Chapter 15 – Land Use and Agricultural Resources

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Chapter 15 Land Use and Agricultural Resources

This chapter is based on the background information and technical analysis documented in Appendix R, *Land Use and Agricultural Resources Technical Appendix*, which includes additional information on land use and agricultural resource conditions and technical analysis of the effects of each alternative.

15.1 Affected Environment

The description of the affected environment is presented at the county-level for agricultural and municipal and industrial (M&I) land uses. In addition, an overview of agricultural resources is provided.

15.1.1 Land Use

An extensive range of land uses are within this study area. These include forestry, agriculture, water, urban (including industrial, commercial, and residential), rural residential, parks and recreation, and public open spaces.

15.1.1.1 Agricultural Resources

Crop production practices vary by crop and locational differences such as soil, slope, local climate, and water source and reliability. Production practices discussed in this subsection include:

- Crop rotation and fallowing
- Crop water use
- Crop irrigation methods
- Crop responses to water quality
- Crop drainage methods
- Crop adaptation to changes in water supply availability

15.2 Effects of the Alternatives

The impact analysis considers changes in land use and agriculture related to changes in CVP and SWP operation under the alternatives as compared with the No Action Alternative.

The No Action Alternative is based on 2040 conditions. Changes that would occur over that time frame without implementation of the action alternatives are not analyzed in this chapter. However, the changes to land use and agriculture that are assumed to occur by 2040 under the

No Action Alternative are summarized in this section. For a detailed analysis, see Appendix R, *Land Use and Agricultural Resources Technical Appendix.*

Conditions in 2040 would be different than existing conditions because of the following factors:

- Climate change and sea-level rise
- General plan development throughout California, including increased water demands in portions of the Sacramento Valley

In the long term, it is anticipated that climate change, and development throughout California, could affect water supply deliveries.

Under the No Action Alternative, Reclamation would continue with the current operation of the Central Valley Project (CVP), as described in the 2020 Record of Decision and subject to the 2019 Biological Opinions. The 2020 Record of Decision for the CVP and the 2020 Incidental Take Permit for the State Water Project (SWP) represent current management direction or intensity pursuant to 43 CFR Section 46.30.

Although the No Action Alternative included habitat restoration projects at a programmatic level, the 2020 ROD did not provide environmental coverage for these projects, and all of the habitat projects considered under the No Action required or will require additional environmental documentation. Thus, ground disturbance for habitat restoration projects did not materialize as a result of implementing the No Action Alternative. For the purpose of the analysis, these habitat restoration projects are considered independent projects that will be considered under cumulative effects.

The No Action Alternative, thus, is expected to result in potential changes in land use. These changes were described and considered in the 2020 Record of Decision.

Action alternatives could change the extent of irrigated acreage and total production value over the long-term average condition and in dry and critical dry years compared to the No Action Alternative. The impact analysis compares the typical changes that would occur between alternatives by 2040.

Both the land use and agricultural resources analyses rely in part on modeling of water deliveries as projected by CalSim 3. CalSim 3 is the model used to simulate CVP and SWP operations and much of the water resources infrastructure in the Central Valley and the Delta region (California Department of Water Resources 2023). CalSim 3 model output includes minor fluctuations of up to 5% due to model assumptions and approaches. Therefore, if quantitative changes between a specific alternative and the No Action Alternative are less than 5%, conditions under the specific alternative would be considered to be “similar” to conditions under the No Action Alternative.

The California Water Economics Spreadsheet Tool (CWEST) model was used to evaluate M&I water demands of CVP and SWP water users in the Central Valley, San Francisco Bay Area, Central Coast, and Southern California regions.

For impacts within the area modeled, agricultural impacts were evaluated using both CalSim 3 and a regional agricultural production model developed for large-scale analysis of irrigation water supply and cost changes. The Statewide Agricultural Production (SWAP) model is a regional model of irrigated agricultural production and economics that simulates the decisions of producers (farmers) in 27 agricultural subregions in the Central Valley, as described in Appendix Q, Attachment 3, *Statewide Agricultural Production (SWAP) Model Documentation*.

15.2.1 Potential Changes in Land Use

As shown in Table 15-1, M&I water deliveries would increase compared to the No Action Alternative for the Sacramento River region under Alternative 2 Without TUCP Systemwide VA and Without TUCP Delta VA, and the Central Coast and Southern California regions would increase compared to the No Action Alternative under Alternative 1, Alternative 2 With TUCP Without VA, and Alternative 4. The Central Coast region would also increase under Alternative 2 Without TUCP Delta VA. M&I water deliveries in the San Joaquin River region would increase compared to the No Action Alternative under Alternative 1 and Alternative 4, and the San Francisco Bay Area region would increase under Alternative 1. Alternative 3 would result in decreases in M&I water deliveries in all regions. As shown in Table 15-2, M&I deliveries under the dry and critical year average conditions would be similar to those under the long-term average condition with the exception of the Central Coast and Southern California regions under Alternative 1 and Alternative 4, the San Joaquin River region under Alternative 1, and the San Francisco Bay Area region under Alternative 3.

Under the alternatives that would see increases or no change in M&I deliveries compared to the No Action Alternative, local jurisdictions would have adequate water supply available to implement their general plans, and there would be no changes in land use. Table 15-3, shows the average annual CVP and SWP deliveries for each region and the associated average annual cost in thousands of dollars.

Table 15-1. Change in CalSim 3 Water Deliveries by Region and Type, Long-Term Average [a,b]

Regions Modeled	Water Delivery Type	Percent Change [c]						
		Alternative 1	Alt2woTUCP DeltaVA	Alt2woTUCP woVA	Alt2woTUCP AllVA	Alt2wTUCP woVA	Alternative 3	Alternative 4
Sacramento River	M&I	2%	**7%**	0%	**10%**	0%	**-17%**	1%
	Agriculture	2%	**-5%**	**-5%**	**-5%**	-4%	**-13%**	1%
San Joaquin River [d]	M&I	**31%**	1%	2%	1%	4%	**-50%**	**6%**
	Agriculture	**26%**	-4%	1%	-4%	1%	**-65%**	4%
San Francisco Bay Area	M&I	**10%**	2%	1%	2%	1%	**-25%**	2%
	Agriculture	**12%**	-2%	0%	-2%	-2%	**-70%**	2%
Central Coast	M&I	**28%**	**6%**	3%	3%	**6%**	**-53%**	**8%**
	Agriculture							
Southern California	M&I	**34%**	4%	4%	3%	**5%**	**-53%**	**7%**
	Agriculture	**45%**	0%	0%	0%	0%	**-60%**	0%

[a] The totals do not include deliveries for CVP Settlement/Exchange or SWP Feather River Service Area
[b] Long Term is the average quantity for the period of Oct 1921 - Sep 2021; simulated at 2022 Median climate.
[c] CalSim 3 model output includes minor fluctuations of up to 5% due to model assumptions and approaches. Changes less than 5% are considered "similar" to conditions under the No Action Alternative.
[d] Does not include Friant-Kern Canal or Madera Canal water users.
Alt2woTUCPDeltaVA= Alternative 2 Without TUCP Delta VA
Alt2woTUCPwoVA= Alternative 2 Without TUCP Without VA
Alt2woTUCPAllVA= Alternative 2 Without TUCP Systemwide VA
Alt2wTUCPwoVA= Alternative 2 With TUCP Without VA
M&I= Municipal and Industrial

Table 15-2. Change in CalSim 3 Water Deliveries by Region and Type, Dry and Critical Average [a,b]

Regions Modeled	Water Delivery Type	Percent Change [c]						
		Alternative 1	Alt2woTUCP DeltaVA	Alt2woTUCP woVA	Alt2woTUCP AllVA	Alt2wTUCP woVA	Alternative 3	Alternative 4
Sacramento River	M&I	**5%**	**7%**	-1%	**8%**	-2%	**-16%**	3%
	Agriculture	**7%**	**-13%**	**-15%**	**-14%**	**-14%**	**-33%**	-1%
San Joaquin River [d]	M&I	**38%**	0%	0%	-2%	0%	**-51%**	**9%**
	Agriculture	**43%**	**-8%**	**-4%**	**-9%**	**-7%**	**-70%**	1%
San Francisco Bay Area	M&I	**10%**	2%	1%	2%	0%	**-20%**	2%
	Agriculture	**42%**	**-6%**	**-6%**	**-6%**	**-12%**	**-83%**	**-6%**
Central Coast	M&I	**45%**	**5%**	0%	**5%**	**5%**	**-55%**	**15%**
	Agriculture							
Southern California	M&I	**46%**	2%	1%	2%	3%	**-56%**	**12%**
	Agriculture	**72%**	0%	0%	0%	0%	**-36%**	0%

[a] The totals do not include deliveries for CVP Settlement/Exchange or SWP Feather River Service Area

[b] Dry and Critical Years Average is the average quantity for the combination of the SWRCB D-1641 40-30-30 Dry and Critical Dry years for the period of Oct 1921 - Sep 2021; simulated at 2022 Median climate.

[c] CalSim 3 model output includes minor fluctuations of up to 5% due to model assumptions and approaches. Changes less than 5% are considered "similar" to conditions under the No Action Alternative.

[d] Does not include Friant-Kern Canal or Madera Canal water users.

Alt2woTUCPDeltaVA= Alternative 2 Without TUCP Delta VA
Alt2woTUCPwoVA= Alternative 2 Without TUCP Without VA
Alt2woTUCPAllVA= Alternative 2 Without TUCP Systemwide VA
Alt2wTUCPwoVA= Alternative 2 With TUCP Without VA
M&I= Municipal and Industrial

Table 15-3. Differences in Water Supply and Costs Between the No Action Alternative and All Alternatives

Regions Modeled	Alternative 1		Alt2woTUCPDeltaVA		Alt2woTUCPwoVA		Alt2woTUCPAllVA	
	Average Annual CVP/SWP Deliveries (TAF)	Average Annual Cost ($1,000) [a]	Average Annual CVP/SWP Deliveries (TAF)	Average Annual Cost ($1,000) [a]	Average Annual CVP/SWP Deliveries (TAF)	Average Annual Cost ($1,000) [a]	Average Annual CVP/SWP Deliveries (TAF)	Average Annual Cost ($1,000) [a]
Sacramento Valley	0.1	578	9.8	-4,309	-0.1	-553	5.9	-1,081
San Joaquin	27.6	-11,596	1.6	-3,709	2.4	-3,640	1.4	-3,609
San Francisco Bay Area	43.3	-35,280	6.8	-8,434	5.1	-5,308	6.7	-6,400
Central Coast	9.6	-2,198	1.5	-335	1.3	-299	1.3	-281
Southern California	467.8	-336,646	49	1,119	52.2	24,009	42.4	-6,300
Total	**548.3**	**-355,865**	**68.8**	**-15,668**	**60.9**	**14,209**	**57.7**	**-5,071**

[a] Benefits are shown as negative costs.
Alt2woTUCPDeltaVA= Alternative 2 Without TUCP Delta VA
Alt2woTUCPwoVA= Alternative 2 Without TUCP Without VA
Alt2woTUCPAllVA= Alternative 2 Without TUCP Systemwide VA
CVP= Central Valley Project
SWP= State Water Project
TAF= Thousand-acre feet

Table 15-3. Differences in Water Supply and Costs Between the No Action Alternative and All Alternatives (continued)

Regions Modeled	Alt2wTUCPwoVA		Alternative 3		Alternative 4	
	Average Annual CVP/SWP Deliveries (TAF)	Average Annual Cost ($1,000) [a]	Average Annual CVP/SWP Deliveries (TAF)	Average Annual Cost ($1,000) [a]	Average Annual CVP/SWP Deliveries (TAF)	Average Annual Cost ($1,000) [a]
Sacramento Valley	0	-162	-15.6	7,903	0	-351
San Joaquin	2.9	-2,422	-54.2	16,108	5.2	-1,408
San Francisco Bay Area	3.1	2,999	-115.4	35,548	8.7	-180
Central Coast	1.6	-373	-18.9	4,286	2.7	-617
Southern California	65.9	-24,111	-736.1	1,098,094	98.8	-68,520
Total	**73.6**	**-24,067**	**-940.1**	**1,161,939**	**115.5**	**-71,074**

[a] Benefits are shown as negative costs.
Alt2wTUCPwoVA= Alternative 2 With TUCP Without VA
CVP= Central Valley Project
SWP= State Water Project
TAF= Thousand-acre feet

As shown in Table 15-3, annual average deliveries would increase across Alternatives 2 and 4 and more significantly under Alternative 1 compared to the No Action Alternative, which would correspond to reduced average annual costs. Alternative 3 would see a reduction in deliveries compared to the No Action Alternative and an increase in average annual costs. Regions that experience increases in deliveries and reductions in annual costs would be expected to have adequate water supply available to implement their general plans, and there would be no changes in land use. Regions that experience an increase in average annual costs may have a difficult time affording alternative water sources to supplement reduced deliveries. Under Alternative 3, local jurisdictions may be unable to implement their general plans which could result in changes to land use. Implementation of Mitigation Measure AG-1 described in Section 15.3, Mitigation Measures, could reduce effects by encouraging water agencies to diversify their water portfolios, thus increasing likelihood that water users would have adequate water and land use and development in the regions would continue as projected by general plans.

15.2.2 Potential Changes in Irrigated Agricultural Acreage

As shown in Table 15-1 and Table 15-2, agricultural water deliveries would increase under Alternative 1, resulting in no conversion of agricultural land to non-agricultural use. Alternative 2 would result in slight decreases, if any, in agricultural water deliveries under long-term average conditions across multiple regions compared to the No Action Alternative. The San Francisco Bay Area region would see a slight decrease compared to the No Action Alternative under Alternative 4 under dry water year conditions. Agricultural water deliveries under Alternative 3 would significantly decrease across all regions compared to the No Action Alternative under dry year conditions, which could result in the conversion of agricultural land to non-agricultural use. Implementation of Mitigation Measure AG-1 could reduce some of the anticipated conversion of agricultural land.

Figure 15-1 and Figure 15-2 present the long-term average annual change in irrigated acreage for each action alternative compared to the No Action Alternative. These figures also depict the dry water year condition, respectively, under Year 2040 conditions. Irrigated crop acreage as modeled by SWAP would increase under Alternative 1 in the Sacramento River and San Joaquin River regions under the long-term average and dry water year conditions. Therefore, there would be no conversion of agricultural land to nonagricultural use. Alternative 4 would see an increase in irrigated acres in the two regions under the long-term average condition but would decrease under the dry water year condition in the San Joaquin River region. Under Alternatives 2 and 3, there would be decreases in irrigated acres in both regions under both the long-term average and dry conditions compared to the No Action Alternative. These decreases would result in the conversion of agricultural land to nonagricultural uses. The conversion of land could be reduced by implementing Mitigation Measure AG-1.

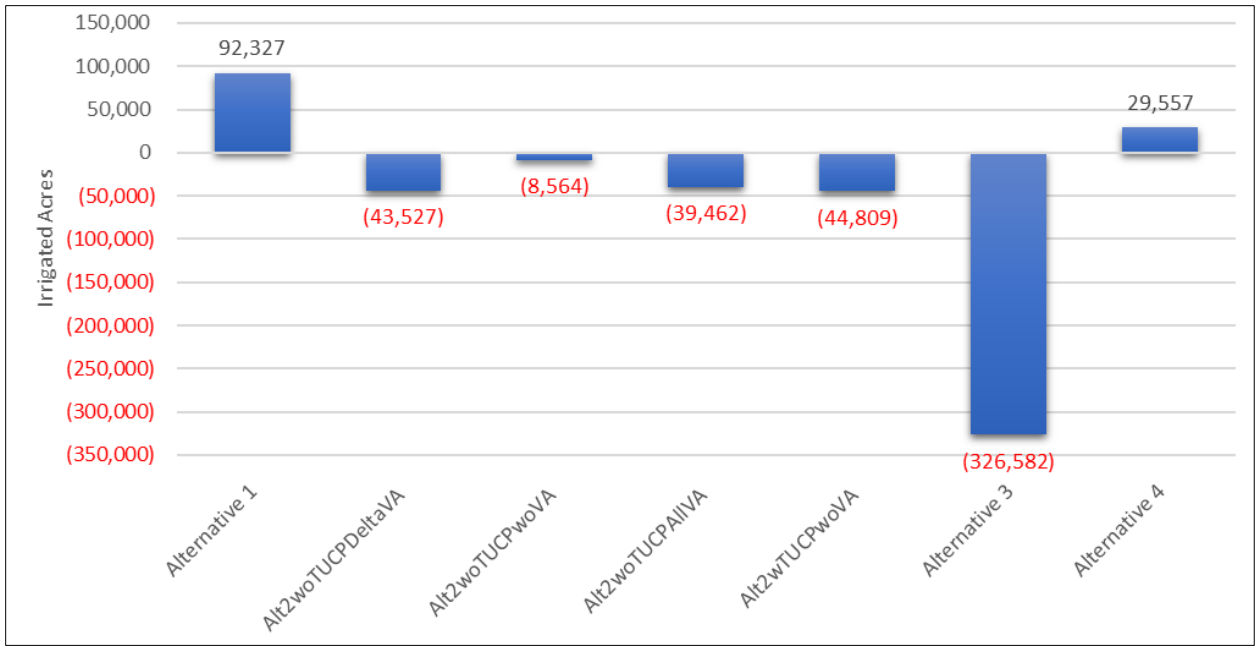

Figure 15-1. Annual Change in Irrigated Acres from No Action Alternative - Long-Term Average Water Year Condition

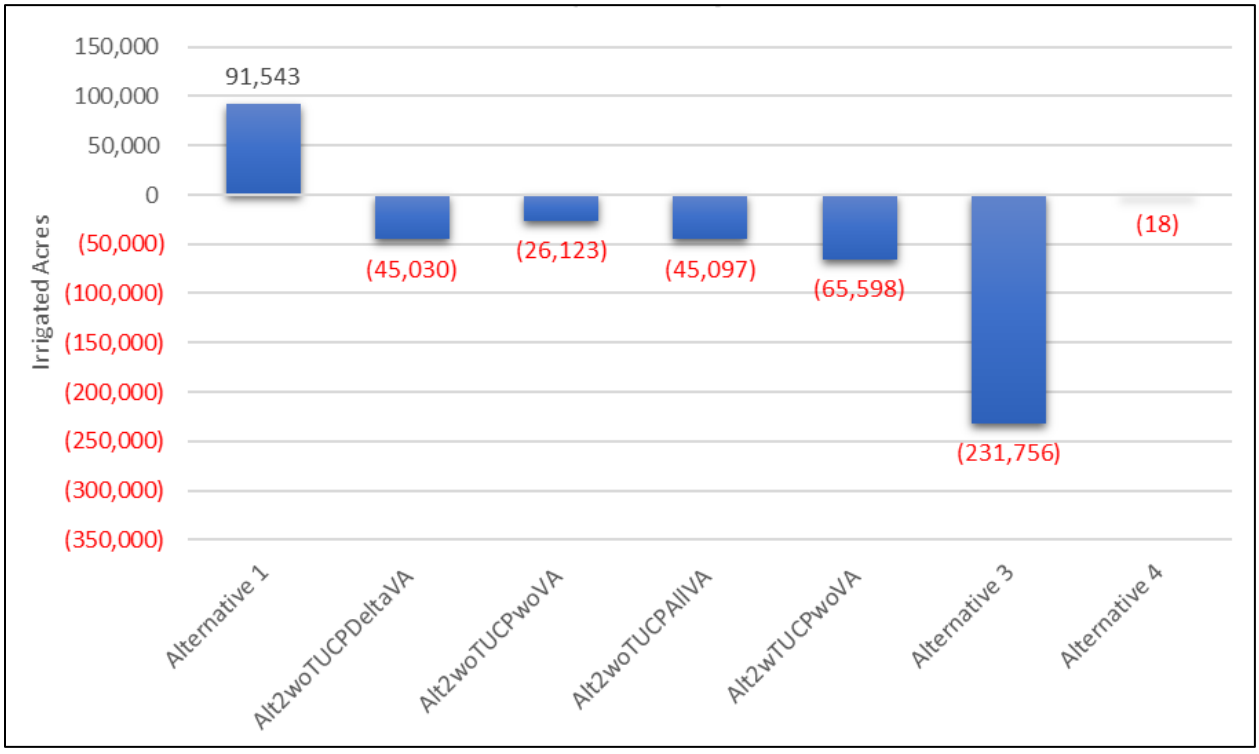

Figure 15-2. Annual Change in Irrigated Acres from No Action Alternative - Dry Water Year Condition

15.3 Mitigation Measures

Appendix D includes a detailed description of mitigation measures identified for land use and agricultural resources per alternative. These mitigation measures include avoidance and minimization measures that are part of each alternative and, where appropriate, additional mitigation to lessen impacts of the alternatives. For land use and agricultural resources, no avoidance and minimization measures have been identified. Additional mitigation measures have been identified for land use and agricultural resources.

15.3.1 Avoidance and Minimization Measures

15.3.1.1 Alternatives 1-4

No avoidance and minimization measures have been identified.

15.3.2 Additional Mitigation

15.3.2.1 Alternatives 1-4

Alternatives 1 through 4 could reduce agricultural land. The mitigation measure below relies on entities other than Reclamation to implement the measures. Because Reclamation does not have authority to implement this measure, Reclamation cannot ensure that it will be implemented.

Mitigation Measure AG-1: Diversify Water Portfolios
Water agencies should diversify their water portfolios. Diversification could include the sustainable conjunctive use of groundwater and surface water, water transfers, water conservation and efficiency upgrades, and increased use of recycled water or water produced through desalination where available. Diversification would include consideration of water conservation plans and technologies for water use efficiency.

15.4 Cumulative Impacts

The No Action Alternative would continue with the current operation of the CVP and may result in potential changes in land use and irrigated agricultural acreage. The action alternatives may result in changes to land use and irrigated agricultural acreage. The magnitude of the changes is dependent on alternative and water year type. Therefore, the No Action Alternative and action alternatives may contribute to cumulative changes to land use resources as described in Appendix R, *Land Use and Agricultural Resources Technical Appendix,* and Appendix Y, *Cumulative Impacts.*