Supply Costs Under the Alternative 3 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $50,000 under Alternative 3 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions. Reduced reliance on groundwater is also expected to decrease groundwater pumping costs under Alternative 3. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 3, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-34, Sacramento River Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-33. Sacramento River Region M&I Water Supply Costs Under the Alternative 3 Compared to the No Action Alternative

	Alternative 3 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	2
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$37
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$0
Transfer Costs (thousand dollars)[7]	-$35
Shortage Costs (thousand dollars)[8]	$0
Groundwater Pumping Costs (thousand dollars)[9]	-$26
Excess Water Costs (thousand dollars)[10]	-$27
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$50**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.

[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-34. Sacramento River Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$28	$77
Mining	0	$5	$35
Construction	0	$366	$916
Manufacturing	0	$56	$482
TIPU	0	$589	$2,396
Trade	0	$1,769	$5,093
Service	< 1	$5,273	$19,950
Government	0	$3,399	$4,337
Total	**< 1**	**$11,483**	**$33,287**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

San Joaquin River Region

Alternative 3 would increase water supplies to M&I water contractors in the San Joaquin River Region on average by approximately 49,000 AFY compared to the No Action Alternative. M&I contractors in the San Joaquin River Region would also not need to invest in 1,000 AFY under the No Action Alternative, which would be a cost saving relative to the No Action Alternative. Additionally, increased water supplies under Alternative 3 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-35, San Joaquin River Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $4.1 million under Alternative 3 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions and development of alternate water supplies under Alternative 3. Reduced reliance on groundwater is also expected to decrease groundwater pumping costs under Alternative 3 compared to the No Action Alternative. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 3, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-36, San Joaquin River Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an

increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-35. San Joaquin River Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative

	Alternative 3 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	49
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$4,591
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	-1
Annualized Alternate Supply Costs (thousand dollars)[4]	-$286
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	-$41
Transfer Costs (thousand dollars)[7]	-$3,491
Shortage Costs (thousand dollars)[8]	-$14
Groundwater Pumping Costs (thousand dollars)[9]	-$1,286
Excess Water Costs (thousand dollars)[10]	-$3,352
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$3,878**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-36. San Joaquin River Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	< 1	$6,058	$17,448
Mining	0	$1,097	$3,783
Construction	< 1	$15,622	$43,158
Manufacturing	< 1	$9,632	$92,426
TIPU	< 1	$49,920	$172,323
Trade	4	$142,207	$394,522
Service	9	$332,526	$1,325,594
Government	2	$155,315	$210,475

Total	**16**	**$712,376**	**$2,259,730**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Bay-Delta Region

Alternative 3 would increase water supplies to M&I water contractors in the Bay-Delta Region on average by approximately 10,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Bay-Delta Region M&I contractors would not need to invest in alternate water supplies under Alternative 3. Additionally, increased water supplies under Alternative 3 would reduce reliance on water transfers in the region.

Table Q.2-37, Bay-Delta Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $1.4 million under Alternative 3 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 3, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-38, Bay-Delta Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-37. Bay-Delta Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative

	Alternative 3 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	10
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$140
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	-$523
Lost Water Sales Revenues (thousand dollars)[6]	-$284
Transfer Costs (thousand dollars)[7]	-$510
Shortage Costs (thousand dollars)[8]	-$95
Groundwater Pumping Costs (thousand dollars)[9]	$51
Excess Water Costs (thousand dollars)[10]	-$140
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$1,361**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates

[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-38. Bay-Delta Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$776	$2,049
Mining	0	$57	$251
Construction	< 1	$6,781	$16,993
Manufacturing	0	$3,860	$36,877
TIPU	< 1	$18,195	$75,509
Trade	1	$44,558	$120,353
Service	3	$146,393	$535,218
Government	< 1	$85,855	$106,169
Total	**5**	**$306,475**	**$893,419**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

San Francisco Bay Area Region

Alternative 3 would increase water supplies to M&I water contractors in the San Francisco Bay Area Region on average by approximately 54,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, San Francisco Bay Area Region M&I contractors would not need to invest in alternate water supplies under Alternative 3. Additionally, increased water supplies under Alternative 3 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-39, San Francisco Bay Area Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $9.1 million under Alternative 3 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions and lost water sales revenue. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 3, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-40, San Francisco Bay Area Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an

increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-39. San Francisco Bay Area Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative

	Alternative 3 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	54
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$1,971
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	-3
Annualized Alternate Supply Costs (thousand dollars)[4]	-$526
Water Storage Costs (thousand dollars)[5]	$252
Lost Water Sales Revenues (thousand dollars)[6]	-$2,891
Transfer Costs (thousand dollars)[7]	-$6,000
Shortage Costs (thousand dollars)[8]	-$965
Groundwater Pumping Costs (thousand dollars)[9]	-$411
Excess Water Costs (thousand dollars)[10]	-$459
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$9,029**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-40. San Francisco Bay Area Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	< 1	$3,903	$7,740
Mining	0	$468	$2,988
Construction	< 1	$73,903	$169,911
Manufacturing	< 1	$42,092	$229,741
TIPU	2	$176,347	$580,222
Trade	6	$371,134	$873,967
Service	20	$1,142,215	$3,599,988
Government	7	$877,342	$991,070

Total	**36**	**$2,687,405**	**$6,455,628**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Central Coast Region

Alternative 3 would increase water supplies to M&I water contractors in the Central Coast Region on average by approximately 12,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Central Coast Region M&I contractors would not need to invest in alternate water supplies under Alternative 3.

Table Q.2-41, Central Coast Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $398,000 under Alternative 3 compared to the No Action Alternative. Cost reductions are mostly due to transfer cost reductions and lost water sales revenue. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 3, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-42, Central Coast Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-41. Central Coast Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative

	Alternative 3 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	12
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$2,232
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$0
Transfer Costs (thousand dollars)[7]	$0
Shortage Costs (thousand dollars)[8]	$0
Groundwater Pumping Costs (thousand dollars)[9]	-$844
Excess Water Costs (thousand dollars)[10]	-$1,786
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$398**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates

[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-42. Central Coast Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	$325	$735
Mining	0	$294	$1,089
Construction	0	$2,792	$7,085
Manufacturing	0	$345	$4,052
TIPU	< 1	$5,077	$19,976
Trade	< 1	$16,460	$42,222
Service	1	$52,226	$183,709
Government	< 1	$31,487	$38,914
Total	**2**	**$109,008**	**$297,782**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Southern California Region

Alternative 3 would increase water supplies to M&I water contractors in the Southern California Region on average by approximately 498,000 AFY compared to the No Action Alternative. With these increases in CVP and SWP water supplies, Southern California Region M&I contractors would not need to invest in alternate water supplies under Alternative 3. Additionally, increased water supplies under Alternative 3 would reduce reliance on water transfers and groundwater pumping in the region.

Table Q.2-43, Southern California Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to reduce by approximately $64.8 million under Alternative 3 compared to the No Action Alternative. Cost reductions are mostly due to reduction in groundwater pumping and increased reliability of water supplies. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 3, there would be a reduction in water supply costs, and, consequently, water rates would be lower than the No Action Alternative. This would result in an increase in disposable income and could result in more spending in the regional economy.

Table Q.2-44, Southern California Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from decreased water supply costs and increased disposable income to CVP and SWP M&I contractors. An increase in disposable income in the area would result an

increase in spending in the region. Increases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-43. Southern California Region M&I Water Supply Costs under the Alternative 3 Compared to the No Action Alternative

	Alternative 3 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	498
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	$71,746
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	-66
Annualized Alternate Supply Costs (thousand dollars)[4]	-$23,394
Water Storage Costs (thousand dollars)[5]	-$3,303
Lost Water Sales Revenues (thousand dollars)[6]	-$22,940
Transfer Costs (thousand dollars)[7]	-$14,203
Shortage Costs (thousand dollars)[8]	-$28,016
Groundwater Pumping Costs (thousand dollars)[9]	-$39,343
Excess Water Costs (thousand dollars)[10]	-$5,330
Average Annual Changes in Water Supply Costs (thousand dollars)	**-$64,782**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-44. Southern California Region M&I Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	< 1	$32,166	$86,269
Mining	< 1	$15,065	$56,770
Construction	4	$279,135	$734,267
Manufacturing	5	$383,964	$2,654,973
TIPU	14	$1,087,146	$4,131,501
Trade	40	$1,912,249	$5,089,884
Service	141	$7,048,894	$22,548,178
Government	26	$3,047,343	$3,812,507

Total	231	$13,805,962	$39,114,349

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Q.2.5.1.2 Potential agriculture-related changes to the regional economy

Trinity River Region

There are no agricultural lands irrigated with CVP/SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 3. Consequently, there would be no impacts to regional economy in the Trinity River Region under Alternative 3.

Sacramento River Region

Alternative 3 is expected to increase average annual agricultural water supply deliveries by 22,000 AFY during average conditions and by 13,000 AFY during dry conditions. As summarized in Table Q.2-45, Sacramento River Region Agricultural Water Supply Costs under the Alternative 3 Compared to the No Action Alternative, this increase in CVP or SWP deliveries could reduce groundwater usage in the Sacramento River Region under dry conditions. Consequently, operation costs associated with crop production would be lower and would result in increased profitability to the growers. Increased deliveries in the Sacramento River Region are very small and are not expected to change irrigated acreage or agricultural revenue in the region. Therefore, the regional economic effects from water supply increases would be minimal.

Table Q.2-45. Sacramento River Region Agricultural Water Supply Costs under the Alternative 3 Compared to the No Action Alternative

	Alternative 3 compared to No Action Alternative
Average Conditions[1]	
Average Annual CVP/SWP Deliveries (TAF)	22
Annual Groundwater Pumping (TAF)	0
Groundwater Pumping Cost (million dollars)	$0
Irrigated Acreage (thousand acres)	0
Agricultural Revenue (million dollars)	$0
Dry Conditions[2]	
Average Annual CVP/SWP Deliveries (TAF)	13
Annual Groundwater Pumping (TAF)	-11
Groundwater Pumping Cost (million dollars)	-$1
Irrigated Acreage (thousand acres)	0
Agricultural Revenue (million dollars)	$0

All costs in 2018 dollars
TAF = thousand acre-feet
[1] Average Conditions refers to an average of all year types in the 81-year simulation period.
[2] Dry Conditions refer to an average of dry years only, using Sacramento River Index.

San Joaquin River Region

Alternative 3 is expected to increase average annual agricultural water supply deliveries by 666,000 AFY during average conditions and by 428,000 AFY during dry conditions in the San Joaquin River Region. Therefore, Alternative 3 reduces the occurrences of water supply shortages to agricultural contractors during all year types. Consequently, agricultural contractors would reduce their reliance on groundwater supplies in lieu of increased surface water deliveries. Table Q.2-46 summarizes the projected groundwater pumping volumes and groundwater pumping costs under Alternative 3 compared to the No Action Alternative. Overall groundwater pumping volumes under Alternative 3 would be lower than under the No Action Alternative due to increased surface water deliveries. Reduction in groundwater pumping would result in reduced groundwater pumping costs. Consequently, operation costs associated with crop production would be lower and could result in increased profitability to the growers.

As summarized in Table Q.2-46, San Joaquin River Region Agricultural Water Supply Costs under the Alternative 3 Compared to the No Action Alternative, SWAP model estimates an increase in irrigated acreage under Alternative 3 compared to the No Action Alternative. This increase in irrigated acreage would result in increased agricultural revenues for the growers as summarized in Table Q.2-46. Additionally, this would affect businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing. Table Q.2-47, San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative under Average Conditions, and Table Q.2-48, San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative under Dry Conditions, summarize the regional economic effects on employment, labor income, and revenue from increased CVP and SWP deliveries to agricultural contractors.

Table Q.2-46. San Joaquin River Region Agricultural Water Supply Costs under the Alternative 3 Compared to the No Action Alternative

	Alternative 3 compared to No Action Alternative
Average Conditions[1]	
Average Annual CVP/SWP Deliveries (TAF)	644
Annual Groundwater Pumping (TAF)	-508
Groundwater Pumping Cost (million dollars)	-$103
Irrigated Acreage (thousand acres)	5
Agricultural Revenue (million dollars)	$15
Dry Conditions[2]	
Average Annual CVP/SWP Deliveries (TAF)	414
Annual Groundwater Pumping (TAF)	-214
Groundwater Pumping Cost (million dollars)	-$54
Irrigated Acreage (thousand acres)	56
Agricultural Revenue (million dollars)	$121

All costs in 2018 dollars
TAF = thousand acre-feet
[1] Average Conditions refers to an average of all year types in the 81-year simulation period.
[2] Dry Conditions refer to an average of dry years only, using Sacramento River Index.

Table Q.2-47. San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative under Average Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	149	$6,431,507	$17,530,096
Mining	<1	$18,591	$79,131
Construction	2	$91,094	$248,062
Manufacturing	1	$71,869	$779,857
TIPU	3	$235,891	$667,704
Trade	9	$399,165	$1,208,678
Service	31	$1,340,969	$4,416,030
Government	1	$98,014	$282,202
Total	196	$8,687,100	$25,211,759

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Table Q.2-48. San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 3 Compared to the No Action Alternative under Dry Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	1083	$47,591,046	$140,880,956
Mining	2	$179,927	$779,446
Construction	12	$735,170	$2,001,398
Manufacturing	8	$619,114	$6,862,175
TIPU	28	$1,981,782	$5,567,972
Trade	72	$3,255,304	$9,965,378
Service	248	$10,688,600	$35,644,437
Government	9	$808,163	$2,326,073
Total	1461	$65,859,107	$204,027,835

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Bay-Delta Region

Alternative 3 is expected to increase average annual agricultural water supply deliveries in the Bay-Delta Region. Impacts from increased water supply to agricultural contractors in the Bay-Delta Region are evaluated under Sacramento and San Joaquin River Region analysis. Increase in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the regional economy as it would impact businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing.

San Francisco Bay Area Region

Alternative 3 is expected to increase average annual agricultural water supply deliveries in the San Francisco Bay Area Region by 14,000 AFY under average conditions and by 9,000 AFY under dry conditions. Increase in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the regional economy as it would impact businesses and individuals who support farming activities, such as farm

workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing.

Central Coast Region

There are no agricultural lands irrigated with CVP and SWP water supplies in the Central Coast Region. Therefore, there would be no changes in irrigated lands under Alternative 3. Consequently, there would be no impacts to regional economy in the Central Coast Region under Alternative 3.

Southern California Region

Alternative 3 is expected to increase average annual agricultural water supply deliveries in the Southern California Region by 3,000 AFY under average conditions and by 2,000 AFY under dry conditions. Increase in agricultural water supply in the region could result in an increase in irrigated acreage and agricultural revenues in the region. This would have a beneficial impact to the region economy as it would affect businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing.

Q.2.5.1.3 Potential fisheries-related changes to the regional economy

Similar to Alternative 2, Alternative 3 would also cause a reduction in salmon population along the SONCC. The magnitude of reduction under Alternative 3 would be lower compared to Alternative 2. Decreases in salmon population could potentially decrease commercial and recreational ocean salmon harvest. This could have a detrimental impact to fishermen and other ocean fisheries-supported industries.

As discussed in Appendix O, flows under Alternative 3 could reduce coho salmon habitat in the Trinity River Region. Additionally, water temperatures under Alternative 3 could negatively affect some Coho life stages. Overall, Alternative 3 could result in adverse impacts to salmon population in the Trinity River Region. These salmon populations are extremely important to the Yurok Tribe and Hoopa Valley Tribe as part of their lives, cultural traditions, ceremonies, and community health (Reclamation 2012). Fifty percent of the total available salmon in the Trinity River is the federally protected harvest for the Yurok and Hoopa Valley tribes (DOI 1993). Each tribe determines the use of the harvest. Decreases in salmon population in the Trinity River would decrease salmon landings by the Yurok and Hoopa Valley tribe. The tribe would sell a portion or all of their landings which would affect revenues and disposable incomes to the tribe. Since salmon population would decrease under Alternative 3, salmon landings would be adversely affected. Therefore, there would be adverse effects to revenue and disposable incomes. This could have a detrimental impact to regional economy.

Q.2.5.2 *Program-Level Effects*

Q.2.5.2.1 Potential changes to the regional economy

Alternative 3 includes several program actions that would require construction such as American River Drought Temperature Facility Improvements, Tracy Fish Collection Facility Improvements, Skinner Fish Facility Improvements, Delta Fish Species Conservation Hatchery, Upper Sacramento Small Screen Program, Juvenile Trap and Haul Programs in the Sacramento River. Construction activities associated with program action would temporarily increase construction-related employment and spending in the areas near the construction sites. These impacts would be beneficial to the regional economy and would result in a temporary increase in employment, labor income, and revenue in Shasta, Sacramento, San Joaquin, and Contra Costa Counties.

In addition to the construction actions, Alternative 3 would also include habitat restoration projects along the upper reaches of the Sacramento River, American River, Stanislaus River, and Lower San Joaquin River. Alternative 3 also includes 8,000 acres of tidal habitat restoration projects and 25,000 acres of additional habitat restoration within the Delta would be implemented under Alternative 3. These habitat restoration projects could remove agricultural lands or grazing lands out of production. These impacts could reduce irrigated acreage and agricultural revenues which would impact growers and businesses and individuals who support farming activities negatively. Tidal restoration projects would mainly occur in the Delta Region and could improve recreational fishing and day use opportunities in the long-term. These impacts could be beneficial to the region as they could increase visitors from within and outside the region. Visitors from outside the region would generate new economic activity in the region due to increased spending. This would be beneficial to the regional economy.

Q.2.6 Alternative 4

Q.2.6.1 *Project-Level Effects*

Q.2.6.1.1 Potential M&I water supply related changes to the regional economy

Trinity River Region

There are no M&I CVP or SWP water service contractors in the Trinity River Region. Therefore, there would be no changes to CVP and SWP water supplies in the Trinity River Region. Consequently, there would be no impacts to regional economy in the Trinity River Region under Alternative 4.

Sacramento River Region

Alternative 4 would decrease water supplies to M&I water contractors in the Sacramento River Region on average by approximately 2,000 AFY compared to the No Action Alternative. These decreases in CVP and SWP water supplies would increase the supply gap to meet 2030 water demands. Therefore, M&I contractors would need to develop other alternate water supplies to meet their demands.

Table Q.2-49, Sacramento River Region M&I Water Supply Costs Under the Alternative 4 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to increase by approximately $137,000 under Alternative 4 compared to the No Action Alternative. The cost increases are mostly because of increased water transfer costs. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 4, there would be an increase in water supply costs, and, consequently, water rates would be higher than the No Action Alternative. This would result in a decrease in disposable income and could result in less spending in the regional economy.

Table Q.2-50, Sacramento River Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from increased water supply costs and decreased disposable income to CVP and SWP M&I contractors. A decrease in disposable income in the area would result a decrease in spending in the region. Decreases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-49. Sacramento River Region M&I Water Supply Costs Under the Alternative 4 Compared to the No Action Alternative

	Alternative 4 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	-2
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	-$33
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$8
Transfer Costs (thousand dollars)[7]	$121
Shortage Costs (thousand dollars)[8]	$2
Groundwater Pumping Costs (thousand dollars)[9]	$14
Excess Water Costs (thousand dollars)[10]	$23
Average Annual Changes in Water Supply Costs (thousand dollars)	**$137**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-50. Sacramento River Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	-$75	-$205
Mining	0	-$12	-$93
Construction	0	-$975	-$2,445
Manufacturing	0	-$149	-$1,286
TIPU	0	-$1,571	-$6,391
Trade	<1 job lost	-$4,718	-$13,587
Service	<1 job lost	-$14,067	-$53,220
Government	<1 job lost	-$9,067	-$11,571
Total	-1	-$30,634	-$88,798

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

San Joaquin River Region

Alternative 4 would decrease water supplies to M&I water contractors in the San Joaquin River Region on average by approximately 10,000 AFY compared to the No Action Alternative. With these decreases in CVP and SWP water supplies, San Joaquin River Region M&I contractors would need to invest in alternate water supplies to meet their 2030 water demand.

Table Q.2-51, San Joaquin River Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to increase by approximately $1.2 million under Alternative 4 compared to the No Action Alternative. The cost increases are mostly because of investments in new supply project and transfer costs. Additionally, the decrease in surface water supply would increase reliance on groundwater and consequently increase groundwater pumping costs. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 4, there would be an increase in water supply costs, and, consequently, water rates would be higher than the No Action Alternative. This would result in a decrease in disposable income and could result in less spending in the regional economy.

Table Q.2-52, San Joaquin River Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from increased water supply costs and decreased disposable income to CVP and SWP M&I contractors. A decrease in disposable income in the area would result a decrease in spending in the region. Decreases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-51. San Joaquin River Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative

	Alternative 4 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	-10
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	-$900
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	<1
Annualized Alternate Supply Costs (thousand dollars)[4]	$89
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$0
Transfer Costs (thousand dollars)[7]	$1,115
Shortage Costs (thousand dollars)[8]	$0
Groundwater Pumping Costs (thousand dollars)[9]	$521
Excess Water Costs (thousand dollars)[10]	$385
Average Annual Changes in Water Supply Costs (thousand dollars)	**$1,211**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.

[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-52. San Joaquin River Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	-$1,898	-$5,468
Mining	0	-$344	-$1,186
Construction	0	-$4,895	-$13,525
Manufacturing	0	-$3,018	-$28,964
TIPU	0	-$15,643	-$54,001
Trade	-1	-$44,564	-$123,632
Service	-3	-$104,205	-$415,404
Government	-1	-$48,671	-$65,957
Total	**-5**	**-$223,239**	**-$708,136**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Bay-Delta Region

Alternative 4 would decrease water supplies to M&I water contractors in the Bay-Delta Region on average by approximately 14,000 AFY compared to the No Action Alternative. With these decreases in CVP and SWP water supplies, Bay-Delta Region M&I contractors would need to invest in alternate water supply sources to meet 2030 water demands.

Table Q.2-53, Bay-Delta Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to increase by approximately $1.5 million under Alternative 4 compared to the No Action Alternative. The cost increase is mostly because of the increase in water transfers and increased reliance in groundwater. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 4, there would be an increase in water supply costs, and, consequently, water rates would be higher than the No Action Alternative. This would result in a decrease in disposable income and could result in less spending in the regional economy.

Table Q.2-54, Bay-Delta Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from increased water supply costs and decreased disposable income to CVP and SWP M&I contractors. A decrease in disposable income in the area would result a decrease in spending in the region. Decreases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-53. Bay-Delta Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative

	Alternative 4 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	-14
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	-$351
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$321
Lost Water Sales Revenues (thousand dollars)[6]	$676
Transfer Costs (thousand dollars)[7]	$369
Shortage Costs (thousand dollars)[8]	$212
Groundwater Pumping Costs (thousand dollars)[9]	$54
Excess Water Costs (thousand dollars)[10]	$228
Average Annual Changes in Water Supply Costs (thousand dollars)	**$1,509**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-54. Bay-Delta Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	-$795	-$2,099
Mining	0	-$58	-$257
Construction	0	-$6,947	-$17,409
Manufacturing	0	-$3,955	-$37,778
TIPU	0	-$18,640	-$77,356
Trade	-1	-$45,647	-$123,295
Service	-3	-$149,972	-$548,304
Government	-1	-$87,954	-$108,765
Total	**-6**	**-$313,969**	**-$915,263**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

San Francisco Bay Area Region

Alternative 4 would decrease water supplies to M&I water contractors in the San Francisco Bay Area Region on average by approximately 11,000 AFY compared to the No Action Alternative. With these decreases in CVP and SWP water supplies, San Francisco Region M&I contractors would need to invest in alternate water supply sources to meet 2030 water demands.

Table Q.2-55, San Francisco Bay Area Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to increase by approximately $3.2 million under Alternative 4 compared to the No Action Alternative. The cost increase is mostly because of the increase in water transfers and increased reliance in groundwater. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 4, there would be an increase in water supply costs, and, consequently, water rates would be higher than the No Action Alternative. This would result in a decrease in disposable income and could result in less spending in the regional economy.

Table Q.2-56, San Francisco Bay Area Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from increased water supply costs and decreased disposable income to CVP and SWP M&I contractors. A decrease in disposable income in the area would result a decrease in spending in the region. Decreases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-55. San Francisco Bay Area Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative

	Alternative 4 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	-11
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	-$402
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	-$65
Lost Water Sales Revenues (thousand dollars)[6]	$647
Transfer Costs (thousand dollars)[7]	$2,789
Shortage Costs (thousand dollars)[8]	$218
Groundwater Pumping Costs (thousand dollars)[9]	$70
Excess Water Costs (thousand dollars)[10]	-$15
Average Annual Changes in Water Supply Costs (thousand dollars)	**$3,242**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.

[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-56. San Francisco Bay Area Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	-$1,463	-$2,902
Mining	0	-$176	-$1,120
Construction	0	-$27,710	-$63,709
Manufacturing	0	-$15,783	-$86,143
TIPU	-1	-$66,122	-$217,557
Trade	-2	-$139,159	-$327,698
Service	-7	-$428,279	-$1,349,833
Government	-3	-$328,964	-$371,607
Total	**-13**	**-$1,007,656**	**-$2,420,570**

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Central Coast Region

Alternative 4 would decrease water supplies to M&I water contractors in the Central Coast Region on average by approximately 2,000 AFY compared to the No Action Alternative. With these decreases in CVP and SWP water supplies, Central Coast Region M&I contractors would need to invest in alternate water supply sources to meet 2030 water demands.

Table Q.2-57, Central Coast Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to increase by approximately $184 thousand under Alternative 4 compared to the No Action Alternative. The cost increase is mostly because of increased reliance in groundwater. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 4, there would be an increase in water supply costs, and, consequently, water rates would be higher than the No Action Alternative. This would result in a decrease in disposable income and could result in less spending in the regional economy.

Table Q.2-58, Central Coast Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from increased water supply costs and decreased disposable income to CVP and SWP M&I contractors. A decrease in disposable income in the area would result a decrease in spending in the region. Decreases in spending would result in induced impacts in the region and would primarily occur in the services sector.

Table Q.2-57. Central Coast Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative

	Alternative 4 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	-2
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	-$448
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	0
Annualized Alternate Supply Costs (thousand dollars)[4]	$0
Water Storage Costs (thousand dollars)[5]	$0
Lost Water Sales Revenues (thousand dollars)[6]	$0
Transfer Costs (thousand dollars)[7]	$0
Shortage Costs (thousand dollars)[8]	$0
Groundwater Pumping Costs (thousand dollars)[9]	$391
Excess Water Costs (thousand dollars)[10]	$241
Average Annual Changes in Water Supply Costs (thousand dollars)	**$184**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.
[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-58. Central Coast Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	-$151	-$340
Mining	0	-$136	-$504
Construction	0	-$1,293	-$3,281
Manufacturing	0	-$160	-$1,877
TIPU	0	-$2,352	-$9,252
Trade	0	-$7,624	-$19,555
Service	-1	-$24,188	-$85,084
Government	0	-$14,583	-$18,023
Total	-1	-$50,486	-$137,916

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Southern California Region

Alternative 4 would decrease water supplies to M&I water contractors in the Southern California Region on average by approximately 91,000 AFY compared to the No Action Alternative. With these decreases in CVP and SWP water supplies, Southern California Region M&I contractors would need to invest in alternate water supply sources to meet 2030 water demands.

Table Q.2-59, Southern California Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative, summarizes the average annual water supply costs over the 81-year hydrologic period for M&I water supplies. Average annual water supply costs are expected to increase by approximately $16.8 million under Alternative 4 compared to the No Action Alternative. The cost increase is mostly because of investment in new supply projects, increases in water transfers and increased reliance on groundwater under Alternative 4. Typically, water supply cost increases are passed on to water customers through water rate increases. Under Alternative 4, there would be an increase in water supply costs, and, consequently, water rates would be higher than the No Action Alternative. This would result in a decrease in disposable income and could result in less spending in the regional economy.

Table Q.2-60, Southern California Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative, summarizes the regional economic effects to employment, labor income, and revenue from increased water supply costs and decreased disposable income to CVP and SWP M&I contractors. A decrease in disposable income in the area would result a decrease in spending in the region. Decreases in spending would result in induced impacts in the region and would primarily occur in the restaurant sector.

Table Q.2-59. Southern California Region M&I Water Supply Costs under the Alternative 4 Compared to the No Action Alternative

	Alternative 4 compared to No Action Alternative
Average Annual CVP/SWP Deliveries (TAF)[1]	-91
Delivery Cost for CVP/SWP Deliveries (thousand dollars)[2]	-$13,506
Alternate Water Supply Deliveries (assumed new supply) (TAF)[3]	8
Annualized Alternate Supply Costs (thousand dollars)[4]	$3,870
Water Storage Costs (thousand dollars)[5]	$859
Lost Water Sales Revenues (thousand dollars)[6]	$5,412
Transfer Costs (thousand dollars)[7]	$2,990
Shortage Costs (thousand dollars)[8]	$8,249
Groundwater Pumping Costs (thousand dollars)[9]	$8,564
Excess Water Costs (thousand dollars)[10]	-$159
Average Annual Changes in Water Supply Costs (thousand dollars)	**$16,278**

All costs in 2018 dollars
TAF = thousand acre-feet
[1] CalSim II simulated CVP/SWP deliveries for North of Delta and South of Delta M&I contractors
[2] Cost to deliver CVP and SWP deliveries (line items 1 in table above) based on Reclamation CVP M&I rates and Bulletin 132-10 rates
[3] Alternate water supply deliveries including desalination, new groundwater development and some types of conservation, water transfer and/or imported water. See Table Q2.2-6 in Appendix Q, Attachment 2 for summary of alternate water supply source by M&I contractor.

[4] Cost to develop alternate water supplies. This cost typically only includes development cost and other marginal costs (such as delivery costs etc.) are not included in this cost.
[5] Storage Costs include costs to store water in local groundwater banks and storage reservoirs. Costs include put and take costs.
[6] Loss of revenue from retail water sales.
[7] Cost to purchase and deliver transfer water purchases on annual spot market, or other annual options if applicable
[8] Estimated consumer surplus loss to water shortages
[9] Cost savings from reduction in groundwater pumping between the action alternatives and the No Action Alternative. Negative refers to savings and positive refers to costs.
[10] Cost savings from contract water not used to meet demand or reduce groundwater pumping. Negative refers to savings and positive refers to costs.

Table Q.2-60. Southern California Region M&I Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	0	-$7,025	-$18,841
Mining	0	-$3,290	-$12,398
Construction	-1	-$60,961	-$160,358
Manufacturing	-1	-$83,855	-$579,827
TIPU	-3	-$237,425	-$902,290
Trade	-9	-$417,621	-$1,111,594
Service	-31	-$1,539,427	-$4,924,358
Government	-6	-$665,517	-$832,624
Total	-51	-$3,015,121	-$8,542,289

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Q.2.6.1.2 Potential agriculture-related changes to the regional economy

Trinity River Region

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 4. Consequently, there would be no impacts to regional economy in the Trinity River Region under Alternative 4.

Sacramento River Region

Alternative 4 is expected to decrease average annual agricultural water supply deliveries by 4,000 AFY during average conditions and by 20,000 AFY during dry conditions. As summarized in Table Q.2-61, this decrease in CVP or SWP deliveries could increase groundwater usage in the Sacramento River Region under dry conditions. Consequently, operation costs associated with crop production would be higher and would result in decreased profitability to the growers. Reductions in irrigated acreage and agricultural revenue from decreases in deliveries are small under average conditions and would result in minimal changes to the regional economy. Under dry conditions, irrigated acreage is expected to reduce by approximately 2,000 acres due to reductions in water supply deliveries. This reduction in irrigated acreage would result in decrease in agricultural revenues for the growers as summarized in Table Q.2-61, Sacramento River Region Agricultural Water Supply Costs under the Alternative 4 Compared to the No Action Alternative. Additionally, this would affect businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing. Table Q.2-62, Sacramento River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative under Dry Conditions summarizes the regional

economic effects on employment, labor income, and revenue from increased CVP and SWP deliveries to agricultural contractors.

Table Q.2-61. Sacramento River Region Agricultural Water Supply Costs under the Alternative 4 Compared to the No Action Alternative

	Alternative 4 compared to No Action Alternative
Average Conditions[1]	
Average Annual CVP/SWP Deliveries (TAF)	-4
Annual Groundwater Pumping (TAF)	0
Groundwater Pumping Cost (million dollars)	$0
Irrigated Acreage (thousand acres)	0
Agricultural Revenue (million dollars)	$0
Dry Conditions[2]	
Average Annual CVP/SWP Deliveries (TAF)	-20
Annual Groundwater Pumping (TAF)	7
Groundwater Pumping Cost (million dollars)	$1
Irrigated Acreage (thousand acres)	-2
Agricultural Revenue (million dollars)	-$3

All costs in 2018 dollars
TAF = thousand acre-feet
[1] Average Conditions refers to an average of all year types in the 81-year simulation period.
[2] Dry Conditions refer to an average of dry years only, using Sacramento River Index.

Table Q.2-62. Sacramento River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 4 compared to the No Action Alternative under Dry Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	-75	-$1,365,885	-$3,834,693
Mining	<1 job lost	-$672	-$5,663
Construction	<1 job lost	-$24,122	-$60,084
Manufacturing	<1 job lost	-$6,547	-$65,686
TIPU	<1 job lost	-$41,943	-$133,802
Trade	-2	-$81,458	-$252,928
Service	-7	-$342,447	-$1,114,679
Government	<1 job lost	-$23,937	-$71,485
Total	-86	-$1,887,010	-$5,539,020

All costs in 2018 dollars

San Joaquin River Region

Alternative 4 is expected to decrease average annual agricultural water supply deliveries by 57,000 AFY during average conditions and by 129,000 AFY during dry conditions in the San Joaquin River Region. Therefore, Alternative 4 would increase the occurrence of water supply shortages to agricultural contractors during all year types. Consequently, agricultural contractors would increase their reliance on groundwater supplies to meet their water demand. Table Q.2-63, San Joaquin River Region Agricultural Water Supply Costs under the Alternative 4 Compared to the No Action Alternative, summarizes the

projected groundwater pumping volumes and groundwater pumping costs under Alternative 4 compared to the No Action Alternative. Overall, groundwater pumping volumes under Alternative 4 would be higher than under the No Action Alternative because of decreased surface water deliveries. Increased groundwater pumping would result in increased groundwater pumping costs. Consequently, operation costs associated with crop production would be higher and could result in decreased profitability to the growers.

As summarized in Table Q.2-63, the SWAP model estimates a decrease in irrigated acreage under Alternative 4 compared to the No Action Alternative. This decrease in irrigated acreage would result in decrease in agricultural revenues for the growers as summarized in Table Q.2-63. Additionally, this would affect businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing. Table Q.2-64, San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative under Average Conditions, and Table Q.2-65, San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative under Dry Conditions, summarize the regional economic effects on employment, labor income, and revenue from increased CVP and SWP deliveries to agricultural contractors.

Table Q.2-63. San Joaquin River Region Agricultural Water Supply Costs under the Alternative 4 Compared to the No Action Alternative

	Alternative 4 compared to No Action Alternative
Average Conditions[1]	
Average Annual CVP/SWP Deliveries (TAF)	-57
Annual Groundwater Pumping (TAF)	26
Groundwater Pumping Cost (million dollars)	$6
Irrigated Acreage (thousand acres)	-6
Agricultural Revenue (million dollars)	-$14
Dry Conditions[2]	
Average Annual CVP/SWP Deliveries (TAF)	-129
Annual Groundwater Pumping (TAF)	49
Groundwater Pumping Cost (million dollars)	$13
Irrigated Acreage (thousand acres)	-12
Agricultural Revenue (million dollars)	-$29

All costs in 2018 dollars
TAF = thousand acre-feet
[1] Average Conditions refers to an average of all year types in the 81-year simulation period.
[2] Dry Conditions refer to an average of dry years only, using Sacramento River Index.

Table Q.2-64. San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative under Average Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	-125	-$5,457,203	-$16,065,756
Mining	0	-$21,261	-$92,290
Construction	-1	-$81,820	-$222,810
Manufacturing	-1	-$70,665	-$790,231

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
TIPU	-3	-$227,152	-$638,960
Trade	-8	-$372,699	-$1,140,728
Service	-29	-$1,228,997	-$4,101,112
Government	-1	-$93,307	-$268,800
Total	-168	-$7,553,103	-$23,320,687

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Table Q.2-65. San Joaquin River Region Agricultural Water Supply Related Regional Economic Effects under Alternative 4 Compared to the No Action Alternative under Dry Conditions

	Employment (in jobs)	Labor Income (in dollars)	Output (in dollars)
Agriculture	-271	-$11,769,901	-$34,431,640
Mining	-1	-$46,251	-$200,915
Construction	-3	-$173,038	-$471,301
Manufacturing	-2	-$151,205	-$1,698,570
TIPU	-7	-$487,588	-$1,372,900
Trade	-18	-$800,168	-$2,447,833
Service	-61	-$2,648,539	-$8,838,113
Government	-2	-$201,181	-$579,832
Total	-364	-$16,277,871	-$50,041,104

All costs in 2018 dollars
TIPU = Transportation, Information, Power, and Utilities

Bay-Delta Region

Alternative 4 is expected to decrease average annual agricultural water supply deliveries in the Bay-Delta Region. Impacts from decreased water supply to agricultural contractors in the Bay-Delta Region are evaluated under Sacramento and San Joaquin River Region analysis. The decrease in agricultural water supply in the region could result in a decrease in irrigated acreage and agricultural revenues in the region. This would have an adverse impact to the regional economy as it would impact businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing.

San Francisco Bay Area Region

Alternative 4 is expected to decrease average annual agricultural water supply deliveries in the San Francisco Bay Area Region by 2,000 AFY under average conditions and by 4,000 AFY under dry conditions. The decrease in agricultural water supply in the region could result in a decrease in irrigated acreage and agricultural revenues in the region. This would have an adverse impact to the regional economy as it would impact businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing.

Central Coast Region

There are no agricultural lands irrigated with CVP and SWP water supplies in the Central Coast Region. Therefore, there would be no changes in irrigated lands under Alternative 4. Consequently, there would no impacts to regional economy in the Central Coast Region under Alternative 4.

Southern California Region

Alternative 4 is expected to decrease average annual agricultural water supply deliveries in the Southern California Region by 300 AFY under average conditions and by 500 AFY under dry conditions. The decrease in agricultural water supply in the region could result in a decrease in irrigated acreage and agricultural revenues in the region. This would have an adverse impact to the regional economy as it would impact businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing

Q.2.6.1.3 Potential fisheries-related changes to the regional economy

The commercial and recreational (ocean sports) ocean salmon fishery along the SONCC are affected by the population of salmon that rely upon the Northern California rivers, including the Sacramento and San Joaquin Rivers. Appendix O describes changes in CVP and SWP water operations would affect the flow patterns and water quality of the Sacramento and San Joaquin Rivers, and the survivability of the salmon that use those rivers for habitat. Appendix O also describes that the population of salmon along the SONCC would be higher under all action alternatives compared to No Action Alternative. Increase in salmon population could potentially increase commercial and recreational ocean salmon harvest. Increase in commercial ocean salmon harvest would increase revenues received by fisherman. Ocean fisheries support industries such as fish processors, boat manufacturers, repair and maintenance would also see an increase in revenue. Overall, increased fisheries under Alternative 4 would be beneficial to the regional economy.

Similar to Alternatives 1 and 2, Alternative 4 would not adversely affect salmon population in the Trinity River Region and salmon landings would not be adversely affected. Therefore, there would be no adverse effects to revenue and disposable incomes. Consequently, there would be no adverse effects to the regional economy.

Q.2.6.2 *Program-Level Effects*

Q.2.6.2.1 Potential changes to the regional economy

Alternative 4 includes water use efficiency components that could include construction actions, public outreach programs and operational changes to improve system efficiency. Construction activities associated with program action would temporarily increase construction-related employment and spending in the areas near the construction sites. These impacts would be beneficial to the regional economy and would result in a temporary increase in employment, labor income, and revenue.

Q.2.7 Mitigation Measures

No mitigation measures have been identified for the effects identified in this EIS.

Q.2.8 Summary of Impacts

Table Q.2-66, Impact Summary, includes a summary of impacts, the magnitude and direction of those impacts, and potential mitigation measures for consideration.

Table Q.2-66. Impact Summary

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
Potential M&I-related changes to the regional economy (Project-Level)	No Action	No Impacts	–
	1	**Trinity River Region:** No Impacts **Sacramento River Region:** Increase of <1 job, $28.8 thousand (K) in labor income, $83.6 K in revenue **San Joaquin River Region:** Increase of 2 jobs, $89.8 K in labor income, $0.2 million (M) in revenue **Bay-Delta Region:** Increase of 3 jobs, $0.2M in labor income, $0.5 M in revenue **San Francisco Bay Area Region:** Increase of 10 jobs, $0.8 M in labor income, $1.9 M in revenue **Central Coast Region:** Decrease of <1 job, $10.2 K in labor income, $27.9 K in revenue **Southern California Region:** Increase of 104 jobs, $6.2 M in labor income, $17.6 M in revenue	–

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
	2	**Trinity River Region:** No Impacts **Sacramento River Region:** Increase of <1 job, $13.5 K in labor income, $39.6 K in revenue **San Joaquin River Region:** Increase of 16 jobs, $0.7 M in labor income, $2.3 M in revenue **Bay-Delta Region:** Increase of 5 jobs, $0.3 M in labor income, $0.9 M in revenue **San Francisco Bay Area Region:** Increase of 35 jobs, $2.7 M in labor income, $6.5 M in revenue **Central Coast Region:** Increase of 2 jobs, $0.1 M in labor income, $0.3 M in revenue **Southern California Region:** Increase of 232 jobs, $13.9 M in labor income, $39.4 M in revenue	–
	3	**Trinity River Region:** No Impacts **Sacramento River Region:** Increase of <1 job, $11.5 K in labor income, $33.3 K in revenue **San Joaquin River Region:** Increase of 16 jobs, $0.7 M in labor income, $2.3 M in revenue **Bay-Delta Region:** Increase of 5 jobs, $0.3 M in labor income, $0.9 M in revenue **San Francisco Bay Area Region:** Increase of 35 jobs, $2.7 M in labor income, $6.4 M in revenue **Central Coast Region:** Increase of 2 jobs, $0.1 M in labor income, $0.3 M in revenue **Southern California Region:** Increase of 232 jobs, $13.9 M in labor income, $39.2 M in revenue	–

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
	4	**Trinity River Region:** No Impacts **Sacramento River Region:** Decrease of <1 job, $30.6 K in labor income, $88.8 K in revenue **San Joaquin River Region:** Decrease of 5 jobs, $0.2 M in labor income, $0.7 M in revenue **Bay-Delta Region:** Decrease of 6 jobs, $0.3 M in labor income, $0.9 M in revenue **San Francisco Bay Area Region:** Decrease of 13 jobs, $1.0 M in labor income, $2.4 M in revenue **Central Coast Region:** Decrease of 1 job, $50.4 K in labor income, $0.1 M in revenue **Southern California Region:** Decrease of 51 jobs, $3.0 M in labor income, $8.5 M in revenue	–
Potential agriculture-related changes to the regional economy (Project-Level)	No Action	No Impacts	–
	1	**Trinity River Region:** No Impacts **Sacramento River Region:** Minimal impacts to regional economy **San Joaquin River Region:** Increase of 136 jobs, $6.0 M in labor income, $16.6 M in revenue under Average Conditions Increase of 482 jobs, $24.8 M in labor income, $83.3 M in revenue under Dry Conditions **Bay Delta Region:** Beneficial to regional economy **San Francisco Bay Area Region:** Beneficial to regional economy **Central Coast Region:** No Impacts **Southern California Region:** Beneficial to regional economy	–

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
	2	**Trinity River Region:** No Impacts **Sacramento River Region:** Minimal impacts to regional economy **San Joaquin River Region:** Increase of 184 jobs, $8.2 M in labor income, $23.7 M in revenue under Average Conditions Increase of 1,467 jobs, $66.1 M in labor income, $204.7 M in revenue under Dry Conditions **Bay Delta Region:** Beneficial to regional economy **San Francisco Bay Area Region:** Beneficial to regional economy **Central Coast Region:** No Impacts **Southern California Region:** Beneficial to regional economy	–
	3	**Trinity River Region:** No Impacts **Sacramento River Region:** Minimal impacts to regional economy **San Joaquin River Region:** Increase of 196 jobs, $8.7 M in labor income, $25.2 M in revenue under Average Conditions Increase of 1,461 jobs, $65.9 M in labor income, $204.0 M in revenue under Dry Conditions **Bay Delta Region:** Beneficial to regional economy **San Francisco Bay Area Region:** Beneficial to regional economy **Central Coast Region:** No Impacts **Southern California Region:** Beneficial to regional economy	–

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
	4	**Trinity River Region:** No Impacts **Sacramento River Region:** Minimal impacts to regional economy under Average Conditions Decrease of 86 jobs, $1.9 M in labor income, $5.5 M in revenue under Dry Conditions **San Joaquin River Region:** Decrease of 168 jobs, $7.5 M in labor income, $23.3 M in revenue under Average Conditions Decrease of 364 jobs, $16.3 M in labor income, $50.0 M in revenue under Dry Conditions **Bay Delta Region:** Adverse impacts to regional economy **San Francisco Bay Area Region:** Adverse impacts to regional economy **Central Coast Region:** No Impacts **Southern California Region:** Adverse impacts to regional economy	–
Potential fisheries-related changes to the regional economy (Project-Level)	No Action	No Impacts	–
	1	Increased ocean salmon fisheries under Alternative 1 would be beneficial to the regional economy No adverse impacts to Trinity River Region salmon population would result in no changes to regional economy	–
	2	Decreased ocean salmon fisheries under Alternative 2 would be detrimental to the regional economy No adverse impacts to Trinity River Region salmon population would result in no changes to regional economy	–
	3	Decreased ocean salmon fisheries under Alternative 3 would be detrimental to the regional economy Decreased salmon population in the Trinity River Region would be detrimental to the regional economy	
	4	Increased ocean salmon fisheries under Alternative 4 would be beneficial to the regional economy No adverse impacts to Trinity River Region salmon population would result in no changes to regional economy	–
Potential changes to the regional economy (Program-Level)	No Action and 2	No Impacts	–

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
	1 and 3	Construction activities associated with program action would temporarily increase construction-related employment and spending in the areas near the construction sites. Habitat Restoration actions could remove agricultural lands or grazing lands out of production and could result in a decrease in agricultural employment and spending in the region. Tidal Restoration action could improve recreational fishing and day use opportunities in the long-term. This could result in increased recreational spending in the region.	–
	4	Construction activities associated with water use efficiency actions would temporarily increase construction related employment and spending in the areas near the construction sites.	–

K = thousand
M = million

Q.2.9 Cumulative Effects

The No Action Alternative would not result in any changes to water operations and therefore additional effects on regional economics would be avoided by design. Thus, no cumulative effects on regional economics under the No Action Alternative were identified.

Potential M&I-related changes to the regional economy

Alternatives 1 through 3 would increase water supply deliveries to North of Delta and South of Delta M&I contractors, potentially helping water agencies meet their existing and future demands without alternate water supply projects. Alternative 4 would decrease M&I water supply deliveries to North of Delta and South of Delta M&I contractors. Implementation of Alternative 4 could increase the supply gap and require water agencies to invest in alternate water supply projects to meet their demands.

Appendix Y, *Cumulative Methodology,* describes past, present, and reasonably foreseeable projects that may have effects on regional economics as well, as they would improve water supply and reliability. These cumulative projects include actions across California to develop new water storage capacity, new water conveyance infrastructure, new water recycling capacity and reoperation of existing water supply infrastructure - including surface water reservoirs and conveyance infrastructure. Cumulative projects also include ecosystem improvement and habitat restoration actions to improve conditions for special status species that could limit water supply deliveries to contractors.

Alternatives 1 through 3 would contribute to cumulatively beneficial impacts to the regional economy due to an overall increase in water supply that would reduce water rates to customers and increase disposable income and spending in the project area. Alternative 4 would decrease water supply and increase water rates to customers, which would contribute water supply shortages under the cumulative condition.

Collectively, implementation of these cumulative projects is expected to directly or indirectly improve water supply reliability to water contractors in California. The contribution of Alternative 1, 2 or 3 would be cumulatively beneficial. Alternative 4 would contribute to increased water rates under the cumulative condition.

Potential agriculture-related changes to the regional economy

Alternatives 1 through 3 would increase water supply deliveries to North of Delta and South of Delta agricultural contractors in all year types which may cause agricultural contractors to reduce their reliance on groundwater supplies, resulting in an overall lowering of groundwater pumping volumes and associated pumping costs. Operation costs associated with crop production would also be lower and would result in increased profitability to the growers and increased revenue to businesses and individuals who support farming activities. Alternative 4 would decrease water supply and would decrease agricultural production and revenue, as well as employment and labor income for growers and businesses and individuals who support farming activities.

Past, present, and reasonably foreseeable projects, described in Appendix Y, may have effects on regional economics as well, as they would improve water supply and reliability.

Alternatives 1 through 3 would contribute to cumulatively beneficial impacts to the regional economy due to an overall increase in water supply that would increase agricultural production and revenue in the project. Alternative 4 would decrease water supply and would decrease agricultural production and revenue, which would contribute to increased water rates under the cumulative condition.

Collectively, implementation of these cumulative projects is expected to directly or indirectly improve water supply reliability to agricultural water users in California. The contribution of Alternative 1, 2, or 3 would be cumulatively beneficial. Alternative 4 would contribute to increased water rates and is expected to reduce agricultural production under the cumulative condition.

Potential fisheries-related changes to the regional economy

Alternatives 1 and 4 would increase the population of salmon along the southern Oregon and northern California coast, potentially increasing commercial and recreational ocean salmon harvest and revenues received by fishermen. Alternatives 2 and 3 could lower the population of salmon along the southern Oregon and northern California coast, the reduction under Alternative 2 being higher than Alternative 3. This reduction could potentially decrease commercial and recreational ocean salmon harvest and result in a detrimental impact on fishermen and other ocean fisheries-supported industries.

Past and present human activities have substantially changed aquatic habitats in the Southern Oregon and northern California coast compared to historical conditions, resulting in cumulative adverse impacts on to the ocean salmon fishing industry. In addition to the ongoing activities, several probable future projects and programs may affect listed fishes and other aquatic biological resources in the Southern Oregon and northern California coast by effecting upstream salmon habitat. Some of the projects and programs listed in Appendix Y may adversely affect special-status fishes and critical habitat but others are likely to be beneficial.

Alternatives 1 and 4 would contribute to cumulatively beneficial impacts to the regional economy due to an overall increase in salmon populations which would increase commercial and recreational ocean salmon harvest and associated revenues for fishermen and ocean fisheries-supported industries. Alternatives 2 and 3 would decrease salmon populations, which would contribute to the reduction in commercial and recreational ocean salmon harvest under the cumulative condition.

Collectively, implementation of these cumulative projects is expected to directly or indirectly improve water quality in the northern California rivers and the survivability of salmon that use those rivers for habitat. Alternative 3 would adversely affect salmon population in the Trinity River and would contribute to a decreased salmon population along the southern Oregon and northern California coast. Alternatives 1, 2, and 4 are not likely to adversely affect salmon population in the Trinity River.

Program-Level Effects - potential changes to the regional economy

Alternative 2 does not have any components considered at a program level. Thus, no cumulative program-level effects on regional economics under Alternative 2 were identified.

Alternatives 1 and 3 include several program actions that would require construction, which would temporarily increase construction-related employment and spending in the areas near the construction sites. Alternatives 1 and 3 also include habitat restoration projects that could remove agricultural lands or grazing lands out of production, which could reduce irrigated acreage and agricultural revenues that would negatively impact growers and businesses and individuals who support farming activities. Alternative 4 includes construction actions associated with water use efficiency components that could temporarily increase construction-related employment and spending in the areas near the construction sites.

Construction activities associated with cumulative projects could be beneficial to regional economics due to the increase in employment, income, and output around the same period as the action alternatives.

Implementation of program actions under Alternatives 1, 3, and 4 would contribute to cumulatively beneficial impacts to the regional economy due to increased construction actions resulting in a temporary increase in employment, labor income, and revenue in the nearby areas.

Collectively, implementation of these cumulative projects is expected to directly or indirectly provide a temporary improvement to employment, labor income, and revenue in California. Alternatives 1, 3, and 4's contribution would be cumulatively beneficial.

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