Chapter 5 – Water Supply

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Chapter 5 Water Supply

This chapter is based on the background information and technical analysis documented in Appendix H, *Water Supply Technical Appendix*, which includes additional information on water supply conditions and technical analysis of the effects of each alternative.

5.1 Affected Environment

Variability and uncertainty are dominant characteristics of California's water resources. Precipitation is the primary source of California's water supply (California Department of Water Resources 2018a). It varies greatly from year to year, as well as by season and location within the state. Unpredictability and geographic variation in precipitation that California receives make it challenging to manage available runoff to meet urban, agricultural, and environmental water needs.

During an average year, approximately two thirds of the precipitation that California receives is lost through evapotranspiration by trees and other vegetation, evaporation into the atmosphere, runoff, storage as effective precipitation, or through other outflows (California Department of Water Resources 2018b). Therefore, approximately one third of the precipitation remains available for use by urban, agricultural, and other environmental uses. However, the variability of annual precipitation in California and the differences in volumes of precipitation and runoff between different regions of the state makes it difficult to standardize water management between years (California Department of Water Resources 2018b).

Due to hydrologic variability that ranges from dry summers and fall months to floods in winter and spring, water from precipitation in winter and spring must be stored for use in summer and fall. The amount of water stored as snowpack is highly variable from year to year. During dry periods, snowpack may comprise less than 5 MAF of water; however, snowpack during wet periods may comprise approximately 30 MAF (University of California, San Diego 2023). However, not all snowpack becomes available in a timely manner for uses throughout the state. Therefore, federal, state, and local agencies and private entities have constructed reservoirs, aqueducts, pipelines, and water diversion facilities to capture and use rainfall and subsequent snowmelt.

With passage of Rivers and Harbors Act of 1935, Congress appropriated funds and authorized construction of CVP by USACE (Bureau of Reclamation 1999). When the Rivers and Harbors Act was reauthorized in 1937, construction and operation of CVP was assigned to the United States Department of the Interior, Bureau of Reclamation (Reclamation), and CVP became subject to Reclamation Law (as defined in the Reclamation Act of 1902 and subsequent legislation).

As CVP facilities were being constructed after World War II, the state began investigations to meet additional water needs through development of the California Water Plan. In 1957, DWR published Bulletin Number 3 that identified new facilities to provide flood control in northern California and water supplies to San Francisco Bay Area, San Joaquin Valley, San Luis Obispo and Santa Barbara counties in the Central Coast Region, and southern California (California Department of Water Resources 1957). The study identified a seasonal deficiency of 2.675 MAF/year in 1950 that resulted in groundwater overdraft throughout many portions of California. The report described facilities to meet water demands and reduce groundwater overdraft, including facilities that would become part of SWP. In 1960, California voters authorized the Burns-Porter Act to construct initial SWP facilities.

During the past 100 years, numerous water supply, flood management, and hydroelectric generation reservoirs were constructed throughout California. Many of these projects were constructed on tributaries to Sacramento and San Joaquin rivers and tributaries to Tulare Lake Basin. Operations of these non-CVP and non-SWP reservoirs affect flow patterns into Sacramento and San Joaquin rivers and Delta. Pacific Gas and Electric owns and operates the McCloud-Pit Hydroelectric Project, which includes five dams, two tunnels, and associated equipment and transmission facilities that limit the flow and temperature of water into Shasta Reservoir (State Water Resources Control Board 2019). However, implementation of alternatives evaluated in this EIS would not result in changes in operations in most of these reservoirs, except on lower Stanislaus River.

5.2 Effects of the Alternatives

The impact analysis considers changes in water supply 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 water supply that are assumed to occur by 2040 under the No Action Alternative are summarized in this section.

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 is expected to result in potential changes in water supply deliveries, with improved water supply deliveries to some CVP and SWP contractors and for other water users, deliveries would remain similar to existing conditions. These changes were described and considered in the 2020 Record of Decision and associated documents.

5.2.1 Potential changes in water supply deliveries

5.2.1.1 Trinity River, Sacramento River, Clear Creek, and American River

CVP and SWP contract deliveries on the Trinity, Sacramento, Clear Creek, and American rivers and their tributaries under the No Action Alternative and action alternatives are shown in Figure 5-1. Tables presenting changes to water supply deliveries are included in Appendix H. The CalSim 3 model was used to estimate operations. The CalSim 3 model depicts operation of the CVP and SWP on a monthly time step and relies on assumptions and approaches that contribute to minor fluctuations of up to 5% in its simulation of real-time operations. In addition, minor deviations in CVP Refuge Level 2 deliveries are the result of modeling but do not reflect an intention by Reclamation to deviate from the CVPIA.

Alternative 1 may reduce (by less than 5%) average annual deliveries to CVP Refuge Level 2 water users. Compared to the No Action Alternative, all contract delivery types, except for deliveries to CVP Refuge Level 2 would remain the same or increase slightly under Alternative 1.

Under Alternative 2, there would be no measurable change in minimum average annual deliveries for SWP M&I water users. The maximum reductions in average annual deliveries under Alternative 2 to CVP Refuge Level 2 and CVP M&I water users would average less than 5%. Alternative 2 would result in a maximum reduction of approximately 6% in average annual water made available for diversion to CVP Settlement Contractors water users and a maximum reduction of approximately 5% in average annual deliveries to CVP agricultural water users.

Alternative 3 may reduce (by less than 5%) average annual deliveries to CVP Settlement Contractors and CVP Refuge Level 2 water users. Alternative 3 would reduce (by approximately 10%) average annual deliveries to CVP M&I water users, would reduce (by approximately 13%) average annual deliveries to CVP agricultural water users, and would reduce (by approximately 32%) average annual deliveries to SWP M&I water users. These results differ from those presented in the Draft EIS because of a compilation error, and is not a change in the modeling results that were disclosed in the Draft EIS. The Draft EIS presented that Alternative 3 would generate no measurable change to SWP M&I water users, while the corrected Final EIS indicates there would be a reduction by 32% (13 TAF) to SWP M&I water users.

Alternative 4 may reduce (by less than 5%) average annual deliveries to CVP Settlement Contractors and would slightly increase or generate no measurable change to average annual deliveries to CVP Refuge Level 2, CVP M&I, CVP agricultural, and SWP M&I deliveries.

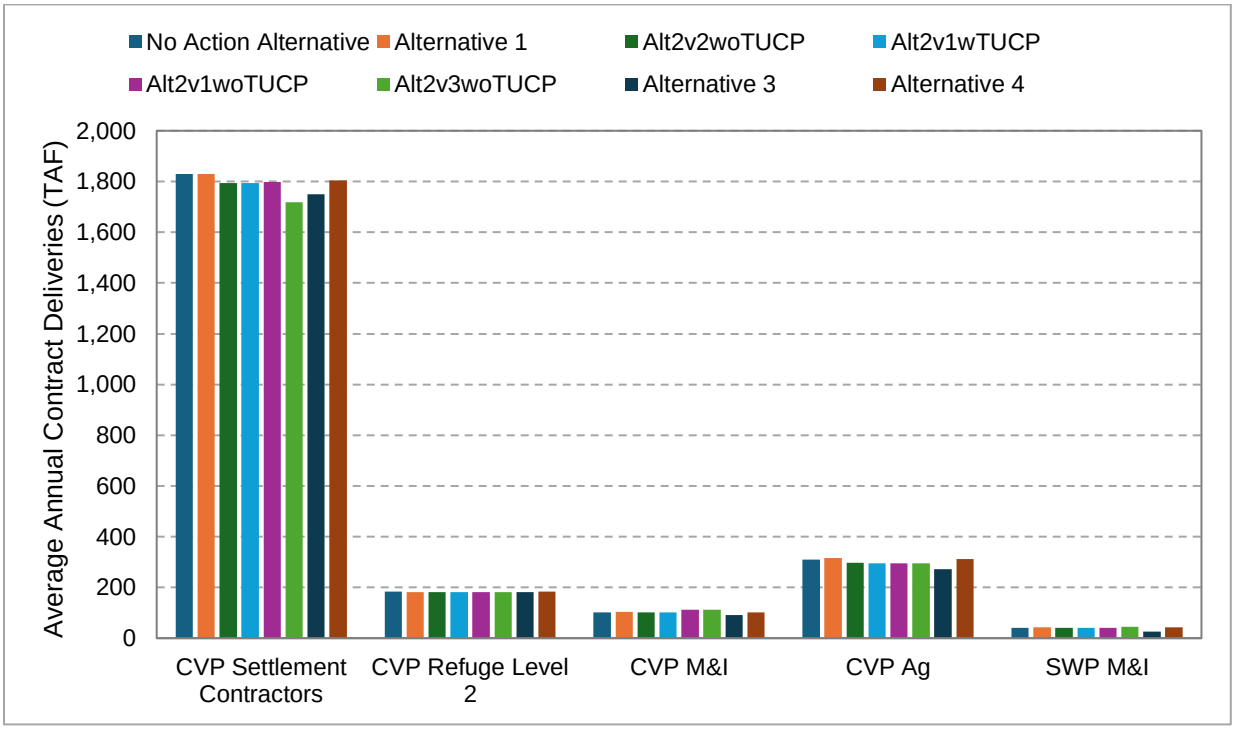

Figure 5-1. Sacramento River Hydrologic Region Average Annual Contract Deliveries under All Water Year Types

5.2.1.2 Stanislaus River and San Joaquin River

CVP and SWP deliveries to contractors in Stanislaus River and San Joaquin River watersheds under the No Action Alternative and action alternatives are shown in Figure 5-2. Tables presenting changes to water supply deliveries are included in Appendix H. Compared to the No Action Alternative, Alternative 1 would improve average annual deliveries for all contractor types. Under Alternative 2, there would be no measurable change in minimum average annual deliveries for CVP M&I, SWP agricultural, CVP Refuge Level 2 water users, and CVP Exchange Contractors. Alternative 2 would result in a maximum reduction of approximately 8% in average annual deliveries to CVP agricultural water users. Alternative 3 would reduce (by less than 5%) average annual deliveries to CVP Exchange Contractors and CVP Refuge Level 2. Alternative 3 would reduce (by approximately 38%) average annual deliveries to CVP M&I water users, would reduce (by approximately 65%) average annual deliveries to CVP agricultural water users, and would reduce (by approximately 37%) average annual deliveries to SWP agricultural water users. Under Alternative 4, there would be no measurable change or slight increases in average annual deliveries for all contractor types.

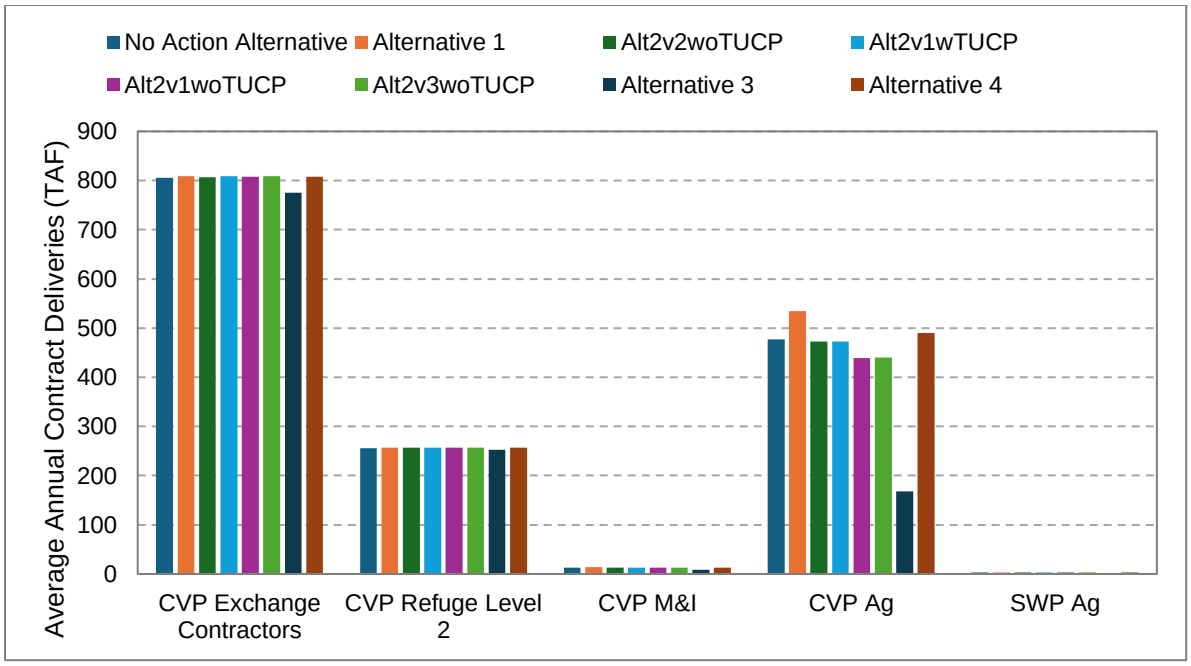

Figure 5-2. San Joaquin River Hydrologic Region Average Annual Contract Deliveries under All Water Year Types

5.2.1.3 Bay-Delta

CVP and SWP contract deliveries in Bay-Delta under the No Action Alternative and action alternatives are shown in Figure 5-3. Tables presenting changes to water supply deliveries are included in Appendix H. Compared to the No Action Alternative, Alternative 1 would improve average annual deliveries for all contractor types. Under Alternative 2, the maximum reductions in average annual deliveries to CVP M&I and CVP agricultural water users would average less than 5%. Alternative 2 would result in improvements in minimum average annual deliveries for SWP M&I water users. Alternative 3 would reduce (by approximately 17%) average annual deliveries to CVP M&I water users, would reduce (by approximately 70%) average annual deliveries to CVP agricultural water users, and would reduce (by approximately 38%) average annual deliveries to SWP M&I water users. Alternative 4 would improve average annual deliveries for all contractor types.

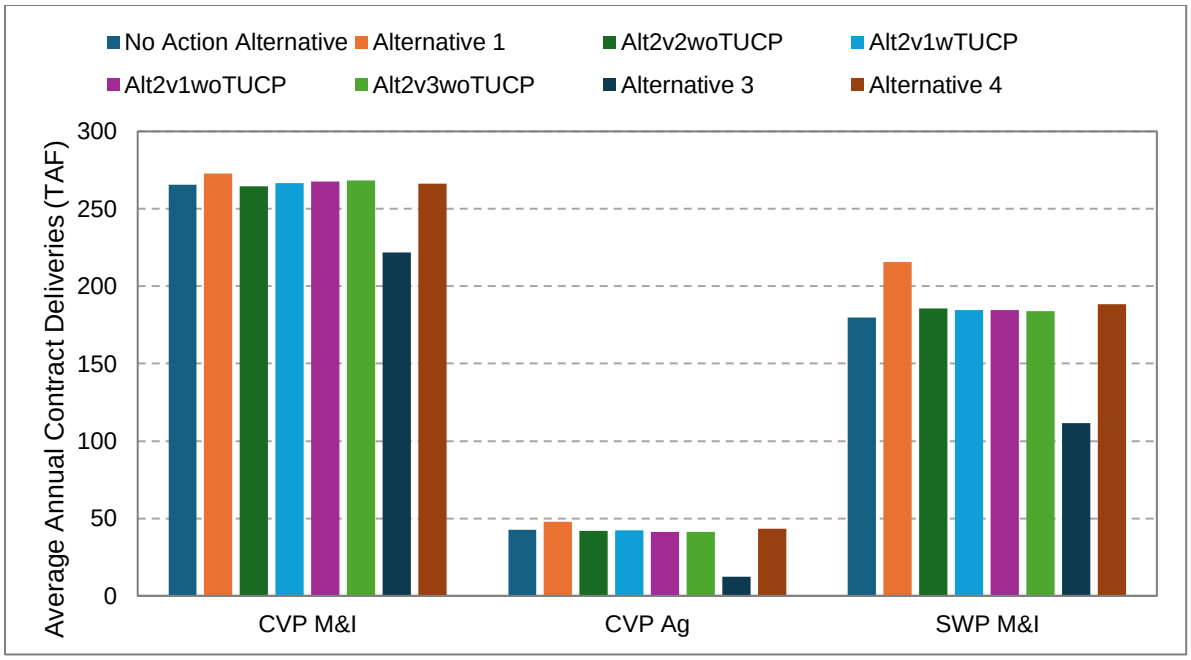

Figure 5-3. San Francisco Hydrologic Region Average Annual Contract Deliveries under All Water Year Types

5.2.1.4 CVP and SWP Service Areas

This section details changes in contract deliveries under the No Action Alternative and action alternatives to CVP and SWP Service Areas in central coast, Tulare Lake, South Lahontan, and south coast regions.

Central Coast Region

SWP contract deliveries in the central coast region under the No Action Alternative and action alternatives are shown in Figure 5-4. Tables presenting changes to water supply deliveries are included in Appendix H. Compared to the No Action Alternative, Alternatives 1, 2, and 4 would improve average annual deliveries to SWP M&I water users. Alternative 3 would reduce (by approximately 53%) average annual deliveries to SWP M&I water users.

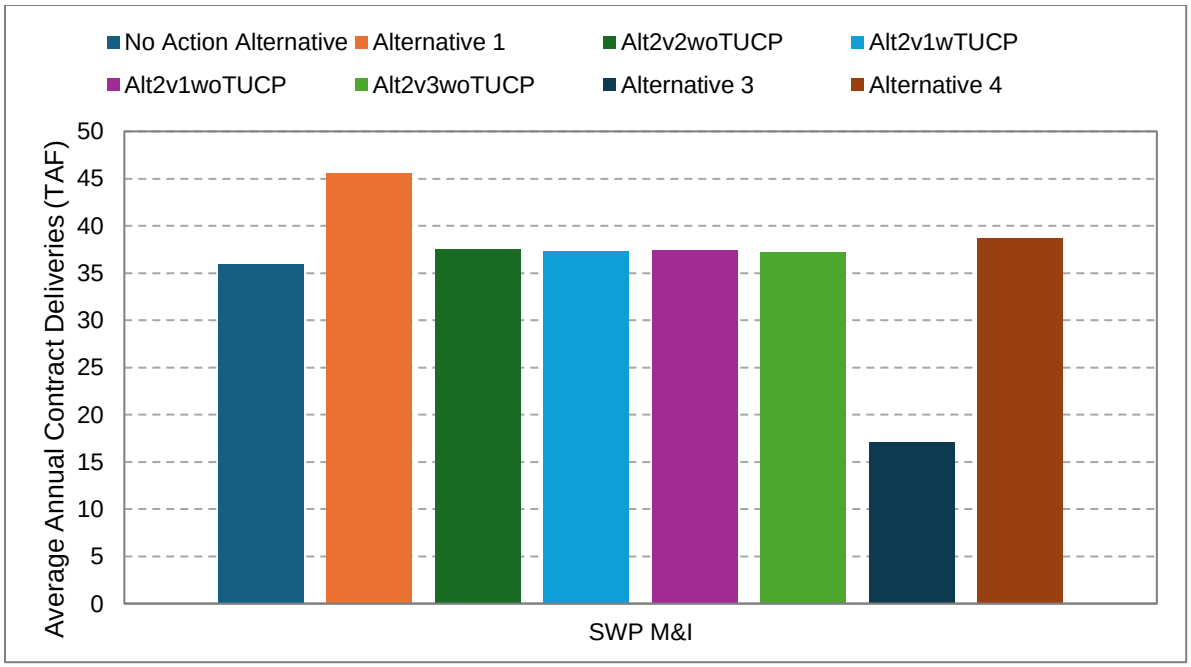

Figure 5-4. Central Coast Hydrologic Region Average Annual Contract Deliveries under All Water Year Types

Tulare Lake Region

CVP and SWP contract deliveries in Tulare Lake region under the No Action Alternative and action alternatives are shown in Figure 5-5. Tables presenting changes to water supply deliveries are included in Appendix H. Compared to the No Action Alternative, Alternative 1 would generate no measurable change to average annual CVP Refuge Level 2 deliveries and would improve average annual deliveries for all other contractor types. Alternative 2 would generate no measurable change to minimum average annual CVP Refuge Level 2 deliveries and would improve minimum average annual deliveries for SWP M&I and SWP agricultural water users. Alternative 2 would result in a maximum reduction of approximately 7% in average annual deliveries to CVP agricultural water users. Alternative 3 would reduce (by approximately 7%) average annual deliveries to CVP Refuge Level 2, would reduce (by approximately 74%) average annual deliveries to CVP agricultural water users, would reduce (by approximately 52%) average annual deliveries to SWP M&I water users, and would reduce (by approximately 56%) average annual deliveries to SWP agricultural water users. Alternative 4 would generate no measurable change to average annual CVP Refuge Level 2 deliveries and would improve average annual deliveries for CVP agricultural, SWP M&I, and SWP agricultural water users.

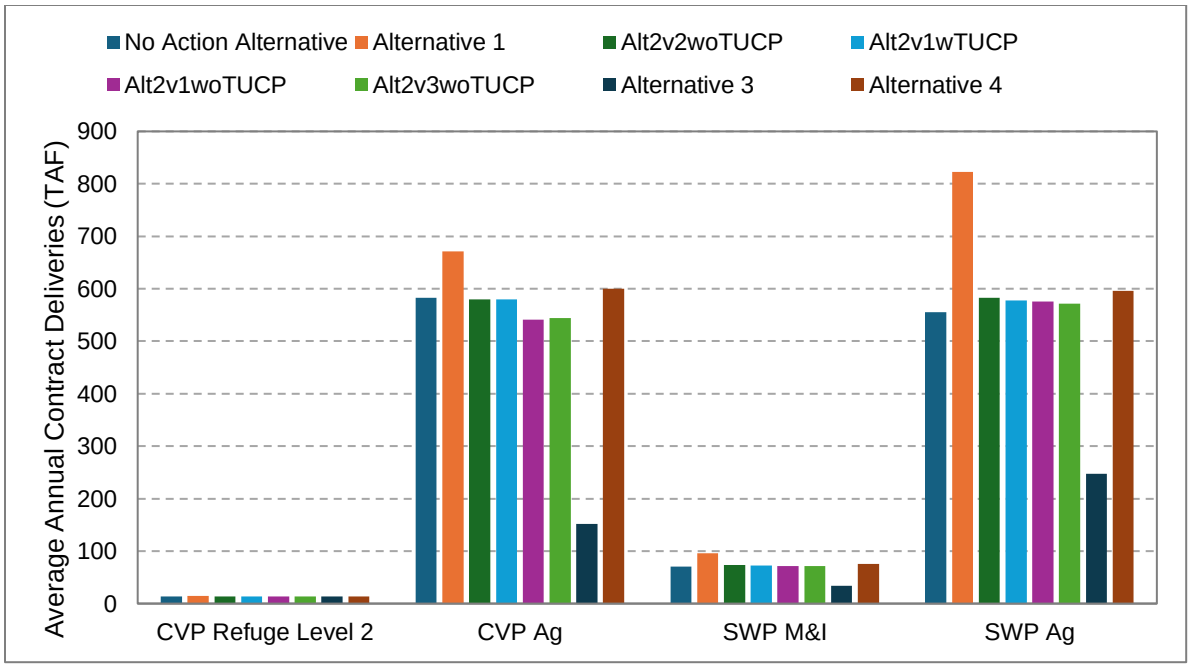

Figure 5-5. Tulare Lake Hydrologic Region Average Annual Contract Deliveries under All Water Year Types

South Lahontan Region

SWP contract deliveries in south Lahontan region under the No Action Alternative and action alternatives are shown in Figure 5-6. Tables presenting changes to water supply deliveries are included in Appendix H. Compared to the No Action Alternative, Alternative 1, Alternative 2, and Alternative 4 would improve average annual deliveries to SWP M&I water users. Alternative 3 would reduce (by approximately 51%) average annual deliveries to SWP M&I water users.

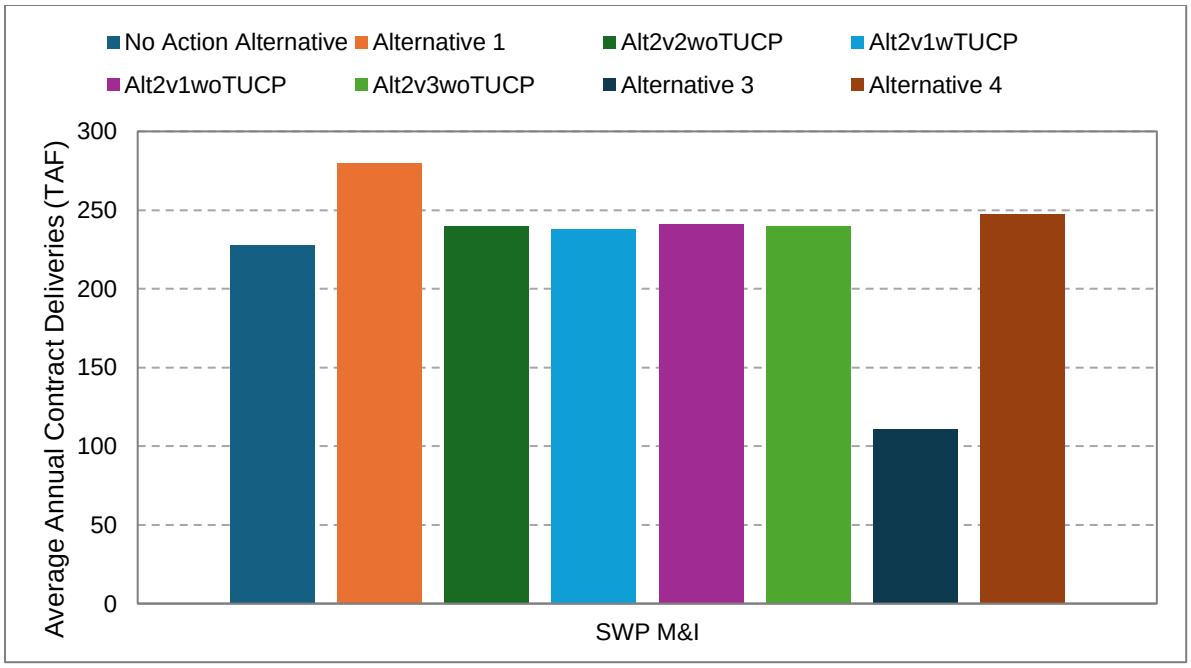

Figure 5-6. South Lahontan Hydrologic Region Average Annual Contract Deliveries under All Water Year Types

South Coast Region

SWP contract deliveries in south coast region under the No Action Alternative and action alternatives are shown in Figure 5-7. Tables presenting changes to water supply deliveries are included in Appendix H. Compared to the No Action Alternative, Alternative 1, Alternative 2, and Alternative 4 would improve or generate no measurable change to average annual deliveries to SWP M&I and SWP agricultural water users. Alternative 3 would reduce (by approximately 54%) average annual deliveries to SWP M&I water users and would reduce (by approximately 56%) average annual deliveries to SWP agricultural water users.

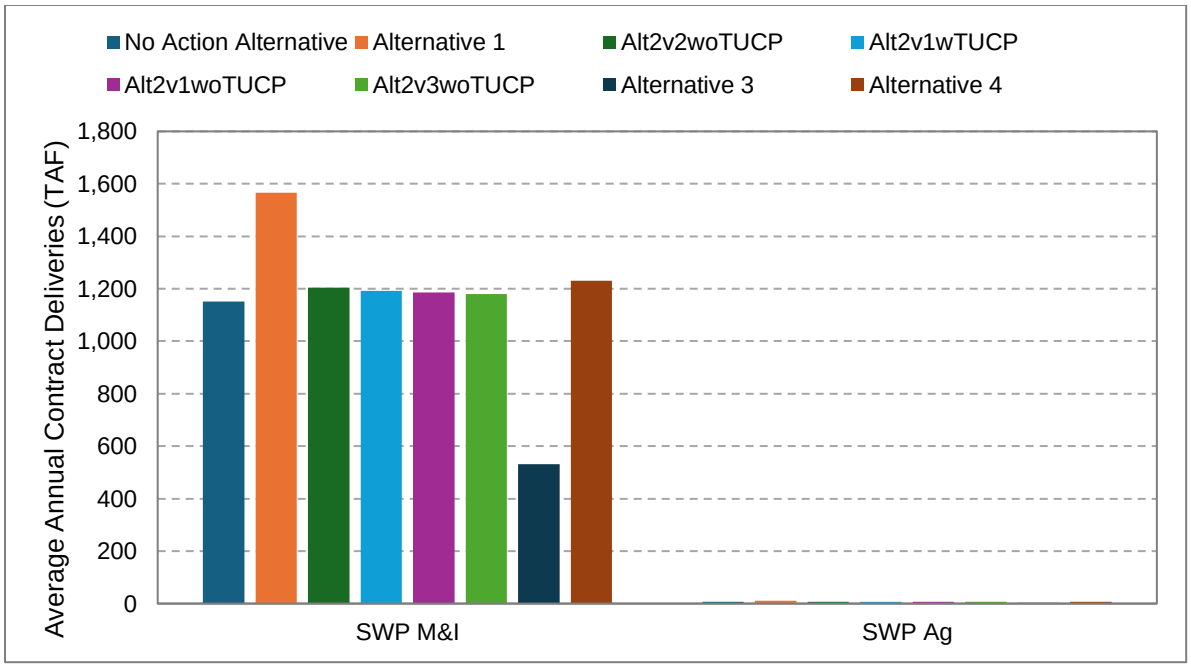

Figure 5-7. South Coast Hydrologic Region Average Annual Contract Deliveries under All Water Year Types

5.3 Mitigation Measures

Appendix D includes a detailed description of mitigation measures identified for water supply 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 water supply, avoidance and minimization measures generally include measures identified for aquatic resources. These measures include water temperature and storage management, minimum instream flows, and capture of high flows during storms. Additional mitigation measures have been identified for water supply resources.

5.3.1 Avoidance and Minimization Measures

See Appendix D and Appendix H for avoidance and minimization measures.

5.3.2 Additional Mitigation

5.3.2.1 Alternatives 1-4

- **MM-WS-1: Coordination with Byron Bethany Irrigation District**
  DWR will coordinate with Byron Bethany Irrigation District prior to herbicide treatments.

- **MM-WS-2: Coordination with Contra Costa Water District**
  Reclamation will coordinate with Contra Costa Water District (CCWD) to avoid creating new or additional restrictions on CCWD's ability to fill Los Vaqueros Reservoir,

beyond the restrictions that are imposed under the then current CCWD Biological Opinions and Incidental Take Permits, so that with implementation of the selected alternative, CCWD will have opportunities to fill Los Vaqueros Reservoir that are at least comparable to the current opportunities.

5.4 Cumulative Impacts

The No Action Alternative would continue with the current operation of the CVP and may result in changes to water supply deliveries. The action alternatives will result in changes to water supply deliveries. 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 water supply as described in Appendix H, *Water Supply* and Appendix Y, *Cumulative Impacts Technical Appendix*.