Chapter 30
Growth Inducement and Other Indirect Effects

This chapter addresses the direct and indirect growth inducement potential of the BDCP alternatives. Assessing growth inducement potential involves determining whether project implementation would directly or indirectly support economic expansion, population growth, or residential construction, and if so, determining the magnitude and nature of the potential environmental effects of that growth. Although some of these effects could be characterized as being direct effects, most of them are *indirect*. "Direct effects" are "caused by the action [or project] and occur at the same time and place," while "indirect effects" are "caused by the [action or project] and… later in time or farther removed in distance, but…still reasonably foreseeable. Indirect or secondary effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems."[1] With respect to ascertaining what is reasonably foreseeable over a substantial time period (here, approximately 50 years), "[d]rafting an EIR…necessarily involves some degree of forecasting. While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can."[2]

One of the objectives of the BDCP is to increase the reliability of the water supplied by the State Water Project (SWP) and the Central Valley Project (CVP). Water supply is one of the primary public services needed to support urban development and the production of agricultural products upon which people depend. A water service deficiency could constrain future development in the state of California, particularly if coupled with policies that constrain growth relative to water supply. Adequate water supply, treatment, and conveyance would play a role in supporting additional growth in areas dependent on this water supply, but it would not be the single impetus behind such growth. Other important factors influencing growth are: economic factors (such as employment opportunities); capacity of public services and infrastructure (e.g., wastewater, public schools, roadways); local land use policies; and land use constraints such as floodplains, sensitive habitat areas, and seismic risk zones.

30.1 Environmental Setting/Affected Environment

30.1.1 Relationship between Land Use Planning and Water Supply

In California, cities and counties have primary authority[3] over land use decisions, while water supply can be the responsibility of special districts, county water agencies, investor-owned utilities,

[1] CEQA Guidelines, § 15358(a)(2).

[2] CEQA Guidelines, § 15144; 40 CFR 1508.8(b).

[3] Although cities and counties have primary authority over land use planning, there are exceptions to this, including the California Coastal Commission (regulating development along the coast), the San Francisco Bay Conservation and Development Commission (a regional agency regulating development adjacent to San Francisco Bay), the Tahoe Regional Planning Authority (regulating development in the Tahoe Basin), the California Energy Commission

mutual water companies and, in some cases, the city and county governments themselves. SWP and CVP contractors that provide water in the state include these same types of agencies. Many SWP and CVP contractors also act as wholesalers of water to the retail agencies that provide water to municipal and industrial (M&I) customers throughout California. Land use planners throughout the state employ various procedures and practices based upon legal and contractual requirements to evaluate whether adequate water and other utilities are available to support urban growth.

This section describes the laws, agencies, guidelines, and publications that provide the regulatory and planning framework for the coordination of land use planning and water supply management and planning in the state. The analysis of the BDCP's growth inducement potential with respect to water supply is made in the context of these regulations and regulatory strategies.

This section also summarizes key regional and local agencies, laws, and planning documents that guide development decisions. Information is presented that highlights the integration of land use planning and water supply availability. For further information on the regulatory context for land use and planning, refer to Chapter 13, *Land Use,* (Section 13.2), Chapter 5, *Water Supply* (Section 5.2).

30.1.1.1 Regional Planning

Councils of Government (COGs) have been formed throughout the state, based on joint powers agreements between cities and counties, to coordinate the planning activities within a region. In addition to the authority that is created through their member cities and counties, COGs carry out state and federal statutory duties. The exact combination of duties varies from region to region. In general, COGs do not have public service delivery responsibility (e.g., water supply, wastewater, etc.). However, while these regional planning agencies are not directly involved with water supply planning, COGs do direct regional growth decisions by setting state-mandated fair-share regional housing allocations for cities and counties in their jurisdictions. While most COGs are single-county organizations, several cover multi-county regions, including: the Southern California Association of Governments (SCAG), the Association of Bay Area Governments (ABAG), the Metropolitan Transportation Commission (MTC), the Sacramento Area Council of Governments (SACOG), and the Association of Monterey Bay Area Governments (AMBAG).

Table 30-1 identifies the COGs and member counties located in the California Department of Water Resources (DWR) hydrologic regions where SWP or CVP water is used.

(with permit authority and CEQA lead agency status for some thermal power plant projects), and the California Public Utilities Commission (with regulatory authority and CEQA lead agency status for certain utility projects).

Table 30-1. Councils of Government in Hydrologic Regions Potentially Affected by the Proposed Project

Hydrologic Regions with SWP and/or CVP Contractors	Councils of Government within Hydrologic Region[a]	Counties within Hydrologic Region[b]
San Francisco Bay	*Association of Bay Area Governments*[c]	*Alameda, Contra Costa, Marin, Napa*, San Francisco, San Mateo*, Santa Clara, Solano,* and *Sonoma*
Sacramento River	Siskiyou Association of Governmental Entities	Siskiyou
	Tri-County Area Planning Council	Colusa, *Glenn,* and Tehama
	Butte Association of Governments	Butte
	Lake County/City Area Planning Council	*Lake*
	Sierra Planning Organization and Economic Development District	*El Dorado, Nevada,* Placer, and *Sierra*
	Central Sierra Planning Council and Economic Development District	*Alpine* and Amador
	Association of Bay Area Governments	*Napa and* Solano
	Sacramento Area COG	*Sacramento*, Sutter, Yolo, and Yuba
San Joaquin River	*Association of Bay Area Governments*	*Contra Costa*
	Sacramento Area COG	*Sacramento*
	Sierra Planning Organization and Economic Development District	*El Dorado*
	Central Sierra Planning Council and Economic Development District	*Alpine,* Amador, Calaveras, and Tuolumne
	San Joaquin COG	San Joaquin
	Calaveras COG	Calaveras
	Stanislaus COG	Stanislaus
	Merced County Association of Governments	Merced
	Council of Fresno County Governments	*Fresno*
Central Coast	Association of Monterey Bay Area Governments	Monterey and Santa Cruz
	Association of Bay Area Governments	*Santa Clara*
	Council of San Benito County Governments	*San Benito*
	San Luis Obispo COG	San Luis Obispo
	Santa Barbara County Association of Governments	Santa Barbara
	Southern California Association of Governments[d]	*Ventura*
South Coast	*San Diego Association of Governments*	*San Diego*
	Southern California Association of Governments	*Los Angeles,* Orange, *Riverside, San Bernardino,* and *Ventura*
Tulare Lake	*Council of San Benito County Governments*	*San Benito*
	Council of Fresno County Governments	*Fresno*
	Kings County Association of Governments	Kings
	Tulare County Association of Governments	Tulare

Hydrologic Regions with SWP and/or CVP Contractors	Councils of Government within Hydrologic Region[a]	Counties within Hydrologic Region[b]
	Kern Council of Governments	*Kern*
South Lahontan	Eastern Sierra COG	Inyo and *Mono*
	Kern COG	*Kern*
	Southern California Association of Governments	*Los Angeles* and *San Bernardino*
Colorado River	*San Diego Association of Governments*	*San Diego*
	Southern California Association of Governments	Imperial*, Riverside,* and *San Bernardino*

Source: Office of Planning and Research, State Clearinghouse and Planning Unit 2012.

[a] COGs in multiple hydrologic regions are shown in *italics.*

[b] Counties listed are only counties that fall within the hydrologic region and may not be a complete list of counties represented in the COG; counties in *italics* are in multiple hydrologic regions.

[c] ABAG consists of the following counties: Sonoma, Napa, Marin, Solano, Contra Costa, San Francisco, Alameda, San Mateo, and Santa Clara.

[d] SCAG consists of the following counties: Ventura, Los Angeles, San Bernardino, Orange, Riverside, and Imperial.

30.1.1.2 Local Planning

General Plans and Zoning

Pursuant to state law (California Government Code Sections 65300-65362), each city and county in California is required to adopt a comprehensive, long-term general plan for the physical development of its jurisdiction. The general plan is a statement of development policies and is required to include land use, circulation, housing, conservation, open space, noise, and safety elements. The land use element designates the proposed general distribution, location, and extent of land uses and includes a statement of the standards of population density and building intensity recommended for lands covered by the plan. Water resource topics, including water supply, are to be addressed in general plan conservation and/or open space elements. The conservation element addresses the conservation, development, and use of water and other natural resources. The water section of the conservation element must be developed in coordination with any county-wide water agency and with all districts and city agencies that have developed, serviced, controlled, managed, or conserved water of any type for any purpose in the city or county for which the general plan is prepared. Such coordination must include the discussion and evaluation of any water supply and demand information provided pursuant to California Government Code Section 65352.5. An EIR prepared in conjunction with a general plan typically provides some assessment of the adequacy of water supply to accommodate development and population growth projected under the general plan. Cities and counties develop policies that connect the management of water resources and provision of water supply infrastructure with development patterns. For how generally water conservation/demand management is addressed, see Appendix 1C, *Demand Management Measures*.

With respect to planning development to accommodate housing growth, the State Planning and Zoning law (California Government Code Section 65000 et seq.) prescribes that the housing element of a general plan may not be constrained by the lack of all needed governmental services, including public water service. The housing element is required to plan for the housing allocated to a given city or county pursuant to Government Code Section 65584 (typically by a COG). To the extent that governmental services, like a public water supply, are not available to fully meet a city's or county's housing allocation, Government Code Section 65583(c)(3) requires the city or county to "remove the governmental constraints" to the development of the housing described in the general plan. This requirement promotes the state general plan policy that "the availability of housing is of vital statewide importance, and the early attainment of decent housing and a suitable living environment for every California family is a priority of the highest order" that "requires the cooperative participation of government and the private sector in an effort to expand housing opportunities and accommodate the housing needs of Californians of all economic levels" (Government Code Section 65580). Although future build-out of housing and other population-accommodating development planned in a general plan may exceed presently available water supplies, this is not inappropriate at a general plan level and state legislation (discussed below) ensures that specific housing and other development projects are not approved and constructed without a demonstrated, adequate water supply.

In addition, city and county planning agencies also use locally adopted zoning ordinances and development regulations to implement the general plan and regulate growth within their jurisdictions. See Chapter 13, *Land Use*, for further discussion of general plans applicable to the proposed project.

Prior to 2003, general plans were typically organized only by the seven required elements described above; however, in 2003, the California Governor's Office of Planning and Research published new guidelines for cities and counties to use in developing their general plans that encouraged local jurisdictions to include in their general plans an optional water element to integrate a more thorough consideration of water supply availability into general plans and subsequent development decisions (Office of Planning and Research 2003). The water element should be developed in conjunction with the appropriate water supply and resource agencies. Cities and counties have used this and other optional elements to focus their general plans on other locally significant or critical resource areas. As of January 2011, 23 of California's 58 counties and 63 of the state's 482 cities and towns had adopted optional water resources elements in their general plans, compared, for example, with 35 counties and 28 cities that adopted optional agricultural elements in their general plans (Office of Planning and Research 2011:83, 96-97).

Local Agency Formation Commissions

To provide for better coordination of local land use planning, the California Legislature created Local Agency Formation Commissions (LAFCOs) within each county to discourage urban sprawl and to preserve open space and agricultural lands while meeting regional housing needs and planning for the efficient provision of public services and utilities, including water supply. (See Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000, Cal. Gov't Code sections 56000 et seq.) LAFCOs have approval authority (with some limits) over the establishment and expansion of municipal and service district boundaries, including expansion related to a city proposing to expand its sphere of influence. LAFCOs evaluate, through the preparation of Municipal Service Reviews, an agency's ability to provide services (including water supply) prior to annexing additional areas.

30.1.1.3 Water Supply Management and Planning

The California Water Code establishes the governing law pertaining to water management and planning in California. The following summarizes information that DWR and Bureau of Reclamation (Reclamation) provide their contractors to assist in managing the water supply provided by the SWP and CVP, respectively; describes recently adopted Delta/water policy laws; and summarizes provisions of the California Water Code and other state laws to strengthen coordination between land use and water supply planning.

California Department of Water Resources—State Water Project

Section 1.3.1 in Chapter 1, *Introduction*, provides an overview of the SWP. Through regular publications and communications, DWR provides SWP and other water-related information to the SWP contractors and the public (including local decision-makers). The Water Code requires that DWR prepare and update the California Water Plan (Bulletin 160), a policy document that guides the development and management of the state's water resources (California Water Code Section 10004 (b)). DWR updates the plan every 5 years to reflect changes in resources and changes in urban, agricultural, and environmental water demands. It suggests ways of managing demand and augmenting supply to balance water supply with demand. In addition to Bulletin 160, DWR publishes an annual bulletin (Bulletin 132) that provides information on the planning, construction, financing, management, and operations of the SWP. DWR annually notifies and updates its SWP contractors on the amount of Table A water[4] available for delivery in the coming year. DWR also posts water availability information on its website. The notices are provided so that SWP contractors, other water agencies, local planners, and the public are informed of water conditions and events that affect deliveries by the SWP (California Department of Water Resources 2011a).

DWR also publishes the State Water Project Delivery Reliability Report, updated every 2 years, which is distributed to all SWP contractors and all city, county, and regional planning departments within the SWP service areas. The purpose of the report is to provide current information to SWP contractors and planning agencies regarding the overall delivery capability of existing SWP facilities under a range of hydrologic conditions, and to provide information regarding supply availability to each contractor in accordance with other provisions of the contractors' contracts.

For further information on the operation of the SWP, refer to Chapter 5, *Water Supply*.

Bureau of Reclamation—Central Valley Project

Section 1.3.2 in Chapter 1, *Introduction*, provides a general description of the CVP. Operation of the CVP is closely tied to the SWP through the joint use of the Sacramento–San Joaquin Delta (Delta), the sharing of other facilities with the SWP, and frequent water transfers between CVP and SWP contractors. Beginning in February of each year and continuing through Spring, Reclamation notifies contractors of the CVP water supply allocations that estimate the amount of contracted water that will be supplied to contractors through the contract year. The estimates are based on the amount of

[4] Table A water is the maximum amount of water delivered to each contractor if water is available and if the contractor requests their full allotment. Table A water is the value in acre feet that is used to determined the portion of available supply to be delivered according to this apportionment methodology and is given first priority for delivery. (California Department of Water Resources 2008b:119,121; California Department of Water Resources. 2010:3)

precipitation received in the region, the water levels in the system's storage reservoirs and other factors.

2009 Delta/Water Policy Bills

In response to a special legislative session called by Governor Schwarzenegger to address the state's water crisis, on November 4, 2009, the California Legislature passed a package of bills intended to reform California's water system and water policies. The water package includes four policy bills, described below, and an $11.14 billion bond.

- SB 7X 1 (Simitian and Steinberg) (California Water Code Section 85000-85350; California Public Resources Code 29702, 29703.5, 29722.5, 28722.7, 29725, 29727, 29728.5, 29733, 29735, 29735.1, 29736, 29738, 29739, 29741, 29751, 29752, 29753, 29754, 29756.5, 29759, 29761, 29761.5, 29763, 29764, 29771, 29773, 29773.5, 29778.5, 29780 and 32300-32381) establishes a framework intended to achieve the co-equal goals of providing a more reliable water supply in California and protecting, restoring and enhancing the Delta ecosystem. The co-equal goals are to be achieved in a manner that protects the unique cultural, recreational, natural resource, and agricultural values of the Delta. SB 7X 1 specifically:
    - Creates a seven member Delta Stewardship Council tasked with developing a Delta Plan to guide state and local actions in the Delta in a manner that furthers the co-equal goals of Delta restoration and water supply; developing performance measures for the assessment and tracking of progress and changes to the health of the Delta ecosystem and water supply reliability; determining if a state or local agency's project in the Delta is consistent with the Delta Plan and the co-equal goals; and acting as an appellate body in the event of a claim that a project is inconsistent with the goals.
    - Requires the California Department of Fish and Wildlife and the State Water Resources Control Board (State Water Board) to identify the water supply needs of public trust resources in the Delta estuary for use in determining the appropriate diversion amounts associated with the BDCP.
    - Establishes a Delta Conservancy to implement ecosystem restoration activities within the Delta. In addition to restoration duties, the Conservancy is required to adopt a strategic plan for implementation of the Conservancy goals; promote economic vitality in the Delta; promote environmental education about the Delta; and assist in the preservation, conservation, and restoration of the Delta region's agricultural, cultural, historic, and living resources.
    - Restructures the current Delta Protection Commission (DPC) by reducing the membership from 25 to 15 and requiring the DPC to adopt an economic sustainability plan for the Delta.
    - Appropriates funding from Proposition 84 to fund the Two-Gates Fish Protection Demonstration Program.
- SB 7X 6 (Steinberg and Pavely) (California Water Code Sections 10920 and 12924) requires local agencies to monitor groundwater elevations to help better manage groundwater resources.
- SB 7X 7 (Steinberg) (California Water Code Sections 10608 and 10800-10853) creates a framework to reduce California's per capita water consumption 20% by 2020. Specifically, the bill:

  - Establishes means for urban water suppliers to achieve the 20% reduction. Means specified include: setting a conservation target of 70% of their daily per capita water baseline; utilizing performance standards for indoor, landscaping, industrial and institutional uses; meeting the per capita water goal for their specific hydrologic region as identified by DWR and other state agencies in the *20x2020 Water Conservation Plan*; or using an alternative method that was to be developed by DWR by December 31, 2010. SB 7X 7 also requires DWR to work cooperatively with the California Urban Water Conservation Council.
  - Requires urban water suppliers to set an interim urban water use target and meet that target by December 31, 2015.
  - Requires DWR to work cooperatively with the California Urban Water Conservation Council to establish a task force to identify best management practices to assist commercial, industrial, and institutional users in meeting the 20% reduction in water use by 2020 goal.
  - Makes any urban or agricultural water supplier who is not in compliance with the bill's water conservation and efficient water management requirements ineligible for state grant funding.
  - Requires DWR to report to the Legislature on agricultural efficient management practices being undertaken and reported in agricultural water management plans in 2013, 2016, and 2021.
  - Requires DWR, SWRCB, and other state agencies to develop a standardized reporting system.
- SB 7X 8 (Steinberg) (California Water Code Sections 348, 5100, 5101, 5103 and 5107) strengthens current law governing the accounting and reporting of water diversion and uses by adding penalties for failure to report and removing some exemptions from reporting requirements. In addition, the bill appropriates existing bond funds for various activities to benefit the Delta ecosystem and secure the reliability of the state's water supply and to increase staffing of the SWRCB.

Coordination of Land Use Planning and Water Supply

As discussed previously, laws and planning documents that guide development decisions provide some integration of land use planning and water supply availability. The following summarizes legislative efforts and initiatives (in addition to certain elements of the 2009 Delta/Water Policy Bills described above) that are intended to strengthen the coordination of land use and water planning activities.

Urban Water Management Planning Act

In 1983, the California Legislature enacted the Urban Water Management Planning Act (California Water Code Section 10610 et seq.). The Act requires every urban water supplier that provides water to 3,000 or more customers or provides over 3,000 acre-feet of water annually to prepare and adopt an urban water management plan (UWMP) (updated every 5 years) for the purpose of "actively pursu[ing] the efficient use of available supplies." In preparing the UWMP, the urban water supplier is required to coordinate with other appropriate agencies, including other water suppliers that share a common source, water management agencies, and relevant public agencies. When a city or county proposes to adopt or substantially amend a general plan, the water agency is required to provide the planning agency with the current version of the adopted UWMP, the current version of the water agency's capital improvement program or plan, and other information about the system's sources of water supply. The Urban Water Management Planning Act also requires urban water suppliers, as part of their long-range planning activities, to make every effort to ensure the appropriate level of reliability in their water service sufficient to meet the needs of their various categories of customers during normal, dry, and multiple dry water years.

Senate Bills 610 and 221

SB 610 (California Water Code Sections 10631, 10656, 10910, 10911, 10912, and 10915; California Public Resources Code 21151.9) and SB 221 (California Government Code Sections 65867.5, 66455.3, and 66473.7; California Business and Professional Code Section 11010) were companion legislative measures that took effect in January 2002 and require increased efforts to identify and assess the reliability of anticipated water supplies and increased levels of communication between municipal planning authorities and local water suppliers.

- SB 610 requires that CEQA review for most large projects and specified smaller projects (including those that generate water demand greater than an equivalent of 500 dwelling units, or increase service connections by 10%) include a water supply assessment. The water supply assessment must address whether existing water supplies will suffice to serve the project and other planned development over a 20-year period in average, dry, and multiple-dry year conditions, and must set forth a plan for finding additional supplies necessary to serve the project. Cities and counties can approve projects notwithstanding identified water supply shortfalls provided that they address such shortfalls in their findings.
- SB 221 requires that cities and counties impose a new condition of tentative subdivision approval, requiring that the applicant provide a detailed, written verification from the applicable water supplier that a sufficient water supply will be available before the final subdivision map can be approved. It applies to similar sized projects as those addressed in SB 610.

State Policies Encouraging Compact and Sustainable Development

Several recent laws have sought to refocus planning efforts to reduce sprawl, preserve farmland, increase the viability of public transportation, and reduce the emission of greenhouse gases. These efforts promote compact and sustainable development, which allow for the more efficient provision of public services and reduce the consumption of resources, including water supply. Sustainable development includes the concepts of more efficient water use, including incorporation of water conservation and efficiency measures such as use of recycled water, water efficient fixtures, and drought tolerant landscaping.

- Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006, adopted the goal of reducing greenhouse gas emissions to 1990 levels by the year 2020. The Act required the California Air Resources Board to develop a scoping plan identifying how reductions will be achieved from significant greenhouse gas sources including water supply infrastructure (i.e., water treatment and distribution facilities). These measures include increased water use efficiency, water recycling, and increasing water system energy efficiency.
- SB 375 was adopted in 2008 to require COGs to align their housing and transportation plans and to develop a sustainable communities strategy that will reduce sprawl and improve air and water quality.

- SB 732 was signed into law in 2008 and establishes the Strategic Growth Council, a cabinet-level committee that is tasked with coordinating the activities of state agencies to improve air and water quality, protect natural resources, and assist in the planning of sustainable communities.
- AB 857, adopted in 2002, established three planning priorities for the state—promoting infill development, protecting natural resources, and encouraging efficient development patterns. These priorities were to be incorporated into the Governor's Goals and Policy Report, completed in 2003, that provided a 20–30 year overview of state growth and development, and guides the commitment of state resources in agency plans and infrastructure projects.
- The Regional Blueprint Planning Program is a grant program operated by the California Department of Transportation that provides assistance to COGs in developing long-range plans with the intent of supporting greater transit use, encouraging more efficient land use, improving air quality, and protecting natural resources.

30.1.2 Statewide Urban Land Use and Water Use Profile

Major sources of the information presented in this section include California Department of Finance (DOF) demographic data, California Water Plan Update 2005 (Bulletin 160-05), California Water Plan Update 2009 (Bulletin 160-09), urban water management plans for select SWP and CVP contractors and DWR (i.e., data on projected water demand and population growth that underlies information and figures presented in Bulletin 160-09).

30.1.2.1 Urban Land Use

California is the most populous state in the United States. The majority of the state's population lives in Southern California. More specifically, population distribution is clustered in the southwestern portion of the state (Ventura, Los Angeles, Orange, San Diego, western San Bernardino, and western Riverside counties); in the nine counties surrounding San Francisco Bay (Sonoma, Napa, Marin, Solano, Contra Costa, San Francisco, Alameda, San Mateo, and Santa Clara); and in the Central Valley along the Interstate 5, State Route 99, and Interstate 80 corridors (Sacramento, San Joaquin, Stanislaus, Merced, Fresno, El Dorado, and Placer Counties). The DOF Demographic Research Unit collects and compiles population data for the state. According to DOF data (as reported in California Department of Finance 2007b and California Department of Finance 2011), California's population increased from approximately 30 million in 1990 to approximately 37.3 million in 2010. The DOF projects that the state's population will be approximately 47 million by the year 2025 and 60 million by 2050 (California Department of Finance 2007a). DWR uses state demographic data in statewide water management planning to help calculate current and projected urban water needs.

Economic growth is a key driver of urban development and water use. Although California has the largest and most diverse economy in the nation, sectors of the economy have contracted as a result of the current economic recession and there are increased uncertainties regarding future development patterns. In addition, factors affecting water supply availability and reliability (such as climate change, water supply shortages, water quality concerns, flood management, and environmental protection regulations) add to future development pattern uncertainties. While long-term projections generally do not account for changing economic conditions, it is likely that actual growth in the state could occur more slowly or in different patterns than characterized in the projections presented in this chapter in response to economic conditions and water supply reliability and availability factors.

30.1.2.2 Water Use

Water consumption patterns vary from year to year based on a variety of factors, including changes in rainfall/climatic conditions (e.g., in wet years outdoor water demand is lower because rainfall directly meets a portion of water needs; during dry years, outdoor water demand is generally greater, although conservation initiatives or rationing, if implemented, may moderate outdoor water use), land use patterns and demographics, water use practices (e.g., increases in urban conservation and irrigation efficiencies), and agricultural practices (e.g., conversion from more water-intensive crops to less water-intensive crops or vice versa). Table 30-2 summarizes the average distribution of water supplies to various applied uses (e.g., urban, agricultural, and environmental uses) for the state for the years 1998 through 2005, based on data collected by DWR (California Department of Water Resources 2011c). This period includes wet, normal, and dry years. As shown in Table 30-2, during this time period, on average, urban uses represented 10.5% of the demand of water distributed in the state, agricultural uses represented 39.9% of the demand for water distributed in the state, and environmental water (including instream flows, wild and scenic river flows, required Delta outflow, and other environmental uses) represented about 49.6% of water distributed in the state.

Table 30-2. Statewide Distribution of Dedicated Water Supply to Applied Water[a] Uses

	Total Demand and Percent Total Demand, 8-Year Average (1998–2005)	
	Million Acre-Feet	Percent of Total Dedicated Water (%)
Urban Uses	8.7	10.5
Agricultural Uses	33.2	39.9
Environmental Uses and Outflow[b]	41.4	49.6
Total Dedicated Supply	83.3	100

Sources: California Department of Water Resources 2011c, adapted by Environmental Science Associates. Bulletin 160-09 is the most current version of Water Plan information available from DWR.

[a] Applied water refers to the total amount of water diverted from any source to meet the demands for beneficial use by water users (dedicated water uses), without adjusting for water that is consumptively used, becomes return flow, is reused, or is irrecoverable.

[b] Environmental uses include instream flows, wild and scenic flows, required Delta outflow, and managed wetlands water use. Some environmental water is reused by agricultural and urban water users.

Overall, urban water use efficiency in California has increased over the past several decades and will continue to increase in the future. As a result, increases in population have not always translated into a proportionate increase in water use. Recently California experienced reduced water availability due to the effects of dry years in 2007, 2008, and (for portions of the state) 2009, along with court-ordered reductions in pumping to protect Delta fisheries (which have since been lifted). Demand management strategies in response to the drought and decreases in economic production attributable to the recession have lowered demand, and in 2008, Governor Schwarzenegger directed state agencies to develop an aggressive conservation plan to reduce per capita consumption by 20%. As described previously, the 2009 Delta/Water Policy Bills, which the California Legislature passed in special session in response to the Governor's proclamation, include provisions to help the state achieve the 20% reduction in per capita consumption by 2020. The bills include several far-reaching provisions intended to reform state water policy to ensure a reliable water supply and restore the Delta and other ecologically sensitive areas.

30.1.3 Urban Land Use and Water Use by Hydrologic Region

For planning purposes, DWR divides the state into 10 hydrologic regions, corresponding to the major water drainage basins.[5] Figure 6-1 in Chapter 6, *Surface Water,* shows the boundaries of each hydrologic region. Table 30-3 presents general characteristics of each hydrologic region, including counties partly or wholly within the region (also shown in Figure 6-1), area, precipitation, existing and projected (2050) population, reservoir storage, and the acreage of irrigated crops under cultivation.

Eight of the 10 hydrologic regions include SWP and CVP contractors that supply water for urban (M&I) uses, and are therefore considered part of the environmental setting/affected environment area for the proposed project. These include the following hydrologic regions: San Francisco Bay, Central Coast, South Coast, Sacramento River, San Joaquin River, Tulare Lake, South Lahontan, and Colorado River. The SWP and CVP are the two largest surface water supply sources in the state. Accordingly, water use by existing SWP and CVP contractors was reviewed to identify those that currently provide water for urban uses. Table 30-4 lists SWP and CVP contractors with at least 3,000 connections and/or that use at least 3,000 acre-feet per year for M&I uses. These thresholds were selected because these contractors supply the vast majority of water for M&I uses among SWP and CVP contractors; the thresholds also correspond with requirements for preparation of urban water management plans (refer to discussion under *Coordination of Land Use Planning and Water Supply* in Section 30.1.1.3).

[5] Using these hydrologic regions as planning boundaries allows consistent tracking of their natural water runoff and the accounting of surface and groundwater supplies.

Table 30-3. General Characteristics of Affected Hydrologic Regions[a]

Hydrologic Regions with SWP and/or CVP Contractors	Counties *(Counties in Multiple Regions in Italics)*	Area (square miles/ percent of State)[b]	Average Annual Precipitation (inches)[b]	Population (2000)[c]	Population (2010)[d]	Projected Population (2050)[b, e]	Total Reservoir Storage (thousand acre-feet)[b]	Total Irrigated Crop Area in Acres (2000)[c]
San Francisco Bay	Sonoma, *Napa,* Marin, *Solano, Contra Costa,* San Francisco, Alameda, San Mateo, *Santa Clara*	4,506 2.8	25.4	6,105,650	6,200,336	8,948,720	746	70,300
Sacramento River	Siskiyou, Modoc, Shasta, Lassen, Tehama, Glenn, Butte, Plumas, Lake, Colusa, Sutter, Yuba, Nevada, Sierra, *Napa*, Yolo, Placer, *Solano*, *Sacramento*, El Dorado, *Alpine,* Amador	27,246 17.2	36.7	2,593,110	3,013,055	5,348,930	16,146	2,038,900
San Joaquin River	*Alameda, Contra Costa, Sacramento, El Dorado,* Amador, San Joaquin, Calaveras, *Alpine*, Stanislaus, Tuolumne, Merced, Mariposa, *Fresno,* Madera	15,214 9.6	26.3	1,751,010	2,166,551	4,885,870	11,477	2,050,400
Central Coast	Santa Cruz, *Santa Clara*, *San Benito*, Monterey, San Luis Obispo, Santa Barbara, *Ventura*	11,326 7.1	18.7	1,459,205	1,370,859	2,153,070	1,227	603,620
South Coast	*Ventura, Los Angeles, San Bernardino*, Orange, *Riverside, San Diego*	10,925 6.9	17.6	18,223,425	19,778,591	27,106,340	3,059	280,260
Tulare Lake	*San Benito, Fresno,* Kings, Tulare, *Kern*	17,033 10.7	15.2	1,884,675	2,263,206	5,194,490	2,046	3,219,000
South Lahontan	Mono, Inyo, *San Bernardino, Los Angeles, Kern*	26,732 16.9	7.8	721,490	913,465	2,387,400	459	65,080
Colorado River	*San Bernardino*, *Riverside, San Diego,* Imperial	19,962 12.6	5.7	606,535	832,477	2,309,280	620	731,890

Sources: California Department of Water Resources 2005; California Department of Water Resources 2009; ESRI 2011.

[a] Excludes those hydrologic regions outside SWP or CVP contractor service areas (North Coast and North Lahontan).

[b] California Department of Water Resources 2009.

[c] California Department of Water Resources 2005.

[d] ESRI 2011.

[e] Reflects growth projections under the Current Trends scenario.

Table 30-4. State Water Project and Central Valley Project Contractors Serving Urban Uses[a]

Hydrologic Region[b]	SWP Contractors	CVP Contractor
San Francisco Bay	Alameda County Flood Control and Water Conservation District—Zone 7 Alameda County Water District Solano County Water Agency Santa Clara Valley Water District Napa Flood Control and Water Conservation District	Santa Clara Valley Water District Contra Costa Water District East Bay Municipal Utility District
Sacramento River	City of Yuba City Solano County Water Agency	City of Redding City of Roseville City of Shasta Lake City of West Sacramento Placer County Water Agency Bella Vista Water District Sacramento County Water Agency San Juan Water District
San Joaquin River		Contra Costa Water District City of Tracy El Dorado Irrigation District
Central Coast	San Luis Obispo County Flood Control and Water Conservation District Santa Barbara County Flood Control and Water Conservation District Santa Clara Valley Water District Ventura County Flood Control District	Santa Clara Valley Water District San Benito County Water District
South Coast	Castaic Lake Water Agency[c] Metropolitan Water District of Southern California San Bernardino Valley Municipal Water District San Gabriel Valley Municipal Water District Antelope Valley – East Kern Water Agency (AVEK) Crestline – Lake Arrowhead Water Agency Desert Water Agency San Gorgonio Pass Water Agency Ventura County Flood Control District	
Tulare Lake	AVEK Kern County Water Agency San Luis Obispo county Flood Control and Water Conservation District Ventura County Flood Control District	City of Coalinga City of Fresno City of Shafter City of Avenal City of Huron
South Lahontan	AVEK Crestline—Lake Arrowhead Water Agency Kern County Water Agency Littlerock Creek Irrigation District Mojave Water Agency Palmdale Water District	
Colorado River	Mojave Water Agency Coachella Valley Water District Desert Water Agency San Gorgonio Pass Water Agency San Bernardino Valley Municipal Water District	

Notes for Table 30-4

Sources: California Department of Water Resources 2008a; Bureau of Reclamation 2011; California Department of Water Resources 2012a.

[a] Includes agencies required to prepare Urban Water Management Plans in 2010 (i.e., those using more than 3,000 acre-feet of water annually or those with 3,000 or more service connections). Of the 29 SWP contractors, 24 supply water for M&I use. Those agencies that did not meet the threshold for preparation of a UWMP in 2010, such as Westlands Water District, San Luis & Delta-Mendota Water Authority (SLDMA), Plumas County Flood Control and Water Conservation District and the County of Butte, are not included in this table. Members of SLDMA that were required to prepare UWMPs in 2010 (Santa Clara Valley WD, City of Tracy and San Benito County WD) are included in this table. Littlerock Creek Irrigation District, while not meeting the threshold for preparation of UWMPs, is included because modeling results indicate potential increases in M&I deliveries to this contractor.

[b] Excludes those hydrologic regions outside SWP or CVP contractor service areas. (North Coast and North Lahontan).

[c] District includes land in the San Joaquin Valley area formerly known as Devil's Den Water District.

The following sections describe each hydrologic region. The descriptions include information on: population characteristics; current water supply and use characteristics (including percent of deliveries provided by the SWP and CVP); SWP and CVP contractor service areas in the region that meet the threshold (serve M&I uses that have at least 3,000 connections and/or that use at least 3,000 acre-feet per year); and projected water use (as prepared by DWR for the 2009 California Water Plan).

Projected water use is provided for 2025 and 2050 under the three demand scenarios presented in the 2009 California Water Plan (California Department of Water Resources 2009): Current Trends; Slow and Strategic Growth; and Expansive Growth. Forecasting under the three demand scenarios acknowledges the uncertainty in predicting future water demand. The year 2050 was established as the horizon year in the 2009 California Water Plan for estimating future water demands and delivery capabilities of existing and planned facilities. Each demand scenario includes different but plausible assumptions regarding including population growth, size and type of urban landscapes, amount of irrigated farmland and level of water conservation that affect future water use and supplies. Because the 2009 California Water Plan was released prior to the implementation of the *20x2020 Water Conservation Plan,* these demand scenarios do not take 20% per capita reduction by 2020 compliance into account[6]. However, the scenarios do take into account varying levels of background water conservation efforts (e.g., plumbing codes, natural replacement, actions water users implement on their own, etc.) (California Department of Water Resources 2009). A summary of the assumptions included for each demand scenario is presented below:

1. **Current Trends.** For this scenario, assumed population growth is consistent with California Department of Finance projections and recent growth trends are assumed to continue into the future. Trends include a moderation of previous population growth rates, while population growth is still large in absolute terms. In 2050, nearly 60 million people live in California. Affordable housing has drawn families to the interior valleys. Commuters take longer trips in distance and time. In some areas where urban development and natural resources restoration has increased, irrigated crop land has decreased. Water savings due to background water conservation activities is assumed to be 10%.

[6] The 20x2020 plan will be factored in to the California Water Plan 2013 Update.

2. **Slow and Strategic Growth.** For this scenario, private, public, and governmental institutions form alliances to provide for more efficient planning and development that is less resource intensive than current conditions. Population growth is slower than currently projected due to declining birth rates, accelerating out of state migration, and little improvement in the mortality rates. About 45 million people live in California by 2050. Compact urban development has eased commuter travel. Californians embrace water and energy conservation; and water savings due to background water conservation activities are assumed to be 15%. Conversion of agricultural land to urban development has slowed and occurs mostly for environmental restoration and flood protection. The state government implements comprehensive and coordinated regulatory programs to improve water quality, protect fish and wildlife, and protect communities from flooding.

3. **Expansive Growth.** For this scenario, future conditions are more resource intensive than Existing Conditions. Population growth is faster than currently projected, with increasing birth rates, increases in migration, and mortality declines. About 70 million people live in California by 2050. Families prefer low-density housing, and many seek rural residential properties, expanding urban areas. Some water and energy conservation programs are offered but at a slower rate than trends in the early century. Water savings due to background water conservation activities are assumed to be 5%. Irrigated crop land has decreased significantly where urban development and natural restoration have increased. Protection of water quality and endangered species is driven mostly by lawsuits, creating uncertainty for local planners and water managers.

30.1.3.1 San Francisco Bay Hydrologic Region

The San Francisco Bay region includes basins draining into San Francisco, San Pablo, and Suisun bays, as well as basins draining into the Sacramento River downstream from Collinsville, western Contra Costa County, and basins directly tributary to the Pacific Ocean below the Russian River watershed to the southern boundary of the Pescadero Creek Basin. As shown in Table 30-3, this region has the smallest land area (approximately 4,506 square miles) among the affected regions. Major cities within the region include San Francisco, Oakland, and San José.

Between 1990 and 2010, the San Francisco Bay Hydrologic Region experienced a 14%[7] increase in population (refer to Figure 30A-1 in Appendix 30A, which depicts changes in population density between 1990 and 2010). Table 30-5 presents the current and projected populations of counties wholly or partially within the region based on DOF projections. In 2010, this region had the second highest population and the second highest population density among the affected hydrologic regions (second only to the South Coast Region). By 2050, the population of the San Francisco Bay region is projected to increase by approximately 2.7 million people,[8] a 44.3% increase relative to the 2010 population (ESRI 2011; California Department of Water Resources 2009).

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[7] Unless otherwise noted, data in this section and the seven subsequent sections profiling water supply and use in the hydrologic regions are taken from California Department of Water Resources 2011c (1998–2005 Water balances revised 03-10-11), California Department of Water Resources 2009 (California Water Plan Update 2009), Rayej pers. comm. 2012 (California Water Plan Update 2009 data provided by Department staff), and Rayej pers. comm. 2010 (Demographic Projections 2005-2050).

[8] This population estimate is based on the 2050 population shown in the regional summary figure (Figure SF-1, San Francisco Bay Hydrologic Region: inflows and outflows in 2005) in the California Water Plan (Department of Water Resources 2009, Vol. 3, p. SF-4). As described above (Section 30.1.3) the California Water Plan includes three

Table 30-5. Current and Projected Populations of Counties[a] within the San Francisco Bay Hydrologic Region (in Thousands)

	Alameda	Contra Costa[b]	Marin	Napa[b]	San Francisco	San Mateo	Santa Clara[b]	Solano[b]	Sonoma
2000 [c]	1,443.9	948.8	247.3	124.3	776.7	707.2	1,682.6	394.9	458.6
2009 [d]	1,540.5	1,064.8	253.5	140.8	814.2	734.2	1,823.8	436.3	491.4
2020 [d]	1,663.5	1,237.5	260.3	165.8	844.5	761.5	1,992.8	503.2	546.2
2025 [d]	1,729.3	1,330.9	266.5	178.4	850.7	774.4	2,092.5	547.0	575.9
2050 [d]	2,047.7	1,812.2	307.9	251.6	854.9	819.1	2,624.7	815.5	761.2
2000–2009									
Numerical Change	96.6	115.9	6.2	16.6	37.5	27.1	**141.2**	41.3	32.8
Percent Growth	6.7	12.2	2.5	**13.3**	4.8	3.8	8.4	10.5	7.2
Average Annual Growth Rate	0.7%	1.3%	0.3%	1.4%	0.5%	0.4%	0.9%	1.1%	0.8%
2009–2025									
Numerical Change	188.8	266.2	13.0	37.6	36.5	40.2	**268.7**	110.7	84.5
Percent Growth	12.3	25.0	5.1	**26.7**	4.5	5.5	14.7	25.4	17.2
Average Annual Growth Rate	0.7%	1.4%	0.3%	1.5%	0.3%	0.3%	0.9%	1.4%	1.0%
2009–2050									
Numerical Change	507.2	747.5	54.4	110.8	40.6	84.9	**800.9**	379.3	269.8
Percent Growth	32.9	70.2	21.4	78.7	5.0	11.6	43.9	**86.9**	54.9
Average Annual Growth Rate	0.7%	1.3%	0.5%	1.4%	0.1%	0.3%	0.9%	1.5%	1.1%

Sources: California Department of Finance 2007a; California Department of Finance 2011.

Note: Numbers in **bold** indicate largest net and percent increase.

n/a = not available.

[a] Includes counties wholly or partially within the San Francisco Bay Hydrologic Region. Excludes Santa Cruz County-only a small and/or relatively unpopulated portion of this county is located within the hydrologic region.

[b] Napa and Solano counties also in the Sacramento River Hydrologic Region; Contra Costa County also in the San Joaquin River Hydrologic Region; Santa Clara County also in the Central Coast Hydrologic Region.

[c] California Department of Finance 2011, Table 1

[d] California Department of Finance 2007a

Water supply and use in the San Francisco Bay Hydrologic Region is characterized below (see Figure 30-1).

- **Water Supply and Use Characteristics.** For the period of 1998–2005 (the reporting years for Bulletin 160-09) the average annual dedicated water supply[9] and annual applied water use[10] (including outflows from the region) were approximately 1,913 thousand acre-feet (TAF).

demand scenarios; this population estimate corresponds to the "Current Trends" demand scenario, which is based on population projections by the California Department of Finance.

[9] Dedicated (or developed) water supply refers to water distributed among urban and agricultural uses, used for protecting and restoring the environment, or storage in surface water and groundwater reservoirs. In any year, some of the dedicated supply includes water that is used multiple times (reuse) and water held in storage from previous years (California Department of Water Resources 2009).

[10] Applied water refers to the total amount of water diverted from any source to meet the demands for beneficial use by water users (dedicated water uses) without adjusting for water that is consumptively used, becomes return flow, is reused, or is irrecoverable (California Department of Water Resources 2009).

Surface water made up the majority (about 88%) of the water supply; urban use constituted the majority (about 60%) of applied water use. SWP and CVP contractors supplied approximately 14% of the region's water.

- **SWP and CVP Contractors in Region.** Table 30-4 lists contractors serving M&I uses[11] in the region.
- **Projected Water Use.**[12] By 2025, water demand in this hydrologic region would decrease under two out of the three of the California Water Plan demand scenarios and would increase in two out of the three demand scenarios by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c).[10] Assuming the Current Trends demand scenario, by year 2025 total demand is expected to decrease by 4.9% (equal to about 89 TAF) relative to annual water use in the baseline reporting period (1998–2005) (California Department of Water Resources 2011c). For comparison, the Slow and Strategic Growth demand scenario indicates a 9.7% decrease, while the Expansive Growth demand scenario indicates a 2.8% increase by 2025 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). By 2050, DWR projections indicate that assuming the Current Trends demand scenario, water demand is expected to increase by 11.8% (215 TAF) relative to baseline reporting period average annual water demand. For comparison, the Slow and Strategic Growth demand scenario indicates a 7.7% decrease, while the Expansive Growth demand scenario indicates a 31.9% increase by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). The reductions in demand by 2025 are due primarily to projected reductions in agricultural and environmental water demand under all scenarios relative to the baseline period; under the Slow and Strategic Growth scenario urban water demand is also projected to decrease somewhat. Under this scenario the region's population is assumed to decline, relative to its 2005 population, and the reduction in demand by 2050 under this scenario is due primarily to a more substantial reduction in urban water demand by 2050, relative to the baseline period, than is projected to occur by 2025. Agricultural water demand is also projected to decrease, while environmental water demand is projected to increase under this scenario.

30.1.3.2 Sacramento River Hydrologic Region

The Sacramento River region includes basins draining into the Sacramento River system in the Central Valley (including the Pit River drainage), from the Oregon border south through the American River drainage basin. As shown in Table 30-3, this region has the largest land area among the affected regions; over 17% of the state is within the Sacramento River region. In 2000, over 2 million acres of irrigated cropland in this region were under cultivation. Major cities in the region include Sacramento, Roseville, Davis, Elk Grove, Folsom, Chico, Redding, and Lodi.

Between 1990 and 2010, the Sacramento River region experienced a 39% increase in population (refer to Figure 30A-2, Appendix 30A, which depicts changes in the population density between

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[11] Only contractors with 3,000 or more connections or using more than 3,000 acre-feet annually are listed.

[12] Projected changes in demand are based on projections prepared for the 2009 California Water Plan (Rayej pers. comm. 2012) relative to updated baseline reporting period data (for 1998–2005) currently provided at the 2009 California Water Plan website (California Department of Water Resources 2011c). The calculated change in demand excludes conveyance applied water, groundwater recharge water, and energy production water from baseline data because they were not modeled in the demand projections. Projected demand by 2025 is based on the average annual projected demand for years 2018–2025. Projected demand by 2050 is based on the average annual projected demand for years 2043–2050.

1990 and 2010). Table 30-6 presents the current and projected populations of counties wholly or partially within the region. In 2010, this region had the third highest total population and the third lowest population density among affected regions. By 2050, the population of the Sacramento River Hydrologic Region is projected to increase by approximately 2.3 million people,[13] a 77% increase relative to 2010 population (California Department of Water Resources 2009; ESRI 2011).

Water supply and use in the Sacramento River region is characterized below (see Figure 30-1).

- **Water Supply and Use Characteristics**. For the baseline reporting period of 1998–2005 (the reporting years for Bulletin 160-09), the average annual dedicated water supply (including outflows from the region) was approximately 22,754 TAF. Surface water made up the majority (about 54%) of the water supply; environmental use constituted the majority (about 60%) of applied water use. SWP and CVP contractors supplied approximately 15% of the region's water.
- **SWP and CVP Contractors in Region**. Table 30-4 lists SWP and CVP contractors serving M&I uses in the hydrologic region.
- **Projected Water Use**. By 2025, water demand for this hydrologic region would increase in the three California Water Plan demand scenarios and would increase in two out of three demand scenarios by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c))[11]. Assuming the Current Trends demand scenario, by year 2025 total demand is expected to increase by 3.8% (equal to about 822 TAF) relative to annual water use in the baseline reporting period (1998–2005) (California Department of Water Resources 2011c). For comparison, the Slow and Strategic Growth demand scenario indicates a 2.8% increase, while the Expansive Growth demand scenario indicates a 4.6% increase by 2025(Rayej pers. comm. 2012; California Department of Water Resources 2011c). By 2050, DWR projections indicate that, assuming the Current Trends demand scenario, water demand is expected to increase by 1.7% (382 TAF) relative to baseline reporting period average annual water demand. For comparison, the Slow and Strategic Growth demand scenario indicates a 0.9% decrease, while the Expansive Growth demand scenario indicates a 4.1% increase by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). The smaller increases in demand relative to the baseline reporting period by 2050 under two scenarios (and the decrease in demand in the case of the Slow and Strategic scenario), compared to the projected increases by 2025, are due to reductions in agricultural water use under all three scenarios by 2050. Urban water use is projected to increase by 2025 and by a greater amount by 2050 relative to the baseline period.

[13] This population estimate is based on the 2050 population shown in the regional summary figure (Figure SR-1, Sacramento River Hydrologic Region: 2005 inflows and outflows) in the California Water Plan (Department of Water Resources 2009, Vol. 3, p. SR-4). The California Water Plan includes three demand scenarios; this population estimate corresponds to the "Current Trends" demand scenario, which is based on population projections by the California Department of Finance.

Table 30-6. Current and Projected Populations of Counties[a] within the Sacramento River Hydrologic Region (in Thousands)

	Butte	Colusa	El Dorado	Glenn	Lake	Lassen	Modoc	Nevada	Napa[b]	Placer	Plumas	Sacramento[b]	Shasta	Sierra	Siskiyou	Solano[b]	Sutter	Tehama	Yolo	Yuba
2000 [c]	203.2	18.8	156.3	26.5	58.3	33.8	9.4	92.0	124.3	248.4	20.8	1,223.5	163.3	3.6	44.3	394.9	78.9	56.0	168.7	60.2
2009 [d]	226.8	23.3	186.3	30.4	66.7	37.6	10.7	101.8	140.8	340.7	21.7	1,437.3	189.1	3.6	46.9	436.3	100.0	64.6	202.7	78.5
2020 [d]	281.4	29.6	221.1	38.0	77.9	42.4	13.1	114.5	165.8	428.5	22.9	1,622.3	224.4	3.5	51.3	503.2	141.2	79.5	245.1	109.2
2025 [d]	308.2	32.1	235.2	41.5	82.6	44.9	14.7	119.7	178.4	470.6	23.8	1,714.9	242.6	3.4	53.6	547.0	161.0	86.5	260.5	123.0
2050 [d]	441.6	41.7	314.1	63.6	106.9	56.0	24.1	136.1	251.6	751.2	28.5	2,176.5	331.7	3.5	66.6	815.5	282.9	124.5	328.0	201.3
2000–2009																				
Numerical Change	23.6	4.5	30.0	4.0	8.4	3.7	1.2	9.8	16.6	92.3	0.9	**213.8**	25.9	0.1	2.6	41.3	21.1	8.6	34.0	18.2
Percent Growth	11.6	23.9	19.2	15.0	14.4	11.1	13.1	10.6	13.3	**37.2**	4.4	17.5	15.8	2.5	5.8	10.5	26.8	15.3	20.2	30.3
Average Annual Growth Rate	1.2%	2.4%	2.0%	1.6%	1.5%	1.2%	1.4%	1.1%	1.4%	3.6%	0.5%	1.8%	1.6%	0.3%	0.6%	1.1%	2.7%	1.6%	2.1%	3.0%
2009–2025																				
Numerical Change	81.4	8.8	48.9	11.1	15.9	7.3	4.0	17.9	37.6	129.9	2.0	**277.6**	53.5	-0.2	6.7	110.7	60.9	21.8	57.8	44.5
Percent Growth	35.9	37.6	26.2	36.6	23.8	19.5	37.6	17.5	26.7	38.1	9.3	19.3	28.3	-6.5	14.3	25.4	**60.9**	33.8	28.5	56.7
Average Annual Growth Rate	1.9%	2.0%	1.5%	2.0%	1.3%	1.1%	2.0%	1.0%	1.5%	2.0%	0.6%	1.1%	1.6%	-0.4%	0.8%	1.4%	3.0%	1.8%	1.6%	2.8%
2009–2050																				
Numerical Change	214.8	18.4	127.8	33.2	40.2	18.4	13.4	34.3	110.8	410.5	6.7	**739.2**	142.6	-0.1	19.7	379.3	182.9	59.8	125.3	122.9
Percent Growth	94.7	78.8	68.6	109.1	60.2	49.0	125.4	33.7	78.7	120.5	31.0	51.4	75.4	-2.7	42.1	86.9	**182.8**	92.6	61.8	156.6
Average Annual Growth Rate	1.6%	1.4%	1.3%	1.8%	1.2%	1.0%	2.0%	0.7%	1.4%	1.9%	0.7%	1.0%	1.4%	-0.1%	0.9%	1.5%	2.6%	1.6%	1.2%	2.3%

Sources: California Department of Finance 2007a; California Department of Finance 2011.

Note: Numbers in bold indicate largest net and percent increase.

n/a = not available.

[a] Includes counties wholly or partially within the Sacramento River Hydrologic Region, Excludes Alpine and Amador counties-only a small and/or relatively unpopulated portion of these counties are located within the hydrologic region.

[b] Napa and Solano counties also in the San Francisco Bay Hydrologic Region; Sacramento County also in the San Joaquin River Hydrologic Region.

[c] California Department of Finance 2011, Table 1.

[d] California Department of Finance 2007a.

30.1.3.3 San Joaquin River Hydrologic Region

The San Joaquin River region includes basins draining into the San Joaquin River system, from the Cosumnes River basin in the north through the southern boundary of the San Joaquin River watershed. As shown in Table 30-3, this region has a total land area of approximately 15,214 square miles; just under 10% of the state is within the San Joaquin River region. In 2000, over 2 million acres of irrigated cropland (slightly greater than Sacramento River region) in this region were under cultivation. In 2010, this region had the fifth highest total population and the third highest population density among affected regions. Major cities in the region include Stockton, Fresno, Tracy, Modesto, Merced, and Clovis.

Between 1990 and 2010, the San Joaquin River region experienced a 52% increase in population (refer to Figure 30A-3, Appendix 30A, which depicts changes in the population density between 1990 and 2010). Table 30-7 presents the current and projected populations of counties wholly or partially within the region. By 2050 the population of the San Joaquin River region is projected to increase by approximately 2.7 million people[14], a 126% increase relative to 2010 population (California Department of Water Resources 2009; ESRI 2011).

Water supply and use in the region is characterized below (see Figure 30-1).

- **Water Supply and Use Characteristics.** For the period of 1998–2005 (the reporting years for Bulletin 160-09), the average annual dedicated water supply (including outflows from the region) was approximately 11,274 TAF. Surface water made up the majority (about 49%) of the water supply; agricultural use constituted the majority (62%) of applied water use. SWP and CVP contractors supplied approximately 15% of the region's water.
- **SWP and CVP Contractors in Region.** Table 30-4 lists SWP and CVP contractors serving M&I uses in the hydrologic region.
- **Projected Water Use.** By 2025, water demand in this hydrologic region would increase in the three California Water Plan demand scenarios and would decrease under two of the three demand scenarios by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c).[12] Assuming the Current Trends demand scenario, by year 2025 total demand is expected to increase by 2.7% (284 TAF) relative to annual water use in the baseline reporting period (1998–2005) (California Department of Water Resources 2011c). For comparison, the Slow and Strategic Growth demand scenario indicates a 1.1% increase, while the Expansive Growth demand scenario indicates a 3.5% increase by 2025 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). By 2050, DWR projections indicated that, assuming the Current Trends demand scenario, water demand is expected to decrease by 1.2% (127 TAF) relative to baseline reporting period average annual water demand. For comparison, the Slow and Strategic Growth demand scenario indicates a 4.9% decrease, while the Expansive Growth demand scenario indicates a 1.0% increase by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). The projected decreases in demand by 2050 for two of the three scenarios, and the smaller increase for the third scenario compared to 2025, are due to

[14] This population estimate is based on the 2050 population shown in the regional summary figure (Figure SJ-1, San Joaquin River Hydrologic Region 2005 inflows and outflows) in the California Water Plan (Department of Water Resources 2009, Vol. 3, p. SJ-4). The California Water Plan includes three demand scenarios; this population estimate corresponds to the "Current Trends" demand scenario, which is based on population projections by the California Department of Finance.

reductions in agricultural water use relative to the baseline reporting period. Agricultural water use is projected to decrease slightly by 2025 (e.g., by 3% under the Current Trends scenario) and more substantially by 2050 (e.g., by 17% under the Current Trends scenario). Urban water use is projected to increase by 2025 and by a greater amount by 2050 relative to the baseline period.

30.1.3.4 Central Coast Hydrologic Region

The Central Coast region includes basins draining to the Pacific Ocean below the Pescadero Creek watershed to the southeastern boundary of Rincon Creek Basin in western Ventura County. As shown in Table 30-3, this region has the third smallest land area (approximately 11,326 square miles) among the affected regions. Major cities in the region include Santa Cruz, Watsonville, San Luis Obispo, and Santa Barbara.

Between 1990 and 2010, the Central Coast region experienced an 8% increase in population (refer to Figure 30A-4, Appendix 30A, which depicts changes in the population density between 1990 and 2010). Table 30-8 presents the current and projected populations of counties wholly or partially within the region. In 2010, this region had the third lowest total population and the fourth lowest population density among affected regions. By 2050 the Central Coast region is projected to experience the smallest net population growth among affected regions, with population increasing by approximately 0.8 million people,[15] a 57.1% increase relative to 2010 population. (California Department of Water Resources 2009; ESRI 2011).

[15] This population estimate is based on the estimated 2050 population shown in the regional summary figure (Figure CC-1, Central Coast Hydrologic Region 2005 inflows and outflows) in the California Water Plan (Department of Water Resources 2009, Vol. 3, p. CC-4). The California Water Plan includes three demand scenarios; this population estimate corresponds to the "Current Trends" demand scenario, which is based on population projections by the California Department of Finance.

Table 30-7. Current and Projected Populations of Counties[a] within the San Joaquin River Hydrologic Region (in Thousands)

	Alameda	Alpine[b]	Amador	Calaveras	Contra Costa[b]	Fresno[b]	Madera	Mariposa	Merced	Sacramento[b]	San Joaquin	Stanislaus	Tuolumne
2000 [c]	1,443.9	1.2	35.1	40.6	948.8	799.4	123.1	17.1	210.6	1,223.5	563.6	447.0	54.5
2009 [d]	1,540.5	1.4	39.9	47.2	1,064.8	964.8	158.3	18.9	267.7	1,437.3	724.0	549.4	58.4
2020 [d]	1,663.5	1.5	47.6	56.3	1,237.5	1,201.8	212.9	21.7	348.7	1,622.3	965.1	699.1	64.2
2025 [d]	1,729.3	1.5	51.3	60.6	1,330.9	1,314.5	243.3	23.0	393.3	1,714.9	1,081.1	776.5	66.0
2050 [d]	2,047.7	1.4	68.5	80.4	1,812.2	1,928.4	413.6	28.1	652.4	2,176.5	1,784.0	1,191.3	73.3
2000–2009													
Numerical Change	96.6	0.2	4.8	6.6	115.9	165.3	35.1	1.8	57.1	**213.8**	160.4	102.4	3.9
Percent Growth	6.7	12.4	13.6	16.4	12.2	20.7	**28.5**	10.5	27.1	17.5	**28.5**	22.9	7.2
Average Annual Growth Rate	0.7%	1.3%	1.4%	1.7%	1.3%	2.1%	2.8%	1.1%	2.7%	1.8%	2.8%	2.3%	0.8%
2009–2025													
Numerical Change	188.8	0.1	11.5	13.4	266.2	349.8	85.0	4.0	125.6	277.6	**357.2**	227.1	7.6
Percent Growth	12.3	8.0	28.8	28.5	25.0	36.3	**53.7**	21.3	46.9	19.3	49.3	41.3	13.0
Average Annual Growth Rate	0.7%	0.5%	1.6%	1.6%	1.4%	2.0%	2.7%	1.2%	2.4%	1.1%	2.5%	2.2%	0.8%
2009–2050													
Numerical Change	507.2	0.0	28.6	33.2	747.5	963.7	255.3	9.2	384.7	739.2	**1,060.0**	641.9	14.9
Percent Growth	32.9	1.4	71.8	70.4	70.2	99.9	**161.3**	48.3	143.7	51.4	146.4	116.8	25.4
Average Annual Growth Rate	0.7%	0.0%	1.3%	1.3%	1.3%	1.7%	2.4%	1.0%	2.2%	1.0%	2.2%	1.9%	0.6%

Sources: California Department of Finance 2007a; California Department of Finance 2011.

Note: Numbers in bold indicate largest net and percent increase.

n/a = not available.

[a] Includes counties wholly or partially within the Sacramento River Hydrologic Region. Excludes Benito and El Dorado counties-only a small and/or relatively unpopulated portion of these counties are located within the hydrologic region.

[b] Contra Costa County also in the San Francisco Bay Hydrologic Region; Sacramento County also in the Sacramento River Hydrologic Region. Fresno County also in the Tulare Lake Hydrologic Region

[c] California Department of Finance 2011, Table 1.

[d] California Department of Finance 2007a.

Table 30-8. Current and Projected Populations of Counties[a] within the Central Coast Hydrologic Region (in Thousands)

	Monterey	San Benito	San Luis Obispo	Santa Barbara	Santa Clara[b]	Santa Cruz	Ventura[b]
2000 [c]	401.8	53.2	246.7	399.3	1,682.6	255.6	753.2
2009 [d]	430.4	62.4	268.0	430.8	1,823.8	266.8	846.8
2020 [d]	476.6	83.8	293.5	459.5	1,992.8	287.5	956.4
2025 [d]	502.7	93.5	305.4	472.3	2,092.5	296.6	1,004.4
2050 [d]	646.6	145.6	364.7	534.4	2,624.7	333.1	1,229.7
2000–2009							
Numerical Change	28.7	9.2	21.3	31.4	**141.2**	11.2	93.6
Percent Growth	7.1	**17.3**	8.6	7.9	8.4	4.4	12.4
Average Annual Growth Rate	0.8%	1.8%	0.9%	0.8%	0.9%	0.5%	1.3%
2009–2025							
Numerical Change	72.2	31.0	37.4	41.6	**268.7**	29.8	157.6
Percent Growth	16.8	**49.7**	14.0	9.7	14.7	11.2	18.6
Average Annual Growth Rate	1.0%	2.6%	0.8%	0.6%	0.9%	0.7%	1.1%
2009–2050							
Numerical Change	216.2	83.1	96.8	103.7	**800.9**	66.3	382.9
Percent Growth	50.2	133.2	36.1	24.1	43.9	24.9	45.2
Average Annual Growth Rate	1.0%	2.1%	0.8%	0.5%	0.9%	0.5%	0.9%

Sources: California Department of Finance 2007a, California Department of Finance 2011.

Note: Numbers in bold indicate largest net and percent increase.

n/a = not available.

[a] Includes counties wholly or partially within the Central Coast Hydrologic Region.

[b] Santa Clara County also in the San Francisco Bay Hydrologic Region; Ventura County also in the South Coast Region.

[c] California Department of Finance 2011, Table 1.

[d] California Department of Finance 2007a.

Water supply and use in the Central Coast region is characterized below (see Figure 30-1).

- **Water Supply and Use Characteristics.** For the period of 1998–2005 (the reporting years for Bulletin 160-09), the average annual dedicated water supply (including outflows from the region) was approximately 1,472 TAF. Groundwater made up the majority (about 76%) of the water supply; agricultural use constituted the majority (about 71%) of applied water use. SWP and CVP contractors supplied approximately 6% of the region's water.
- **SWP and CVP Contractors in Region**. Table 30-4 lists SWP and CVP contractors in the hydrologic region serving M&I uses.
- **Projected Water Use.** By 2025 water demand in this hydrologic region would increase in two out of the three demand scenarios and would also increase in two out three demand scenarios

by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c)[13]. Assuming the Current Trends demand scenario, by year 2025 total demand is expected to increase by 2.3% (32 TAF) relative to annual water use in the baseline reporting period (1998–2005) (California Department of Water Resources, 2011c). For comparison, the Slow and Strategic Growth demand scenario indicates an 3.9% decrease, while the Expansive Growth demand scenario indicates a 3.0% increase by 2025 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). By 2050, DWR projections indicate that, assuming the Current Trends demand scenario, water demand is expected to increase 2.2% (31 TAF) relative to the baseline reporting period. For comparison, the Slow and Strategic Growth demand scenario indicates a 14.1% decrease, while the Expansive Growth demand scenario indicates a 5.4% increase by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). The slightly smaller increase in demand by 2050 under the Current Trends scenario relative to the baseline reporting period, compared to the projected increase by 2025, is due to more substantial reductions in agricultural water use by 2050 than is projected to occur by 2025. The larger reduction in demand by 2050 under the Slow and Strategic Growth scenario than is projected to occur by 2025 is due both to a more substantial reduction in agricultural water demand and a smaller increase in urban water demand by 2050 than are projected for 2025.

30.1.3.5 South Coast Hydrologic Region

The South Coast region includes basins draining into the Pacific Ocean from the southeastern boundary of Rincon Creek Basin to the international border with Mexico. As shown in Table 30-3, this region has the second smallest land area (approximately 10,925 square miles) among the affected regions. Major cities in this hydrologic region include Los Angeles, Santa Ana, Riverside, San Bernardino and San Diego, among others.

Between 1990 and 2010, the South Coast region experienced a 22% increase in population (refer to Figure 30A-5, Appendix 30A, which depicts changes in the population density between 1990 and 2010). Table 30-9 presents the current and projected populations of counties wholly or partially within the region. In 2010, this region had the highest total population and the highest population density among affected regions. By 2050 the South Coast region is projected to experience the largest net population growth among affected regions, with population increasing by approximately 7.3 million people,[16] a 37% increase relative to 2010 population (California Department of Water Resources 2009; ESRI 2011).

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[16] This population estimate is based on the estimated 2050 population shown in the regional summary figure (Figure SC-1, South Coast Hydrologic Region) in the California Water Plan (Department of Water Resources 2009, Vol. 3. p. SC-4). The California Water Plan includes three demand scenarios; this population estimate corresponds to the "Current Trends" demand scenario, which is based on population projections by the California Department of Finance.

Table 30-9. Current and Projected Populations of Counties[a] within the South Coast Hydrologic Region (in Thousands)

	Los Angeles	Orange	Riverside[b]	San Bernardino[b]	San Diego	Ventura[b]
2000 [c]	9,519.3	2,846.3	1,545.4	1,710.1	2,813.8	753.2
2009 [d]	10,449.2	3,152.6	2,178.7	2,136.4	3,169.1	846.8
2020 [d]	11,214.2	3,520.3	2,904.8	2,581.4	3,550.7	956.4
2025 [d]	11,593.2	3,618.5	3,204.9	2,773.6	3,752.5	1,004.4
2050 [d]	13,061.8	3,987.6	4,730.9	3,662.2	4,508.7	1,229.7
2000–2009						
Numerical Change	**929.8**	306.4	633.3	426.3	355.3	93.6
Percent Growth	9.8	10.8	**41.0**	24.9	12.6	12.4
Average Annual Growth Rate	1.0%	1.1%	3.9%	2.5%	1.3%	1.3%
2009–2025						
Numerical Change	**1,144.1**	465.9	1,026.1	637.2	583.4	157.6
Percent Growth	10.9	14.8	**47.1**	29.8	18.4	18.6
Average Annual Growth Rate	0.7%	0.9%	2.4%	1.6%	1.1%	1.1%
2009–2050						
Numerical Change	**2,612.6**	835.0	2,552.2	1,525.8	1,339.6	382.9
Percent Growth	25.0	26.5	**117.1**	71.4	42.3	45.2
Average Annual Growth Rate	0.5%	0.6%	1.9%	1.3%	0.9%	0.9%

Sources: California Department of Finance 2007a; California Department of Finance 2011

Note: Numbers in bold indicate largest net and percent increase.

n/a = not available

[a] Includes counties wholly or partially within the Central Coast Hydrologic Region.

[b] Ventura County also in the Central Coast Hydrologic Region; San Bernardino County also in the Colorado River Hydrologic Region and the South Lahontan Hydrologic Region. Riverside County also in the Colorado River Hydrologic Region. Kern County also in the South Lahontan Hydrologic Region.

[c] California Department of Finance 2011, Table 1

[d] California Department of Finance 2007a

Water supply and use in the South Coast region is characterized below (see Figure 30-1).

- **Water Supply and Use Characteristics.** For the period of 1998–2005 (the reporting years for Bulletin 160-09), the average annual dedicated water supply (including outflows from the region) was approximately 5,009 TAF. Surface water made up the majority (about 59%) of the water supply; urban use constituted the majority (about 81%) of applied water use. SWP contractors supplied approximately 26% of the region's water.
- **SWP and CVP Contractors in Region.** Table 30-4 lists contractors serving M&I uses in region.
- **Projected Water Use.** By 2025, water demand in this hydrologic region would increase in all three demand scenarios and would increase in two out of three demand scenarios by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c).[14] Assuming the

Current Trends demand scenario, by year 2025 total demand is expected to increase by 11.7% (560 TAF) relative to annual water use in the baseline reporting period (1998–2005) (California Department of Water Resources, 2011c). For comparison, the Slow and Strategic Growth demand scenario indicates a 4.2% increase, while the Expansive Growth demand scenario indicates a 22.2% increase by 2025 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). By 2050, DWR projections indicate that, assuming the Current Trends demand scenario, water demand is expected to increase by 27.3% (1,306 TAF) relative to the baseline reporting period. For comparison, the Slow and Strategic Growth demand scenario indicates a 3.4% decrease, while the Expansive Growth demand scenario indicates a 59.7% increase in water demand by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). The projected reduction in demand by 2050 under the Slow and Strategic Growth scenario is due to a substantially smaller increase in urban demand and somewhat greater reduction in agricultural water demand by 2050, relative to the baseline reporting period, than are projected to occur by 2025.

30.1.3.6 Tulare Lake Hydrologic Region

The Tulare Lake region comprises the closed drainage basin at the south end of the San Joaquin Valley, south of the San Joaquin River watershed, encompassing basins draining to the beds of the former Kern and Tulare lakes, and Buena Vista Lake (or Buena Vista Aquatic Recreation Area). As shown in Table 30-3, this region has the fourth largest land area (approximately 17,033 square miles) among the affected regions. Among the affected regions, the Tulare Lake region has the highest acreage of irrigated cropland (3.2 million acres). Major cities within the region include Tulare, Visalia, Bakersfield, and Porterville.

Between 1990 and 2010, the Tulare Lake region experienced a 48% increase in population (refer to Figure 30A-6, Appendix 30A, which depicts changes in the population density between 1990 and 2010). Table 30-10 presents the current and projected populations of counties wholly or partially within the region. In 2010, this region had the fourth highest total population and the fourth highest population density among affected regions. By 2050, the Tulare Lake region is projected to experience the second largest net population growth among affected regions with population increasing by approximately 2.9 million people,[17] a 130% increase relative to 2010 population (California Department of Water Resources 2009; ESRI 2011).

[17] This population estimate is based on the estimated 2050 population shown in the regional summary figure (Figure TL-1, Tulare Lake Hydrologic Region 2005 inflows and outflows) in the California Water Plan (Department of Water Resources 2009, Vol. 3, p. TL-4). The California Water Plan includes three demand scenarios; this population estimate corresponds to the "Current Trends" demand scenario, which is based on population projections by the California Department of Finance.

Table 30-10. Current and Projected Populations of Counties[a] within the Tulare Lake Hydrologic Region (in Thousands)

	Fresno[b]	Kern[b]	Kings	Tulare
2000 [c]	799.4	661.7	129.5	368.0
2009 [d]	964.8	853.2	161.0	456.6
2020 [d]	1,201.8	1,086.1	205.7	599.1
2025 [d]	1,314.5	1,215.9	227.6	669.5
2050 [d]	1,928.4	2,106.0	352.8	1,026.8
2000–2009				
Numerical Change	165.3	**191.6**	31.6	88.6
Percent Growth	20.7	**29.0**	24.4	24.1
Average Annual Growth Rate	2.1%	2.9%	2.5%	2.4%
2009–2025				
Numerical Change	349.8	**362.6**	66.6	212.8
Percent Growth	36.3	42.5	41.3	**46.6**
Average Annual Growth Rate	2.0%	2.2%	2.2%	2.4%
2009–2050				
Numerical Change	963.7	**1,252.8**	191.7	570.2
Percent Growth	99.9	**146.8**	119.1	124.9
Average Annual Growth Rate	1.7%	2.2%	1.9%	2.0%

Sources: California Department of Finance 2007a; California Department of Finance 2011.

Note: Numbers in bold indicate largest net and percent increase.

n/a = not available.

[a] Includes counties wholly or partially within the Tulare Lake Hydrologic Region. Excludes San Benito County; only a small and relatively unpopulated portion of the county is located within the hydrologic region.

[b] Kern County also in the South Lahontan Hydrologic Region; Fresno County also in San Joaquin River Hydrologic Region.

[c] California Department of Finance 2011, Table 1.

[d] California Department of Finance 2007a.

Water supply and use in the Tulare Lake region is characterized below (see Figure 30-1).

- **Water Supply and Use Characteristics.** For the period of 1998–2005 (the reporting year for Bulletin 160-09), the average annual dedicated water supply (including outflows from the region) was approximately 12,730 TAF. Surface water constituted about 44% of supply and groundwater constituted about 43% of the supply in this region; agricultural use constituted the majority (about 82%) of applied water use. SWP and CVP contractors supplied approximately 27% of the region's water.
- **SWP and CVP Contractors in Region.** Table 30-4 lists contractors in the hydrologic region.
- **Projected Water Use.** By 2025, water demand in this hydrologic region would decrease under two of the three demand scenarios and would decrease under all three demand scenarios by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c).[15] Assuming the Current Trends demand scenario, by year 2025 total demand is expected to decrease by 1.2% (138 TAF) relative to annual water use in the baseline reporting period (1998–2005)

(California Department of Water Resources 2011c). For comparison, the Slow and Strategic Growth demand scenario indicates a 3.0% decrease, while the Expansive Growth demand scenario indicates almost no change (a 0.1% decrease) in demand by 2025 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). By 2050, DWR projections indicate that, assuming the Current Trends demand scenario, water demand is expected to decrease by 4.9% (583 TAF) relative to the baseline reporting period. For comparison, the Slow and Strategic Growth demand scenario indicates a 9.4% decrease, while the Expansive Growth demand scenario indicates a 1.5% decrease by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). The projected reductions in demand are due to greater projected reductions in agricultural water demand over time under all scenarios relative to the baseline period (i.e., with greater reductions in agricultural water demand by 2050 than by 2025).

30.1.3.7 South Lahontan Hydrologic Region

The South Lahontan region includes the interior drainage basins east of the Sierra Nevada crest, south of the Walker River watershed, northeast of the Transverse Ranges, and north of the Colorado River region. The main basins are the Owens and the Mojave river basins. As shown in Table 30-3, this region has the second largest land area (approximately 26,732 square miles) among the affected regions, covering approximately 16.9% of the state. The South Lahontan and Colorado regions comprise the southeastern portion of California and contain the most arid lands in the state. Major cities within the region include Victorville, Palmdale, and Lancaster within the high desert areas at the margins of the Los Angeles metropolitan area.

Between 1990 and 2010, the South Lahontan region experienced a 57% increase in population (refer to Figure 30A-7, Appendix 30A, which depicts changes in the population density between 1990 and 2010). Table 30-11 presents the current and projected populations of counties wholly or partially within the region. In 2010, this region had the second lowest total population among affected regions and the lowest population density. By 2050, population is projected to increase by approximately 1.5 million people,[18] a 161% increase relative to 2010 population (California Department of Water Resources 2009; ESRI 2011).

[18] This population estimate is based on the estimated 2050 population shown in the regional summary figure (Figure SL-1, South Lahontan Hydrologic Region 2005 inflows and outflows) in the California Water Plan (Department of Water Resources 2009, Vol. 3, p. SL-4). The California Water Plan includes three demand scenarios; this population estimate corresponds to the “Current Trends” planning scenario, which is based on population projections by the California Department of Finance.

Table 30-11. Current and Projected Populations of Counties[a] Within the South Lahontan Hydrologic Region (in Thousands)

	Inyo	Kern	Los Angeles	Mono	San Bernardino[b]
2000 [c]	18.1	661.7	9,519.3	12.9	1,710.1
2009 [d]	19.1	853.2	10,449.2	14.6	2,136.4
2020 [d]	20.5	1,086.1	11,214.2	18.1	2,581.4
2025 [d]	21.4	1,215.9	11,593.2	20.4	2,773.6
2050 [d]	25.1	2,106.0	13,061.8	36.1	3,662.2
2000–2009					
Numerical Change	1.0	191.6	**929.8**	1.7	426.3
Percent Growth	5.6	29.0	9.8	13.5	24.9
Average Annual Growth Rate	0.6%	2.9%	1.0%	1.4%	2.5%
2009–2025					
Numerical Change	2.3	362.6	**1,144.1**	5.8	637.2
Percent Growth	11.9	**42.5**	10.9	39.8	29.8
Average Annual Growth Rate	0.7%	2.2%	0.7%	2.1%	1.6%
2009–2050					
Numerical Change	6.0	1,252.8	**2,612.6**	21.5	1,525.8
Percent Growth	31.6	146.8	25.0	**147.3**	71.4
Average Annual Growth Rate	0.7%	2.2%	0.5%	2.2%	1.3%

Sources: California Department of Finance 2007a; California Department of Finance 2011.

Note: Numbers in bold indicate largest net and percent increase.

n/a = not available.

[a] Includes counties wholly or partially within the South Lahontan Hydrologic Region.

[b] San Bernardino County also in the South Coast and Colorado River Hydrologic Regions; Los Angeles County also in the South Coast Hydrologic Region. Kern County also in the Tulare Lake Hydrologic Region.

[c] California Department of Finance 2011, Table 1.

[d] California Department of Finance 2007a.

Water supply and use in the South Lahontan region is characterized below (see Figure 30-1).

- **Water Supply and Use Characteristics.** For the period of 1998–2005 (the reporting years for Bulletin 160-09), the average annual dedicated water supply (including outflows from the region) was approximately 690 TAF. Groundwater made up the majority (about 59%) of the water supply; agricultural use constituted the majority (about 51%) of applied water use. SWP contractors supplied approximately 12% of the region's water.
- **SWP and CVP Contractors in Region.** Table 30-4 lists contractors in the hydrologic region.
- **Projected Water Use.** By 2025, water demand in this hydrologic region would increase under all three demand scenarios as it also would by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c).[16] Assuming the Current Trends demand scenario, by year 2025 demand is expected to increase by 31.8% (213 TAF) relative to annual water use in the baseline reporting period (1998–2005) (California Department of Water Resources 2011c). For comparison, the Slow and Strategic Growth demand scenario indicates a 20.0% increase,

while the Expansive Growth demand scenario indicates a 54.5% increase by 2025 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). By 2050, DWR projections indicate that, assuming the Current Trends demand scenario, water demand is expected to increase by 69.8% (467 TAF) relative to baseline reporting period. For comparison, the Slow and Strategic Growth demand scenario indicates a 11.4% increase, while the Expansive Growth demand scenario indicates a 143.3% increase by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). The increases in demand are due primarily to projected increases in urban demand by 2025 and 2050 while decreases in agricultural water demand are projected to be relatively minor.

30.1.3.8 Colorado River Hydrologic Region

The Colorado River region includes basins south and east of the South Coast and South Lahontan regions, areas that drain into the Colorado River, and areas that drain into the Salton Sea and other closed basins north of the border with Mexico. The South Lahontan and Colorado River regions comprise the southeastern portion of California and contain the most arid lands in the state. As shown in Table 30-3, this region has the third largest land area (approximately 19,962 square miles) among the affected regions. Major cities in the region are located within the Coachella Valley and include Palm Springs, Cathedral City, Palm Desert, Rancho Mirage, and Indio.

Between 1990 and 2010, the Colorado River region experienced a 74% increase in population (refer to Figure 30A-8, Appendix 30A, which depicts changes in the population density between 1990 and 2010). Table 30-12 presents the current and projected populations of counties wholly or partially within the region. In 2010, this region had the lowest total population in the state and the second lowest population density. By 2050, the population is projected to increase by approximately 1.5 million people,[19] a 178% increase relative to 2010 population (California Department of Water Resources 2009; ESRI 2011).

[19] This population estimate is based on the estimated 2050 population shown in the regional summary figure (Figure CR-1, Colorado River Hydrologic Region 2005 inflows and outflows) in the California Water Plan (Department of Water Resources 2009, Vol. 3, p. CR-4). The California Water Plan includes three demand scenarios; this population estimate corresponds to the “Current Trends” planning scenario, which is based on population projections by the California Department of Finance.

Table 30-12. Current and Projected Populations of Counties[a] Within the Colorado River Hydrologic Region (in Thousands)

	Imperial	Riverside[b]	San Bernardino[b]	San Diego[b]
2000 [c]	142.4	1,545.4	1,710.1	2,813.8
2009 [d]	184.7	2,178.7	2,136.4	3,169.1
2020 [d]	239.1	2,904.8	2,581.4	3,550.7
2025 [d]	261.5	3,204.9	2,773.6	3,752.5
2050 [d]	387.8	4,730.9	3,662.2	4,508.7
2000–2009				
Numerical Change	42.3	**633.3**	426.3	355.3
Percent Growth	29.7	**41.0**	24.9	12.6
Average Annual Growth Rate	2.9%	3.9%	2.5%	1.3%
2009–2025				
Numerical Change	76.8	**1,026.1**	637.2	583.4
Percent Growth	41.6	**47.1**	29.8	18.4
Average Annual Growth Rate	2.2%	2.4%	1.6%	1.1%
2009–2050				
Numerical Change	203.1	**2,552.2**	1,525.8	1,339.6
Percent Growth	109.9	**117.1**	71.4	42.3
Average Annual Growth Rate	1.8%	1.9%	1.3%	0.9%

Sources: California Department of Finance 2007a; California Department of Finance 2011.
Note: Numbers in bold indicate largest net and percent increase.
n/a = not available.
[a] Includes counties wholly or partially within the Colorado River Hydrologic Region.
[b] San Bernardino County also in the South Coast and South Lahontan Hydrologic Regions; Riverside and San Diego counties also in the South Coast Hydrologic Region.
[c] California Department of Finance 2011, Table 1.
[d] California Department of Finance 2007a.

Water supply and use in the Colorado River region is characterized below (see Figure 30-1).

- **Water Supply and Use Characteristics.** For the period of 1998–2005 (the reporting years for Bulletin 160-09), the average annual dedicated water supply (including outflows from the region) was approximately 4,613 TAF. Surface water made up the majority (about 83%) of the water supply; agricultural use constituted the majority (about 85%) of applied water use. SWP contractors supplied approximately 2% of the region's water.
- **SWP and CVP Contractors in Region.** Table 30-4 lists contractors in the region.
- **Projected Water Use.** By 2025, water demand in this hydrologic region would decrease under all three demand scenarios and would increase under two out of three scenarios by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c).[17] Assuming the Current Trends demand scenario, by 2025 demand is expected to decrease by 9.3% (373 TAF) relative to annual water use in the baseline reporting period (1998–2005) (California Department of Water Resources 2011c). For comparison, the Slow and Strategic Growth demand scenario indicates a 13.6% decrease, while the Expansive Growth demand scenario indicates a 7.2% decrease by 2025 (Rayej pers. comm. 2012; California Department of Water Resources 2011c).

By 2050, DWR projections indicate that, assuming the Current Trends demand scenario, demand is expected to increase 7.4% (296 TAF) relative to baseline reporting period. For comparison, the Slow and Strategic Growth demand scenario indicates a 9.5% decrease, while the Expansive Growth demand scenario indicates an 18.5% increase by 2050 (Rayej pers. comm. 2012; California Department of Water Resources 2011c). The reductions in demand by 2025 are due to projected reductions in agricultural water demand under all scenarios relative to the baseline period. By 2050, under the Current Trends and Expansive Growth scenarios, the projected increases in urban water demand are greater than projected decreases in agricultural demand, resulting in increases in total demand. Under the Slow and Strategic Growth scenario, the reduction in total demand is due to a smaller increase in urban demand than the projected decrease in agricultural water demand.

30.2 Regulatory Setting

The CEQA Guidelines (Section 15126.2(d)) require that an EIR evaluate the growth-inducing impacts of a project. The EIR must:

> Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristics of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

Economic growth refers to the extent that a project could cause increased activity in the local or regional economy. Economic and population growth can be induced in a number of ways, including through the elimination of obstacles to growth, through the stimulation of economic activity and job growth in the area, or the construction of new housing to attract new residents to an area. Elimination of obstacles to growth refers to the extent to which a project removes infrastructure limitations or regulatory constraints. For example, an increase in the capacity of utility or road infrastructure installed as part of a project could allow additional development in the surrounding areas. Increases in population may tax existing community service facilities, thus requiring new facilities to be built, the construction and operation of which could cause potentially significant environmental impacts.

As indicated in CEQA Guidelines Section 15126.2(d), above, under CEQA a project can have direct and/or indirect growth inducement potential, although, as noted at the outset of this chapter most growth inducing effects are characterized as indirect.

The CEQ regulations for implementing NEPA also require the analysis of growth-inducing impacts. Under CEQ Regulations, growth-inducing effects are a subset of indirect effects, which are defined as effects "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 Code of Federal Regulations [CFR] 1502.16(b), 40 CFR 1508.8(b)).

Growth that is induced by a project may be consistent with adopted local or regional land use plans; as such, the secondary effects of such planned growth would have been identified and evaluated through a formal CEQA environmental review process and, as necessary, mitigation would have been adopted to address these effects. If a project would have growth inducement potential that is not consistent with the land use plans and growth management plans and policies for the area affected (e.g., growth beyond that reflected in adopted plans and polices), then additional adverse secondary effects of growth beyond those previously evaluated could occur. Regional and local land use plans provide for land use development patterns and growth policies that allow for the orderly expansion of urban development supported by adequate urban public services, such as water supply, roadway infrastructure, utilities, wastewater, and solid waste service. This urban development may have environmental impacts, as identified in CEQA documents prepared for adoption of local land use plans. A project that would induce "disorderly" growth that conflicts with regional and local planning could indirectly cause additional adverse environmental impacts and impacts on other public services. Thus, it is important to assess the degree to which the growth associated with a project would or would not be consistent with regional and local planning.

30.3 Environmental Consequences

30.3.1 Methods for Analysis

This section describes the methods and key assumptions used to determine the growth inducement potential of the BDCP alternatives. This analysis relied in part on modeling conducted using the CALSIM II to estimate SWP and CVP deliveries under early and long term implementation for each alternative. Chapter 4, *Approach to the Environmental Analysis*, provides a brief overview of the modeling tools and outputs; Appendix 5A, *Modeling Tools*, provides a full description of the modeling efforts.

30.3.1.1 Direct Growth Inducement Potential

Alternatives 1A through 9 involve the construction and operation of water supply conveyance facilities. The analysis of direct growth inducement potential compared the number of construction and permanent operations and maintenance jobs associated with the alternatives with the labor force located in the Delta vicinity and evaluated the capacity of the local labor force to meet project-generated employment demand.

30.3.1.2 Indirect Growth Inducement Potential

To determine indirect growth inducement potential, the alternatives were evaluated for their potential to stimulate additional housing development and the need for services by (1) increasing water deliveries to SWP/CVP contractors that could support additional population in their service areas; (2) constructing new access roads in the vicinity of project facilities, thereby removing lack of roadway infrastructure as an obstacle to development; and/or (3) reducing the risk of flooding, thereby removing flood risk as an obstacle to development. New housing and expansion of public services can result in adverse effects on the environment (such as increased traffic or noise levels).

In assessing the environmental impacts of changes in water use, numerous issues arise, including the following.

- What is the relationship between water supply and urban population growth?

- Is the urban growth a consequence of the project's water supply or would that growth occur anyway, even in the absence of increased water deliveries associated with the BDCP?

The first question is addressed throughout this chapter. The second question is particularly important in light of NEPA requirements regarding the point of comparison. In situations where it is clear that growth would result from increased water deliveries, and these impacts can be attributed to the federal action, detailed descriptions of the impacts must be provided in the NEPA document.

The growth associated with identified additional population was assessed for consistency with applicable land use plans and associated environmental clearance documents. The potential for implementation of the proposed alternatives to indirectly induce growth by increasing water deliveries to SWP/CVP contractors was assessed using the steps listed below. A discussion of the assessment of indirect growth inducement potential associated with access roads and flood risk reduction is provided in Section 30.3.2.2, Indirect Growth Inducement Associated with Facility Construction and Operation.

- **Identify Study Area.** For purposes of this analysis, the study area (the area in which impacts may occur) comprises areas where facility construction and operation would occur and areas that could receive increased SWP/CVP deliveries associated with implementation of the BDCP.
- **Characterize Water Use and Growth Trends.** Section 30.1 characterizes urban development and water use trends at the state, regional, and local level, and characterizes, among other things, past and future potential changes in population and water use based on planning scenarios in the California Water Plan. This information is provided for context in considering changes in deliveries under BDCP alternatives.
- **Identify Changes in Water Deliveries Associated with the Alternatives.** Indirect growth could occur if an alternative were to result in increases in deliveries of reliable water supplies. Based on the results of the CALSIM II modeling effort, the change in SWP and CVP deliveries to contractors for each alternative at 2060 compared to Existing Conditions and the No Action Alternative was identified.
- **Characterize Regional Growth Inducement Potential.** For this analysis, all SWP and CVP contractors serving urban uses were identified. The growth inducement potential was characterized at the regional level by aggregating delivery projections for individual contractors based on the hydrologic region in which each contractor was located. Section 30.3.2.3 summarizes the projected changes in deliveries of SWP and CVP water overall under the No Action Alternative and each of the nine action alternatives, describing changes in deliveries that would occur at 2060, and compares the projected changes in deliveries with the projected changes in demand identified in the California Water Plan's Current Trends scenario. (See discussion of Projections under "Key Assumptions," below, for more information on the use of the Current Trends scenario in this analysis.)

  To assess the growth inducement potential of the projected changes in deliveries, the population potentially supported by the projected increases in M&I water deliveries was calculated by applying a per capita water use rate to the projected increases in deliveries. The demand scenarios presented in the California Water Plan 2009 Update did not incorporate the 20% reduction in per capita water use required in recent state law or the regional targets identified in the *20x2020 Water Conservation Plan,* which was finalized after publication of the 2009 California Water Plan. Therefore, the per capita water demand rates identified for each hydrologic region in the 20x2020 plan (shown in Table 30-18 in Section 30.3.2.5) were used to calculate the potential population that could be supported under each alternative overall and by hydrologic region. The population potentially supported by the increased deliveries under each alternative was compared with population increases projected in the California Water Plan assuming the Current Trends Scenario.

- **Select Contractor Service Areas for In-Depth Consideration.** The growth inducement analysis presents conclusions based on regional increases in SWP/CVP water supplies for urban uses. However, the majority of water supply planning for urban areas occurs at the local water wholesaler and retailer level. On the basis of projected increases in water demand and population, representative SWP and/or CVP contractor service areas were selected to assist in developing more in-depth profiles of the BDCP's growth inducement potential.
- **Characterize Future Growth Under the No-Action Alternative.** On the basis of information presented in Section 30.1 and other published data, the analysis investigated whether growth would occur without increases in reliability and supply brought about by BDCP implementation. The analysis addressed the major factors driving changing patterns in urban demand and the likely continuing decline in per capita use.
- **Assess Consistency with Regional Planning Documents/Projections.** If the analysis concluded that alternatives could induce, or remove an obstacle to, growth, then the analysis attempted to determine whether that level of growth would be consistent with adopted regional plans, focusing on the regions projected to receive the largest increases in M&I deliveries. The regional growth forecasts prepared by COGs, which incorporate and reflect information from the adopted general plans of the cities and counties represented by the COGs, and typically are prepared in consultation with local jurisdictions, were used for this purpose.
- **Characterize the Secondary Effects of Growth Potentially Induced by Alternatives and Mitigation Programs and Measures.** The study area encompassed numerous cities and counties. For this analysis, multiple published CEQA documents and other reports that have evaluated growth within representative cities and counties were reviewed and their findings summarized to help characterize adverse physical environmental effects potentially attributable to induced growth. In addition, programs and plan- or project-specific measures adopted to mitigate secondary effects of growth are summarized to indicate who has responsibility for addressing secondary effects of growth and how these effects are addressed.

30.3.1.3 Key Assumptions

The key assumptions used in the analysis of indirect growth inducement potential are discussed below.

Water Availability and Use

Future Water Deliveries

The level of detail of this analysis corresponded to the level of detail currently available with respect to water deliveries under the project alternatives. Implementation of some alternatives would increase the water delivery capacity of the SWP/CVP, potentially allowing contractors to receive more water relative to existing delivery conditions and/or the No Action Alternative.

Water Use within the Study Area

This analysis conservatively assumed that any M&I contractors projected to receive increased deliveries would allocate the new supply to urban growth rather than for other purposes (e.g., agriculture, dry year reliability, groundwater overdraft protection, environmental water). Some M&I contractors that receive increased deliveries might instead use some or all of it for purposes other than to supply new residents.

Future Changes in Consumption Patterns

Recent changes in state law, and changing practices at the water contractor level, alter, and will continue to alter, water consumption patterns, likely lowering per-capita demand for imported surface water through increased conservation and water recycling. (For example, "Community X" has a population of 1,000 and in a normal water year uses 500 acre-feet of water. Community X reduces water consumption to 400 acre-feet per year by implementing an ordinance that mandates cutbacks in landscape irrigation, so now just 400 acre-feet per year of water is needed to support 1,000 people.) The extent to which decreases in per-capita consumption of imported surface water could change the amount of growth that could be supported by water deliveries under the BDCP was explored as part of the No-Action Alternative.

Transfers from Agricultural to Urban Uses

For purpose of this analysis, the transfer of agricultural water to M&I contractors was considered an ongoing action that will continue independent of changes in the deliveries associated with the alternatives. Multi-year transfers and permanent transfers are subject to separate analysis under CEQA and NEPA as applicable. With respect to the SWP, authority for such transfers exists under the SWP contracts. CEQA evaluation and subsequent approval of permanent transfers from agricultural contractors to M&I contractors has already occurred for a number of transfers. Future transfers would be subject to new CEQA evaluation and approval.[20, 21] In addition to ongoing transfer actions, the SWP water supply contracts are likely to be amended, or specific funding agreements executed, to provide for SWP funding for the construction, operation, and maintenance of the new conveyance facility described by any action alternative considered for the Plan (See Chapter 3.8). A SWP contract amendment or funding agreement could identify allocation of benefits of the new conveyance facility that would be shared among contractors based on those who pay, receive the benefits attributed to the Plan, and this could result in multi-year or permanent transfer of SWP water among contractors, such as from agricultural use to urban use. At this time, because a specific SWP amendment or funding agreement has not been developed, the potential for changes in SWP water distribution has not been analyzed. If the SWP amendment or agreement, after it is developed, may have potential to have an environmental effect not already contemplated in the BDCP EIR/EIS, DWR would prepare additional analysis. For purposes of this analysis, SWP and CVP water supply allocations and the ability to divert from the south Delta intakes are determined in accordance with

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[20] The transfer of 41,000 acre feet of SWP Table A water to Castaic Lake Water Agency from Kern County Water Agency is an example of a large transfer from an agricultural contractor to an M&I contractor. The transfer was the subject of several CEQA documents, the last of which was upheld in December 2009 in the decision *Planning and Conservation League et al. v. Castaic Lake Water Agency* (2nd Appellate District No. B200673).

[21] The Monterey Plus EIR, formally known as the *Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement (Monterey Plus) Environmental Impact Report (*SCH# 2003011118) is available at the following website: http://www.water.ca.gov/environmentalservices/monterey_plus.cfm.

federal and state regulations, as described in Section 5.2, *Regulatory Setting*, and Appendix 5A, *BDCP EIR/S Modeling*.

Projections

Changes in Projected Growth

Projections necessarily entail the use of assumptions about factors that cannot be known or predicted with absolute certainty. Starting in 2005, the California Water Plan has explicitly acknowledged this uncertainty by describing three potential scenarios of future growth, rather than a single "likely future." DWR considers the three scenarios to represent plausible alternative future conditions rather than forecasts per se (California Department of Water Resources 2009:5-23). The Current Trends scenario follows population projections by the DOF, while the population estimates for the other two scenarios (Slow and Strategic Growth and Expansive Growth) are based on low- and high-population growth scenarios prepared by the Public Policy Institute of California (California Department of Water Resources 2009:v. 1, 6-24). Water use assuming the three demand scenarios (from the 2009 Update of the California Water Plan) is included for information purposes in the description of the hydrologic regions presented in Section 30.1.3.

The DOF's Demographic Research Unit is designated as the single official source of demographic data for state planning and budgeting; it provides demographic research and analysis, produces current population estimates and future projections of population and school enrollment, and disseminates census data. DOF's population estimates and demographic data are used in determining the annual appropriations limit for California jurisdictions, to distribute State subventions to cities and counties, and to comply with various State statutes, and are relied on by state agencies and departments, local governments, the federal government, school districts, the academic community the private sector and the public (California Department of Finance 2012a). As such, the DOF projections were considered the best source of population projections for the purposes this analysis. Therefore, the projections associated with the Current Trends demand scenario, which is based on DOF population projections, were used as the basis for evaluating water deliveries under the BDCP alternatives. Because these projections were completed in 2008 they would not reflect the effects on economic growth of the recession that began in 2008. Consequently development trends could occur more slowly or in different patterns than characterized in the projections. Nevertheless, this analysis reflected the California Department of Finance's best efforts to disclose expectations regarding future growth in the study area, consistent with CEQA and NEPA.

Delta Protection Commission

Pursuant to the Delta Protection Act of 1992[22] the Delta Protection Commission (DPC) prepared and adopted a comprehensive long-term Land Use and Resource Management Plan ("Resource Management Plan"). The DPC first adopted the Resource Management Plan in 1995; the Plan was subsequently reviewed and updated in 2010.[23] The Resource Management Plan sets forth a description of the needs and goals for the Delta and a statement of policies, standards and elements including land use. The overall goal of the Resource Management Plan is to "protect, maintain, and where possible, enhance and restore the overall quality of the Delta environment, including but not limited to agriculture, wildlife habitat, and recreational activities; assure orderly, balanced

[22] Public Resources Code 29760 et. seq.

[23] 14 CCR § 20030 et. seq.

conservation and development of Delta land resources and improve flood protection by structural and nonstructural means to ensure an increased level of public health and safety." The Delta Protection Act of 1992 also divided the Delta into a Primary Zone, where development is restricted, and a Secondary Zone, where development is permitted if allowed by the applicable local general plan. The Primary Zone is the DPC's principal jurisdiction. The Secondary Zone is not within the DPC's planning area but is within the Legal Delta.[24]

Specifically, the Land Use Section[25] sets out a goal of protecting the unique character and qualities of the Primary Zone by preserving the cultural heritage, strong agricultural/economic base, unique recreational resources, and biological diversity of the Primary Zone. This includes directing any new non-agriculturally oriented, non-farmworker residential development within the existing unincorporated towns (Walnut Grove, Clarksburg, Courtland, Hood, Locke and Ryde) in the Primary Zone of the Delta. In addition the Land Use Section encourages a critical mass of farms, agriculturally-related businesses and supporting infrastructure to ensure the economic vitality of agriculture within the Delta.

Because Delta counties must comply with and conform their general plans to the DPC's LURMP, development in the Primary Zone is significantly restricted. In addition, the Delta Reform Act of 2009[26] directed the DPC to prepare and submit to the Legislature recommendations regarding the potential expansion of or change to the Primary Zone. In response the DPC published the Sacramento San Joaquin Delta Primary Zone Study (Primary Zone Study) in December 2010. The Primary Zone Study recommended expansion of the Primary Zone through reclassification of several Secondary Zone study areas including Cosumnes/Mokelumne River Central, Bethel Island and Andrus/Brannan Island. The expansion of the Primary Zone would increase restrictions on development and further restrict growth in the Delta.

30.3.2 Effects and Mitigation Approaches

30.3.2.1 Direct Growth Inducement

Construction Jobs

Depending on the alternative, construction of the BDCP would require a peak of approximately 4,390[27] construction workers over an eight-year period. It is estimated that approximately 30 percent of these workers would come from out of state (due to the specialized nature of some of the jobs) and reside temporarily in the vicinity. Assuming the peak number of construction jobs (assumed to occur in year four of the eight-year period, as discussed in Chapter 16, *Socioeconomics*), this would mean approximately 1,300 workers coming from out of state. Construction would occur in the Delta area roughly between Sacramento and Stockton, and it is expected that the remaining approximately 3,100 workers would be drawn from the labor force of the five Delta counties in the project vicinity—Contra Costa, Sacramento, San Joaquin, Solano, and Yolo. The 3,100 jobs expected to be drawn from the local labor pool represents approximately 7% of the number of construction

[24] As defined in the Delta Protection Act of 1959.

[25] 14 CCR § 20060.

[26] SBX7 1.

[27] Based on the estimated construction workforce presented in Chapter 16, *Socioeconomics*, Table 16-19.

jobs in four of the five counties (Sacramento, San Joaquin, Solano, and Yolo)[28] in 2009, according to the California Department of Employment (California Employment Development Department 2011). While this is not an inconsequential percentage of construction jobs in 2009, the 3,100 project construction jobs is substantially less than the 13,000 construction jobs that were *lost* in the previous year (from 2008 to 2009) (California Employment Development Department 2011), due to the ongoing economic downturn.

As shown in Figure 30-2, construction employment in the four counties has fluctuated substantially over the past 20 years. After experiencing strong growth from the mid 1990s to a peak of 81,100 construction jobs in 2005, these counties lost 34,300 construction jobs between 2005 and 2009 (the BDCP base year); jobs continued to be lost between 2009 and 2010, although at a slightly slower rate (California Employment Development Department 2011). Considering the effects of the economic downturn on construction employment in the Delta region, it is reasonable to assume that the 3,100 construction workers would be drawn from the local labor pool, and that the employment opportunities afforded by BDCP would not require a substantial influx of workers from outside the area to fill them.

With respect to the 1,300 workers who are assumed would be from out of state, according to the 2010 decennial census, there were almost 20,000 vacant residential units for rent in the five Delta counties in 2010 and, in the cities of Sacramento and Stockton alone, there were 4,052 vacant residential units for rent (U.S. Census Bureau 2011). All these jurisdictions except Yolo County had residential rental vacancy rates higher than the 5% rate considered optimal to allow normal turnover and renter mobility.[29] The cities of Sacramento and Stockton alone had a combined total of 12,591 vacant residential units for rent and rental vacancy rates of 8.3% and 9.4%, respectively. In addition to the available rental housing units, there are recreational vehicle and mobile home parks and numerous hotels and motels within the five-county region to accommodate any construction workers. Given the availability of housing in the project vicinity, out-of-state workers would be readily accommodated by existing housing; therefore the influx of these workers during project construction would not induce substantial new housing development.

Permanent Jobs

The BDCP would require approximately 190 permanent operations and maintenance workers, who would be anticipated to live in the Delta region. This number represents about 0.02% of the total nonfarm jobs and 0.4% of the transportation, warehousing, and utilities jobs in the five Delta counties (California Employment Development Department 2011). It is therefore likely that this small number of new jobs would readily be filled by the local labor force and would not induce

[28] Information on construction employment for Contra Costa County is not included in the industry employment by county data provided by the California Employment Development Department; therefore the construction employment numbers discussed here do not include Contra Costa County. In addition the only annual average industry employment data provided for San Joaquin and Solano counties is for the Stockton Metropolitan Statistical Area (MSA) and the Vallejo-Fairfield MSA, respectively; consequently the job information for the four counties presented here is likely to be understated to some degree, although it is assumed the MSAs reflect county employment trends and are the major employment centers in their respective counties.

[29] According to the Association of Bay Area Governments (ABAG), in the Bay Area a 5% vacancy rate is considered necessary to permit ordinary mobility in rental housing (i.e., normal housing turnover and mobility on the part of renters), and a 2% vacancy rate is considered necessary to permit ordinary mobility in for-sale housing (Association of Bay Area Governments ND:1-18.) Rental vacancy rates in four of the five Delta counties ranged from 6.8% to 8.3%; Yolo County's rental vacancy rate was 5%.

additional growth in the area. Assuming some or all of the jobs were specialized and required workers from outside the local labor pool, given the availability of housing in the project vicinity, these workers would be readily accommodated by existing housing; therefore the influx of these workers during project operation would not induce substantial new housing development.

30.3.2.2 Indirect Growth Inducement Associated with Facility Construction and Operation

Access Roads within the BDCP Plan Area

As shown in the figures in Chapters 13, *Land Use*, and 14, *Agricultural Resources* (Figures 13-2 and 14-1), much of the Plan Area is designated for agricultural use, some is identified as open space, and only a small portion is currently in urban use. Project alternatives would involve construction of new temporary and permanent access roads at locations within the project work area to provide access to conveyance structures and other project facilities including intakes, pumping plants, tunnel shafts, and forebays (see Chapter 19, *Transportation*, for more detail). In general, construction of roads in relatively undeveloped areas has the potential to induce growth by facilitating access to such areas – removing lack of roadway infrastructure as an obstacle to growth. The temporary access roads would be removed following construction and the land would be returned to its pre-project conditions; therefore temporary roads would not have the potential to induce future development. The permanent access roads would remain and, given the nature of the Plan Area, would largely be located on agricultural or open space lands. However, existing roads, including Highways 84, 160, and 4, are located close to much of the proposed alignments and facility sites, and the majority of the permanent access roads would be short segments providing a direct route between an existing road and a given project facility; therefore the new permanent roads would not provide access to substantial areas of agricultural or undeveloped lands not already served by area roads. No changes are proposed to the land use or zoning designations of land within the Plan Area; although the construction of proposed BDCP facilities (including the permanent access roads) would remove the specific facility sites from agricultural production or other current land use, as discussed in Chapters 13 and 14, adjacent lands would continue to be designated for their current land uses. Therefore, the construction of the relatively limited segments of permanent access roads would not induce urban development.

Flood Risk Reduction

Actions under the BDCP are not anticipated to have any substantial impact or change on potential for flooding within the Plan Area and downstream areas (Chapter 6, *Surface Water*). Action alternatives would not result in an increase in potential risk for flood management compared to Existing Conditions when the changes due to sea level rise and climate change are eliminated from the analysis. Peak monthly flows under action alternatives in the locations considered in the analysis done in this EIR/EIS either were similar to or less than those that would occur under Existing Conditions without the changes in sea level rise and climate change; or the increased peak monthly flows would not exceed the flood capacity of the channels at these locations. It is not expected that there will be changes to land use or zoning designations within the Plan Area and therefore, no large-scale or substantial development would be expected to occur. There is not anticipated to have any indirect effect on growth.

30.3.2.3 Indirect Growth Inducement Potential: Summary of Modeling Results

The following sections highlight changes in SWP and CVP deliveries associated with the BDCP alternatives based on modeling conducted using CALSIM II, focusing on changes in municipal and industrial (M&I) deliveries (also referred to as urban deliveries). Figure 30-3 summarizes overall changes in SWP deliveries to both agricultural and M&I contractors for each alternative relative to Existing Conditions (the CEQA baseline) and the No Action Alternative (2060) (which reflects with sea level rise and climate change (i.e., effects of precipitation and snowpack). Figure 30-4 summarizes changes in CVP deliveries by alternative relative to Existing Conditions as well as the No Action Alternative.

Note that the CALSIM II model was designed to evaluate water deliveries for the project as a whole, and was not designed to provide delivery allocation at the contractor level. Under circumstances of reduced SWP and CVP deliveries, CALSIM II tends to allocate water first to contractors in the northern portion of the project and then to contractors in the south. This results in an uneven distribution of reductions, with contractors in the south receiving larger reductions than contractors in the north. Consequently, under several alternatives where reduced deliveries are projected (Alternatives 4 (Scenario H4), 5, 6A, 6B, 6C, 7, 8, and 9), some contractors (and therefore hydrologic regions) are projected to experience much larger decreases than others. This discrepancy is for the most part an artifact of the algorithm used in the model. Although system constraints may still lead to differences in distribution of reductions, these reductions in deliveries are likely to be more evenly distributed across the regions than CALSIM II has predicted. For more information on the modeling of water deliveries using the CALSIM II model, see Chapter 5, *Water Supply*, and Appendix 5A, *Modeling Methodology*.

For purposes of analyzing the project's potential to induce growth, this analysis focuses on the net increase in annual average deliveries; all information on water deliveries presented below is for average annual deliveries in normal hydrologic years. The SWP modeling results reflected in the tables and figures presented in this section include Table A water as well as Article 21 water.[30]

This analysis does not address potential effects of redistribution of SWP water supply among SWP water contractors that might occur from an SWP contract amendment or funding agreements for implementing BDCP, other than as possible multi-year or permanent agricultural to urban water transfer of SWP water. A SWP contract amendment or funding agreement could include provisions for allocating benefits such as a more reliable water supply, to contractors who pay for BDCP and could create the potential for redistributing SWP water. At this time, because a specific SWP amendment or funding agreement has not been developed, the potential for changes in SWP water distribution has not been analyzed. If the SWP amendment or agreement, after it is developed, may

[30] Article 21 water is interruptible water allocated under certain conditions. Water supply under Article 21 becomes available only during wet months of the year (December through March). A SWP contractor must have an immediate use for Article 21 supply or a place to store it outside of SWP; therefore not all SWP contractors can take advantage of this additional supply. Article 21 is a section of the contract between DWR and the water contractor that permits delivery of water in excess of delivery of SWP Table A. It is apportioned to contractors that request it in the same proportion as their SWP Table A water. Article 21 water is allocated under certain conditions: (a) SWP's share of San Luis Reservoir is full or projected to fill in the near term; (b) other SWP reservoirs are full or at their storage targets, or conveyance capacity to fill these reservoirs is maximized; (c) releases from upstream reservoirs plus unregulated inflow exceed the water supply needed to meet Sacramento Valley in-basin uses; (d) SWP Table A deliveries are being fully met; and (e) Banks Pumping Plant has spare capacity (California Department of Water Resources 2008b:32,39).

have potential to have an environmental effect not already contemplated in the BDCP EIR/EIS, DWR would prepare additional analysis.

No Action Alternative

Table 30-13 summarizes SWP and CVP deliveries under Existing Conditions (the CEQA baseline) and the No Action Alternative (the NEPA point of comparison). Under the No Action Alternative, the facilities and operations of the SWP and CVP would continue to be similar to Existing Conditions. However, the No Action Alternative includes two additional assumptions. First, the No Action Alternative assumes that there would be an increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta. Second, the No Action Alternative includes effects of implementation of the Fall X2 action, which requires additional water releases through the Delta in September and October of wet and above normal years and would result in decreased availability of water for export to SWP and CVP facilities in years the action is implemented. The No Action Alternative also includes the effects of sea level rise and climate change at the year 2060, which would reduce the amount of water available for SWP and CVP water supplies, as described in Chapter 5, *Water Supply*. These factors lead to an overall decrease in deliveries under the No Action Alternative as compared to Existing Conditions. For more detailed explanation of factors influencing deliveries under the No Action Alternative, see Chapter 5, *Water Supply.*

Table 30-13. Existing Conditions and No Action Alternative: Summary of Annual SWP and CVP Deliveries (thousand acre-feet)

	Existing Conditions		No Action Alternative	
	Table A	Table A + Article 21	Table A	Table A + Article 21
M&I[a]	1,852	1,889	1,756	1,780
Agriculture	665	706	592	614
Total SWP	2,517	2,595	2,348	2,395
CVP M&I[a]	125		110	

Sources: Based on projected water deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; and SWP_TableA_Art21_ delivery_by_contractor_tables_110111(031412).xls, March 2012) and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012; BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; and BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012). California Department of Water Resources, 2011b; California Department of Water Resources, 2012b; California Department of Water Resources, 2012c; California Department of Water Resources, 2012d; California Department of Water Resources 2012e; California Department of Water Resources 2012g, adapted by ESA.

[a] M&I – Municipal and Industrial (urban) customers.

Deliveries to the Hydrologic Regions

SWP. Under the No Action Alternative deliveries would generally be decreased to all regions relative to Existing Conditions. By 2060, overall deliveries to all regions would decrease due to the factors described above; however, deliveries to the Napa County Flood Control and Water Conservation District in the San Francisco Bay region and the Coachella Valley Water District in the Colorado

River are projected to increase due to the assumption that in the future, these contractors will increase their demand to their full contracted SWP Table A amounts.

CVP. Under the No Action Alternative, deliveries to all M&I contractors and all hydrologic regions would decrease by a total of 15 TAF relative to Existing Conditions. The San Francisco Bay region would receive the largest decrease (a decrease of approximately 7 TAF), while the Tulare Lake region would receive the smallest decrease (a decrease of approximately 2 TAF).

No Action Alternative Compared to Existing Conditions.

SWP. By 2060 under the No Action Alternative, Table A deliveries to all SWP contractors are projected to decrease by 7% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to decrease by 8%. By 2060, Table A and total deliveries to M&I contractors are projected to decrease by 5% and 6%, respectively.

CVP. By 2060 under the No Action Alternative, deliveries to all CVP M&I contractors are projected to decrease by 12% relative to Existing Conditions.

Alternatives 1A, 1B, and 1C

Table 30-14 summarizes annual SWP deliveries (including M&I and agricultural deliveries) under Alternatives 1 through 9, and indicates the change in deliveries relative to Existing Conditions and the No Action Alternative. Table 30-15 summarizes annual CVP deliveries (M&I only) under Alternatives 1 through 9, and indicates the change in deliveries relative to Existing Conditions and the No Action Alternative. Figure 30-5 depicts the percent change in total SWP deliveries for the hydrologic regions relative to the No Action Alternative. Table 30-16 identifies net increases in M&I deliveries for the State Water Project by hydrologic region compared with Existing Conditions and No Action Alternative. Table 30-17 identifies net increases in M&I deliveries for the Central Valley Project by hydrologic region compared to Existing Conditions and the No Action Alternative. Figure 30-6 depicts the percent change in total CVP deliveries for the hydrologic regions relative to the No Action Alternative.

1 **Table 30-14. Alternatives 1 to 9: Summary of Annual SWP Deliveries (thousand acre-feet)**

				Change in Water Deliveries for Each Alternative							
		Water Deliveries for Each Alternative		Compared to Existing Conditions[a]				Compared to No Action Alternative[a]			
	Contractor			Table A		Table A+Article 21		Table A		Table A+Article 21	
Alternative	Type	Table A	Table A + Article 21	Net	Percent	Net	Percent	Net	Percent	Net	Percent
1A, 1B, 1C	M & I[b]	2,173	2,232	321	17%	343	18%	417	24%	452	25%
	Agriculture	744	934	79	12%	228	32%	152	26%	320	52%
	Total	2,917	3,166	400	16%	571	22%	570	24%	771	32%
2A, 2B, 2C	M & I	2,031	2,071	179	10%	182	10%	276	16%	291	16%
	Agriculture	718	835	52	8%	129	18%	126	21%	221	36%
	Total	2,749	2,906	232	9%	311	12%	401	17%	511	21%
3	M & I	2,140	2,191	289	16%	301	16%	385	22%	410	23%
	Agriculture	730	888	65	10%	182	26%	139	23%	274	45%
	Total	2,871	3,078	354	14%	484	19%	523	22%	684	29%
4 (Scenario H1)	M & I	2,118	2,153	266	14%	264	14%	362	21%	373	21%
	Agriculture	726	827	60	9%	121	17%	134	23%	213	35%
	Total	2,843	2,980	326	13%	385	15%	496	21%	585	24%
4 (Scenario H2)	M & I	1,745	1,793	-106	-6%	-97	-5%	-10	-1%	12	1%
	Agriculture	592	682	-74	-11%	-24	-3%	0	0%	67	11%
	Total	2,337	2,474	-180	-7%	-121	-5%	-10	0%	80	3%
4 (Scenario H3)	M & I	1,988	2,019	136	7%	130	7%	232	13%	239	13%
	Agriculture	702	777	37	6%	71	10%	111	19%	163	27%
	Total	2,690	2,796	173	7%	201	8%	343	15%	402	17%
4 (Scenario H4)	M & I	1,609	1,656	-243	-13%	-233	-12%	-147	-8%	-124	-7%
	Agriculture	566	644	-99	-15%	-62	-9%	-26	-4%	29	5%
	Total	2,176	2,300	-342	-14%	-295	-11%	-172	-7%	-95	-4%
5	M & I	1,911	1,939	59	3%	50	3%	155	9%	159	9%
	Agriculture	654	704	-11	-2%	-1	0%	63	11%	90	15%
	Total	2,565	2,643	48	2%	48	2%	218	9%	249	10%
6A, 6B, 6C	M & I	1,374	1,400	-478	-26%	-490	-26%	-382	-22%	-381	-21%
	Agriculture	511	568	-154	-23%	-138	-20%	-80	-14%	-46	-8%
	Total	1,886	1,968	-632	-25%	-627	-24%	-462	-20%	-427	-18%
7	M & I	1,413	1,431	-439	-24%	-458	-24%	-343	-20%	-349	-20%
	Agriculture	533	549	-133	-20%	-157	-22%	-59	-10%	-65	-11%
	Total	1,946	1,981	-571	-23%	-614	-24%	-402	-17%	-414	-17%
8	M & I	989	1,008	-863	-47%	-881	-47%	-767	-44%	-772	-43%
	Agriculture	431	461	-235	-35%	-245	-35%	-161	-27%	-154	-25%
	Total	1,420	1,469	-1098	-44%	-1,126	-43%	-928	-40%	-926	-39%
9	M & I	1,696	1,717	-156	-8%	-172	-9%	-59	-3%	-63	-4%
	Agriculture	631	644	-34	-5%	-62	-9%	40	7%	30	5%
	Total	2,328	2,361	-189	-8%	-234	-9%	-19	-1%	-34	-1%

Sources: Based on projected water deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012; SWP_TableA_Art21_delivery_by_contractor_Alt4A_tables_050112.xls, May 2012; and SWP_TableA_Art21_delivery_by_contractor_010913_Alt4_Decision_Tree_Result.xls, January 2013). California Department of Water Resources, 2011b; California Department of Water Resources, 2012c; California Department of Water Resources, 2012d; California Department of Water Resources 2012f, California Department of Water Resources 2013a, adapted by ESA.

a Refer to Table 30-13 regarding annual deliveries for Existing Conditions and the No Action Alternative.

b M&I – Municipal and Industrial (urban) customers.

Table 30-15. Alternatives 1 to 9: Summary of Annual CVP M&I Deliveries[a] (thousand acre-feet)

Alternative	Water Deliveries for Each Alternative	Change in Water Deliveries for Each Alternative			
		Compared to Existing Conditions[b]		Compared to No Action Alternative[b]	
		Net	Percent	Net	Percent
1A, 1B, 1C	122	-3	-3%	12	10%
2A, 2B, 2C	115	-10	-8%	5	5%
3	122	-3	-2%	12	11%
4(Scenario H1)	121	-4	-3%	11	10%
4 (Scenario H2)	120	-5	-4%	10	9%
4 (Scenario H3)	115	-10	-8%	5	5%
4 (Scenario H4)	115	-10	-8%	5	4%
5	115	-10	-8%	5	4%
6A, 6B, 6C	94	-31	-25%	-16	-14%
7	94	-31	-25%	-16	-14%
8	65	-60	-48%	-45	-41%
9	110	-15	-12%	<1	0%

Sources: Based on projected water deliveries as reported in BDCP modeling results for CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012; BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012; and BDCP_Alternatives_CVP_M&I_Deliveries_Alt4_Decision_Tree_010913.xls, January 2013). California Department of Water Resources, 2012b; California Department of Water Resources 2012e; California Department of Water Resources 2012g, California Department of Water Resources, 2013b, adapted by ESA.

[a] M&I – Municipal and Industrial (urban) customers.

[b] Refer to Table 30-13b regarding annual deliveries for Existing Conditions and the No Action Alternative.

Alternatives 1A, 1B, and 1C would include the construction of five new intakes and intakes pumping plants and additional facilities as described in Chapter 3, *Description of Alternatives*.

The addition of these north Delta intakes as well as changes to Delta regulatory requirements under Alternatives 1A, 1B and 1C would provide operational flexibility that would allow the SWP and CVP to increase Delta exports compared to operations under Existing Conditions and the No Action Alternative. However, Alternatives 1A, 1B, 1C and the No Action Alternative also assume an increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta. Consequently, SWP M&I deliveries under Alternatives 1A, 1B and 1C are projected to increase due to increased opportunities for Delta exports, while in some cases CVP south of Delta deliveries are projected to decrease due to increased water rights demands north of Delta.

See Chapter 3, *Description of Alternatives*, for more detail on proposed facilities and operational criteria and Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternatives 1A, 1B, and 1C.

Changes in Deliveries to the Hydrologic Regions

SWP. Compared to both Existing Conditions and the No Action Alternative, Alternatives 1A, 1B, and 1C would increase deliveries to all hydrologic regions except for the San Joaquin River region, which would experience no change in deliveries. Compared to Existing Conditions, South Coast would receive the largest net increase (up to 239 TAF of Table A plus Article 21 deliveries) among the regions, which represents 70% of the net increase in Table A plus Article 21 M&I deliveries under Alternatives 1A, 1B, and 1C. Compared to the No Action Alternative, South Coast would again receive the largest net increase (up to 308 TAF of Table A plus Article 21 deliveries) among the regions, which represents 68% of the net increase in Table A plus Article 21 M&I deliveries under Alternatives 1A, 1B, and 1C (refer to Table 30-16 for more information).

CVP. Alternatives 1A, 1B, and 1C would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions. Compared to Existing Conditions, Alternatives 1A, 1B, and 1C would result in decreased deliveries to the other hydrologic regions. Compared to Existing Conditions, San Francisco Bay is projected to receive the largest decrease (2 TAF) among the hydrologic regions. Compared to the No Action Alternative, Alternatives 1A, 1B, and 1C would result in increased deliveries to the other hydrologic regions. Compared to the No Action Alternative San Francisco Bay is projected to receive the largest potential increase (5 TAF) among the hydrologic regions (refer to Table 30-17 for more information).

Alternatives 1A, 1B, and 1C Compared to Existing Conditions

SWP. Under Alternatives 1A, 1B, and 1C, by 2060, Table A deliveries to all SWP contractors are projected to increase by 16% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to increase by 22%. By 2060, Table A and total deliveries to M&I contractors are projected to increase by 17% and 18%, respectively.

CVP. Under Alternatives 1A, 1B, and 1C, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 3% relative to Existing Conditions.

Alternatives 1A, 1B, and 1C Compared to No Action Alternative.

SWP. Under Alternatives 1A, 1B, and 1C, by 2060, Table A deliveries to all SWP contractors are projected to increase by 24% relative to the No Action Alternative, while total deliveries are projected to increase by 32% relative to the No Action Alternative. By 2060, Table A and total deliveries to M&I contractors are projected to increase by 24% and 25%, respectively.

CVP. Under Alternatives 1A, 1B, and 1C, by 2060, deliveries to all CVP M&I contractors are projected to increase by 10% relative to the No Action Alternative.

Table 30-16. Projected Increases in M&I Deliveries for the State Water Project by Hydrologic Region (thousand acre-feet)

Potential Net Increase in M&I Deliveries Compared to the Existing Conditions [b]

	1A, 1B, or 1C		2A, 2B, or 2C		3		4 (Scenario H1)		4 (Scenario H2)		4 (Scenario H3)		4 (Scenario H4)		5		9	
Hydrologic Region[a]	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries
San Francisco Bay	30	36	23	27	26	32	25	29	-6	-1	19	21	-13	-8	8	11	2	4
Sacramento River	3	3	2	2	2	2	2	2	-1	-1	1	1	-2	-2	1	1	-<1	-<1
San Joaquin River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central Coast	9	11	6	7	8	9	7	8	-6	-5	5	5	-9	-8	<1	<1	-2	-2
South Coast	228	239	118	114	205	210	189	181	-64	-61	87	78	-170	-166	46	34	-133	-150
Tulare Lake	10	10	6	6	8	8	75	90	46	58	70	82	41	52	-1	-1	-4	-4
South Lahontan	16	17	9	9	14	15	12	12	-13	-13	6	6	-21	-21	-2	-2	-9	-10
Colorado River	26	28	16	17	25	26	22	23	-6	-6	13	13	-17	-16	7	7	-9	-9
Total[c]	**321**	**343**	**179**	**182**	**289**	**301**	**333**	**347**	**-51**	**-29**	**202**	**207**	**-190**	**-169**	**59**	**50**	**-156**	**-172**

Potential Net Increase in M&I Deliveries Compared to No Action Alternative[b]

	1A, 1B, or 1C		2A, 2B, or 2C		3		4 (Scenario H1)		4 (Scenario H2)		4 (Scenario H3)		4 (Scenario H4)		5		9	
Hydrologic Region[a]	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries	Table A Deliveries	Table A + Article 21 Deliveries
San Francisco Bay	36	41	29	32	33	37	32	34	<1	4	25	26	-6	-4	15	16	9	8
Sacramento River	4	4	3	3	3	3	3	3	-<1	-<1	2	2	-1	-1	2	2	1	1
San Joaquin River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Central Coast	15	16	12	13	14	15	13	14	0	1	11	11	-3	-2	6	6	4	3
South Coast	284	308	173	183	261	279	245	251	-9	8	143	147	-114	-96	101	103	-77	-81
Tulare Lake	19	19	16	16	17	17	84	99	55	68	79	91	50	61	8	8	5	5
South Lahontan	29	30	22	22	27	28	25	25	-1	-<1	19	19	-8	-8	11	11	3	3
Colorado River	32	33	22	22	30	32	28	29	-1	-<1	19	19	-11	-11	12	12	-3	-3
Total[c]	**417**	**452**	**275**	**291**	**385**	**410**	**429**	**456**	**45**	**80**	**298**	**316**	**-94**	**-60**	**155**	**159**	**-59**	**-63**

Sources: California Department of Water Resources, 2011b; California Department of Water Resources, 2012c; California Department of Water Resources, 2012d, California Department of Water Resources, 2013a, adapted by ESA

[a] Listed hydrologic regions excludes North Coast and North Lahontan (which lack SWP or CVP contractors receiving water from the Delta). Listed alternatives include only those with the potential to increase deliveries to M&I uses based on modeling results.

[b] Based on projected increases in municipal and industrial (M&I) water deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; and SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012; SWP_TableA_Art21_delivery_by_contractor_010913_Alt4_Decision_Tree_Result.xls, January 2013), adapted by ESA

[c] Totals may not sum due to rounding.

Alternatives 2A, 2B, and 2C

As described in Chapter 3, *Description of Alternatives*, Alternatives 2A, 2B and 2C would include the construction of five new intakes and intakes pumping plants, among other facilities and would follow the operational criteria described as Scenario B, which includes the Fall X2 action and less negative south Delta Old and Middle River flows than under Scenario A.

The addition of new north Delta intakes as well as changes to Delta regulatory requirements under Alternatives 2A, 2B and 2C would provide operational flexibility that would allow the SWP and CVP to increase Delta exports compared to operations under Existing Conditions. However, Alternatives 2A, 2B, 2C and the No Action Alternative also assume that there would be an increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta. Consequently, SWP M&I deliveries under Alternatives 2A, 2B, and 2C are projected to increase due to increased Delta exports, while in some cases CVP deliveries south of Delta are projected to decrease due to increased water rights demands north of Delta.

See Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternatives 2A, 2B, and 2C.

Changes in Deliveries to the Hydrologic Regions.

SWP. Compared to both Existing Conditions and the No Action Alternative, Alternatives 2A, 2B, and 2C would increase deliveries to all hydrologic regions except for the San Joaquin River region, which would experience no change in deliveries. Compared to Existing Conditions, South Coast would receive the largest net increase (up to 118 TAF of Table A) among the regions, which represents 63% of the net increase in M&I deliveries. Compared to the No Action Alternative, South Coast would again receive the largest net increase (up to 183 TAF of Table A plus Article 21 deliveries) among the regions, which represents 65% of the net increase in M&I deliveries (refer to Table 30-16 for more information).

CVP. Alternatives 2A, 2B, and 2C would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions.

Compared to Existing Conditions, Alternatives 2A, 2B, and 2C would result in decreased deliveries to the other hydrologic regions due to an assumed increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta. Compared to Existing Conditions, San Francisco Bay is projected to receive the largest decrease in deliveries (5 TAF) among the hydrologic regions.

Compared to the No Action Alternative, Alternatives 2A, 2B, and 2C would result in increased deliveries to the other hydrologic regions. Compared to the No Action Alternative, San Francisco Bay is projected to receive the largest increase in deliveries (2 TAF) among the hydrologic regions (refer to Table 30-17 for more information).

Table 30-17. Projected Increases in M&I Deliveries for the Central Valley Project by Hydrologic Region (thousand acre-feet)

Hydrologic Region[a]	1A, 1B, or 1C	2A, 2B, or 2C	3	4 (Scenario H1)	4 (Scenario H2)	4 (Scenario H3)	4 (Scenario H4)	5	9
Potential Net Increase in M&I Deliveries Compared to the Existing Conditions [b]									
San Francisco Bay	-2	-5	-2	-2	-2	-5	-5	-5	-7
Sacramento River	0	0	0	0	0	0	0	0	0
San Joaquin River	-<1	-2	-<1	-<1	-1	-2	-2	-1	-3
Central Coast	-1	-3	-1	-1	-1	-3	-3	-3	-4
South Coast	0	0	0	0	0	0	0	0	0
Tulare Lake	-<1	-1	-<1	-<1	-<1	-1	-1	-1	-2
South Lahontan	0	0	0	0	0	0	0	0	0
Colorado River	0	0	0	0	0	0	0	0	0
al[c]	**-3**	**-10**	**-3**	**-4**	**-5**	**-10**	**-10**	**-10**	**-15**
Potential Net Increase in M&I Deliveries Compared to No Action Alternative[b]									
San Francisco Bay	5	2	6	5	5	2	2	2	<1
Sacramento River	0	0	0	0	0	0	0	0	0
San Joaquin River	2	1	2	2	2	1	1	1	-<1
Central Coast	3	1	3	3	3	1	1	1	<1
South Coast	0	0	0	0	0	0	0	0	0
Tulare Lake	1	1	1	1	1	1	1	1	0
South Lahontan	0	0	0	0	0	0	0	0	0
Colorado River	0	0	0	0	0	0	0	0	0
al[c]	**11**	**5**	**12**	**11**	**10**	**5**	**5**	**5**	**0**

Sources: California Department of Water Resources 2012b, 2013b, adapted by ESA

[a] Listed hydrologic regions excludes North Coast and North Lahontan (which lack SWP or CVP contractors receiving water from the Delta). Listed alternatives include only those with the potential to increase deliveries to M&I uses based on modeling results.

[b] Based on projected water deliveries as reported in BDCP modeling results for CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012; BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012; and BDCP_Alternatives_CVP_M&I_Deliveries_Alt4_Decision_Tree_010913.xls, January 2013).

[c] Totals may not sum due to rounding.

Alternatives 2A, 2B, and 2C Compared to Existing Conditions.

SWP. Under Alternatives 2A, 2B, and 2C, by 2060, Table A deliveries to all SWP contractors are projected to increase by 9% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to increase by 12%. By 2060, Table A and total deliveries to M&I contractors are projected to increase by 10% and 14%, respectively, relative to Existing Conditions.

CVP. Under Alternatives 2A, 2B, and 2C, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 8% relative to Existing Conditions.

Alternatives 2A, 2B, and 2C Compared to No Action Alternative.

SWP. Under Alternatives 2A, 2B, and 2C, by 2060, Table A deliveries to all SWP contractors are projected to increase by 17% relative to the No Action Alternative, while total deliveries are projected to increase by 21% relative to the No Action Alternative. By 2060, Table A and total deliveries to M&I contractors are projected to increase by 16% and 21%, respectively, relative to the No Action Alternative.

CVP. Under Alternatives 2A, 2B, and 2C, by 2060, deliveries to all CVP M&I contractors are projected to increase by 5% relative to the No Action Alternative.

Alternative 3

As described in Chapter 3, *Description of Alternatives*, facility construction and operational criteria under Alternative 3 would be similar to Alternative 1A, with the exception of only two new intakes instead of five. The addition of new north Delta intakes as well as changes to Delta regulatory requirements under Alternative 3 would provide operational flexibility that would allow the SWP and CVP to increase Delta exports compared to operations under Existing Conditions and the No Action Alternative.

However, Alternative 3 and the No Action Alternative also assume that there would be an increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta. Consequently, SWP M&I deliveries under Alternative 3 are projected to increase due to increased opportunities for Delta exports, while in some cases CVP deliveries south of Delta are projected to decrease due to increased water rights demands north of Delta. See Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternative 3.

Changes in Deliveries to the Hydrologic Regions

SWP. Compared to both Existing Conditions and the No Action Alternative, Alternative 3 would increase deliveries to all hydrologic regions except for the San Joaquin River region, which would experience no change in deliveries. Compared to Existing Conditions, South Coast would receive the largest net increase (up to 210 TAF of Table A plus Article 21 deliveries) among the regions, which represents 70% of the net increase in M&I deliveries. Compared to the No Action Alternative, South Coast would again receive the largest net increase (up to 279 TAF of Table A plus Article 21 deliveries) among the regions, which represents 68% of the net increase in M&I deliveries (refer to Table 30-16 for more information).

CVP. Alternative 3 would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions.

Compared to Existing Conditions, Alternative 3 would result in decreased deliveries to the other hydrologic regions due to an assumed increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta. Compared to Existing Conditions, San Francisco Bay is projected to receive the largest decrease in deliveries (2 TAF) among the affected hydrologic regions.

Compared to the No Action Alternative, Alternative 3 would result in increased deliveries to the other hydrologic regions. Compared to No Action Alternative, San Francisco Bay is projected to receive the largest increase in deliveries (6 TAF) among the affected hydrologic regions (refer to Table 30-17 for more information).

Alternative 3 Compared to Existing Conditions.

SWP. Under Alternative 3, by 2060, Table A deliveries to all SWP contractors are projected to increase by 14% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to increase by 19%. By 2060, Table A and total deliveries to M&I contractors are projected to increase by 16%, relative to Existing Conditions.

CVP. Under Alternative 3, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 2% relative to Existing Conditions; as described above, reduced deliveries are due to an assumed increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta.

Alternative 3 Compared to No Action Alternative.

SWP. Under Alternative 3, by 2060, Table A deliveries to all SWP contractors are projected to increase by 22% relative to the No Action Alternative, while total deliveries are projected to increase by 29% relative to the No Action Alternative. By 2060, Table A and total deliveries to M&I contractors are projected to increase by 22% and 23%, respectively, relative to the No Action Alternative.

CVP. Under Alternative 3, by 2060, deliveries to all CVP M&I contractors are projected to increase by 11% relative to the No Action Alternative.

Alternative 4

As described in Chapter 3, *Description of Alternatives*, facility construction and operational criteria under Alternative 4 would include three new intakes. The addition of new north Delta intakes as well as changes to Delta regulatory requirements under Alternative 4 would provide operational flexibility that would allow the SWP and CVP to increase Delta exports compared to operations under Existing Conditions and the No Action Alternative. Water supply and conveyance operations would follow the guidelines described as Scenario H1, H2, H3, or H4, which variously include or exclude implementation of fall X2 and/or enhanced spring outflow. See Chapter 3, *Description of Alternatives,* Section 3.5.9, for additional details on Alternative 4. Alternative 4 and the No Action Alternative also assume that there would be an increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta.

Consequently, SWP M&I deliveries under Alternative 4 are projected to increase due to increased opportunities for Delta exports, while in some cases CVP deliveries south of Delta are projected to decrease due to increased water rights demands north of Delta. See Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternative 4.

Changes in Deliveries to the Hydrologic Regions.

SWP. Compared to Existing Conditions, Scenario H1 would increase deliveries to all hydrologic regions except for the San Joaquin River region, which would experience no change in deliveries. Compared to Existing Conditions, under Scenario H1, South Coast would receive the largest net increase in deliveries (up to 189 TAF of Table A deliveries) among the regions, which represent 57% of the net increase in M&I deliveries. Compared to Existing Conditions, Scenario H4 would decrease deliveries to all hydrologic regions except for the Tulare Lake region, which would receive an increase and the San Joaquin River region, which would experience no change in deliveries. Compared to Existing Conditions, under Scenario H4, South Coast would receive the largest net decrease in deliveries (a decrease of up to 170 TAF of Table A deliveries) among the regions while Tulare Lake would receive the only net increase in deliveries (up to 52 TAF of Table A plus Article 21 deliveries) among the regions. The other two operational scenarios (H2 and H3) would have effects that would fall within the range of Scenario H1 and Scenario H4 (refer to Table 30-16 for more information).

Compared to the No Action Alternative, Scenario H1 would increase deliveries to all hydrologic regions except for the San Joaquin River region, which would experience no change in deliveries. Compared to No Action Alternative, under Scenario H1, South Coast would receive the largest net increase in deliveries (up to 251 TAF of Table A plus Article 21 deliveries) among the regions, which represent 55% of the net increase in M&I deliveries. Compared to No Action Alternative, Scenario H4 would decrease deliveries to all hydrologic regions except for the Tulare Lake region, which would receive an increase and the San Joaquin River region, which would experience no change in deliveries. Compared to No Action Alternative, under Scenario H4, South Coast would receive the largest net decrease in deliveries (a decrease of up to 114 TAF of Table A deliveries) among the regions while Tulare Lake would receive the only net increase in deliveries (up to 61 TAF of Table A plus Article 21 deliveries) among the regions. The other two operational scenarios (H2 and H3) would have effects that would fall within the range of Scenario H1 and Scenario H4 (refer to Table 30-16 for more information).

CVP. The operational scenarios under Alternative 4 would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions. Compared to Existing Conditions, Scenario H1 would decrease deliveries to the other hydrologic regions; San Francisco Bay is projected to receive the largest potential decrease (2 TAF) among the affected hydrologic regions. Compared to Existing Conditions, Scenario H4 would also decrease deliveries to the other hydrologic regions; San Francisco Bay is projected to receive the largest potential decrease (5 TAF) among the affected hydrologic regions. The other two operational scenarios (H2 and H3) would have effects that would fall within the range of Scenario H1 and Scenario H4 (refer to Table 30-17 for more information).

Compared to the No Action Alternative, Scenario H1 would increase deliveries to the other hydrologic regions. San Francisco Bay is projected to receive the largest potential increase (5 TAF) among the affected hydrologic regions. Compared to the No Action Alternative, Scenario H4 would also increase deliveries to the other hydrologic regions and San Francisco Bay is projected to receive the largest potential increase (2 TAF) among the affected hydrologic regions. The other two operational scenarios (H2 and H3) would have effects that would fall within the range of Scenario H1 and Scenario H4 (refer to Table 30-17 for more information).

Alternative 4 Compared to Existing Conditions.

SWP. Under Scenario H1, by 2060, Table A deliveries to all SWP contractors are projected to increase by 13% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to increase by 15%. Under Scenario H4, by 2060, Table A deliveries to all SWP contractors are projected to decrease by 14% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to decrease by 11%. Under Scenario H1, by 2060, Table A and total deliveries to M&I contractors are projected to increase by 14% each, relative to Existing Conditions. Under Scenario H4, by 2060, Table A and total deliveries to M&I contractors are projected to decrease by 13% and 12%, respectively, relative to Existing Conditions.

Scenarios H1 and H4 reflect the range of effects that would result from the four potential outcomes under Alternative 4. The other two operational scenarios would have effects that would fall within this range. For example, under Scenario H3, by 2060, Table A deliveries to all SWP contractors are projected to increase by 7% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to increase by 8%. Under Scenario H3, by 2060, Table A and total deliveries to M&I contractors are projected to increase by 7%, each respectively, relative to Existing Conditions.

CVP. Under Scenario H1, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 3% relative to Existing Conditions. Under Scenario H4, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 8% relative to Existing Conditions. Scenarios H1 and H4 reflect the range of effects that would result from the four potential outcomes under Alternative 4. The other two operational scenarios would have effects that would fall within this range. For example, under Scenario H3, by 2060, deliveries to all CVP M&I contractors are also projected to decrease by 8% relative to Existing Conditions.

Alternative 4 Compared to No Action Alternative.

SWP. Under Scenario H1, by 2060, Table A deliveries to all SWP contractors are projected to increase by 21% relative to the No Action Alternative, while total deliveries are projected to increase by 24% relative to the No Action Alternative. Under Scenario H4, by 2060, Table A deliveries to all SWP contractors are projected to decrease by 7% relative to the No Action Alternative, while total deliveries are projected to decrease by 4% relative to the No Action Alternative. Under Scenario H1, by 2060, Table A and total deliveries to M&I contractors are projected to increase by 21% each, relative to the No Action Alternative. Under Scenario H4, by 2060, Table A and total deliveries to M&I contractors are projected to decrease by 8% and 7%, respectively, relative to the No Action Alternative.

Scenarios H1 and H4 reflect the range of effects that would result from the four potential outcomes under Alternative 4. The other two operational scenarios would have effects that would fall within this range. For example, under Scenario H3, by 2060, Table A deliveries to all SWP contractors are projected to increase by 15% relative to No Action Alternative, while total deliveries to all SWP contractors are projected to increase by 17%. By 2060, Table A and total deliveries to M&I contractors are projected to increase by 13% each, relative to No Action Alternative.

CVP. Under Scenario H1, by 2060, deliveries to all CVP M&I contractors are projected to increase by 10% relative to No Action Alternative. Under Scenario H4, by 2060, deliveries to all CVP M&I contractors are projected to increase by 4% relative to No Action Alternative. Scenarios H1 and H4 reflect the range of effects that would result from the four potential outcomes under Alternative 4. The other two operational scenarios would have effects that would fall within this range. For example, under Scenario H3, by 2060, deliveries to all CVP M&I contractors are projected to increase by 5% relative to No Action Alternative.

Alternative 5

As described in Chapter 3, *Description of Alternatives*, facility construction under Alternative 5 would be similar to Alternative 1A, with the exception of only one new intake instead of five. Alternative 5 would follow the operational criteria described as Scenario C and would include criteria for north Delta diversion bypass flows, OMR flows increased flows over Fremont Weir via a notch into Yolo Bypass, Delta inflow and outflow, Delta Cross Channel gate operations, additional Rio Vista minimum flows, Fall X2, San Joaquin River Inflow/Export Ratio, operations for Delta water quality and residence, and water quality for agricultural and M&I diversions. These operations criteria are described in detail in Section 3.6.4.2 in Chapter 3, *Description of Alternatives*, and in Appendix 5A, *BDCP EIR/S Modeling.*

The addition of a new north Delta intake as well as changes to Delta regulatory requirements under Alternative 5 would provide operational flexibility that would allow the SWP and CVP to increase Delta exports. However, inclusion of Fall X2 in Alternative 5 leads to a reduction in deliveries in some cases compared to Existing Conditions, which does not include the Fall X2 standard. In addition, Alternative 5 and the No Action Alternative also assume that there would be an increase in M&I water rights demands north of the Delta, which would increase overall system demands and reduce the amount of CVP water available for total export south of the Delta. Consequently, in some cases SWP M&I deliveries under Alternative 5 are projected to increase due to increased opportunities for Delta exports, while in some cases deliveries are projected to decrease due to inclusion of Fall X2 and increased water rights demands north of Delta.

See Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternative 5.

Changes in Deliveries to the Hydrologic Regions.

SWP. Compared to Existing Conditions, Alternative 5 would increase deliveries to all hydrologic regions except for Tulare Lake and South Lahontan which would experience a decrease in deliveries, and the San Joaquin River region, which would experience no change in deliveries. Compared to Existing Conditions, South Coast would receive the largest net increase in deliveries (up to 45 TAF of Table A deliveries) among the regions, and represents 76% of the net increase in Table A M&I deliveries under Alternative 5. Compared to Existing Conditions, Table A plus Article 21 M&I deliveries to Tulare Lake and South Lahontan would decrease by up to 1 TAF and 2 TAF, respectively. Compared to the No Action Alternative, Alternative 5 would result in increased deliveries to all hydrologic regions. Compared to the No Action Alternative, South Coast would receive the largest net increase in deliveries (up to 103 TAF of Table A plus Article 21 deliveries) among the regions, which represents 65% of the net increase in Table A plus Article 21 M&I deliveries under Alternative 5 (refer to Table 30-16 for more information).

CVP. Alternative 5 would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions. Compared to Existing Conditions, Alternative 5 would result in decreased deliveries to the other hydrologic regions. Compared to Existing Conditions, San Francisco Bay is projected to receive the largest potential decrease in deliveries (5 TAF) among the affected hydrologic regions. Compared to the No Action Alternative, Alternative 5 would result in increased deliveries to the other hydrologic regions. Compared to the No Action Alternative, San Francisco Bay is projected to receive the largest potential increase in deliveries (2 TAF) among the affected hydrologic regions (refer to Table 30-17 for more information).

Alternative 5 Compared to Existing Conditions.

SWP. Under Alternative 5, by 2060, Table A deliveries and total deliveries to all SWP contractors are each projected to increase by 2% relative to existing conditions. By 2060, Table A and total deliveries to M&I contractors are projected to increase by 3% each, relative to Existing Conditions.

CVP. Under Alternative 5, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 8% relative to Existing Conditions.

Alternative 5 Compared to No Action Alternative.

SWP. Under Alternative 5, by 2060, Table A deliveries to all SWP contractors are projected to increase by 9% relative to the No Action Alternative, while total deliveries are projected to increase by 10% relative to the No Action Alternative. By 2060, Table A and total deliveries to M&I contractors are each projected to increase by 9% each, relative to the No Action Alternative.

CVP. Under Alternative 5, by 2060, deliveries to all CVP M&I contractors are projected to increase by 4% relative the No Action Alternative.

Alternatives 6A, 6B, and 6C

As described in Chapter 3, *Description of Alternatives*, facility construction under Alternatives 6A, 6B and 6C would be similar to Alternatives 1A, 1B and 1C, respectively. Alternatives 6A, 6B and 6C would follow the operational criteria described in Scenario D, would not include operations of the south Delta intakes, and would include criteria for north Delta diversion bypass flows, increased flows over Fremont Weir via a notch into Yolo Bypass, Delta inflow and outflow, Delta Cross Channel gate operations, additional Rio Vista minimum flows, Fall X2, and water quality for agricultural and M&I diversions. These operations criteria are described in detail in Section 3.6.4.2 in Chapter 3, *Description of Alternatives*, and in Appendix 5A, *BDCP EIR/S Modeling.*

The elimination of diversions at the south Delta intakes and implementation of Fall X2 reduce operational flexibility and water supply available to SWP and CVP for exports south of the Delta. Therefore, SWP and CVP M&I deliveries under Alternatives 6A, 6B and 6C are projected to decrease compared to Existing Conditions and the No Action Alternative. See Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternatives 6A, 6B and 6C.

Changes in Deliveries to the Hydrologic Regions.

SWP. Compared to both Existing Conditions and the No Action Alternative, Alternatives 6A, 6B and 6C would decrease deliveries to all hydrologic regions except San Joaquin River, which would experience no change in deliveries. Compared to Existing Conditions, South Coast would experience the largest net decrease in deliveries (a decrease of up to 356 TAF of Table A plus Article 21 deliveries), which represents 72% of the decrease in Table A plus Article 21 M&I deliveries. Compared to the No Action Alternative, South Coast would again experience the largest net decrease in deliveries (a decrease of up to 286 TAF of Table A plus Article 21 deliveries), which represents 75% of the decrease in Table A plus Article 21 M&I deliveries.

CVP. Alternatives 6A, 6B and 6C would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions. Compared to Existing Conditions, Alternatives 6A, 6B and 6C would decrease M&I deliveries to the other hydrologic regions. Compared to Existing Conditions, San Francisco Bay would experience the largest decrease (a decrease of up to 15 TAF of Table A plus Article 21 deliveries); decreases to the other three regions would range from approximately 3 to 8 TAF of Table A plus Article 21 deliveries. Compared to the No Action Alternative, Alternatives 6A, 6B and 6C would also decrease M&I deliveries to the other hydrologic regions. Compared to the No Action Alternative, San Francisco Bay would experience the largest decrease (a decrease of up to 8 TAF of Table A plus Article 21 deliveries); decreases to the other three regions would range from approximately 2 TAF to 4 TAF of Table A plus Article 21 deliveries.

Alternatives 6A, 6B, and 6C Compared to Existing Conditions.

SWP. Under Alternative 6A, 6B, and 6C by 2060, Table A deliveries to all SWP contractors are projected to decrease by 25% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to decrease by 24%. By 2060, Table A and total deliveries to M&I contractors are each projected to decrease by 26% relative to Existing Conditions.

CVP. By 2060, deliveries to all CVP M&I contractors are projected to decrease by 25% relative to Existing Conditions.

Alternatives 6A, 6B, and 6C Compared to No Action Alternative.

SWP. Under Alternative 6A, 6B, and 6C by 2060, Table A deliveries to all SWP contractors are projected to decrease by 20% relative to the No Action Alternative, while total deliveries are projected to decrease by 18% relative to the No Action Alternative. By 2060, Table A and total deliveries to M&I contractors are projected to decrease by 22% and 21%, respectively, relative to the No Action Alternative. As described above, the operational criteria followed under Alternatives 6A, 6B and 6C would eliminate diversions at the south Delta intakes and include implementation of Fall X2, which would reduce operational flexibility and water supply available to SWP for exports south of the Delta; therefore deliveries under these alternative would decrease relative to the No Action Alternative.

CVP. Under Alternative 6A, 6B, and 6C by 2060, deliveries to all CVP M&I contractors are projected to decrease by 14% relative to the No Action Alternative. As described above, the operational criteria followed under Alternatives 6A, 6B and 6C would eliminate diversions at the south Delta intakes and include implementation of Fall X2, which would reduce operational flexibility and water supply available to CVP for exports south of the Delta; therefore deliveries under these alternative would decrease relative to the No Action Alternative.

Alternative 7

As described in Chapter 3, *Description of Alternatives*, facility construction under Alternative 7 would be similar to Alternative 1A, with the exception of only three new intakes instead of five, and would follow the operational criteria described as Scenario E, including implementation of Fall X2.

The addition of the north Delta intakes under Alternative 7 would provide operational capacity to the SWP and CVP to increase Delta exports. However, reduced diversions under Scenario E would reduce operational flexibility and water supply available to SWP and CVP for exports south of the Delta. Therefore, SWP and CVP M&I deliveries under Alternative 7 are projected to decrease compared to Existing Conditions and the No Action Alternative. See Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternative 7.

Changes in Deliveries to the Hydrologic Regions.

SWP. Compared to both Existing Conditions and the No Action Alterative, Alternative 7 would decrease deliveries to the hydrologic regions. Compared to Existing Conditions, South Coast would experience the largest net decrease in deliveries (a decrease of up to 337 TAF Table A plus Article 21 deliveries), which represents 73% of the decrease in Table A plus Article 21 M&I deliveries, decreases in deliveries to other regions would range from 3 TAF to 37 TAF of Table A plus Article 21 M&I deliveries. Compared to the No Action Alternative, South Coast would again experience the largest net decrease in deliveries (a decrease of up to 267 TAF Table A plus Article 21 deliveries), which represents 76% of the decrease in Table A plus Article 21 M&I deliveries; decreases in deliveries to other regions would range from 2 TAF to 31 TAF of Table A plus Article 21 M&I deliveries.

CVP. Alternative 7 would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions. Compared to Existing Conditions, Alternative 7 would decrease M&I deliveries to the other hydrologic regions. Compared to Existing Conditions, San Francisco Bay would experience the largest decrease (a decrease of up to 16 TAF of Table A plus Article 21 deliveries); decreases to the other three regions would range from between 3 and 8 TAF. Compared to the No Action Alternative, Alternative 7 would decrease M&I deliveries to the other hydrologic regions. Compared to the No Action Alternative, San Francisco Bay would experience the largest decrease (a decrease of up to 8 TAF of Table A plus Article 21 deliveries); decreases to the other three regions would range from between 2 and 4 TAF.

Alternative 7 Compared to Existing Conditions.

SWP. Under Alternative 7, by 2060, Table A deliveries to all SWP contractors are projected to decrease by 23% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to decrease by 24%. By 2060, Table A and total deliveries to M&I contractors are projected to decrease by 24% relative to Existing Conditions.

CVP. Under Alternative 7, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 25% relative to Existing Conditions.

Alternative 7 Compared to No Action Alternative.

SWP. Under Alternative 7, by 2060, Table A and total deliveries to all SWP contractors are projected to decrease by 17% relative to the No Action Alternative. By 2060, Table A and total deliveries to M&I contractors are each projected to decrease by 20% relative to the No Action Alternative.

CVP. Under Alternative 7, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 14% relative to the No Action Alternative.

Alternative 8

As described in Chapter 3, *Description of Alternatives*, facility construction under Alternative 8 would be similar to Alternative 1A, with the exception of only three new intakes instead of five, and would follow the operational criteria described as Scenario F, including implementation of Fall X2.

The addition of the north Delta intakes under Alternative 8 would provide operational capacity to the SWP and CVP to increase Delta exports. However, reduced diversions under Scenario F would reduce operational flexibility and water supply available to SWP and CVP for exports south of the Delta. Therefore, SWP and CVP M&I deliveries under Alternative 8 are projected to decrease compared to Existing Conditions and the No Action Alternative.

See Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternative 8.

Changes in Deliveries to the Hydrologic Regions.

SWP. Compared to both Existing Conditions and the No Action Alternative, Alternative 8 would decrease deliveries to the hydrologic regions. Compared to Existing Conditions, South Coast would experience the largest net decrease in deliveries (a decrease of up to 636 TAF of Table A plus Article 21 deliveries), which represents 72% of the decrease in M&I deliveries, decreases in deliveries to other regions would range from 9 TAF to 72 TAF. Compared to the No Action Alternative, South Coast would experience the largest net decrease in deliveries (a decrease of up to 566 TAF of Table A plus Article 21 deliveries), which represents 78% of the decrease in M&I deliveries, decreases in deliveries to other regions would range from 19 TAF to 66 TAF.

CVP. Alternative 8 would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions. Compared to Existing Conditions, Alternative 8 would decrease M&I deliveries to the other hydrologic regions. Compared to Existing Conditions, San Francisco Bay would experience the largest decrease (a decrease of up to 32 TAF of Table A plus Article 21 deliveries); decreases in deliveries other regions would range from 4 TAF to 17 TAF. Compared to the No Action Alternative, Alternative 8 would also decrease M&I deliveries to the other hydrologic regions. Compared to the No Action Alternative, San Francisco Bay would experience the largest decrease (a decrease of up to 25 TAF of Table A plus Article 21 deliveries); decreases in deliveries to other regions would range from 2 TAF to 13 TAF.

Alternative 8 Compared to Existing Conditions.

SWP. Under Alternative 8, by 2060, Table A deliveries to all SWP contractors are projected to decrease by 44% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to decrease by 43%. By 2060, Table A and total deliveries to M&I contractors are each projected to decrease by 47% relative to Existing Conditions.

CVP. Under Alternative 8, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 48% relative to Existing Conditions.

Alternative 8 Compared to No Action Alternative.

SWP. Under Alternative 8, by 2060, Table A deliveries to all SWP contractors are projected to decrease by 40% relative to the No Action Alternative, while total deliveries are projected to decrease by 39% relative to the No Action Alternative. By 2060, Table A and total deliveries to M&I contractors are projected to decrease by 44% and 43%, respectively, relative to the No Action Alternative.

CVP. By 2060, deliveries to all CVP M&I contractors are projected to decrease by 41% relative to the No Action Alternative.

Alternative 9

As described in Chapter 3, *Description of Alternatives*, facility construction under Alternative 9 would include two new intakes along the Sacramento River near Walnut Grove, enlargement of existing canals and construction of other new facilities, and would follow the operational criteria described as Scenario G, including implementation of Fall X2.

As described below and in Chapter 5, *Water Supply*, SWP and CVP deliveries under Alternative 9 would decrease only slightly compared to the No Action Alternative. As described above, the No Action Alternative, like Alternative 9, includes the effects of water rights demands, sea level rise and climate change. Therefore, a majority of the change in deliveries under Alternative 9 is due to the effects of increased water rights demands, sea level rise and climate change.

See Chapter 5, *Water Supply*, for more detail on changes in Delta exports and SWP and CVP deliveries under Alternative 9.

Changes in Deliveries to the Hydrologic Regions.

SWP. Compared to Existing Conditions, Alternative 9 would decrease deliveries to all regions except for the San Francisco Bay region, which would receive an increase in deliveries and the San Joaquin region, which would experience no change in deliveries. Compared to Existing Conditions, South Coast would receive the largest net decrease in deliveries (a decrease of up to 150 TAF of Table A plus Article 21 deliveries) while San Francisco Bay would receive the only increase (up to 4 TAF of Table A plus Article 21 deliveries).

Compared to the No Action Alternative, Alternative 9 would increase deliveries to all regions except for the South Coast region and the Colorado River region, which would receive decreases in deliveries and the San Joaquin region, which would experience no change in deliveries. Compared to the No Action Alternative, South Coast would receive the largest net decrease in deliveries (a decrease of up to 81 TAF of Table A plus Article 21 deliveries) while San Francisco Bay would receive the largest increase (up to 8 TAF of Table A plus Article 21 deliveries) (refer to Table 30-16 for more information).

CVP. Alternative 9 would not change M&I deliveries for the Sacramento River, South Coast, South Lahontan and Colorado River regions because there are no affected CVP contractors located in these regions.

Compared to Existing Conditions, Alternative 9 would decrease M&I deliveries to the other regions. Compared to Existing Conditions, San Francisco Bay would receive the largest decrease (7 TAF) among the hydrologic regions.

Compared to the No Action Alternative, Alternative 9 would increase deliveries to the other regions, with the exception of San Joaquin River, which would experience a reduction in deliveries. Compared to the No Action Alternative, San Francisco Bay would receive the largest net increase (<1 TAF) among the hydrologic regions (refer to Table 30-17 for more information).

Alternative 9 Compared to Existing Conditions.

SWP. Under Alternative 9, by 2060, Table A deliveries to all SWP contractors are projected to decrease by 8% relative to Existing Conditions, while total deliveries to all SWP contractors are projected to decrease by 9%. By 2060, Table A and total deliveries to M&I contractors are projected to decrease by 8% and 9%, respectively, relative to Existing Conditions.

CVP. Under Alternative 9, by 2060, deliveries to all CVP M&I contractors are projected to decrease by 12% relative to Existing Conditions.

Alternative 9 Compared to No Action Alternative.

SWP. Under Alternative 9, by 2060, Table A and total deliveries to all SWP contractors are each projected to decrease by 1% relative to the No Action Alternative. By 2060, Table A and total deliveries to M&I contractors are each projected to decrease by 3% and 4%, respectively, relative to the No Action Alternative.

CVP. Under Alternative 9, by 2060, deliveries to all CVP M&I contractors are projected to increase by less than 1% relative to the No Action Alternative.

Comparison of Water Deliveries with California Water Plan Projected Demand[31]

As described in Section 30.1.3, *Urban Land Use and Water Use by Hydrologic Region*, the California Department of Water Resources estimated total long-term (year 2050) water demand (including water for agricultural, M&I and environmental uses) in the hydrologic regions in the California Water Plan. Assuming the Current Trends demand scenario identified in the California Water Plan (and described above), total water demand in the eight regions described in Section 30.1.3. would increase by approximately 1,986 TAF relative to the baseline reporting period (1998–2005) (Rayej pers. comm. 2012). This section compares deliveries under the BDCP alternatives in 2060 with projected demand under the Current Trends demand scenario.

Under Alternatives 1A, 1B, and 1C, total SWP deliveries to all regions would increase by approximately 571 TAF, total CVP M&I deliveries to all regions would decrease by 3 TAF and CVP

[31] As described in Section 30.1.1.3, the California Water Plan is updated every five years. The latest California Water Plan was released in 2009 and contains projections to the year 2050. It is not expected that there will be substantial changes in demand trends between 2050 and 2060 that would impact the comparison of the year 2050 projections from the California Water Plan with modeling projections for the BDCP at the "Late Long Term" BDCP planning horizon (year 2060).

agricultural deliveries would decrease by 66 TAF (see Chapter 5, *Water Supply*, for more information on CVP agricultural deliveries) compared to Existing Conditions. Therefore, under Alternatives 1A, 1B and 1C, net SWP and CVP deliveries would increase by approximately 502 TAF by 2060. This increase in supply equates to about 25% of the projected increase in demand for the hydrologic regions assuming the Current Trends demand scenario.

Under Alternatives 2A, 2B, and 2C, total SWP deliveries to all regions would increase by approximately 311 TAF, total CVP M&I deliveries to all regions would decrease by 10 TAF and CVP agricultural deliveries would decrease by 207 TAF[32] compared to Existing Conditions. Therefore, under Alternatives 2A, 2B and 2C, net SWP and CVP deliveries would increase by approximately 94 TAF by 2060. This increase in supply equates to about 5% of the projected increase in demand for the hydrologic regions assuming the Current Trends demand scenario.

Under Alternative 3, total SWP deliveries to all regions would increase by approximately 484 TAF, total CVP M&I deliveries to all regions would decrease by 3.0 TAF and CVP agricultural deliveries would decrease by 73 TAF compared to Existing Conditions. Therefore, under Alternative 3, net SWP and CVP deliveries would increase by approximately 408 TAF by 2060. This increase in supply equates to about 21% of the projected increase in demand for the hydrologic regions assuming the Current Trends demand scenario.

Under Alternative 4, total SWP deliveries to all regions would increase under two scenarios and would decrease under two other scenarios compared to existing conditions. Under Scenario H1, total SWP deliveries to all regions would increase by approximately 385 TAF; under Scenario H2, total SWP deliveries to all regions would decrease by approximately 121 TAF, under Scenario H3, total SWP deliveries to all regions would increase by approximately 201 TAF, and under Scenario H4, total SWP deliveries to all regions would decrease by approximately 295 TAF. Total CVP M&I deliveries to all regions would decrease under all four Alternative 4 scenarios: under Scenario H1, CVP M&I deliveries would decrease by 5 TAF, under Scenario H2 they would decrease by 10 TAF, under Scenario H3 they would decrease by 10 TAF, and under Scenario H4 CVP M&I deliveries would decrease by 10 TAF compared to existing conditions. CVP agricultural deliveries would decrease by 81 TAF under Scenario H1, would decrease by 108 TAF under Scenario H2, would decrease by 215 TAF under Scenario H3, and would decrease by 243 TAF under Scenario H4.

Based on the information above, under Alternative 4 Scenario H1, net SWP and CVP deliveries would increase by approximately 299 TAF by 2060. This increase in supply equates to about 15% of the projected increases in demand for the hydrologic regions assuming the Current Trends demand scenario. Under Alternative 4 Scenario H2, net SWP and CVP deliveries would decrease by approximately 239 TAF by 2060. This decrease in supply is in contrast to projected increases in demand for the hydrologic regions assuming the Current Trends demand scenario. Under Alternative 4 Scenario H3, net SWP and CVP deliveries would decrease by approximately 24 TAF by 2060. This decrease in supply is in contrast to projected increases in demand for the hydrologic regions assuming the Current Trends demand scenario. Under Alternative 4 Scenario H4, net SWP and CVP deliveries would decrease by approximately 548 TAF by 2060 compared to existing conditions. This decrease in supply is in contrast to projected increases in demand for the hydrologic regions assuming the Current Trends demand scenario.

[32] See Chapter 5, *Water Supply*, for more information on CVP agricultural deliveries summarized in this section.

Under Alternative 5, total SWP deliveries to all regions would increase by approximately 48 TAF, total CVP M&I deliveries to all regions would decrease by 10 TAF and CVP agricultural deliveries would decrease by 216 TAF compared to Existing Conditions. Therefore, under Alternative 5, net SWP and CVP deliveries would decrease by approximately 178 TAF by 2060. This decrease in supply is in contrast to projected increases in demand for the regions assuming the Current Trends demand scenario.

Under Alternatives 6A, 6B, and 6C, total SWP deliveries to all regions would decrease by approximately 627 TAF, total CVP M&I deliveries to all regions would decrease by 31 TAF and CVP agricultural deliveries would decrease by 487 TAF compared to Existing Conditions. Therefore, under Alternatives 6A, 6B, and 6C, net SWP and CVP deliveries would decrease by approximately 1,145 TAF by 2060. This decrease in supply is in contrast to projected increases in demand for the regions assuming the Current Trends demand scenario.

Under Alternative 7, total SWP deliveries to all regions would decrease by approximately 614 TAF, total CVP M&I deliveries to all regions would decrease by 31 TAF and CVP agricultural deliveries would decrease by 487 TAF compared to Existing Conditions. Therefore, under Alternative 7, net SWP and CVP deliveries would decrease by approximately 1,132 TAF by 2060. This decrease in supply is in contrast to projected increases in demand for the regions assuming the Current Trends demand scenario.

Under Alternative 8, in the late long term period, total SWP deliveries to all regions would decrease by approximately 1,126 TAF, total CVP M&I deliveries to all regions would decrease by 60 TAF and CVP agricultural deliveries would decrease by 583 TAF (see Chapter 5, *Water Supply*, for more information on CVP agricultural deliveries) compared to Existing Conditions. Therefore, under Alternative 8, net SWP and CVP deliveries would decrease by approximately 1,769 TAF by 2060. This decrease in supply is in contrast to projected increases in demand for the regions assuming the Current Trends demand scenario.

Under Alternative 9, total SWP deliveries to all regions would decrease by approximately 234 TAF, total CVP M&I deliveries to all regions would decrease by 15 TAF and CVP agricultural deliveries would decrease by 354 TAF compared to Existing Conditions. Therefore, under Alternative 9, net SWP and CVP deliveries would decrease by approximately 603 TAF by 2060. This decrease in supply is in contrast to projected increases in demand for the regions assuming the Current Trends demand scenario.

30.3.2.4 Potential for Increases in Water Deliveries to Agricultural Contractors to Remove Obstacles to Growth

Changes in the amount, cost or reliability of water deliveries could affect agricultural production within SWP and/or CVP contractor service areas. As described in Chapter 5, *Water Supply*, and shown in Table 30-14, deliveries to agricultural contractors are projected to increase under some alternatives. To the extent that the lack of sufficient, reliable water supplies currently poses a constraint to agricultural production, then increased reliable supplies have the potential to support increased agricultural production. Increased reliability of supplies (e.g., increased supplies to agricultural contractors during dry years) may support additional agricultural production. Where and how such increases would occur likely could vary from one farming interest to another. Increased agricultural production could support an increase in seasonal and permanent on-farm employment as well as increased economic activity in the larger agricultural industry (associated with agricultural inputs, processing, transport, etc.). The ability of local labor pools to support seasonal and permanent increases in employment would likely vary from region to region.

30.3.2.5 Potential for Increases in Water Deliveries to Urban Contractors to Remove Obstacles to Growth

No Action Alternative

Under the No Action Alternative SWP, deliveries to M&I contractors overall would decrease over time (by about 5.2% for Table A deliveries and 5.8% for Table A and Article 21 deliveries by 2060) relative to Existing Conditions, because of increases in North of Delta urban water demand and implementation of Fall X2 salinity and flow augmentation requirements. The No Action Alternative would not remove an obstacle to growth. Overall water demand can vary substantially from year to year irrespective of population growth (as shown in Figure 30-7), largely due to annual variations in weather and rainfall, which affect agricultural and outdoor urban demands. As discussed above, population growth is driven by a complex mix of factors. While water is needed for urban development, the minor decline in combined SWP Table A and Article 21 deliveries under the No Action Alternative are not expected to deter or slow the rate of growth in areas where conditions (especially economic conditions) are otherwise favorable for growth. Instead, water providers would be expected to find alternative supply sources in conjunction with implementing or enhancing conservation programs to reduce demands. Specifically, affected water contractors would likely find alternative sources of water (including transfers from agricultural contractors, desalination and wastewater reclamation) to support population growth within their service areas and, therefore, growth could probably occur with or without the increased water deliveries resulting from implementation of the BDCP. This expectation is supported by the growing recognition by California water managers and planners in recent years (e.g., California Department of Water Resources 2005:v.17-87-18; California Department of Water Resources 2009:v.12-2, 5-45-6) of the importance of integrated regional water management, diversified supply portfolios, and efficiency improvements for adapting to future conditions and meeting the water needs of a growing population. The potential environmental consequences of providing alternative water sources are discussed in Appendix 5B, *Responses of Reduced South of Delta Water Supplies*.

Factors affecting whether or not growth would occur under the No Action Alternative are described below.

- **Supply Portfolio Diversity**. As shown in Figure 30-1, SWP and CVP deliveries represented at most 27% of all water supplies for the hydrologic regions, indicating that there is already substantial reliance on sources other than the SWP and CVP. Water contractors with more diverse water supply portfolios may be better able to employ alternative sources to meet demand and support population with or without increased water deliveries that would result from some action alternatives (e.g., Alternatives 1A, 1B, and 1C). Expansion of integrated regional water management (IRWM) is a key objective of the California Water Plan's Implementation Plan[33] (California Department of Water Resources 2009: Vol. 1, 7-8-7-11). IRWM is a portfolio approach for determining the appropriate mix of water-related resource management strategies and actions and would enable individual water suppliers to diversify

[33] A fundamental objective of the California Water Plan is to provide guidance to local government agencies and regional partnerships on ways to increase regional self sufficiency in meeting their future water demands (California Department of Water Resources 2010:5-135-16).

their supply portfolios. The goal of IRWM is to provide long-term reliable water supplies for all users at the lowest reasonable cost and the highest possible economic development, environmental quality, and societal objectives (California Department of Water Resources 2009:Vol.1, 7-8). Continuing emphasis on IRWM has the potential to increase supply options and flexibility for many water suppliers.

- **Storage Capacity**. Water contractors with the ability to store water within or outside of their service areas may be able to carry over excess supply from year to year, which could then be used to support population growth or improve supply reliability with or without increased water deliveries resulting from the BDCP. Articles 54, 55 and 56 of the Monterey Amendment contained provisions intended to provide more consistency and greater flexibility in SWP contractors' use of existing SWP storage and conveyance facilities and to promote groundwater banking, conjunctive use of local and SWP water sources, and earlier and more efficient use of excess allocated Table A water. Expansion of the conjunctive management of multiple water supplies, including groundwater, is another key objective of the California Water Plan's Implementation Plan (California Department of Water Resources 2009:Vol.1, 7-14–7-18). The objective recognizes that by taking advantage of extensive storage capacity of groundwater basins, in closer coordination with surface storage and other water supplies when available, water managers can prepare for future droughts, flood, and climate change, and improve water supply reliability and water quality.[34] Given DWR's endorsement and growing recognition generally of the value of conjunctive management of future water supplies, additional SWP and CVP contractors may have access to conjunctive management and storage opportunities over time.

Conservation/Water Use Efficiency. Conservation programs have been effective in reducing water demand in California over the past few decades, and strategies to further reduce both urban and agricultural water demands are recognized as critical to meeting future water needs while minimizing the impacts of water management on natural systems. While acknowledging the past success of conservation projects, the California Water Plan identifies the need for greater effort in this area. Objective 2 of the California Water Plan's Implementation Plan, Use and Reuse Water More Efficiently, calls for the aggressive promotion and investment in water use efficiency efforts (including water recycling as well as conservation) and innovation in the pursuit of efficiency (California Department of Water Resources 2009:Vol.1, 7-11–7-14). The plan states that water use efficiency must be a key part of the water portfolio of every water agency, city, county, farm, and business—as well as that of State and federal government agencies, and that efficient water use must be a foundational action of every water plan (California Department of Water Resources 2009:Vol.1, 7-12).[35] As described in Appendix 1C, *Demand Management Measures*, DWR encourages agricultural and urban water conservation around the state through a variety of programs.

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[34] Such other water supplies could include recycled municipal water, surface runoff and floodflows, urban runoff and storm water, imported water, water transfers, and desalination of brackish water and sea water (California Department of Water Resources 2009:Vol.1, 7-14). At the same time, it must be noted that many aquifers are contaminated and would require remediation before they could be used for water supply storage (California Department of Water Resources 2009:Vol.1, 7-15).

[35] The plan also recognizes that water use efficiency and conservation reduce not only water demand but wastewater loads as well, and can reduce energy demand and greenhouse gas (GHG) emissions. Efficient water use can help communities cope with reduced water supply reliability that may be induced by climate change, thus reducing economic and environmental impacts of water scarcity (California Department of Water Resources 2009: Ch. 7).

In a February 2008 letter to the State senate leadership, California Governor Schwarzenegger outlined key elements of a solution to problems in the Delta and called for preparation of a plan to achieve a 20% reduction in per capita water use by 2020.[36] In response to the Governor's letter, in February 2010 a collaboration of state agencies[37] released *20x2020 Water Conservation Plan*. The plan identifies baseline per capita use rates for each hydrologic region and recommended regional targets for 2020 as well as baseline and target per capita rates for the state as a whole. The plan is based on analyses conducted on a regional and statewide basis and were designed to account for regional differences, including varying levels of past conservation in different regions and climate variations, which affect outdoor water use. Consistent with the law, the 20x2020 plan recommends actions that will reduce per capita use (not total urban use *per se*) by 20%. Table 30-18 presents a summary of baseline and target per capita use rates identified in the plan.

Table 30-18. Urban Per Capita Water Use by Hydrologic Region: 2005 Baseline and 2020 Target

Hydrologic Region[a]	2005 M&I Per Capita Water Use (gallons per capita per day)	2020 Target M&I Per Capita Water Use[b] (gallons per capita per day)	Difference 2005–2020 (%)
San Francisco Bay	157	131	-17
Sacramento River	253	176	-30
San Joaquin River	248	174	-30
Central Coast	154	123	-20
South Coast	180	149	-17
Tulare Lake	285	188	-34
South Lahontan	237	170	-28
Colorado River	346	211	-39
Statewide[c] Total	**192**	**154**	**-20**

Source: California Department of Water Resources et al., 2010

[a] Listed hydrologic regions exclude North Coast and North Lahontan (which lack SWP or CVP contractors receiving water from the Delta).

[b] The targets set by the 20x2020 Water Conservation Plan are based on analyses designed to account for regional differences including varying degrees of past conservation and climate variations.

[c] Statewide total include all hydrologic regions in the state.

Based on the statewide average target per capita rate and projected population in the hydrologic regions, the per capita reduction will likely lower water demand in 2020 to below Existing Conditions. By 2060 however, projected demands would be expected to exceed savings achieved by the target per capita reduction due to projected population growth.

DWR's commitment to the implementation of water efficiency programs, in conjunction with the State's 20x2020 requirements and initiatives at the contractor level, will continue to provide opportunities for participation in new or expanded conservation and reuse programs, effectively augmenting supplies reduced under the No Action Alternative.

[36] This requirement was later codified as part of SB 7X 7 discussed in subsection 30.1.1.3.

[37] The plan was prepared by DWR, SWRCB, California Bay-Delta Authority, California Energy Commission, California Department of Public Health, California Public Utilities Commission, California Air Resources Board, with assistance from California Urban Water Conservation Council and U.S. Bureau of Reclamation

In conclusion, considering the options available to contractors to find alternative sources of supply and implement programs to reduce demands under existing regulations and management plans, it is reasonable to assume that population growth would occur in the water service areas with or without water supplied under the BDCP action alternatives, as suppliers would seek alternative sources in response to projected demands to avoid water service deficiencies.

Alternatives 1 through 9

Estimating Growth Potential Supported by Increases in Average Annual Deliveries

Under Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4 (Scenarios H1 and H3), and 5,[38] average annual water deliveries to M&I contractors are projected to increase for most hydrologic regions, with the largest projected increases occurring under Alternatives 1A, 1B, and 1C (see Tables 30-16 and 30-17).

For this analysis, *potential growth* attributable to projected increases in average annual M&I deliveries was estimated by applying year 2020 target per capita water consumption rates for the hydrologic regions published in the *20x2020 Water Conservation Plan* (California Department of Water Resources, et al. 2010; shown in Table 30-18) to the projected increases in water deliveries to M&I contractors. The potential population growth associated with net increases in deliveries is shown in Table 30-19, which indicates the potential increase in population that could be supported by the projected increases in SWP and CVP deliveries compared to Existing Conditions and the No Action Alternative.

Tables 30-20 and 30-21 characterize potential increases in population associated with year 2060 deliveries, by region, under Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4 (Scenarios H1 through H4), 5, and 9, compared to Existing Conditions and the No Action Alternative, respectively. The potential population growth associated with the long term M&I deliveries was estimated as described above (i.e., by applying the 2020 target per capita water consumption rates to the projected deliveries). The tables show potential population based on the maximum potential deliveries[39] under each alternative, relative to the given baseline.

Note that this approach estimates a *growth potential* supported by increases in average annual deliveries. Notwithstanding the fact that decreased per capita consumption will improve water use efficiency, long-term water supply reliability is essential to support long-term population increases, and its absence would at some point constrain growth. But increases in deliveries would not be the impetus for future growth; rather, factors such as natural growth, employment opportunities, local policy, and quality of life will likely drive future changes in population.

There are a number of conservative assumptions in this approach. Growth potential was assumed to be proportionate to the net increase in deliveries; that is, any M&I contractors projected to receive increased deliveries would allocate the new supply to urban growth rather than for other purposes (e.g., dry year reliability, groundwater overdraft protection, agricultural or environmental uses).

Some contractors likely would use increases in deliveries for other uses. Contractors have increasingly sought to diversify their water supply portfolios and firm up supplies. In the event that

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[38] Under Alternative 9, average annual water deliveries to M&I contractors would also increase for most hydrologic regions relative to the No Action Alternative (2060), but not relative to existing conditions.

[39] Typically the maximum deliveries include both Table A and Article 21 in the SWP component, although there are exceptions to this.

available water supplies exceed demand, contractors may opt to rely on sources other than the SWP or CVP based on (for example) cost or water quality.

Growth Potential by Region

As shown in Tables 30-20 and 30-21, the potential increase in population would be greatest under Alternatives 1A, 1B, and 1C. Deliveries to the South Coast region, the most populous region in the state, represent more than 60% of the net increase in deliveries under Alternatives 1A–1C, 2A, 2B, 2C, 3, 4 (Scenarios H1 through H4), and 5.[40] Aside from the South Coast region, the hydrologic regions that could realize the largest increases in M&I deliveries include San Francisco Bay, South Lahontan, and Colorado River.

Growth Potential Associated with BDCP Compared to California Water Plan Projections

The section below compares the population growth potentially supported by increased M&I deliveries under each BDCP alternative to the growth forecasts presented in the California Water Plan. Table 30-22 shows population estimates by region for 2025, 2050 and 2060 based on DWR data prepared for the California Water Plan.[41] A comparison of growth potential supported by alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5 and 9 is provided below.

Because M&I deliveries are projected to decrease under Alternatives 6A, 6B, 6C, 7 and 8 (as described in Section 30.3.2.3), these alternatives are not expected to support additional population and are not discussed below. The indirect effects of reduced SWP and CVP deliveries in the export service area are discussed in Section 30.4, below.

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[40] As described in Section 30.1.3.5, *South Coast Hydrologic Region*, DWR projections indicate that by 2050 the South Coast region will experience the largest net population growth among affected regions, with population increasing by approximately 7 million people, a 35% increase relative to 2010 population (California Department of Water Resources 2009; ESRI 2011).

[41] The population forecasts presented in Table 30-22 are based on population data prepared for the period 2005 to 2050 by DWR (Rayej pers. comm. 2010) for the California Water Plan, assuming the "Current Trends" planning scenario described in the plan (and summarized in Section 30.1.3 of this chapter); estimates for 2025 were interpolated based on data for 2020 and 2030 and estimates for 2060 were extrapolated based on data for 2040 and 2050. The Current Trends scenario adheres to population projections by the California Department of Finance.

Table 30-19. Potential Population Increases Due to Estimated Average Annual Deliveries Associated with BDCP Alternatives

	Population Potentially Supported by Changes in M&I Deliveries[a]		
Compared to Existing Conditions[b]			
Alternative[c]	State Water Project		Central Valley Project
	Table A	Table A + Article 21	
1A, 1B, 1C	1,888,631	2,020,497	--[d]
2A, 2B, 2C	1,056,910	1,074,082	--[d]
3	1,694,302	1,773,653	--[d]
4 (Scenario H1)	1,883,722	1,947,476	--[d]
4 (Scenario H2)	218,407	279,413	--[d]
4 (Scenario H3)	1,113,010	1,135,041	--[d]
4 (Scenario H4)	192,359	246,452	--[d]
5	366,021	313,002	--[d]
9	13,930	23,888	--[d]
Compared to No Action Alternative[b]			
Alternative[b]	State Water Project		Central Valley Project
	Table A	Table A + Article 21	
1A, 1B, 1C	2,446,036	2,652,816	73,154
2A, 2B, 2C	1,614,314	1,706,401	33,623
3	2,251,707	2,405,971	76,419
4 (Scenario H1)	2,441,127	2,579,794	70,744
4 (Scenario H2)	262,391	403,749	66,324
4 (Scenario H3)	1,670,414	1,767,360	32,693
4 (Scenario H4)	235,847	289,948	30,465
5	908,457	930,352	31,473
9	128,645	126,103	4,119

Source: California Department of Water Resources 2011b, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2013a, 2013b; adapted by ESA

[a] Based on projected water deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012; and SWP_TableA_Art21_delivery_by_contractor_Alt4A_tables_050112.xls, May 2012) and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012; BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012; SWP_TableA_Art21_delivery_by_contractor_010913_Alt4_Decision_Tree_Result.xls, January 2013; and BDCP_Alternatives_CVP_M&I_Deliveries_Alt4_Decision_Tree_010913.xls, January 2013), adapted by ESA.

[b] The comparison of each alternative to Existing Conditions reflects changes in deliveries resulting from SWP/CVP water supply conditions, including decreases in SWP/CVP water availability caused by increases in M&I water rights demands north of the Delta, implementation of the Fall X2 standard, sea level rise, and climate change, as well as implementation of the alternatives. In contrast, because the No Action Alternative accounts for these factors, the comparison of each alternative to the No Action Alternative (2060) indicates the general extent of changes in SWP/CVP water supply conditions due to implementation of the alternative only. See Chapter 5, *Water Supply*, for more information.

[c] Listed alternatives include only those with the potential to increase deliveries to M&I uses based on modeling results.

[d] Decrease in water deliveries shown as "—".

Table 30-20. Potential Increase in Population Supported by Maximum Net Increase in SWP and CVP Deliveries, Compared to Existing Conditions

Hydrologic Region[a]	Potential Increase in Population (Thousands) by Alternative[b, c]							
	1A, 1B, or 1C	2A, 2B or 2C	3	4 (Scenario H1)	4 (Scenario H2)	4 (Scenario H3)	4 (Scenario H4)	5
San Francisco Bay	235.2	150.8	205.8	186.5	0	113.5	0	43.4
Sacramento River	13.8	8.9	11.7	10.9	0	7.5	0	3.4
San Joaquin River	0	0	0	0	0	0	0	0
Central Coast	70.1	34.2	58.4	50.5	0	19.7	0	0
South Coast	1,430.7	681.5	1,255.4	1,087.0	0	466.4	0	201.1
Tulare Lake	44.8	26.0	36.9	427.1	277.2	384.6	241.7	0
South Lahontan	87.5	48.0	77.0	65.0	0	31.5	0	0
Colorado River	116.6	70.0	110.4	97.1	0	56.7	0	28.2
Total[d]	1,998.9	1,019.4	1,755.6	1,924.2	277.2	1,079.9	241.7	276.1

Source: California Department of Water Resources et al. 2010; California Department of Water Resources 2011b, 2012c, 2012d, 2012e, 2012g, 2013a, 2013b, adapted by ESA.

[a] Listed hydrologic regions exclude North Coast and North Lahontan (which lack SWP or CVP contractors receiving water from the Delta). Listed alternatives include only those with the potential to increase deliveries to M&I uses based on modeling results.

[b] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; and SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012) and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012; SWP_TableA_Art21_delivery_by_contractor_010913_Alt4_Decision_Tree_Result.xls, January 2013; and BDCP_Alternatives_CVP_M&I_Deliveries_Alt4_Decision_Tree_010913.xls, January 2013.), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in California Department of Water Resources et al. 2010.

[c] In most cases the population increase supported by the maximum net increase in deliveries reflects SWP Table A plus Article 21 deliveries combined with CVP deliveries. In a few cases, where Article 21 deliveries are projected to decrease, the maximum net increase reflects SWP Table A deliveries combined with CVP deliveries.

[d] Numbers rounded to the nearest 100. Numbers may not total due to rounding.

Table 30-21. Potential Increase in Population Supported by the Maximum Net Increase in SWP and CVP Deliveries, Compared to the No Action Alternative

Hydrologic Region[a]	Potential Increase in Population (Thousands) by Alternative[b]								
	1A, 1B, or 1C	2A, 2B or 2C	3	4 (Scenario H1)	4 (Scenario H2)	4 (Scenario H3)	4 (Scenario H4)	5	9
San Francisco Bay	317.6	233.1	288.1	268.9	58.6	195.9	0	125.8	59.9
Sacramento River	18.1	13.2	16.0	15.2	0	11.8	0	7.7	4.0
San Joaquin River	10.8	4.3	10.5	10.1	8.9	3.9	2.8	4.5	0
Central Coast	139.6	103.8	127.9	120.0	24.0	89.3	0	54.1	26.0
South Coast	1,847.7	1,098.5	1,672.4	1,503.9	50.4	883.3	0	618.0	0
Tulare Lake	95.9	77.0	87.9	478.1	328.2	435.6	292.7	39.7	23.2
South Lahontan	155.0	115.5	144.5	132.6	0	99.0	0	59.1	17.2
Colorado River	141.3	94.6	135.1	121.8	0	81.3	0	52.8	0
Total [c]	**2,726.0**	**1,740.0**	**2,482.4**	**2,650.5**	**470.1**	**1,800.1**	**295.50**	**961.8**	**130.2**

Source: California Department of Water Resources et al. 2010; California Department of Water Resources 2011b, 2012c, 2012d, 2012e, 2012g, 2013a, 2013b, adapted by ESA.

[a] Listed hydrologic regions exclude North Coast and North Lahontan (which lack SWP or CVP contractors receiving water from the Delta). Listed alternatives include only those with the potential to increase deliveries to M&I uses based on modeling results.

[b] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; and SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012) and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; and BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012; SWP_TableA_Art21_delivery_by_contractor_010913_Alt4_Decision_Tree_Result.xls, January 2013; and BDCP_Alternatives_CVP_M&I_Deliveries_Alt4_Decision_Tree_010913.xls, January 2013.), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in California Department of Water Resources et al. 2010.

[c] Numbers rounded to the nearest 100. Numbers may not total due to rounding.

Table 30-22. Projected Population Growth in Affected Hydrologic Regions (In Thousands)[a]

Hydrologic Regions with SWP and/or CVP Contractors	Population (2010)[b]	Projected Population (2025)[c]	Projected Population (2050)[d, e]	Projected Population (2060)[c]
San Francisco Bay	6,200.3	7,339.0	8,948.7	9,653.5
Sacramento River	3,013.1	3,887.6	5,348.9	6,040.0
San Joaquin River	2,166.6	3,098.1	4,885.9	5,785.1
Central Coast	1,370.9	1,788.4	2,153.1	2,319.1
South Coast	19,778.6	23,389.9	27,106.3	28,584.5
Tulare Lake	2,263.2	3,271.3	5,194.5	6,189.1
South Lahontan	913.5	1,547.4	2,387.4	2,769.3
Colorado River	832.5	1,353.1	2,309.3	2,815.0

Sources: Rayej pers. comm. 2012; California Department of Water Resources 2009; ESRI 2011.

[a] Excludes those hydrologic regions outside SWP or CVP contractor service areas (North Coast and North Lahontan).

[b] ESRI 2011

[c] Estimates for 2025 and 2060 are based on DWR projections (Rayej pers. comm. 2012) assuming the "current trends" scenario described in the California Water Plan (California Department of Water Resources 2009) (summarized in Section 30.1.3 of this chapter). Estimates for 2025 were interpolated based on DWR forecasts for 2020 and 2030 and estimates for 2060 were extrapolated based on DWR forecasts for 2040 and 2050.

[d] California Department of Water Resources 2009

[e] Reflects growth projections under the Current Trends scenario, which follows population projections by the California Department of Finance.

Note that because the California Water Plan forecasts were completed in 2008 (for use in the 2009 plan) the effects of the recession that commenced in 2008, including its depth and duration, could not have been anticipated at the time. Therefore, given the effects of the recession on growth throughout the state, the population growth based on the California Water Plan shown in Table 30-23 may overstate the level of growth that will be reached by 2060. Nevertheless, given the small percentage of total population growth represented by the population potentially supported by the BDCP (as described below), it is reasonable to assume that the level of growth supported by the BDCP M&I deliveries would remain substantially smaller than overall growth experienced by 2060 within the eight hydrologic regions.

Alternatives 1A, 1B, and 1C

Table 30-23 compares the projected net and percent increase in population from 2010 to 2060 (based on the information presented in Table 30-22) with the growth potential associated with Alternatives 1A, 1B, and 1C deliveries, compared to both Existing Conditions and the No Action Alternative. Growth potential supported by the BDCP in the South Coast region represents the largest percentage of projected increase in population from 2010 to 2060 among the regions (16% compared to Existing Conditions and 21% compared to the No Action Alternative).

Table 30-23. Population Growth Potentially Supported by BDCP Deliveries (Alternatives 1A, 1B, and 1C) Compared with Projected Population Growth (In Thousands)

		Potential Population Increase Relative to Existing Conditions [b, c]		Potential Population Increase Relative to No Action Alternative [b, c]	
Hydrologic Regions [a]	Increase in Population 2010-2060[d, e]	Total	As Percentage of Increase in Population 2010-2060	Total [b]	As Percentage of Increase in Population 2010-2060
San Francisco Bay	3,453.2	235.2	6.8%	317.6	9.2%
Sacramento River	3,027.0	13.9	0.5%	18.1	0.6%
San Joaquin River	3,618.6	n/a[f]	n/a[f]	10.8	0.3%
Central Coast	948.2	70.1	7.4%	139.6	14.7%
South Coast	8,805.9	1,430.7	16.2%	1,847.7	21.0%
Tulare Lake	3,925.9	44.8	1.1%	95.9	2.4%
South Lahontan	1,855.8	87.5	4.7%	155.0	8.4%
Colorado River	1,982.5	116.6	5.9%	141.3	7.1%

Sources: Rayej pers. comm. 2012; California Department of Water Resources 2009, 2012d, 2012f; ESRI 2011.
n/a = not applicable.

[a] Excludes those hydrologic regions outside SWP or CVP contractor service areas (North Coast and North Lahontan).

[b] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012), and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in DWR et al. 2010.

[c] Population increase is based on the sum of SWP Table A, Article 21 and CVP Deliveries under Alternatives 1A, 1B and 1C in the Late Long Term period.

[d] 2010 population data based on ESRI 2011.

[e] Projected increase in population is based on DWR projections (Rayej pers. comm. 2012) assuming the "current trends" scenario described in the California Water Plan (California Department of Water Resources 2009), extrapolated to 2060 for this analysis (see Table 30-22).

[f] Because water deliveries to the San Joaquin River region would decrease relative to Existing Conditions, no population increase is projected.

Alternatives 2A, 2B, and 2C

Table 30-24 compares the projected net and percent increase in population from 2010 to 2060 (based on the information presented in Table 30-22) with the growth potential associated with Alternatives 2A, 2B, and 2C deliveries, compared to both Existing Conditions and the No Action Alternative. Growth potential supported by the BDCP in the South Coast region represents the largest percentage of projected increase in population from 2010 to 2060 among the regions (7.7% compared to Existing Conditions and 12.5% compared to the No Action Alternative).

Table 30-24. Population Growth Potentially Supported by BDCP Deliveries (Alternatives 2A, 2B, and 2C) Compared with Projected Population Growth (In Thousands)

Hydrologic Regions [a]	Increase in Population 2010-2060[d, e]	Potential Population Increase Relative to Existing Conditions [b, c]		Potential Population Increase Relative to No Action Alternative [b, c]	
		Total	As Percentage of Increase in Population 2010-2060	Total [b]	As Percentage of Increase in Population 2010-2060
San Francisco Bay	3,453.2	150.8	4.4%	233.1	6.8%
Sacramento River	3,027.0	8.9	0.3%	13.2	0.4%
San Joaquin River	3,618.6	n/a[f]	n/a[f]	4.3	0.1%
Central Coast	948.2	34.2	3.6%	103.8	10.9%
South Coast	8,805.9	681.5	7.7%	1,098.5	12.5%
Tulare Lake	3,925.9	26.0	0.7%	77.0	2.0%
South Lahontan	1,855.8	48.0	2.6%	115.5	6.2%
Colorado River	1,982.5	70.0	3.5%	94.6	4.8%

Sources: Rayej pers. comm. 2012; California Department of Water Resources 2009, 2012d 2012f; ESRI 2011.
n/a = not applicable.

[a] Excludes those hydrologic regions outside SWP or CVP contractor service areas (North Coast and North Lahontan).

[b] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012), and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in DWR et al. 2010.

[c] Population increase is based on the sum of SWP Table A, Article 21 and CVP Deliveries under Alternatives 2A, 2B and 2C in the Late Long Term period.

[d] 2010 population data based on ESRI 2011

[e] Projected increase in population is based on DWR projections (Rayej pers. comm. 2012) assuming the "current trends" scenario described in the California Water Plan (California Department of Water Resources 2009), extrapolated to 2060 for this analysis (see Table 30-22).

[f] Because water deliveries to the San Joaquin River region would decrease relative to Existing Conditions, no population increase is projected.

Alternative 3

Table 30-25 compares the projected net and percent increase in population from 2010 to 2060 (based on the information presented in Table 30-22) with the growth potential associated with Alternative 3 deliveries, compared to both Existing Conditions and the No Action Alternative. Growth potential supported by the BDCP in the South Coast region represents the largest percentage of projected increase in population from 2010 to 2060 among the regions (14% compared to Existing Conditions and 19% compared to the No Action Alternative).

Table 30-25. Population Growth Potentially Supported by BDCP Deliveries (Alternative 3) Compared with Projected Population Growth (In Thousands)

		Potential Population Increase Relative to Existing Conditions [b, c]		Potential Population Increase Relative to No Action Alternative [b, c]	
Hydrologic Regions [a]	Increase in Population 2010-2060[d, e]	Total	As Percentage of Increase in Population 2010-2060	Total [b]	As Percentage of Increase in Population 2010-2060
San Francisco Bay	3,453.2	205.8	6.0%	288.1	8.3%
Sacramento River	3,027.0	11.7	0.4%	16.0	0.5%
San Joaquin River	3,618.6	n/a[f]	n/a[f]	10.5	0.3%
Central Coast	948.2	58.4	6.2%	127.9	13.5%
South Coast	8,805.9	1,255.4	14.3%	1,672.4	19.0%
Tulare Lake	3,925.9	36.9	0.9%	87.9	2.2%
South Lahontan	1,855.8	77.0	4.1%	144.5	7.8%
Colorado River	1,982.5	110.4	5.6%	135.1	6.8%

Sources: Rayej pers. comm. 2012; California Department of Water Resources 2009, 2012d, 2012f; ESRI 2011.
n/a = not applicable.

[a] Excludes those hydrologic regions outside SWP or CVP contractor service areas (North Coast and North Lahontan).

[b] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012), and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in DWR et al. 2010.

[c] Population increase is based on the sum of SWP Table A, Article 21 and CVP Deliveries under Alternative 3 in the Late Long Term period.

[d] 2010 population data based on ESRI 2011

[e] Projected increase in population is based on DWR projections (Rayej pers. comm. 2012) assuming the "current trends" scenario described in the California Water Plan (California Department of Water Resources 2009), extrapolated to 2060 for this analysis (see Table 30-22).

[f] Because water deliveries to the San Joaquin River region would decrease relative to Existing Conditions, no population increase is projected.

Alternative 4 (Scenarios H1, H2, H3, and H4)

Table 30-26 compares the projected net and percent increase in population from 2010 to 2060 (based on the information presented in Table 30-22) with the growth potential associated with deliveries of each of the Alternative 4 scenarios, compared to both Existing Conditions and the No Action Alternative.

For Scenarios H1, H3 and H4, growth potential supported by the BDCP in the South Coast region represents the largest percentage of projected increase in population from 2010 to 2060 among the regions: 12.3% compared to Existing Conditions and 17.1% compared to the No Action Alternative for Scenario H1; 5.3% compared to Existing Conditions and 10.1% compared to the No Action Alternative for Scenario H3; and 6.2% compared to Existing Conditions and 7.5% compared to the No Action Alternative for Scenario H4.

Table 30-26. Population Growth Potentially Supported by BDCP Deliveries (Alternative 4) Compared with Projected Population Growth (In Thousands)

		Scenario H1				Scenario H2				Scenario H3				Scenario H4			
		Potential Population Increase				Potential Population Increase				Potential Population Increase				Potential Population Increase			
		Relative to Existing Conditions		Relative to No Action Alternative		Relative to Existing Conditions		Relative to No Action Alternative		Relative to Existing Conditions		Relative to No Action Alternative		Relative to Existing Conditions		Relative to No Action Alternative	
Hydrologic Region[a]	Increase in Population 2010-2060	Total	As % of Increase in Population 2010-2060	Total	As % of Increase in Population 2010-2060	Total	As % of Increase in Population 2010-2060	Total	As % of Increase in Population 2010-2060	Total	As % of Increase in Population 2010-2060	Total	As % of Increase in Population 2010-2060	Total	As % of Increase in Population 2010-2060	Total	As % of Increase in Population 2010-2060
San Francisco Bay	3,453.2	186.5	5.4%	268.9	7.8%	n/a[f]	n/a[f]	58.6	1.7%	113.5	3.3%	195.9	5.7%	n/a[f]	n/a[f]	n/a[f]	n/a[f]
Sacramento River	3,027.0	10.9	0.4%	15.2	0.5%	n/a[f]	n/a[f]	n/af	n/af	7.5	0.2%	11.8	0.4%	n/a[f]	n/a[f]	n/a[f]	n/a[f]
San Joaquin River	3,618.6	n/a[f]	n/a[f]	10.1	0.3%	n/a[f]	n/a[f]	8.9	0.2%	n/a[f]	n/a[f]	3.9	0.1%	n/a[f]	n/a[f]	2.8	0.1%
Central Coast	948.2	50.5	5.3%	120.0	12.7%	n/a[f]	n/a[f]	24.0	2.5%	19.7	2.1%	89.3	9.4%	n/a[f]	n/a[f]	n/a[f]	n/a[f]
South Coast	8,805.9	1087.0	12.3%	1503.9	17.1%	277.2	3.1%	50.4	0.6%	466.4	5.3%	883.3	10.0%	n/a[f]	n/a[f]	n/a[f]	n/a[f]
Tulare Lake	3,925.9	427.1	10.9%	478.1	12.2%	n/a[f]	n/a[f]	328.2	8.4%	16.7	0.4%	67.7	1.7%	241.7	6.2%	292.7	7.5%
South Lahontan	1,855.8	65.0	3.5%	132.6	7.1%	n/a[f]	n/a[f]	0.0	0.0%	31.5	1.7%	99.0	5.3%	n/a[f]	n/a[f]	n/a[f]	n/a[f]
Colorado River	1,982.5	97.1	4.9%	121.8	6.1%	n/a[f]	n/a[f]	0.0	0.0%	56.7	2.9%	81.3	4.1%	n/a[f]	n/a[f]	n/a[f]	n/a[f]

Sources: Rayaej pers. comm. 2012; California Department of Water Resources 2009, 2012d, 2012f, 2013a, 2013b; ESRI 2011

n/a = not applicable.

[a] Excludes those hydrologic regions outside SWP or CVP contractor service areas (North Coast and North Lahontan).

[b] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012), CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012; SWP_TableA_Art21_delivery_by_contractor_010913_Alt4_Decision_Tree_Result.xls, January 2013; and BDCP_Alternatives_CVP_M&I_Deliveries_Alt4_Decision_Tree_010913.xls, January 2013), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in DWR et al. 2010.

[c] Population increase is based on the sum of SWP Table A, Article 21 and CVP Deliveries under Alternative 4 in the Late Long Term period.

[d] 2010 population data based on ESRI 2011

[e] Projected increase in population is based on DWR projections (Rayej pers. comm. 2012) assuming the "current trends" scenario described in the California Water Plan (California Department of Water Resources 2009), extrapolated to 2060 for this analysis (see Table 30-22).

[f] Because water deliveries to hydrologic region would decrease under this scenario no population increase is projected.

For Scenario H2, growth potential supported by the BDCP in the South Coast region represents the largest percentage of projected increase in population from 2010 to 2060 among the regions (3.1%) compared to Existing Conditions; growth potential supported by the BDCP in the Tulare Lake region represents the largest percentage of projected increase in population from 2010 to 2060 among the regions (8.4%) compared to the No Action Alternative.

Alternative 5

Table 30-27 compares the projected net and percent increase in population from 2010 to 2060 (based on the information presented in Table 30-22) with the growth potential associated with Alternative 5 deliveries, compared to both Existing Conditions and the No Action Alternative. Growth potential supported by the BDCP in the South Coast region represents the largest percentage of projected increase in population from 2010 to 2060 among the regions (2.3% compared to Existing Conditions and 7% compared to the No Action Alternative).

Table 30-27. Population Growth Potentially Supported by BDCP Deliveries (Alternative 5) Compared with Projected Population Growth (In Thousands)

		Potential Population Increase Relative to Existing Conditions [b, c]		Potential Population Increase Relative to No Action Alternative [b, c]	
Hydrologic Regions [a]	Increase in Population 2010-2060[d, e]	Total	As Percentage of Increase in Population 2010-2060	Total [b]	As Percentage of Increase in Population 2010-2060
San Francisco Bay	3,453.2	43.4	1.3%	125.8	3.6%
Sacramento River	3,027.0	3.4	0.1%	7.7	0.3%
San Joaquin River	3,618.6	n/a[f]	n/a[f]	4.5	0.1%
Central Coast	948.2	n/a[f]	n/a[f]	54.1	5.7%
South Coast	8,805.9	201.1	2.3%	618.0	7.0%
Tulare Lake	3,925.9	n/a[f]	n/a[f]	39.7	1.0%
South Lahontan	1,855.8	n/a[f]	n/a[f]	59.1	3.2%
Colorado River	1,982.5	28.2	1.4%	52.8	2.7%

Sources: Rayej pers. comm. 2012; California Department of Water Resources 2009, 2012d, 2012f; ESRI 2011.
n/a = not applicable.

[a] Excludes those hydrologic regions outside SWP or CVP contractor service areas (North Coast and North Lahontan).

[b] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012), and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in DWR et al. 2010.

[c] Population increase is based on the sum of SWP Table A, Article 21 and CVP Deliveries under Alternative 5 in the Late Long Term period.

[d] 2010 population data based on ESRI 2011

[e] Projected increase in population is based on DWR projections (Rayej pers. comm. 2012) assuming the "current trends" scenario described in the California Water Plan (California Department of Water Resources 2009), extrapolated to 2060 for this analysis (see Table 30-22).

[f] Because water deliveries to the San Joaquin River, Central Coast, Tulare Lake, and South Lahontan regions would decrease relative to Existing Conditions, no population increase is projected.

Alternative 9

Table 30-28 compares the projected net and percent increase in population from 2010 to 2060 (based on the information presented in Table 30-22) with the growth potential associated with Alternative 9 deliveries, compared to both Existing Conditions and the No Action Alternative. Growth potential supported by the BDCP in the South Coast region compared to the No Action Alternative represents the largest percentage of projected increase in population from 2010 to 2060 among the regions. The population potential represented by the BDCP deliveries under this alternative compared to the No Action Alternative represents up to 2.7% of the growth anticipated by 2060 based on the forecasts prepared for the California Water Plan. As the table shows, the population potential represented by the BDCP deliveries under Alternative 9 compared to Existing Conditions is projected to decrease.

Table 30-28. Population Growth Potentially Supported by BDCP Deliveries (Alternative 9) Compared with Projected Population Growth (In Thousands)

		Potential Population Increase Relative to Existing Conditions [b, c]		Potential Population Increase Relative to No Action Alternative [b, c]	
Hydrologic Regions [a]	Increase in Population 2010-2060[d, e]	Total	As Percentage of Increase in Population 2010-2060	Total [b]	As Percentage of Increase in Population 2010-2060
San Francisco Bay	3,453.2	n/a[f]	n/a[f]	59.9	1.7%
Sacramento River	3,027.0	n/a[f]	n/a[f]	4.0	0.1%
San Joaquin River	3,618.6	n/a[f]	n/a[f]	n/a[f]	n/a[f]
Central Coast	948.2	n/a[f]	n/a[f]	26.0	2.7%
South Coast	8,805.9	n/a[f]	n/a[f]	n/a[f]	n/a[f]
Tulare Lake	3,925.9	n/a[f]	n/a[f]	23.2	0.6%
South Lahontan	1,855.8	n/a[f]	n/a[f]	17.2	0.9%
Colorado River	1,982.5	n/a[f]	n/a[f]	n/a[f]	n/a[f]

Sources: Rayej pers. comm. 2012;, California Department of Water Resources 2009, 2012d, 2012f; ESRI 2011.
n/a = not applicable.

[a] Excludes those hydrologic regions outside SWP or CVP contractor service areas (North Coast and North Lahontan).

[b] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012), and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in DWR et al. 2010.

[c] Population increase is based on the sum of SWP Table A, Article 21 and CVP Deliveries under Alternative 9 in the Late Long Term period.

[d] 2010 population data based on ESRI 2011

[e] Projected increase in population is based on DWR projections (Rayej pers. comm. 2012) assuming the "current trends" scenario described in the California Water Plan (California Department of Water Resources 2009), extrapolated to 2060 for this analysis (see Table 30-22).

[f] Because water deliveries to all regions would decrease relative to Existing Conditions, no population increase is projected. Because water deliveries to the San Joaquin River, South Coast, and Colorado River regions would decrease relative to the No Action Alternative, no population increase is projected.

Comparison of BDCP Growth Potential with Growth Forecasts from Regional Planning Agencies

The South Coast, San Francisco Bay, South Lahontan, and Colorado River regions are the regions that could realize the largest increases in M&I deliveries (see Tables 30-20 and 30-21). This section compares the population growth potentially supported by M&I deliveries in these regions to the growth forecasts of the respective regional planning agencies. These four regions account for 93 to 99% of the potential population supported by deliveries in 2060 compared to Existing Conditions, and 89 to 90% of the potential population supported by deliveries in 2060 compared to the No Action Alternative for five of the six alternatives[42] that provide increased deliveries. Because deliveries to the other regions that would receive increases (Sacramento River, Central Coast, and Tulare Lake) would not support substantial potential population overall or compared to the population increases projected for each region, the growth potential of the BDCP in these regions is limited. Therefore, this discussion focuses on the four regions that would receive the largest M&I increase.

South Coast Hydrologic Region

Alternatives 1A, 1B, and 1C

This region contains parts of Los Angeles, Riverside, San Bernardino, San Diego, and Ventura Counties, and all of Orange County. The Southern California Association of Governments (SCAG) and San Diego Association of Governments (SANDAG) are the two COGs representing these counties. Current SCAG forecasts extend from 2008 to 2035, while SANDAG forecasts cover the period from 2008 to 2050 including forecasts for 2035. Because these forecasts cover a different time period from that of the BDCP, the population forecasts are not directly comparable.[43] However, the average annual rate of growth projected in the COG forecasts provides a means to compare the population growth that potentially would be supported with implementation of Alternatives 1A, 1B, and 1C. Table 30-29 shows the COG forecasts from 2008 to 2035 for the counties within the South Coast Region and the population potential of Alternatives 1A, 1B, and 1C relative to existing conditions. As shown, in this timeframe, counties in the hydrologic region are projected to grow at an average annual rate of 0.77% to 0.94%. The average annual growth rate of the COGs considered together is about 0.80%. By contrast, between 2010 and 2060, the average annual growth rate represented by potential population supported by M&I deliveries under Alternatives 1A, 1B, and 1C is substantially less—approximately 0.14%. Although the BDCP extends well beyond the timeframe for which both COGs provide projections (due to the longer planning horizon needed for a project of this magnitude), this comparison suggests that population growth potentially supported by BDCP M&I deliveries to the South Coast region would not exceed growth anticipated by the regional planning agencies.

SANDAG provides forecasts for San Diego County to 2050, closer to BDCP's long term 2060 horizon. Between 2008 and 2050 SANDAG projects the county will grow by 40%, or 0.80% per year on

[42] Under Alternative 9 these four regions account for 59% of total deliveries compared to the No Action Alternative (2060). However, because deliveries under this alternative are relatively small its potential to support population growth in any region receiving deliveries is limited: Alternative 9 would support less than 1% of the population increase projected to occur in the eight hydrologic regions between 2010 and 2060 and no more than 3% of the projected population increase in any particular hydrologic region.

[43] Note that the SCAG planning area (which includes all of Ventura, Los Angeles, San Bernardino, Orange, Riverside and Imperial counties) covers a larger area than the South Coast region (which includes portions of Ventura, Los Angeles, San Bernardino, Riverside Counties and San Diego counties, and all of Orange County). Only the SCAG projections for counties within the hydrologic region are considered in this analysis.

average. Although somewhat slower than the 0.94% average annual rate projected for San Diego County over the shorter timeframe shown in Table 30-29, this rate is also substantially higher than the average annual rate potentially supported by BDCP deliveries. This longer term forecast indicates further that SANDAG anticipates higher rates of growth than would potentially be supported under Alternatives 1A, 1B, and 1C relative to existing conditions.

As shown in Table 30-13, and in Figures 30-3 and 30-4, by 2060 deliveries under the No Action Alternative (2060) would decrease compared to existing conditions. By 2060, under the No Action Alternative (2060) M&I deliveries to the South Coast region would decrease by about 70 TAF compared to existing conditions. Therefore, the potential population supported by deliveries to the South Coast region in 2060 under Alternatives 1A, 1B, and 1C compared to the No Action Alternative (2060) (1,847,700) would be greater than the difference between the population potentially supported by these alternatives compared to existing conditions (1,430,700).

Table 30-29. Comparison of Average Annual Growth Rates Indicated by COG Population Forecasts and Alternatives 1A, 1B, 1C Population Potential: South Coast Region

	Population Projection (In Thousands)				Population Potential Alternatives 1A, 1B, 1C a (In Thousands)	
COG	2008	2035	Net Change 2008-2035	Average Annual Growth Rate (%)	Net Change 2010-2060	Average Annual Growth Rate (%)
SCAG b	17,724.0	21,802.0	4,078.0	0.77	-	-
SANDAG c	3,131.6	4,026.1	894.6	0.94	-	-
Total	20,855.6	25,828.1	4,972.6	0.80	1,430.7	0.14

Sources: Southern California Association of Governments 2012; San Diego Association of Governments 2010; California Department of Water Resources 2011b, 2012c, 2012d, 2012e, 2012g; ESRI 2011.

[a] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; and SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012) and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; and BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in California Department of Water Resources et al. 2010; average annual growth rate calculated based on population potential of late long term deliveries relative to 2010 hydrologic region population (ESRI 2011).

[b] Based on projections for Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties in Adopted 2012 RTP Growth Forecasts (Southern California Association of Governments 2012).

[c] Based on 2050 Regional Growth Forecast, Subregional Results: Population & Housing (San Diego Association of Governments 2010).

Alternatives 2A, 2B, 2C, 3, 4 (Scenarios H1 through H4), and 5

As shown in Table 30-20 the growth potential under these alternatives would be less than that associated with Alternatives 1A, 1B, and 1C. Compared to existing conditions, under Alternatives 2A–2C, 3, and 4(Scenarios H1 and H3) the distribution of deliveries among the hydrologic regions would remain roughly proportionate to deliveries under Alternatives 1A, 1B, and 1C, although the total amount of water deliveries would vary. Thus, deliveries to the South Coast region (which under

Alternatives 1A, 1B, and 1C would receive deliveries supporting 72% of the total population potentially supported relative to existing conditions) would receive deliveries that could support from 43-72% of the total population potentially supported by deliveries under these alternatives (representing potential population for the South Coast region of 466,400 to 1.3 million people). Under Alternative 5, fewer regions would receive deliveries, and the South Coast region's share of population supported by total water delivered would increase to 78% (representing a potential population of 274,000 people).

As shown in Table 30-21, growth potential under these alternatives relative to the No Action Alternative (2060) would also be less than that associated with Alternatives 1A, 1B, and 1C. Under Alternatives 2A, 2B, 2C, 3, 4(Scenarios H1 and H3), and 5 the relative distribution of deliveries among regions would remain roughly proportionate to deliveries under Alternatives 1A, 1B and 1C, while total deliveries vary. Deliveries to the South Coast region (which under Alternatives 1A, 1B, and 1C would receive deliveries that could support 68% of total population potentially supported relative to the No Action Alternative (2060)) would receive deliveries that could support from 49-64% of the total population potentially supported by deliveries under these alternatives (representing potential population for the South Coast region of 618,000 to 1.7 million people).

Alternative 4 (Scenarios H2 and H4)

As shown in Table 30-20, there would be no deliveries to the South Coast region under Alternative 4 Scenarios H2 and H4, relative to existing conditions; therefore there would be no growth potential as a consequence of BDCP deliveries under these scenarios.

As shown in Table 30-21, deliveries under Alternative 4 Scenario H2 relative to the No Action Alternative would support a much smaller proportion of the total population potentially supported by deliveries under this scenario (11%, supporting a population of approximately 50,400 people). Under Scenario H4 there would no deliveries relative to the No Action Alternative, and therefore no growth potential under this scenario.

Alternative 9

None of the regions would receive an increase in M&I deliveries under Alternative 9 relative to existing conditions. Therefore, no additional population would be supported by deliveries under this alternative compared to existing conditions.

Relative to the No Action Alternative (2060), Alternative 9 would provide the lowest deliveries overall, of the alternatives that involve some increase in M&I deliveries, and would shift the allocation of water among the hydrologic regions. Under this alternative the South Coast Region as a whole would not receive an increase in deliveries, limiting growth inducement potential in this Region.

Alternatives 6A, 6B, 6C, 7, and 8

None of these alternatives involve increases in water deliveries to any hydrologic region. Therefore, these alternatives would have no growth inducement potential as no additional population would be supported by deliveries under these alternatives compared to either existing conditions or the No Action Alternative (2060). The indirect effects of reduced SWP and CVP deliveries in the export service areas are discussed in Section 30.4, below.

San Francisco Bay Hydrologic Region

Alternatives 1A, 1B, and 1C

This region contains parts of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties. The Association of Bay Area Governments (ABAG) is the COG that represents these counties. ABAG's current projections series provides population forecasts to 2035. Because these forecasts cover a different time period from that of the BDCP, the population forecasts are not directly comparable.[44] However, the average annual rate of growth projected in ABAG forecasts provides a means to compare the population growth that potentially would be supported with implementation of Alternatives 1A, 1B, and 1C. Table 30-30 shows the forecast for the ABAG planning area from 2010 to 2035 and the population potential of Alternatives 1A, 1B, and 1C relative to existing conditions. As shown, in this timeframe, counties in the hydrologic region represented by ABAG are projected to grow at an average annual rate of 0.9%. By contrast, between 2010 and 2060, the average annual growth rate represented by potential population supported by M&I deliveries under Alternatives 1A, 1B, or 1C is substantially less—approximately 0.07%. Although the BDCP extends well beyond the timeframe for which ABAG provides projections, this comparison suggests that population growth potentially supported by BDCP M&I deliveries to the San Francisco Bay region would not exceed growth anticipated by the regional planning agency.

Table 30-30. Comparison of Average Annual Growth Rates Indicated by COG Population Forecasts and Alternatives 1A, 1B, 1C Population Potential: San Francisco Bay Region

	Population Projection[a] (In Thousands)				Population Potential Alternatives 1A, 1B, 1C[a] (In Thousands)	
COG	2010	2035	Net Change 2010-2035	Average Annual Growth Rate (%)	Net Change 2010-2060	Average Annual Growth Rate (%)
ABAG[b]	7,341.7	9,073.7	1,732.0	0.9	-	-
Total	**7,341.7**	**9,073.7**	**1,732.0**	**0.9**	**235.2**	**.07**

Sources: Association of Bay Area Governments 2009; California Department of Water Resources 2011b, 2012c, 2012d, 2012e, 2012g; ESRI 2011.

n/a = not applicable.

[a] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; and SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012) and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; and BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in California Department of Water Resources et al. 2010; average annual growth rate calculated based on population potential of late long term deliveries relative to 2010 hydrologic region population (ESRI 2011).

[b] Based on projections for Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties in *Projections and Priorities 2009: Building Momentums* (Association of Bay Area Governments 2009).

[44] Note that the ABAG planning area is larger than the area included in the San Francisco Bay region: ABAG covers the entire area of the nine counties within its planning area, only portions of which are located within the San Francisco Bay region.

As shown in Table 30-13 and in Figures 30-3 and 30-4, by 2060 M&I deliveries under the No Action Alternative (2060) would decrease compared to existing conditions. By 2060, under the No Action Alternative (2060) M&I deliveries to the San Francisco Bay region would decrease by about 12 TAF compared to existing conditions. Therefore, the potential population supported by SWP and CVP deliveries to the San Francisco Bay region in 2060 under Alternatives 1A, 1B, and 1C compared to the No Action Alternative (2060) (317,600) would be greater than the difference between the population potentially supported by these alternatives compared to existing conditions (235,200).

Alternatives 2A, 2B, 2C, 3, 4 (Scenarios H1 and H3, and 5)

As shown in Table 30-20 the growth potential under these alternatives would be less than that associated with Alternatives 1A, 1B, and 1C. Compared to existing conditions, under Alternatives 2A, 2B, 2C, 3, and 4 (Scenarios H1 and H3) the distribution of deliveries among the hydrologic regions would remain roughly proportionate to deliveries under Alternative 1A, although the total amount of water deliveries would vary. Thus, deliveries to the San Francisco Bay region (which under Alternatives 1A, 1B, 1C would receive deliveries supporting 12% of the total population potentially supported relative to existing conditions) would receive deliveries that could support from 10-15% of the total population potentially supported by deliveries under these alternatives (representing potential population for the San Francisco Bay region of 43,400 to 205,800 people). The San Francisco Bay region would be one of the four regions receiving an increase in deliveries relative to existing conditions under Alternative 5; the region's share of population potentially supported by water deliveries under Alternative 5 would be roughly the same as the other alternatives discussed above (12%, representing a potential population of 43,400 people). As shown in Table 30-21, growth potential under these alternatives relative to the No Action Alternative (2060) would also be less than that associated with Alternatives 1A, 1B, and 1C. Under Alternatives 2A, 2B, 2C, 3, 4(Scenarios H1 and H3), and 5 the relative distribution of deliveries between regions would remain roughly proportionate to deliveries under Alternatives 1A, 1B, and, 1C, while total deliveries would vary. Deliveries to the San Francisco Bay region (which under Alternatives 1A, 1B, and 1C would receive deliveries that could support 12% of total population potentially supported relative to the No Action Alternative (2060) would receive deliveries that could support from 10-13% of the total population potentially supported by deliveries under these alternatives (representing potential population for the San Francisco Bay region of 125,800 to 288,100 people).

Alternative 4 (Scenarios H2 and H4)

As shown in Table 30-20, there would be no deliveries to the San Francisco Bay region under Alternative 4 Scenarios H2 and H4, relative to existing conditions; therefore there would be no growth potential as a consequence of BDCP deliveries under these scenarios.

As shown in Table 30-21, deliveries under Alternative 4 Scenario H2 relative to the No Action Alternative would be similar to Alternatives H1 and H3 discussed above. Specifically, deliveries under Scenario H2 could support about 12% of the total population potentially supported by deliveries under this scenario. Under Scenario H4 there would no deliveries relative to the No Action Alternative, and therefore no growth potential under this scenario.

Alternative 9

None of the regions would receive an increase in M&I deliveries under Alternative 9 relative to existing conditions. Therefore, no additional population would be supported by deliveries under this alternative compared to existing conditions.

Relative to the No Action Alternative (2060) period, Alternative 9 would provide the lowest deliveries overall, of the alternatives that involve some increase in M&I deliveries, and would shift the allocation of water among the hydrologic regions. Under this alternative the San Francisco Bay region's share of total population potentially supported by M&I deliveries would be the largest, approximately 46% (representing approximately 60,800 people).

Alternatives 6A, 6B, 6C, 7, and 8

None of these alternatives involve increases in water deliveries to any hydrologic region. Therefore, these alternatives would have no growth inducement potential as no additional population would be supported by deliveries under these alternatives compared to either existing conditions or the No Action Alternative (2060).

South Lahontan Hydrologic Region

Alternatives 1A, 1B, and 1C

This region contains parts of Mono, Kern, Los Angeles, and San Bernardino Counties, and all of Inyo County. SCAG, Kern COG, and Eastern Sierra COG are the COGs representing these counties; however, only SCAG and Kern COG prepare population forecasts for their respective jurisdictions. Current SCAG forecasts extend from 2008 to 2035, while Kern COG provides forecasts for 2010 to 2030. Mono County's Housing Element provides forecasts for 2008 to 2030. In the absence of population projections in Inyo County General Plan elements, population for Inyo County was based on California Department of Finance projections for the period 2010 to 2030.[45] Because forecasts provided by these sources cover different time periods from that of the BDCP, the population forecasts are not directly comparable.[46] However, the average annual rates of growth projected in the COG and county forecasts provide a means to compare the population growth that potentially would be supported with implementation of Alternatives 1A, 1B, and 1C. Table 30-31 shows the COG and county forecasts for the periods covered in the respective projections (2008/2010 to 2030/2035) for the counties within the South Lahontan Region and the population potential of Alternatives 1A, 1B, and 1C relative to existing conditions. As shown, in this timeframe, counties in the hydrologic region are projected to grow at an average annual rate of 0.52% to 2.3%. The average annual growth rate of the COGs considered together is about 0.71%. By contrast, between 2010 and 2060, the average annual growth rate represented by potential population supported by M&I deliveries under Alternatives 1A, 1B, and 1C is substantially less—approximately 0.18%. Although the BDCP extends well beyond the timeframe for which both COGs provide projections, this comparison suggests that population growth potentially supported by BDCP M&I deliveries to the South Lahontan region would not exceed growth anticipated by the regional planning agencies.

[45] According to Inyo County staff the County relies on U.S. Census Bureau and California Department of Finance for its demographic data.

[46] Note that the planning areas of the respective COGs and counties is larger than the area included in the South Lahontan region: COGs and counties cover the entire area of the five counties; with the exception of Inyo County, only portions of these counties are located within the hydrologic region. SCAG projections only for the two counties within this hydrologic region (Los Angeles and San Bernardino) were considered in this analysis.

Table 30-31. Comparison of Average Annual Growth Rates Indicated by COG Population Forecasts and Alternatives 1A, 1B, 1C Population Potential: South Lahontan Region

	Population Projection (In Thousands)				Population Potential Alternatives 1A, 1B, 1C [a] (In Thousands)	
COG/County	2008/2010	2030/2035	Net Change	Average Annual Growth Rate [d] (%)	Net Change 2010-2060	Average Annual Growth Rate (%) [b]
SCAG [b]	11,794.0	14,103.0	2,309.0	0.66	-	-
Kern COG [c]	845.6	1,208.2	362.6	1.8	-	-
Inyo County [d]	18.6	20.7	2.03	0.52	-	-
Mono County [e]	13.8	22.9	9.1	2.3	-	-
Total	**12,672.0**	**15,354.8**	**2,682.8**	**0.71 [f]**	**87.5**	**0.18**

Sources: Southern California Association of Governments 2012; California Department of Finance 2012b; California Department of Water Resources 2011b, 2012c, 2012d, 2012e, 2012g; ESRI 2011; Mono County Community Development Department 2009.

[a] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; and SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012) and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; and BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in California Department of Water Resources et al. 2010; average annual growth rate calculated based on population potential of late long term deliveries relative to 2010 hydrologic region population (ESRI 2011).

[b] Based on projections for Los Angeles and San Bernardino Counties in *Adopted 2012 RTP Growth Forecasts* (Southern California Association of Governments 2012); population shown is for 2008 and 2035.

[c] Population shown is for 2010 and 2030.

[d] Based on projections prepared by California Department of Finance (2012b); population shown is for 2010 and 2030.

[e] Population shown is for 2008 and 2030.

[f] Calculation of average annual rate assumes a period of 27 years based on the period covered by the most populous COG within the region(SCAG representing approximately 90% of the population shown).

As shown in Table 30-13 and in Figures 30-3 and 30-4, by 2060 M&I deliveries under the No Action Alternative (2060) would decrease compared to existing conditions. By 2060, under the No Action Alternative (2060) M&I deliveries to the South Lahontan region would decrease by about 13 compared to existing conditions. Therefore, the potential population supported by SWP and CVP deliveries to the South Lahontan region in 2060 under Alternatives 1A, 1B, and 1C compared to the No Action Alternative (2060) (155,000) would be greater than the difference between the population potentially supported by these alternatives compared to existing conditions (87,500).

Alternatives 2A, 2B, 2C, 3, 4(Scenarios H1 and H3), and 5

As shown in Table 30-20 the growth potential under these alternatives would be less than that associated with Alternatives 1A, 1B, and 1C. Compared to existing conditions, under Alternatives 2A–2C, 3, and 4 (Scenarios H1 and H3) the distribution of deliveries among the hydrologic regions would remain roughly proportionate to deliveries under Alternatives 1A, 1B, and 1C, although the total amount of water deliveries would vary. Thus, deliveries to the South Lahontan Region (which under Alternatives 1A, 1B, and 1C would receive deliveries supporting 4% of the total population potentially supported relative to existing conditions) would receive deliveries that could support from 3-5% of the total population potentially supported by deliveries under these alternatives (representing potential population for the South Lahontan region of 31,500 to 77,000 people). Under Alternative 5, the South Lahontan region would receive no increase in deliveries relative to existing conditions; therefore this alternative would not support any additional population growth in this region. As shown in Table 30-21, growth potential under these alternatives relative to the No Action Alternative (2060) would also be less than that associated with Alternatives 1A, 1B, and 1C. Under Alternatives 2A–2C, 3, 4 (Scenarios H1 and H3), and 5 the relative distribution of deliveries between regions would remain roughly proportionate to deliveries under Alternatives 1A–1C, while total deliveries vary. Deliveries to the South Lahontan region (which under Alternatives 1A, 1B, and 1C would receive deliveries that could support 6% of total population potentially supported relative to the No Action Alternative (2060)) would receive deliveries that could support from 5-7% of the total population potentially supported by deliveries under these alternatives (representing potential population for the South Lahontan region of 59,100 to 144,500 people).

Alternative 4 (Scenarios H2 and H4)

As shown in Table 30-20, there would be no deliveries to the South Lahontan region under Alternative 4 Scenarios H2 and H4 relative to existing conditions; therefore there would be no growth potential as a consequence of BDCP deliveries under these scenarios.

As shown in Table 30-21, there would also be no deliveries to the South Lahontan region under Alternative 4 Scenarios H2 and H4 relative to the No Action Alternative; therefore there would be no growth potential as a consequence of BDCP deliveries under these scenarios.

Alternative 9

None of the regions would receive an increase in M&I deliveries under Alternative 9 relative to existing conditions. Therefore, no additional population would be supported by deliveries under this alternative compared to existing conditions.

Relative to the No Action Alternative (2060), Alternative 9 would provide the lowest deliveries overall, of the alternatives that involve some increase in M&I deliveries, and would shift the allocation of water among the hydrologic regions. The South Lahontan region would receive deliveries that could support about 13% (representing approximately 17,600 people) of the total population potentially supported by M&I deliveries under this alternative. Although the region's share of deliveries would be relatively high compared to the other alternatives that provide increases in M&I deliveries, because total deliveries under this alternative would be lower, the population potentially supported would be less than under the other alternatives providing increased M&I deliveries.

Alternatives 6A, 6B, 6C, 7, and 8

None of these alternatives involve increases in water deliveries to any hydrologic region. Therefore, these alternatives would have no growth inducement potential as no additional population would be supported by deliveries under these alternatives compared to either existing conditions or the No Action Alternative (2060).

Colorado River Hydrologic Region

Alternatives 1A, 1B, and 1C

This region contains parts of Imperial, Riverside, San Bernardino, and San Diego Counties. SCAG and SANDAG are the COGs that represent these counties. Current SCAG forecasts extend from 2008 to 2035, while SANDAG forecasts cover the period from 2008 to 2050 including forecasts for 2035. Because these forecasts cover a different time period from that of the BDCP, the population forecasts are not directly comparable.[47] However, the average annual rate of growth projected in the COG forecasts provides a means to compare the population growth that potentially would be supported with implementation of Alternatives 1A, 1B, and 1C. Table 30-32 shows the forecast from 2008 to 2035 for the counties with the Colorado Region and the population potential of Alternatives 1A–1C relative to existing conditions. As shown, in this timeframe, counties in this hydrologic region are projected to grow at an average annual rate of 0.94% to 1.45%. The average annual growth rate of the COGs considered together is about 1.24%. By contrast, between 2010 and 2060, the average annual growth rate represented by potential population supported by M&I deliveries under Alternatives 1A, 1B, or 1C is substantially less—approximately 0.26%. Although the BDCP extends well beyond the timeframe for which SCAG provides projections, this comparison suggests that population growth potentially supported by BDCP M&I deliveries to the Colorado River region would not exceed growth anticipated by the regional planning agency.

Table 30-32. Comparison of Average Annual Growth Rates indicated by COG Population Forecasts and Alternatives 1A, 1B, 1C Population Potential: Colorado River Region

	Population Projection (In Thousands)				Population Potential Alternatives 1A, 1B, 1C [a] (In Thousands)	
COG	2008	2035	Net Change 2008-2035	Average Annual Growth Rate (%)	Net Change 2010-2060	Average Annual Growth Rate (%)
SCAG [b]	4,314.0	6,362.0	2,048.0	1.45	-	-
SANDAG [c]	3,131.6	4,026.1	894.6	0.94	-	-
Total	7,445.6	10,388.1	2,942.6	1.24	116.6	0.26

Sources: Southern California Association of Governments 2012; San Diego Association of Governments 2010; California Department of Water Resources 2011b, 2012c, 2012d, 2012e, 2012g; ESRI 2011.

[a] Based on projected increase in M&I deliveries as reported in BDCP modeling results for SWP contractors (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; and SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls, March 2012) and CVP contractors (BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012; and BDCP_Alternatives_CVP_M&I_Deliveries_ELT_052112, May 2012), aggregated by hydrologic region, and divided by projected year 2020 per capita water use for the hydrologic region as reported in California Department of Water Resources et al. 2010; average annual growth rate calculated based on population potential of late long term deliveries relative to 2010 hydrologic region population (ESRI 2011).

[b] Based on projections for Imperial, Riverside, and San Bernardino Counties in Adopted 2012 RTP Growth Forecasts (Southern California Association of Governments 2012).

[c] Based on 2050 Regional Growth Forecast, Subregional Results: Population & Housing (San Diego Association of Governments 2010).

[47] Note that the SCAG planning area (which includes all of Ventura, Los Angeles, San Bernardino, Orange, Riverside and Imperial counties) covers a larger area than the Colorado River region (which includes portions of San Bernardino, Riverside Counties and Imperial counties). Only the SCAG projections for counties within the hydrologic region are considered in this analysis.

As shown in Table 30-13 and in Figures 30-3 and 30-4, by 2060 M&I deliveries under the No Action Alternative (2060) would decrease compared to existing conditions. By 2060, under the No Action Alternative (2060) M&I deliveries to the Colorado River region would decrease by about 6 TAF compared to existing conditions. Therefore, the potential population supported by SWP and CVP deliveries to the Colorado River region in 2060 under Alternatives 1A, 1B, and 1C compared to the No Action Alternative (2060) (141,300) would be greater than the difference between the population potentially supported by these alternatives compared to existing conditions (116,600).

Alternatives 2A, 2B, 2C, 3, 4 (Scenarios H1 and H3), and 5

As shown in Table 30-20 the growth potential under these alternatives would be less than that associated with Alternatives 1A, 1B, and 1C. Compared to existing conditions, under Alternatives 2A, 2B, 2C, 3, and 4 (Scenarios H1 and H3) the distribution of deliveries among the hydrologic regions would remain roughly proportionate to deliveries under Alternative 1A, although the total amount of water deliveries would vary. Thus, deliveries to the Colorado River region (which under Alternatives 1A–1C would receive deliveries supporting 6% of the total population potentially supported relative to existing conditions) would receive deliveries that could support from 5-7% of the total population potentially supported by deliveries under these alternatives (representing potential population for the Colorado River region of 57,000 to 110,000 people). The Colorado River region would be one of the four regions receiving an increase in deliveries relative to existing conditions under Alternative 5; the region's share of population potentially supported by water deliveries under Alternative 5 would be slightly higher than under other alternatives discussed above (9%, representing a potential population of 29,800 people).

As shown in Table 30-21, growth potential under these alternatives relative to the No Action Alternative (2060) would also be less than that associated with Alternatives 1A–1C. Under Alternatives 2A–2C, 3, 4 (Scenarios H1 and H3), and 5 the relative distribution of deliveries between regions would remain roughly proportionate to deliveries under Alternatives 1A–1C, while total deliveries vary. Deliveries to the Colorado River region (which under Alternatives 1A–1C would receive deliveries that could support 5% of total population potentially supported relative to the No Action Alternative (2060)) would receive deliveries that could support from 5-6% of the total population potentially supported by deliveries under these alternatives (representing potential population for the Colorado River region of 52,800 to 135,100 people).

Alternative 4 (Scenarios H2 and H4)

As shown in Table 30-20, there would be no deliveries to the Colorado region under Alternative 4 Scenarios H2 and H4, relative to existing conditions; therefore there would be no growth potential as a consequence of BDCP deliveries under these scenarios.

As shown in Table 30-21, there would also be no deliveries to the Colorado region under Alternative 4 Scenarios H2 and H4 relative to the No Action Alternative; therefore there would be no growth potential as a consequence of BDCP deliveries under these scenarios.

Alternative 9

None of the regions would receive an increase in M&I deliveries under Alternative 9 relative to existing conditions. Therefore, no additional population would be supported by deliveries under this alternative compared to existing conditions.

Relative to the No Action Alternative (2060), Alternative 9 would provide the lowest deliveries overall, of the alternatives that involve some increase in M&I deliveries, and would shift the allocation of water among the hydrologic regions. Under this alternative the Colorado River region as a whole would not receive an increase in M&I deliveries, limiting growth inducement potential in this region.

Alternatives 6A, 6B, 6C, 7, and 8

None of these alternatives involve increases in water deliveries to any hydrologic region. Therefore, these alternatives would have no growth inducement potential as no additional population would be supported by deliveries under these alternatives compared to either existing conditions or the No Action Alternative (2060).

Potential Changes in Deliveries by Contractor

While this analysis focuses on changes in growth inducement potential at the regional level, CALSIM modeling can reflect changes in delivery at the contractor level. Table 30-33 presents projected minimum and maximum changes in water deliveries under the BDCP, compared to both Existing Conditions and the No Action Alternative. As shown, the greatest potential increases in M&I deliveries (as well as decreases) would be to Metropolitan Water District (MWD). When compared to Existing Conditions, contractors with the greatest projected increases after MWD include Coachella Valley Water District (CVWD), Antelope Valley – East Kern Water Agency (AVEK) and Santa Clara Valley Water District (SCVWD). When compared to the No Action Alternative (2060), the contractors with the greatest projected increases after MWD include SCVWD, AVEK Water District and Kern County Water Agency (KCWA).

Per capita use rates can vary widely among contractors and within each contractor's service area, and several of the contractors' service areas occupy multiple hydrologic regions. For that reason, the projected changes in contractor deliveries have not been converted into estimates of potential population increases.

Profiles of Representative Contractors Potentially Receiving Increased Deliveries

The majority of water supply planning for urban areas occurs at the local water wholesaler and retailer level. SWP and CVP contractors providing water to 3,000 or more customers or providing over 3,000 acre-feet of water annually to urban customers are required to coordinate with local land use agencies (among others) in their pursuit of developing adequate water supplies and ensuring that supplies are used efficiently. The results of those coordination efforts are reflected in the contractors' urban water management plans.

On the basis of projected increases in M&I deliveries, representative SWP and/or CVP contractor service areas were selected to assist in developing more in-depth profiles of the BDCP's growth inducement potential. These contractors' urban water management plans were reviewed to assess, among other things, existing and projected water supply and demand, the basis for projected increases in demand, and consistency between contractor projections of water supply with projected water deliveries under the BDCP alternatives. The contractors selected were those that serve M&I uses and were projected to receive the largest net increase in water deliveries for the SWP and CVP systems. See Appendix 30B, *Water Contractor Profiles*, for more detail. The selected contractors include the following:

Table 30-33. Projected Changes in Annual M&I Deliveries to SWP and CVP Contractors[a] (No Action Alternative) (thousand acre-feet)

Contractor	Compared to Existing Conditions			Compared to the No Action Alternative		
	Minimum[b]		Maximum[c]	Minimum[b]		Maximum[c]
Alameda County Flood Control and Water Conservation District, Zone 7	-12.9	-	10.7	-10.2	-	13.3
Alameda County Water District	-7.8	-	4.8	-4.9	-	7.6
Antelope Valley-East Kern Water Agency	-36.8	-	14.8	-29.7	-	21.8
Castaic Lake WA (M&I only)	-25.3	-	7.6	-21.5	-	11.3
City of Avenal	-1.3	-	0.0	-1.0	-	0.3
City of Coalinga	-3.8	-	-0.1	-2.9	-	0.8
City of Huron	-1.1	-	0.0	-0.9	-	0.3
City of Tracy	-4.3	-	-0.3	-2.0	-	2.1
Coachella Valley Water District	-35.4	-	19.7	-35.8	-	19.4
Crestline-Lake Arrowhead Water Agency	-1.4	-	0.6	-1.1	-	0.9
Desert Water Agency	-16.0	-	6.2	-14.5	-	7.7
Kern County Water Agency (M&I only)	-32.0	-	10.1	-22.3	-	19.8
Littlerock Creek Irrigation District	-0.7	-	0.2	-0.5	-	0.3
Metropolitan Water District of Southern California	-559.8	-	220.9	-504.8	-	275.9
Mojave Water Agency	-27.3	-	0.8	-20.6	-	7.5
Napa County Flood Control and Water Conservation District	-5.2	-	6.7	-8.9	-	3.1
Palmdale Water District	-6.1	-	1.8	-4.8	-	3.1
San Benito County Water District	-3.2	-	-0.2	-2.5	-	0.5
San Bernardino Valley Municipal Water District	-36.4	-	6.0	-29.1	-	13.3
San Gabriel Valley Municipal Water District	-10.6	-	2.0	-8.3	-	4.3
San Gorgonio Pass Water Agency	-6.2	-	1.3	-4.8	-	2.6
San Luis Obispo County Flood Control and Water Conservation District	-4.7	-	1.9	-2.9	-	3.7
Santa Barbara County Flood Control and Water Conservation District	-12.8	-	3.8	-9.9	-	6.7
Santa Clara Valley Water District	-68.9	-	13.7	-55.5	-	27.2
Solano County Water Agency	-17.2	-	5.5	-15.5	-	7.1
Ventura County Flood Control District	-4.1	-	1.5	-2.7	-	3.0

Source: California Department of Water Resources 2011b, 2012b, 2012c, 2012d, 2012e, 2012f, adapted by ESA

[a] Based on projected changes in municipal and industrial (M&I) water deliveries as reported in BDCP modeling (SWP_TableA_Art21_delivery_by_contractor_newAlt1A2B_tables_110211.xls, November 2011; SWP_TableA_Art21_delivery_by_contractor_Alt2A_tables_021412.xls, February 2012; SWP_TableA_Art21_delivery_by_contractor_tables_110111(031412).xls; March 2012; BDCP_Alternatives_CVP_M&I_Deliveries_020212.xls, February 2012; SWP_TableA_Art21_delivery_by_contractor_Alt4A_tables_050112.xls, May 2012; and Alt 8 BDCP_Alternatives_CVP_M&I_Deliveries_with_Alt8_050112.xls, May 2012).

[b] For SWP contractors, the low end of range typically reflects Table A plus Article 21 deliveries under Alternative 8. For CVP contractors, the low end of range typically reflects deliveries under Alternative 8.

[c] For SWP contractors, the high end of the range typically reflects Table A plus Article 21 deliveries under Alternatives 1A, 1B and 1C. For CVP contractors, the high end of the range typically reflects deliveries under Alternative 3.

- **Metropolitan Water District (MWD)**. MWD is the largest SWP contractor and provides water service within the most populous hydrologic region, South Coast. Under Existing Conditions, MWD receives approximately 1,148 TAF combined Table A and Article 21 deliveries (equal to about 45% of all SWP deliveries, including deliveries to agricultural contractors), and 60% of all M&I deliveries. Projected changes in deliveries to MWD vary widely by alternative and depending on whether deliveries are compared to Existing Conditions or the No Action Alternative. The change in SWP Table A plus Article 21 deliveries to MWD under the BDCP is projected to range from an increase of 276 TAF under Alternatives 1A, 1B and 1C to a decrease of 505 TAF under Alternative 8, compared to the No Action Alternative.

  The change in SWP Table A plus Article 21 deliveries to MWD under the BDCP is projected to range from an increase of 221 TAF under Alternatives 1A, 1B and 1C to a decrease of 560 TAF under Alternative 8, compared to Existing Conditions.

- **Santa Clara Valley Water District (SCVWD)**. SCVWD, both an SWP and CVP contractor, provides M&I water in the second most populous hydrologic region, San Francisco Bay. Among M&I contractors SCVWD is projected to receive the second greatest increase in deliveries (following MWD) under the BDCP alternatives. Under Existing Conditions, SCVWD receives approximately 61 TAF combined Table A and Article 21 deliveries (equal to about 3% of SWP M&I deliveries). Projected changes in deliveries to SCVWD vary. The change in SWP Table A plus Article 21 deliveries to SCVWD under the BDCP is projected to range from an increase of 20 TAF under Alternatives 1A, 1B and 1C to a decrease of 20 TAF under Alternative 8, compared to the No Action Alternative. The change in SWP Table A plus Article 21 deliveries to SCVWD under the BDCP is projected to range from an increase of 17 TAF under Alternatives 1A, 1B and 1C to a decrease of 23 TAF under Alternative 8, compared to Existing Conditions. The change in CVP deliveries to SCVWD under the BDCP is projected to range from an increase of 7 TAF under Alternative 3 to a decrease of 36 TAF under Alternative 8, compared to the No Action Alternative.

  The change in CVP deliveries to SCVWD under the BDCP is projected to range from a decrease of 2 TAF under Alternative 3 to a decrease of 46 TAF under Alternative 8, compared to existing conditions.

- **Antelope Valley – East Kern Water Agency (AVEK).** Among M&I contractors AVEK is projected to receive the third greatest increase in deliveries under the BDCP alternatives. AVEK is in the South Lahontan, Tulare Lake, and South Coast regions. Under Existing Conditions, AVEK receives approximately 88 TAF combined Table A and Article 21. Projected changes in deliveries to AVEK vary. The change in SWP Table A plus Article 21 deliveries to AVEK under the BDCP is projected to range from an increase of 22 TAF under Alternatives 1A, 1B and 1C to a decrease of 30 TAF under Alternative 8, compared to the No Action Alternative.

  The change in SWP Table A plus Article 21 deliveries to AVEK under the BDCP is projected to range from an increase of 15 TAF under Alternatives 1A, 1B and 1C to a decrease of 37 TAF under Alternative 8, compared to existing conditions.

- **Coachella Valley Water District (CVWD)**. CVWD is in the Colorado River region. Under Existing Conditions, CVWD receives approximately 76 TAF combined Table A and Article 21. Projected changes in deliveries to CVWD vary. The change in SWP Table A plus Article 21 deliveries to CVWD under the BDCP is projected to range from an increase of 19 TAF under Alternatives 1A, 1B and 1C to a decrease of 36 TAF under Alternative 8, compared to the No Action Alternative.

The change in SWP Table A plus Article 21 deliveries to CVWD under the BDCP is projected to range from an increase of 20 TAF under Alternatives 1A, 1B and 1C to a decrease of 35 TAF under Alternative 8, compared to existing conditions.

- **Kern County Water Agency (KCWA)**. KCWA is in the South Lahontan and Tulare Lake regions. KCWA is the second largest SWP contractor after MWD; over 85% of deliveries are to agricultural uses. Under Existing Conditions, KCWA's deliveries to M&I uses are approximately 87 TAF combined Table A and Article 21. Projected changes in deliveries to KCWA vary. The change in SWP Table A plus Article 21 deliveries to KCWA under the BDCP is projected to range from an increase of 20 TAF under Alternatives 1A, 1B and 1C to a decrease of 22 TAF under Alternative 8, compared to the No Action Alternative.

  The change in SWP Table A plus Article 21 deliveries to KCWA under the BDCP is projected to range from an increase of 10 TAF under Alternatives 1A, 1B and 1C to a decrease of 32 TAF under Alternative 8, compared to existing conditions.

30.3.3 Secondary Effects of Induced Growth

Increases in average annual deliveries to M&I contractors' service areas would support population growth. The development of housing and services needed to support population could stimulate increased economic activity resulting from an increased demand for goods and services. This growth could require the physical expansion of housing, transportation systems, utilities and services, which could adversely affect the physical environment.

The location, nature and magnitude of that physical expansion would determine the type and severity of resulting environmental effects. Determining the specific environmental impacts attributable to the growth would be too speculative to predict or evaluate at this time since the location and nature of that physical expansion within the multiple contractor service areas cannot be known. This section presents a general assessment of the secondary environmental effects of growth. For this analysis, multiple published reports that have evaluated growth within representative cities and counties in the contractor service areas were reviewed and their findings summarized and supplemented to characterize adverse physical environmental effects potentially attributable to induced growth.

30.3.3.1 No Action Alternative

As indicated in Section 30.3.2.3, *Indirect Growth Inducement Potential: Summary of Modeling Results*, secondary effects of growth could occur irrespective of whether action alternatives are implemented because contractors would develop alternative sources of supply (in which case the impacts described below would be attributable to other water supply projects).

30.3.3.2 Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, and 9

Secondary Impacts of Growth Identified in Jurisdictions' General Plan Environmental Impact Reports

Cities and counties in the service areas of contractors projected to receive increased M&I deliveries have adopted comprehensive, long term general plans for the physical development of their jurisdictions, and regional planning agencies have prepared projections of future growth in the area, as discussed in Section 30.2, *Regulatory Setting*. Pursuant to CEQA, cities and counties have prepared environmental impact reports (EIRs) on general plans that characterize the adverse physical changes expected to result from development. As indicated in Tables 30-20 and 30-21, the hydrologic regions with the highest potential increase in population include South Coast, San Francisco Bay, South Lahontan, Colorado River, Central Coast and Tulare Lake. Accordingly, to characterize potential secondary effects of planned growth, the general plan EIRs prepared by cities and counties in these hydrologic regions were reviewed (see Table 30-34) in order to provide a cross-section of environmental conditions (in terms of geography, existing levels of development, climate, and ecosystems) of these service areas.

Table 30-34. General Plan EIRs Reviewed for Secondary Effects of Growth

	Hydrologic Region					
Cities	San Francisco Bay	Central Coast	South Coast	Tulare	South Lahontan	Colorado River
Bakersfield				X		
Campbell	X					
Hesperia					X	
Lancaster					X	
Los Angeles			X			
Los Gatos	X					
Milpitas	X					
Ontario			X			
Palmdale					X	
San Diego			X			
San José	X					
Santa Clara	X					
Counties						
Los Angeles			X		X	
Riverside			X			X
San Bernardino			X		X	X
San Diego			X			X
Santa Clara	X					
Unincorporated Communities						
Santa Ynez Valley		X				
Los Alamos		X				
Orcutt		X				

Effects that have been identified as significant and unavoidable in the majority of EIRs reviewed include impacts to agricultural resources, air quality, biological resources, hydrology and water quality, land use, transportation and traffic, noise, and public services and utilities; these and significant impacts identified as mitigable are summarized in tables presented in Appendix 30C. Pursuant to CEQA, the local lead agencies have adopted statements of overriding consideration for any significant unavoidable effects prior to adoption of the general plans. The regulatory context for several of the environmental issues addressed in these documents, such as air quality considerations and sustainable development, is evolving and could change the scope and magnitude of impacts disclosed.

The following provides a summary of the types and nature of impacts identified as significant and unavoidable in the EIRs for the approved general plans listed above.

Visual and Aesthetic Resources

Impacts on visual resources include: impacts on scenic vistas and other scenic resources; impacts to scenic highways, the degradation of views and visual character; and creation of new sources of light and glare. These impacts are considered by most jurisdictions identifying these impacts to be potentially significant or significant but mitigable and by a few to be significant and unavoidable. Mitigation measures to reduce impacts include protecting natural areas; promoting park development and open space easements; implementing general plan policies to protect visual resources; requiring compliance with lighting standards; developing and implementing hillside and ridgeline preservation programs and policies and policies to conserve visual resources; concentrating urban building in certain planning areas; and requiring project-level mitigation measures identified during CEQA review.

Agricultural Resources

Impacts on agricultural resources are associated with the conversion of farmland to urban uses, which most jurisdictions consider significant and unavoidable, and conflicts with agricultural zoning or Williamson Act contracts, which are considered by different jurisdictions to be significant but mitigable or significant and unavoidable. Identified mitigation measures include: protecting areas with prime soils; creating buffers between new uses and adjacent agricultural uses; adopting mechanisms to offset impacts to prime agricultural lands; implementing right-to-farm ordinances; encouraging expansion of agriculture to under-utilized areas; preventing inappropriate land division; promoting initiation of Williamson Act contracts and considering Williamson Act provisions when evaluating development proposals; discouraging expansion of urban spheres of influence; and revising community plans to identify important agricultural areas.

Air Quality

Significant air quality impacts include increases in air pollutant and criteria pollutant emissions; violations of air quality standards; exposure of sensitive receptors to air pollution; and cumulative impacts on air quality. Other air quality impacts include increased odor emissions, including diesel fumes, long term air emissions from stationary sources, increased emissions from vehicles, and construction-related air quality impacts. These impacts are considered by different jurisdictions to be significant and unavoidable or significant but mitigable. Identified mitigation measures include: promoting a concentrated pattern of development that integrates mixed uses and reduces the need for vehicle use; supporting stringent air quality regulations; encouraging alternative transit options; providing incentives for use of alternative fuel vehicles and technologies; requiring buffers and ventilation systems to reduce impacts of toxic emissions; ensuring sensitive uses are not located near sources of air pollution; requiring implementation of Odor Abatement Plans; implementing construction standards to minimize dust; requiring compliance with air district regulations; compliance with transportation improvement and mitigation plans; and implementing general plan policies to improve air quality.

Table 30-35. Nonattainment Status of Counties Within Hydrologic Regions Expected to Experience Growth from BDCP

County	Ozone	CO	PM10	PM2.5	Lead
Alameda[a]	N	M*	A/U	N	A/U
Contra Costa[a]	N	M*	A/U	N	A/U
Fresno[b]	N	M*	M	N	A/U
Imperial[c]	N	A/U	N*	N*	A/U
Inyo[d]	A/U	A/U	N*/M*	A/U	A/U
Kern[d]	N*	M*	N*/M*	N*	A/U
Kings[b]	N	A/U	M	N	A/U
Los Angeles[d, e]	N*	M*	N*	N*	N*
Marin[a]	N	M*	A/U	N	A/U
Mono[d]	A/U	A/U	N*	A/U	A/U
Napa[a]	N	M*	A/U	N	A/U
Orange[e]	N*	M*	N	N	A/U
Riverside[e]	N*	M*	N*	N*	A/U
San Bernardino [d, e]	N*	M*	N*	N*	A/U
San Diego[e]	N	M*	A/U	A/U	A/U
San Mateo[a]	N	M*	A/U	N	A/U
Santa Barbara[e]	A/U	A/U	A/U	A/U	A/U
Santa Clara[a]	N	M*	A/U	N	A/U
Solano[a]	N*	M*	A/U	N*	A/U
Sonoma	N*	M*	A/U	N*	A/U
Tulare[b]	N	A/U	M	N	A/U
Ventura[e]	N*	A/U	A/U	A/U	A/U

Source: U.S. Environmental Protection Agency 2012
* Designation applies to a portion of the county.
N = Nonattainment.
M = Maintenance.
A/U = Attainment/Unclassified.
[a] San Francisco Bay Hydrologic Region
[b] Tulare Lakes Hydrologic Region
[c] Colorado River Hydrologic Region
[d] South Lahontan Hydrologic Region
[e] South Coast Hydrologic Region

Table 30-35 shows the nonattainment status of counties within the hydrologic regions that are anticipated to experience growth as a result of BDCP. The majority of counties are designated nonattainment for the ozone, CO, PM10, and PM2.5 NAAQS. A portion of Los Angeles County is also designated nonattainment for the lead NAAQS. Additional growth in these regions may contribute to worsening air quality conditions and further exacerbate violations of the federal air quality standards. All air districts within the hydrologic regions have adopted regulations and long-term plans to help prevent the deterioration of air quality. New development and future emissions sources would be subject to these air district rules and regulations.

Greenhouse Gas Emissions

Increased greenhouse gas emissions are believed to correlate with climate change trends.[48] Some of the EIRs reviewed for this analysis address the issue. Impacts identified in these documents include generation of greenhouse gas emissions that would contribute to the impacts of global climate change, including adverse effects on climate, sea level, water supply reliability, wildfire frequency, ecosystems, public health, and energy needs. Impacts are considered significant and unavoidable. Identified mitigation measures include preparing and implementing Climate Action Plans and implementing general plan policies and other policies and initiatives to address the effects of greenhouse gas emissions and improve energy efficiency. The Climate Action Plans require updates of greenhouse gas inventories, municipal building upgrades to meet LEED standards, requiring energy efficiency in building design and siting, use of efficient lighting for traffic signals and in municipal buildings, expansion of the use of recycled water for irrigation, and participation in a cooperative green energy initiative with other jurisdictions.

Biological Resources

Impacts on biological resources identified by some jurisdictions include impacts of sensitive species due to habitat modification or loss and fragmentation of migratory corridors. These are considered by the majority of jurisdictions to be significant and unavoidable. Other impacts include loss of wetlands, loss of protected trees, and conflicts with preservation ordinances or habitat conservation plans. Most jurisdictions that identify these as significant impacts considered them to be mitigable. Identified mitigation measures include: preserving habitat and natural open space; providing habitat replacement; creating buffers around sensitive habitat to serve as wildlife corridors; integrating National Forest policies into the general plan; coordinating with state and federal agencies and local interest groups to conserve important biological resources; establishment of an open space maintenance district; compliance with tree preservation ordinances; and limiting sprawl in certain areas through planning and zoning.

Cultural Resources

Cultural resource impacts include impacts to historical, archaeological, and/or paleontological impacts and impacts on human remains. These impacts are considered by most jurisdictions to be significant but mitigable. Identified mitigation measures include: protecting cultural heritage sites; requiring studies, field surveys and development of detailed mitigation plans; requiring a qualified archaeologist to be onsite during ground-disturbing construction work; requiring specific procedures regarding the discovery of human remains; employing local ordinances to identify and protect important resources; requiring that new development preserve and restore the historic character of the area; and implementing general plan policies to avoid and protect cultural resources.

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[48] Refer to Chapter 22, *Air Quality and Greenhouse Gas Emissions*, for a detailed discussion of greenhouse gases and potential impacts associated with emissions to Chapter 29, *Climate Change*, for a discussion of foreseeable changes in climate within the BDCP study area. While there are no thresholds of significance specific to growth and greenhouse gases, numerous regulations have been proposed or adopted to address greenhouse gases as they relate to climate change and develop standards of significance for related impacts. For example, SB 375 (discussed in this chapter) addresses local growth and its relationship to regional planning, specifically transportation planning.

Geology, Soils, and Seismicity

Seismic or geologic hazards such as seismic ground shaking, liquefaction, and landslides are considered significant and unavoidable by some jurisdictions, and significant but mitigable by most. Other related impacts include soil erosion, loss of topsoil, and risks from unstable or expansive soils. Most jurisdictions consider geology, soils, and seismicity impacts to be significant but mitigable. Mitigation measures include implementing general plan policies to restrict development in areas subject to seismic and geologic hazards; requiring compliance with California building and seismic codes, managing hillside areas to reduce the risks from flood, erosion, and mudslides; requiring soils engineering, soil performance review, and measures to avoid and address geologic and seismic hazards.

Hazards and Hazardous Materials

Impacts related to hazards and hazardous materials include exposure of people and structures to wildland fire, which different jurisdictions have considered to be significant and unavoidable or significant but mitigable; increased exposure to hazards near oil wells and exposure to safety hazards due to proximity to public or private airstrips, which the jurisdictions considered to be significant but mitigable. Identified mitigation measures include: implementation of general plan policies that discourage isolated urban development in wildland fire areas; conditioning development approval on compliance with safety development standards; coordination of evaluation plans through the emergency services office; encouraging the use of fire retardant building materials; implementation of county policies and regulations that promote the proper handling and storage transportation, and disposal of hazardous materials and wastes; evaluating airport hazards when reviewing development proposals; coordinating with the regional airport authority on airport planning; and implementing general plan measures to reduce risks associated with airports.

Hydrology and Water Quality

Significant and unavoidable impacts related to hydrology and water quality include violation of water quality standards and impacts on groundwater, including depletion of groundwater resources. Other impacts include exposure to flood hazards and risk of inundation from seiche, tsunami, mudflow, or dam failure. These impacts are considered by different jurisdictions to be significant and unavoidable or significant but mitigable. Identified mitigation measures include: restricting or prohibiting development in flood-prone areas; updating flood zone maps; managing hillside development and promoting cluster development to reduce the extent of impervious surface; implementing an urban runoff management plan; limiting development on ridgelines and steep slopes to reduce erosion and siltation; monitoring water quality; promoting water conservation; protecting groundwater recharge areas; prohibition of septic systems in well protection areas; protecting groundwater quality through use of sewer systems; monitoring the groundwater basin; and retaining natural drainage courses and prohibiting their conversion to culverts or storm drains.

Land Use

Impacts on land use involving the conversion of undeveloped, rural, or open space lands and conflicts with existing land uses are considered significant and unavoidable by some jurisdictions and significant but mitigable by others. Other land use impacts identified by some jurisdictions include conflicts with plans and policies, loss of older suburbs, and overcrowding. Identified mitigation measures include: enforcing development standards; prohibiting incompatible land uses in residential areas; implementing general plan policies to concentrate growth in community centers; prevent inappropriate development in natural areas; and maintenance of buffers between urban uses and adjacent rural and equestrian land uses; implementing general plan polices to minimize effects of development on adjacent airport land uses plans and submit development plans to the airport commission for review; coordinate with adjacent communities regarding resource protection; and review development proposals for consistency with general plan provisions and zoning.

Mineral Resources

Impacts on mineral resources include the loss of the availability of mineral resources of local, regional, or statewide importance. Different jurisdictions that identified these impacts consider them to be significant and unavoidable or significant but mitigable. Identified mitigation measures include: implementation of general plan policies; compliance with Surface Mining and Reclamation Act requirements; consideration of impacts on mineral resources during project-level review; and establishment and implementation of standards to protect access to and economic use of mineral resources.

Noise

Noise-related impacts are expected to result from increased traffic and stationary noise sources. Other impacts identified by some jurisdictions include increased exposure to airport-related noise, railroad noise, and ground-bourne vibration. These impacts are considered by different jurisdictions to be significant and unavoidable or significant but mitigable. Identified mitigation measures include: implementation of general plan noise policies; requiring acoustical analyses to determine land use compatibility; enforcing truck idling limitations; requiring review of development proposals by the applicable airport land use commission; and requiring a buffer between incompatible land uses.

Population and Housing

Impacts related to population and housing include jobs/housing imbalance, displacement of housing and the need for its replacement, and lack of affordable housing. These are considered by some jurisdictions to be significant unavoidable and by others to be significant but mitigable impacts. Identified mitigation measures include: developing strategies to address imbalances between jobs and housing; developing new housing development regulations; and implementing policies to meet existing and future housing needs.

Recreation

Recreation-related impacts include deterioration of recreational facilities due to increased use, the need for new or expanded facilities, and reduction of existing open space/trail networks. These impacts are considered to be significant but mitigable. Identified mitigation measures include: supporting the establishment of urban open space; adhering to established ratios of open space per capita; requiring new residential development to provide recreational facilities; expanding trail systems to connect with local, state, and federal trail systems; continuing to acquire land for recreational uses; implementing general plan policies to limit the effects of growth on recreational facilities and policies to provide for dual use of school yards as parks, replacing asphalt with turf;

and exploring sources of funding for after-school and summer programs; and implementing measures to mitigate impacts on other resources that would also reduce impacts on recreation.

Traffic and Transportation

Traffic and transportation impacts include increased congestion and exceedance of roadway levels of service, which most jurisdictions consider significant and unavoidable. Other impacts identified by some jurisdictions include impacts on parking capacity, emergency access, conflicts with or increased demand for alternative transportation, and altered air traffic patterns; these are considered by some jurisdictions to be significant but mitigable and by at least one jurisdiction to be significant and unavoidable. Identified mitigation measures include: implementation of general plan traffic and circulation policies; provision of alternative means of transportation; implementing traffic signal improvements; implementing road system improvements; and coordinating with Caltrans and local councils of government to apportion traffic impact mitigation.

Utilities, Public Services and Energy Consumption

Significant impacts on public services and utilities identified by some jurisdictions include impacts due to inadequate wastewater treatment capacity, water supply, and landfill capacity, increased demand for natural gas and electricity, and increased demand for telecommunication services. Some jurisdictions identify inadequate water supplies as significant and unavoidable; most jurisdictions consider impacts on utilities and public services to be significant but mitigable. Identified mitigation measures include: requiring discretionary approval applications to include commitments from water and sanitation districts; increasing wastewater treatment capacity; use of alternative water sources; implementation of measures and incentives to encourage energy efficiency and the reduction of greenhouse gas emissions; and expanding recycling and composting programs.

Secondary Impacts of Growth – Other Considerations

Age of General Plan EIRs

Some of the General Plan EIRs used to characterize secondary effects of growth are over 10 years old; these documents can not reflect changes that have occurred subsequent to publication. Changes in the physical environmental setting could include identification of an endangered species or other protected resource in an area subsequent to EIR preparation. Changes in the regulatory context for evaluating impacts to resources occur over time and can alter the way lead agencies determine impact significance and mitigate significant impacts. Increased concern over climate change led to changes to the evaluation and mitigation of impacts associated with greenhouse gas emissions.

Horizon Years for Land Use Planning and Water Supply Planning

The planning horizon for BDCP is 2060. None of the horizon years of the general plan EIRs reviewed for this analysis extends to 2060. This is a common issue when comparing land use and water supply planning. Given the many years it takes to develop water supply projects, and the cost and impacts of constructing new facilities, water agencies often select a horizon year that extends well beyond the planning horizons of the cities and counties served by the agency. Due to the BDCP's longer planning horizon, in some areas water deliveries could support a degree of growth that has not been addressed in adopted land use plans.

Project-specific EIRs on new development will be required to consider direct, indirect and cumulative impacts on resources in the context of changes in the physical and regulatory environment and consistency with general plans, and will identify measures to mitigate these effects. In addition, state policies encouraging compact and sustainable development, described in Section 30.1.1.3, *Water Supply Management and Planning*, will influence local land use planning and development, promoting strategies to reduce sprawl, preserve farmland, and support the viability of public transportation, and likely lessening the overall impacts of newer development on the environment.

30.3.4 Indirect Effects of Reduced SWP and CVP Deliveries in Export Service Areas

Changes in the amount, cost, and/or reliability of water deliveries could affect agricultural production and urban growth within SWP and CVP Export Service Areas (Export Service Areas). Implementation of the BDCP would require payment for the costs of the project from contractors that wish to receive proposed increases in deliveries through the project, while those contractors that opt out of payment for BDCP implementation would keep their existing Table A deliveries as delivered through existing facilities. As described in Chapter 5, *Water Supply*, and shown in Tables 30-14 and 30-15, deliveries to contractors in the Export Service Areas are projected to remain the same, increase, or decrease depending on which project alternative is implemented. Indirect effects of increased deliveries to Export Service Areas as a result of implementing the BDCP are addressed in Section 30.3.3. This section describes potential indirect effects of reductions in SWP and CVP deliveries to Export Service Areas resulting from implementation of the BDCP including increases in cost of water using empirical evidence from past behavior of agricultural and M&I contractors to increases in cost of water.

30.3.4.1 Agricultural Contractor Export Service Areas

The San Joaquin Valley represents a portion of the Export Service Areas with a majority of the agricultural production. The San Joaquin Valley is among the most productive agricultural regions in the world, each year generating more than $23 billion in farm output and supporting more than 200,000 jobs. This success can largely be attributed to the availability of water supplies delivered by the SWP and CVP. As discussed in Chapter 5, *Water Supply*, reduced exports of Delta water supplies have already occurred as a result of legislative and regulatory actions, with estimated reductions of 15 percent for SWP and 30 percent for CVP deliveries. Additional regulatory actions could result in further reductions, although a specific estimate may not be feasible, given the multiple options and tools available to regulatory agencies.

Implementation of the BDCP, in addition to environmental factors (e.g., drought, sea level rise, etc.) could increase the cost of contractors' water; however, the future cost of water is unknown at this time and would depend on a variety of factors including capital and operations and maintenance costs associated with the proposed project facilities and the cost of acquiring land for habitat. The effect of increased costs of water for agricultural production (and, consequently, the potential for such increased water cost to induce or constrain economic development) is uncertain and would vary between Export Service Areas and among agricultural customers. Increased water cost could affect agricultural growth within Export Service Areas in a variety of ways that could result in indirect effects.

Response from individual agricultural water agencies, and agriculture overall, to previous reductions and periods of drought provide useful examples of how those agencies would respond if the cost of water increased beyond the means of agricultural users. Reductions that occur as a result of a regulatory or policy decision are assumed to remain in place for some time. Therefore, it is likely that any such reductions would remain for several years or could be permanent as would increases in the cost of water exported by the SWP and CVP.

The responses of water agencies to extended droughts provide good insights into the effects of further reductions in exports of Delta water supplies. The 1987-1992 drought had severe impacts on water agencies. Many purchased water from alternative sources to offset reduced Delta supplies, often at very high costs which some clients were unable to afford. Farmers responded to the resultant higher costs by increasing their own groundwater pumping and reducing their purchases from water agencies, but also fallowed large areas of both annual and permanent crop land. The financial viability of some water agencies themselves suffered and was reflected in increased credit risks and downgrades by credit rating agencies because of these reduced supplies (Moody's Investors Service 1994).

The effect on individual agricultural agencies would vary considerably, as some are almost entirely reliant on exports of Delta water supplies, while for others these sources provide only a portion of their water supply portfolios, and those other water sources could remain available. For example, during the period of 1978 to 2006, Westlands Water District relied on CVP deliveries for an average of 73 percent of its total supplies (Westlands Water District 2008).

The timing of the reduction would also influence the potential response: if the reduction occurred during an ongoing drought, the response would be more significant than if it occurred during a period of above-average precipitation, as water agencies would have more options available. In prolonged droughts, however, water supply reductions impact agriculture and extend in other directions as well. In many small San Joaquin Valley towns, agriculture is the dominant business sector and employer. The city of Mendota, for example, was devastated by the drought and regulatory water reallocations (Villarejo 1996). The small agricultural towns in the San Joaquin Valley suffered severe losses of output and income and jobs with attendant increases in social service costs.

Many agricultural water agencies rely upon water held in storage in reservoirs, and some can call upon this water with little notice. However, given the expectation that a regulatory action would result in a long-term reduction, it is likely that agencies would be cautious about using surface storage to replace lost supplies, as the availability of such supplies is not always assured and some reservoirs primarily provide seasonal storage. Further, use of reservoir storage would reduce the potential for subsequent withdrawals and would leave agencies vulnerable in the event of drought conditions or local supply emergencies.

In some areas, agricultural agencies or individual land owners could expand reliance on groundwater. However, this is not possible in areas served by adjudicated basins and the ability to expand groundwater utilization would depend on groundwater levels and the capacity of infrastructure needed to pump and deliver the water. Over the long-term, cumulative impacts associated with expanded reliance on groundwater could include subsidence and lowering of groundwater levels which could have adverse effects on in-stream flows, springs or artesian wells fed by groundwater and riparian and wetland vegetation that is dependent on groundwater. The effect of groundwater withdrawals that exceed natural recharge has been well documented in the Tulare Lake Basin, where groundwater levels declined significantly and subsidence on the order of 20 feet occurred over a wide area (Central Valley Regional Water Quality Control Board 2006).

Previous studies have shown the severe effects on San Joaquin Valley agriculture resulting from prolonged reductions in Delta water exports. The studies, by authors in both the public and private sectors and spanning more than 30 years, have shown clearly how reliant San Joaquin Valley agriculture is on Delta supplies. DWR analyzed the effects of the 1991 drought in California (California Department of Water Resources 1991). In that year, CVP supplies were reduced by 25 to 75 percent. SWP deliveries to Feather River water rights contractors were reduced by 50 percent, while no agricultural deliveries of SWP water were made elsewhere (including the San Joaquin Valley). Some 455,000 acres of cropland were idled throughout the state, resulting in a loss of $500 million in farm output. Another study found that for 1992, a single drought year, 172,000 acres of cropland were not farmed or abandoned and another 33,300 acres had reduced yields. Farm revenues fell by $157 million, water costs increased by $259 million, and groundwater operations costs rose $80 million. Total income losses exceeded $500 million, and job losses totaled 4,900 (Northwest Economic Associates 1993).

Water transfers are a potential response to a further reduction of Delta water supplies. However, given the historic costs of transferred water, likely competition from urban agencies and infrastructure limitations, the potential for transfers between agricultural suppliers is assumed to be low. Moreover, all agricultural agencies that use Delta exports will be subject to similar limitations. While there have been some transfers among agricultural water agencies based on the willingness of farmers in the service areas to fallow land and not utilize the water which would otherwise be allocated to irrigate the land, that does not represent a viable long-run source of supply. The Westlands Water District estimates that fallowed land would increase from approximately 55,000 acres in 2006 to 125,000 acres in 2020, due to reductions in water supplies resulting from restrictions placed on Delta exports (Westlands Water District 2008).

To the extent that surface storage or groundwater are not viable alternatives to decreased SWP and CVP deliveries, agricultural operations would have no option other than to endure reductions due to increased costs. Implementation of additional water conservation activities may be feasible in some locations; however, many agricultural operations have already implemented such measures, such as drip irrigation for permanent crops. If additional water conservation activities are not feasible, then changes in crop selection or fallowing of lands could occur.

Some suggest reduced agricultural water supplies can be remedied by farmers in the San Joaquin Valley switching to less water-intensive crops such as vegetables, fruits, and nuts. Those recommendations do not take into account the market characteristics of such specialty crops and the unique growing conditions in the Central Valley to produce crops that cannot be grown elsewhere in the U.S. Converting hundreds of thousands of acres of land historically used to grow cotton, alfalfa, and grains to fruits, nuts, and vegetables would cause significant supply disruptions in the affected markets. Prices of fruits, nuts, and vegetables would likely decline, which could make continued reliance of those crops infeasible for many agricultural operations.

Thus, it may not be reasonable to assume that rapid, large changes in cropping patterns would occur in response to reduced water supplies. The state and national demands for vegetables, fruits, and nuts translate into requirements for many fewer crop acres than the demands for crops like alfalfa, cotton, and grains. In addition, the cultural practices, machinery, equipment, and establishment costs for permanent crops and for vegetables are much different than those for other crops. While changes in cropping patterns over time have correlated somewhat to reductions in water supplies, cropping practices and patterns are affected by many other factors such as market conditions. As a result, long-term or permanent reductions in agricultural water supplies due to increased costs of water can reasonably be assumed to result in a decline in agricultural land use and rural economies. Therefore, it is likely that an indirect effect of fallowed lands and decreased water purchased by agricultural users could result in more land available for urban development and more water available for purchase by M&I contractors to serve urban water agencies. The indirect effects of increased supplies to M&I contractors and subsequent growth that could result from implementation of the BDCP are provided in Section 30.3.3.

30.3.4.2 M&I Contractor Export Service Areas

Similar to agricultural production changes in reaction to past droughts described above, prior responses from urban water agencies in periods of drought provide useful examples of how those agencies could respond to further reductions of Delta water supplies. Reductions that occur as a result of a regulatory or policy decisions are likely to remain in place for some time (unless and until some alternative program or projects can address the underlying issues which were the impetus for the regulatory action). Therefore, it is likely that any such reductions would at a minimum remain in place for a period of years, or could essentially be permanent and likely result in increases in the cost of water exported by the SWP and CVP. Investigation of the response of M&I contractors to drought and reduced water deliveries can provide insight into the potential indirect effects of future reduced deliveries to M&I contractors due to increase in cost of water from the SWP and CVP.

The effect on individual water agencies would vary considerably, as some are almost entirely reliant on exports of Delta water supplies, while for others these sources provide only a portion of their water supply portfolios, and other water sources could remain available. For example, in 2010, supplies exported from, or diverted in, the Delta comprised approximately 89 percent of the total water supplies for the Zone 7 Water Agency (Zone 7 Water Agency 2010), while the SWP provided less than 30 percent of water supplies for Metropolitan.

The timing of reduction in deliveries would also influence the potential response of M&I contractors; if the reduction occurred during an ongoing drought, the response would be more significant than if it occurred during a period of above-average precipitation, when water agencies would likely have more options available. However, as any such reductions would remain in place for a considerable period, it is assumed that most M&I contractors and their consumers would likely proceed cautiously and in accordance with local water planning policies and regulations as discussed in Section 30.1.1.3.

Increased cost of water from the SWP could reach a level that would be economically challenging to existing consumers in Export Service Areas served by M&I contractors. In the event costs reach a maximum threshold for the urban water agencies and consumers, the most likely initial response from urban water agencies would be to make a request of the public at large and other water users for voluntary conservation to maintain levels of service without further increases in cost to consumers and ultimately prevent losses to the urban water agencies. Such communications would likely convey the significance of the reduction, describe the availability of other water resources, and provide information on how to implement additional water conservation activities. However, as many urban water agencies have well established conservation programs, their prior success may limit the ability to substantively expand water conservation activities due to “demand hardening,” in which customers lose the ability to easily institute emergency conservation during drought or other crises because they have already captured all their conservation savings (California Department of Water Resources et al. 2010). The State of California’s plan to reduce per capita water consumption by 20 percent by the year 2020 will result in the widespread implementation of water conservation activities across the state (California Department of Water Resources et al. 2010). Additional demand reductions beyond the 20 percent mandated in that plan could be more difficult, as it would require additional capital investments and may achieve incrementally smaller results. Ultimately, more significant water conservation may also require substantial lifestyle and behavioral changes by urban water users (e.g., elimination of turf grass lawns) that may not be readily accepted by the public. However, given recent experience in Australia, the implementation of water rationing and other demand management measures can achieve substantial reductions in per capita water use (Cahill and Lund 2013).

Many urban water agencies rely upon water held in storage in reservoirs, some of which are part of the SWP and CVP systems, while others provide storage for local use. Although some urban water agencies can call upon this water with little notice, it is likely that agencies would be very cautious about using surface storage to replace lost supplies. The availability of surface storage supplies is not always assured (i.e., from the variability of precipitation patterns and the timing of a supply reduction) as some reservoirs provide seasonal storage, with substantial declines in supplies during the summer and early fall. Further, use of water supplies in reservoirs would reduce the potential for withdrawals in subsequent years, especially if drought conditions diminish the anticipated reservoir replenishment from winter rains. In addition, drawdown of storage may leave agencies vulnerable in the event of other local supply emergencies, such as those that result from pipeline or other equipment failures.

Urban water agencies could also elect to expand reliance on groundwater; however, this is not possible in areas served by adjudicated basins, and the ability to expand groundwater use would depend on groundwater levels and the capacity of infrastructure needed to pump, treat, and deliver the water. Over the long-term, cumulative impacts associated with expanded reliance on groundwater could include subsidence and lowering of groundwater levels, which could have adverse effects on instream flows, springs or artesian wells fed by groundwater and riparian and wetland vegetation that is dependent on groundwater.

As potential reductions in the purchase of Delta water supplies could be in place indefinitely, water agencies could be forced to implement water shortage contingency plans, such as those mandated in by DWR's Urban Water Management Plan (UWMP) guidelines (California Department of Water Resources 2011a). For example, Santa Clara Valley Water District's 2010 UWMP describes a range of actions and implementation triggers, identifies mandatory prohibitions on water use, penalties or charges for excessive use, and actions that could be implemented should costs of water prove prohibitive to importing all of their Table A allotment (Santa Clara Valley Water District 2010).

The type of actions that urban agencies might implement could include across-the-board reductions in water deliveries (e.g., to retail agencies), curtailment of certain water uses, such as groundwater replenishment or deliveries to customers with interruptible supplies (which may include local agricultural users), or reduce the amount of water available for in-stream water uses in some locations. As many urban agencies currently take advantage of the availability of "surplus" SWP (or Article 21) water to augment native groundwater replenishment, it is likely that surplus water may not be used if costs are too high, and thus long-term decline of groundwater levels could result in some basins.

Expansion of recycled water use is another likely response to potential future reductions in purchases. The experience with, and application of, recycled water programs varies considerably across California, with substantial use in some portions of Southern California (e.g., Orange and Los

Angeles counties) and little or none in other areas. The potential for substantial expansion of recycled water use may exist in many areas, but the capital costs associated with implementation can be substantial, and are driven by the proximity of recycled water sources to potential uses, which traditionally have included industrial processes and landscape irrigation. Further expansion is also limited by public perceptions and concerns about the salt buildup, as recycled water typically has a higher content of minerals and salts than the original source water. The SWRCB's recycled water policy finds that salt and nutrient issues can be appropriately addressed through the development of regional or subregional salt and nutrient management plans (State Water Resources Control Board 2009). One such mechanism for such planning is their incorporation into IRWM plans, as those plans are required to consider the Resource Management Strategies included in the 2009 (and subsequent) updates of the California Water Plan (California Department of Water Resources 2011c).

Water transfers may be likely in the event of further reduction in imports of Delta water supplies. Transfers could be expected to occur from water agencies in Export Service Areas, including areas served by the Colorado River, and would most likely involve the transfer of water from agricultural contractors to M&I contractors. Because these transfers would be a response to a long-term trend, it is possible they would be implemented for significant periods of time, which could result in the long-term fallowing of agricultural lands, as described previously in this section. For example, between 1989 and 2009, the amount of fallowed land in the service area of the San Luis-Delta Mendota Water Authority more than doubled as water supplies were reduced by drought conditions and as a result of regulatory actions (San Luis-Delta Mendota Water Authority 2009).

Proposals to desalinate seawater or brackish groundwater could also be a response to the further reduction in import of Delta water supplies and could serve as the impetus for the initiation of such proposals.

Depending of the magnitude of cost increases, the supply reduction and the availability of other supplies, the imposition of more severe restrictions on water use could be implemented (e.g., prohibition of landscape irrigation), or in more dire situations, water rationing could be implemented. However, most SWP and CVP contractors operate as wholesale water agencies and as such, lack the direct authority to restrict the specific use of treated water at the individual customer level. These agencies would work with local water retailers to implement demand management measures, including rationing, at the discretion of the water retailers.

A qualitative analysis of indirect effects of growth inducement on the environment is provided in Section 30.3.3.2 for individual issue areas (e.g., aesthetics, air quality, etc.). In summary, the effects of reduced deliveries of water to M&I users could result in indirect impacts related to very low or negative growth effects (e.g., no new commitments of water for new development, shrinking population, economic instability, and employment instability) the location, nature and magnitude of which would determine the type and severity of resulting environmental effects. Determining the specific environmental impacts attributable to no or very low growth rates would be too speculative to predict or evaluate at this time since the location and nature of physical expansion within the multiple contractor service areas cannot be known.

30.3.5 Authority to Mitigate Effects of Growth

As described in Section 30.1.1, *Relationship between Land Use Planning and Water Supply*, the authority to regulate growth, and by extension to mitigate the environmental effects of growth, resides primarily with land use planning agencies. Neither DWR or Reclamation nor the contractors are land use planning agencies and, consequently, do not have the authority to approve or deny urban development within the study area or to impose mitigation for the environmental consequences of such development. Section 30.1.1.3, *Water Supply Management and Planning*, and Section 1.3 in Chapter 1, *Introduction*, summarize DWR and Reclamation's responsibilities regarding water supply planning. Regarding DWR's role in facilitating demand reduction (thereby lessening the environmental effects of water supply development attributable to urban growth), refer to *Conservation/Water Use Efficiency* in Section 30.3.2.5, *Potential for Increases in Water Deliveries to Remove Obstacles to Growth*, and to Appendix 1C, *Demand Management Measures*.

Table 30-36 identifies agencies with the authority to implement measures to avoid or mitigate the environmental impacts of growth in the study area; the agencies generally fall into two categories, as discussed below.

- Agencies with primary authority over land use planning and CEQA lead agency status for approval of land use plans, permits and other approvals.
- Agencies responsible for stewardship of environmental resources.

Table 30-36. Agencies with the Authority to Implement or Require Implementation of Measures to Avoid or Mitigate Growth-Related Impacts

Agency	Authority
Planning Agencies	
Counties within the Study Area	***Planning and Enforcement.*** Responsible for planning, land use, and environmental protection of unincorporated areas and adoption of the general plan governing unincorporated county lands. Responsible for enforcing County environmental policies through zoning and building codes and ordinances. Refer to Section 30.2.2 for additional information. ***CEQA.*** Counties typically act as the lead agency for CEQA compliance for development projects in unincorporated areas; as such they bear responsibility for adopting measures to mitigate the project's significant direct and indirect impacts on the environment and programs to ensure that mitigation measures are successfully implemented.
Cities within the Study Area	***Planning and Enforcement.*** Responsible for planning, land use, and environmental protection of the area within the city's jurisdictional boundaries and adoption of the general plan governing this area. Responsible for enforcing city environmental policies through zoning and building codes and ordinances. Refer to Section 30.2.2 for additional information. ***CEQA.*** Cities typically act as the lead agency for CEQA compliance for development projects in incorporated areas; as such they bear responsibility for adopting measures to mitigate the project's significant direct and indirect impacts on the environment and programs to ensure that mitigation measures are successfully implemented.
Councils of Government	Tasked with creating "Sustainable Community Strategies" through integrated land use and transportation planning, and demonstrating ability to attain the proposed reduction targets.
Local Agency Formation Commissions	Empowered to approve or disapprove all proposals to incorporate cities, to form special districts, or to annex territories to cities or special districts. Also empowered to guide growth of governmental service responsibilities.

Agency	Authority
California Coastal Commission	Under the California Coastal Act, regulates the use of land and water within the coastal zone. Under the federal Coastal Zone Management Act, exercises federal consistency review authority over all federal activities and federally licensed, permitted or assisted activities that affect coastal resources.
San Francisco Bay Conservation and Development Commission	A state agency responsible for regulating development adjacent to San Francisco Bay. Under the federal Coastal Zone Management Act, exercises federal consistency review authority over all federal activities and federally licensed, permitted or assisted activities that affect resources within the San Francisco Bay segment of the California coastal zone.
NEPA Lead Agencies	Certain NEPA lead agencies (such as the U.S. Army, U.S. Air Force, and U.S. Navy) oversee the development or redevelopment of federal properties and through NEPA have authority to impose mitigation.
U.S. Environmental Protection Agency	Responsible for writing regulations and setting national standards to implement a variety of federal environmental protection and human health laws. In California, EPA has delegated much of the authority to enforce the Clean Air Act, Clean Water Act and Drinking Water Quality Act to state agencies while retaining some oversight. EPA also comments on the environmental review of projects through its participation in the NEPA process.
Water Resources	
State Water Resources Control Board (SWRCB)[a]	Shares responsibility with the RWQCBs to protect and restore water quality; approves regional basin plans; provides administrative and other support to regional boards; and administers surface water rights. Develops water quality control plans and polices in certain instances where water quality issues cross regional boundaries or have statewide application.
Regional Water Quality Control Boards (RWQCBs)[a]: San Francisco Bay, Central Valley, Lahontan, Central Coast, Los Angeles, Santa Ana, San Diego, Colorado River	Share responsibility with SWRCB to protect and restore water quality. Formulate and adopt water quality control plans. Implements portions of the Clean Water Act when EPA and SWRCB delegate authority, as is the case with issuance of NPDES permits for waste discharge, reclamation, and storm water drainage.
California Department of Public Health	Responsible for the purity and potability of domestic water supplies. Assists SWRCB, RWQCBs in setting quality standards.
Air Resources	
California Air Resources Board[a]	Responsible for adopting and enforcing standards, rules, and regulations for the control of air pollution from mobile sources throughout the state. Also responsible for developing plans and regional reduction targets for greenhouse gas emissions.
Air Pollution Control Districts[b] and Air Quality Management Districts[c]	Adopt and enforce local regulations governing stationary sources of air pollutants. Issue Authority to Construct Permits and Permits to Operate. Provide compliance inspections of facilities and monitor regional air quality. Develop Clean Air Plans in compliance with the Clean Air Act. Publish guidelines to guide lead agencies in evaluating and mitigating air quality impacts.
Biological Resources	
National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS)	Requires consultation under Section 7 or Section 10 of the Endangered Species Act for projects which could potentially impact endangered or threatened species under the purview of National Marine Fisheries Service. Prepares biological opinions on the status of species in specific areas and potential effects of proposed projects. Approves reasonable and prudent measures to reduce impacts and establishes Habitat Conservation Plans.

Agency	Authority
U.S. Fish and Wildlife Service (USFWS)	Requires consultation under Section 7 or Section 10 of the Endangered Species Act for projects which could potentially impact endangered or threatened species. Prepares biological opinions on the status of species in specific areas and potential effects of proposed projects. Approves reasonable and prudent measures to reduce impacts and establishes Habitat Conservation Plans.
U.S. Army Corps of Engineers	Issues permits to place fill in waters of the United States, including wetlands, pursuant to the Clean Water Act. Required to consult with USFWS and NMFS regarding compliance with the federal Endangered Species Act.
California Department of Fish and Wildlife	Issues Stream Bed Alteration Agreements for projects potentially impacting waterways. Issues incidental take permits for projects that would result in the take of listed species under the California Endangered Species Act if specific criteria are met. Under the Natural Community Conservation Planning Act, provides oversight for the development of regional Natural Community Conservation Plans which aim to balance ecosystem protection and land use.

[a] These agencies fall under the umbrella of the California Environmental Protection Agency

[b] Air Pollution Control Districts within the study area include: Siskiyou County, Modoc County, Lassen County, Tehama County, Glenn County, Colusa County, Placer County, Northern Sonoma County, Amador County, Calaveras County, Tuolumne County, San Joaquin Valley Unified, Mariposa County, Monterey Bay Unified, Kern County, San Luis Obispo County, Santa Barbara County, Ventura County, San Diego County, Imperial County, El Dorado County, Great Basin Unified

[c] Air Quality Management Districts within the study area include: North Coast Unified, Shasta County, Northern Sierra, Butte County, Mendocino County, Feather River, Lake County, Yolo-Solano, Bay Area, Sacramento Metropolitan, Antelope Valley, South Coast, Mojave Desert.

30.3.5.1 Implementation of Environmental Protection Measures by Land Use Planning Agencies

Cities and counties (for unincorporated areas) have the greatest authority over land use decisions within their jurisdictions through implementation of their general plans (as described in Section 30.1.1, *Relationship between Land Use Planning and Water Supply*), locally adopted ordinances and regulations to regulate growth, and development approval processes. Some ordinances and policies adopted at the local level (e.g., ordinances establishing urban growth limit lines, protecting natural resources such as riparian habitat, or establishing resource conservation easements) are intended to avoid or reduce environmental impacts.

In their capacities as lead agencies under CEQA (PRC Section 21002 and Section 21067), cities and counties also have the authority and responsibility to evaluate the environmental impacts that would result from implementation of plans and individual development projects within their jurisdictions, and to adopt measures to mitigate any significant adverse impacts. Cities and counties are required to identify mitigation measures in CEQA documents on these plans and projects, and to adopt feasible measures within their authority, as well as programs to monitor and report on their implementation, as conditions of approval. The CEQA Guidelines and guidelines published by state and regional resource protection agencies regarding CEQA implementation are periodically amended to reflect major policy shifts in environmental protection, such as the adoption AB 32, the Global Warming Solutions Act of 2006 (described in Section 30.1.1.3, *Water Supply Management and Planning*).

The California Coastal Commission and the San Francisco Bay Conservation and Development Commission also exercise authority over land uses within the coastal zone and areas adjacent to San

Francisco Bay, respectively, and can impose measures to mitigate adverse environmental effects of development within their jurisdictions through their approval processes.

30.3.5.2 Implementation of Environmental Protection Measures by Resource Management Agencies

Mitigation of impacts relating to specific resources categories generally falls under the responsibility of resource-specific agencies at the federal, state, and regional levels through permitting and related regulatory processes summarized in Table 30-36. Through their permitting authority these agencies mitigate the impacts of proposed land uses and enforce the provisions of adopted resource protection plans (e.g., water basin plans and air basin plans). For example, regional water quality control boards identify specific requirements and water quality standards for facilities through issuance of waste discharge requirements and local air districts mitigate the effects of pollutant emissions through issuance of permits to construct and operate stationary sources of air emissions.

30.3.6 Environmental Impacts Relating to Water Transfers

The BDCP provides coverage for water that enters the Delta as a result of transactions involving transfers and/or other voluntary water market transactions as discussed in Chapter 5.1.2.7. The movement of such water would have to be consistent with CM 1 *Water Facilities and* operation the effects analysis described in Chapter 5, *Effects Analysis* and it is not limited by other factors including hydrological, regulatory and contacts conditions. As discussed in Chapter 5, Water Supply, the scale, location, frequency and duration of future water transfers are impossible to predict with certainty because of a wide range of variables. *See also Appendix 1E, Water Transfers in California: Types, Recent History, and General Regulatory Setting, Appendix 5C, Historical Background of Cross-Delta Water Transfers and Potential Source Regions and Appendix 5D, Water Transfer Analysis Methodology and Results*. The effect of any future transfers on environmental resources will depend on the location, size, and duration of the transaction, any regulatory conditions imposed on the transaction by the State Water Resources Control Board or other agency, and potential land use and water management changes in source areas.

Compared with baseline conditions (i.e., existing conditions for CEQA and No Action conditions for NEPA), the creation of new diversion facilities in the north Delta could provide additional project capacity to move transfer and other voluntary water market transaction water from areas upstream of the Delta to export service areas. It is unclear, however, how great the demand for additional water would be, because Alternatives 1-5 of the BDCP, if successful, should result in an increase of SWP and CVP project allocations compared to what would happen in the long-term future without the BDCP. Even so, transfer demand is anticipated to be greater in the future than with existing conditions with or without BDCP (Figures 5D-6 and 5D-8).

Some increased demand for water transfers will likely arise for reasons unrelated to the BDCP, including sea level rise, climate change, and increased future upstream consumptive use of water, all of which are expected to reduce systemwide water yield and reduce project deliveries under the time frame of the BDCP (2060). New BDCP facilities under Alternatives 1-5 can likely offset only part of this reduction.

Under Water Code section 1810, DWR would have to make unused conveyance capacity at any new SWP facilities available for water transfers, provided that the use of facilities would not impact SWP operations and the transfers could be accomplished "without injuring any legal user of water and without unreasonably affecting fish, wildlife, or other instream beneficial uses and without unreasonably affecting the overall economy or the environment of the county from which the water is being transferred."

The State Water Board would have to make similar findings under the provisions of the Water Code (i.e. 1700, 1725, 1735) governing transfers under its jurisdiction (those involving post-1914 water rights). Due to the location of the new north Delta facilities, some of the restrictions relating to export of transfer water, including those related to Delta reverse flows or south Delta water levels and potential fisheries impacts (the basis for the current July through September transfer window) would not apply to the new facilities. Thus, transfer water could potentially be moved at any time of the year that capacity exists in the new BDCP cross-Delta facility and the export pumps, depending on operational and regulatory constraints. If the new north Delta facilities are not restricted to the current July through September transfer export window, crop idling or crop shifting-based transfers may become a more viable source of transfer water for much of the Sacramento Valley. Execution of specific transfers will require willing sellers and, as noted above, could not occur unless each transfer meets stringent regulatory requirements. There is uncertainty regarding whether the BDCP alternatives involving new north Delta diversions (i.e., Alternatives 1 through 8) would facilitate increased transfers and whether, if they do, such transfers would lead to potential environmental impacts. However, these effects would depend on the timing of the transfers, the volume of water in question, and third party actions and decisions. As discussed in Chapter 5 and Appendix 1E, transfers and other upstream water transactions are subject to a number of regulatory requirements that make it unlikely that significant adverse impacts will occur. Because there is uncertainty regarding future transfers, the following sections identify types of impacts that are likely to be considered in any water transfer transaction.

30.3.6.1 Surface Water

Transfers could lead to decreased reservoir storage levels if additional transfers result in the release of water from a reservoir when it would otherwise have been stored. Storage levels could also increase seasonally if surplus capacity would be created. If transferred water could be held in reservoirs beyond its originally scheduled date for release, the reservoirs could store the water further into the year. These changes may affect a reservoir's ability to store flood water.

Transfers of water could also change the rate and timing of flows in the Sacramento River and its tributaries. The incidence and magnitude of changes in flows would depend on the volume of water transferred and the scheduled release of that water. Depending on the hydrologic conditions, water made available for transfer could be released on the same schedule as if the water were used for its original purpose, except that the flows would not be diverted, increasing flows below the historic point of diversion. If water was stored, flows above the historic point of diversion would decrease by the amount of water that the willing seller would have used. After the water was released, the flows downstream from historic points of diversion would be higher than without the transfer. Flows could also vary as a result of groundwater substitution-based transfers due to changes in the timing of surface water releases and the interaction between stream flows and groundwater (Bureau of Reclamation 2010). This could result in an increase in groundwater recharge from surface water (i.e. accretion) or a reduction of groundwater that would otherwise have discharged into surface water (i.e. depletion).

30.3.6.2 Groundwater

Groundwater substitution-based transfers, could result in temporary changes to local groundwater levels. Groundwater substitution-based transfers occur when surface water is transferred and groundwater is pumped to replace the surface water that would have otherwise been used. The geographic extent, intensity, and duration of these effects would depend on the individual characteristics of the transfer and local hydrogeology.

Groundwater pumping could result in the lowering of local groundwater levels, which could create environmental effects including depletion of streamflow or depletion of groundwater flow that would otherwise have caused an increase to streamflow in absence of the transfer. Additionally, yield from groundwater wells may be reduced while the costs to pump groundwater could increase as a result of declining groundwater levels. Groundwater drawdown could temporarily exceed historical seasonal fluctuations and dry years could extend the period necessary for recovery of groundwater levels.

Additionally, groundwater pumping could add to the potential for subsidence by decreasing groundwater levels, which could allow consolidation of underlying clay beds. While subsidence is a gradual process, in extreme cases it could create problems for flood control, infrastructure, and water distribution systems. Groundwater substitution transfers could also result in changes in groundwater quality because pumping can alter local groundwater levels, flow patterns can change and surface water could be drawn into the groundwater.

30.3.6.3 Water Quality

Water Transfers could lead to a variety of water quality effects in the acquisition areas and in the Sacramento River and Delta watersheds related to potential changes in water quality constituent concentrations. These potential concentration changes could occur in the river and delta system from changes in river flows, natural tidal exchange and water management decisions in the water acquisition areas. Important water quality constituents in the Delta include metals, pesticides, nutrients, sediment and turbidity, salinity, bromide and organic carbon. Changes in water quality constituents are evaluated based on the potential for these changes to affect beneficial uses such as domestic, agricultural, municipal and industrial water supply and recreation, aesthetic, and fish and wildlife resources. Protection and enhancement of existing and potential beneficial uses are primary goals for water quality planning.

If a surface water source used for agricultural production is proposed for transfer, the potential exists for the transferred water to be replaced by groundwater substitution or accounted for by crop idling or substitution. These potential changes could result in a number of localized water quality effects in acquisition areas, up-stream reservoirs, the Sacramento River and its tributaries, and Delta waterways. Potential effects in acquisition areas could include local changes in groundwater quality from the migration of lower-quality groundwater and changes in crop yield due to differences in irrigation water quality. Crop idling associated with a transfer could result in increased wind erosion on agricultural fields, which could result in increased surface water deposition. Idling crops in acquisition areas could however, result in a reduction in the application of fertilizers and pesticides that might otherwise reduce the nutrient concentrations in surface water sources.

Potential water quality effects in reservoirs include the potential for water transfers to increase or decrease the reservoir storage levels during the transfer period. Increasing or decreasing reservoir storage levels related to water transfers could improve or degrade reservoir water quality conditions, respectively by reducing or increasing constituent concentrations. In most scenarios these reservoir water quality changes would be relatively minor because potential changes in constituent concentrations would be based on changes in the amount and timing of transfer deliveries, which would likely constitute only a small fraction of reservoir stored capacity.

The potential also exists for water transfers to result in changes in water quality in the Sacramento River and Delta waterways, depending on the time of year and size and duration of the transfer. Flows in the Sacramento River could increase or decrease during the summer transfer period, depending on the prescribed timing of the transfer. These flow changes have the potential to degrade river water quality constituent concentrations and temperature conditions if stored transfer water is not released during summer periods when river water quality conditions are less than optimum. However, because DWR and Reclamation must meet the water quality and temperature requirements contained in their respective water rights permits, the potential for these effects are unlikely.

30.3.6.4 Fish and Aquatic Resources

Water transfers can affect fisheries and aquatic resource conditions in up-stream reservoirs, rivers and the Delta. BDCP covered and non-covered species such as delta smelt, longfin smelt, Chinook salmon, steelhead, green sturgeon, and striped bass, among others could be affected by water transfers that are consistent with CM1's operational criteria. Potential effects in upstream reservoirs would be related to changes in reservoir aquatic habitat, most specifically temperature that could affect fish species such Kokanee salmon and rainbow trout. These reservoir fish species rely on coldwater habitat. Aside from annual variations in hydrological conditions, drawdown of reservoir storage from June through October from water transfers can diminish the volume of cold water, thereby reducing the amount of habitat for coldwater fish species during these months.

Potential effects in the Sacramento River, its tributaries, and the Delta would be related to changes in river flow, water quality and temperature that could affect survival of fish species such as delta and longfin smelt, Chinook salmon, steelhead, green sturgeon, American shad and striped bass. These changes could result in effects on entrainment, spawning, rearing, and migration.

30.3.6.5 Terrestrial Biological Resources

The principal effect of concern on terrestrial biological resources resulting from water transfers is the potential loss of habitat for special-status and common wildlife species due to reduction in agricultural crop production. There could be an associated effect related to reduced agricultural return flows in valley canals and streams. Transfers could temporarily reduce habitat and food sources for species that utilize cultivated lands in the Sacramento Valley. The major crops of concern would be rice, corn and alfalfa. These annual crops provide a significant source of food, resting and roosting habitat, and a prey base for many species, including waterfowl and shorebirds, sandhill cranes, giant garter snakes, and raptors, including Swainson's hawk. Reductions in agricultural return flows could also affect waterfowl, giant garter snakes, and a variety of special-status and common mammals and birds that use valley canals and streams and their adjacent vegetation for foraging, resting, and cover. Recent documentation of the potential effects of water transfers prepared by Reclamation and DWR indicates that major transfers from the Sacramento Valley would primarily impact rice production (Bureau of Reclamation 2010; California Department of Water Resources and Bureau of Reclamation 2012). Although there is the potential for a reduction in rice production as a result of water transfers, it is speculative to estimate the effect in the absence of specific transfer proposals. The significance of this effect would be determined by the size, duration, and location of the reduced agricultural production measures implemented to address any potential concerns and the water seller's response to reduced water availability.

30.3.6.6 Agricultural Resources

If water proposed for transfer was originally being applied to cropland, agricultural production could possibly continue during the transfer if growers substitute groundwater for surface water or shift to a less water-intensive crop during the term of the transfer. Crop yields could be affected by changes in irrigation water quality. Farmers could also choose to idle cropland during a transfer.

Recent documentation prepared by Reclamation and DWR indicates that the potential impacts from water transfers based on cropland idling in the Sacramento Valley would primarily impact rice production (Bureau of Reclamation 2010; California Department of Water Resources and Bureau of Reclamation 2012). DWR and Reclamation do not currently accept transfer proposals based on the idling of pasture, mixed grasses, alfalfa grown in the Delta, orchards and vineyards. Nor do DWR and Reclamation currently accept transfers from farmland that has been historically irrigated by groundwater (California Department of Water Resources and Bureau of Reclamation 2012).

The duration of a crop idling-based transfer would, to a large extent, determine the magnitude of its impact on farmland and associated agricultural production. If transfers are temporary, farmland could be placed back in production when the transfer is completed and the designation of farmland (i.e. prime, unique, statewide importance, etc.) by the state would not be affected. The resulting indirect impacts to socioeconomic, recreation, and terrestrial resources would also be expected to be short-term and the benefits accruing to these resources as a result of producing rice would also be expected to return when the water transfer is completed and the land placed back in production. Rice would be the crop type most likely affected by water transfers (California Department of Water Resources and Bureau of Reclamation 2012). The loss of rice production could result in adverse effects on agriculture-related employment and income, certain types of wildlife habitat, and recreation. Direct and indirect effects on employment and income could occur because the number of workers needed to plant, harvest, and process crops could decrease. Wildlife habitat and specifically habitat available to support waterfowl could decrease as a result of flooding fewer acres. As discussed in other resources descriptions in this Section, consumptive and nonconsumptive recreation opportunities associated with the abundance of waterfowl may also be reduced.

Large-scale, long-term transfers could result in a substantial change in agricultural production and potentially significant secondary impacts on other resources described above. A longer-term transfer could also affect the designation of farmland by the state. (Prime farmland must be irrigated some time during a 4-year period prior to the date of the Important Farmland Map to maintain its designation by the State of California.) Longer-term or permanent transfers could result in a permanent loss of farmland.

30.3.6.7 Recreation

Adverse recreation impacts could occur as a result of idling cropland and resulting losses in habitat used by waterfowl. Water-dependent and water-enhanced recreation opportunities are not expected to be adversely affected because there would not be measurable changes in reservoir storage or river flows.

The duration and amount of water transferred would, to a large extent, determine the magnitude of the adverse effects on recreation. The indirect impacts on recreation opportunities are expected to be short- term on an annual basis.

Previous studies conducted by Reclamation on water transfers from agricultural lands within the Sacramento Valley indicate that transfer would most likely originate from land under rice production (DWR and Reclamation 2012; Reclamation 2010) Rice production can result in benefits to consumptive and nonconsumptive recreation activities because fields are flooded and the flooding period coincides with the presence of waterfowl in the Central Valley. Habitat available to support waterfowl could decrease if transfers occur, rice is not grown, and flooding fields does not occur.

Nonconsumptive activities are primarily bird watching and nature study. Consumptive activities include waterfowl hunting. Recreationists participating in these activities make expenditures for goods and services including supplies, food, and lodging. The magnitude of the economic impact is driven by the recreationist's place of origin. The distance traveled by recreationists affects the amount of money typically spent in local and regional economies. A decrease in rice production that reduces available waterfowl habitat could result in a reduction in available areas for hunting and birding. In turn, this could result in a potential reduction in recreation opportunities associated with the presence of waterfowl species.

Short-term transfers are not expected to result in a substantial effect on consumptive and nonconsumptive recreation because farmland providing waterfowl habitat could be placed back in production after a transfer is completed. Longer-term or permanent transfers could result in a permanent loss of recreation opportunities if farmland supporting waterfowl habitat is not placed back into crop production.

30.3.6.8 Employment and Income

Impacts on recreation-related employment and income could occur as a result of reducing waterfowl habitat if harvested rice fields are not flooded

The duration and amount of water transferred would, to a large extent, determine the magnitude of both the adverse and beneficial impacts on employment and income. The amount of water transferred would be driven by water year types. The resulting indirect impacts to socioeconomic, recreation, and terrestrial resources are expected to be short- term and would last only for the duration of a transfer. The socioeconomic benefits resulting from crop production would be expected to return when the water transfer is completed and agricultural lands are placed back in production.

Previous studies conducted by DWR and Reclamation (DWR and Reclamation 2012; Reclamation 2010) on water transfers from agricultural lands within the Sacramento Valley indicate that transfers would most likely originate from land under rice production. Direct and indirect effects on agricultural employment and income could occur because the number of workers needed to plant, tend, harvest, and process crops would decrease. Indirect and induced socioeconomic effects could also occur as farmers reduce expenditures for inputs (machinery, fuels, chemicals, etc.) needed to raise crops. Beneficial socioeconomic impacts could also occur within the areas from which the water is transferred as a result future expenditures of the revenues generated by the transfer.

The importance of rice production to the socioeconomic well-being of a particular area depends on the diversity of local and regional economies. The magnitude of the impact on employment and income would be expected to be greatest in counties that have a larger proportion of agriculture-related employment. As an example, in 2010, rice production accounted for 2% and 4% of total employment within Colusa and Glen Counties, respectively (California Employment Development Department 2012). Conversely, rice production accounted for less than 1 percent of total employment within Yolo County during 2010 (California Employment Development Department 2012). Transfers that would affect agricultural lands within counties such as Colusa and Glen would be expected to have greater socioeconomic impacts than water transfers occurring from counties with a more diverse economic base.

Production of certain crops can also result in benefits to consumptive and nonconsumptive recreation activities. Nonconsumptive activities are primarily bird watching and nature study. Consumptive activities include duck and goose hunting. Recreationists make expenditures for goods and services needed to support these activities including supplies, food, and lodging. The magnitude of the economic impact is driven by the recreationist's place of origin. The distance traveled by recreationists affects the amount of money typically spent in local and regional economies.

Rice fields are flooded during times that coincide with the presence of waterfowl. Some of these flooded areas are used for sport hunting. Habitat available to support waterfowl could be impacted if flooding did not occur. The resulting decrease in available waterfowl habitat could result in a reduction in available areas for hunting and birding. In turn, this could result in a reduction in expenditures made by recreationists and a reduction in local and regional economic activity associated with recreation activities.

***NEPA Effects*:** Because California law (specifically Water Code section 1810) requires DWR to make excess conveyance capacity for bona fide water transferors, provided that certain environmental, water supply, and economic effects can be avoided, DWR could not preclude the use of available capacity in the new north Delta conveyance facilities for transfers where the appropriate findings can be made. Thus, should additional transfers occur as a result of capacity at the new facilities, the construction of such new facilities would be a factor in the facilitation of the transfers.

Such construction, though, would only be one of many factors of causation contributing to any effects that might result, and would not be the substantial factor in causing such effects. Most importantly, no transfers could occur absent willing seller-willing buyer transactions so any impacts that might occur in upstream areas would, as a practical matter, be under the control of upstream water users. Decisions by such potential sellers would have to be made at the local level and thus, upstream water users would have the ability to refuse to take actions deemed unacceptable by constituencies in their communities.

Moreover, prior to approving the use of SWP or joint SWP/CVP facilities for conveyance of transfer water, DWR would be required to find that the transfer would not injure any other legal users of water or unreasonably affect fish, wildlife or other beneficial uses. If the transfer requires SWRCB approval, that agency must make similar findings. All transfers based on pre-1914 water rights and any transfer for a term greater than one year must include an analysis of the potential environmental impacts under CEQA. Furthermore, water users would be subject to state and federal endangered species laws in the event that the transfer was likely to cause the take of protected species. Where Reclamation approval is necessary, compliance with NEPA would be required.

There would be an opportunity for public review and comment on all transfers either as part of the SWCB review or under CEQA/NEPA. Water transfers can also have beneficial environmental effects. For example, if water released from upstream sources for downstream diversion is scheduled to augment instream flows between the point of release and the point of diversion during periods when the additional flow can benefit fisheries resources or as mentioned earlier, short term idling could result in a reduction in the local use of pesticides and resultant runoff.

For the reasons noted above, there is considerable uncertainty whether, compared with No Action conditions, implementation of Alternatives 1 through 8 would result in adverse environmental effects due to an increase in the number of transfers or the quantities transferred. Although the construction of new north Delta diversion and conveyance capacity may increase the opportunity for more transfers, such construction, by itself, will not directly and proximately result in any adverse water quality effects. For such effects to occur, many other elements of causation must arise, including but not limited to: (i) sellers in upstream areas must be willing to sell; (ii) an opportunity for public review and comment must be provided; (iii) the SWRCB (if the transfer is within its jurisdiction) must determine that such transfers will not result in injury to other legal users of water, unreasonably affect fish, wildlife, or other instream beneficial; (iv) DWR must make findings similar to those required of the SWRCB, as well as that the transfer will not result in unreasonable effects to the overall economy or the environment of the county from which the water is being transferred; (v) transfers of more than one year in duration or any transfer based on pre-1914 water rights must comply with CEQA; and (vi) transfers must comply with state and federal endangered species laws.

Taken together, these protections are very likely to ensure that transfers facilitated by the existence of new north Delta infrastructure will not result in any adverse environmental effects. Even so, the federal Lead Agencies, out of an abundance of caution despite the speculative nature of the effects, conclude that additional water transfers indirectly facilitated by new north Delta structures could result in ***potentially adverse*** effects. Effects could be adverse, though, only if the multiple parties noted above, following evaluation of the transfer, determine that any potential effects, although not unreasonable, are nevertheless potentially adverse and would not occur under the No Action Alternative. This result, though seemingly very unlikely, is at least theoretically possible, and is acknowledged as such. No mitigation is proposed, because state law requires that new conveyance capacity be available for transfers, and because existing regulatory protections are already very stringent.

CEQA Conclusion: It is highly speculative as to whether, compared with existing conditions, implementation of Alternatives 1 through 8 would result in adverse environmental effects. As discussed above in the NEPA Effects conclusion, the construction new north Delta diversion and conveyance capacity, by itself, will not directly and proximately result in any adverse water quality effects. For such effects to occur, many other elements of causation must arise, as described above.

Any increased demand for additional transfers would not be solely attributable to the implementation of the alternatives but rather would exist due to potential reductions in the availability of SWP and CVP water due to other unrelated factors such as climate change effects, increased future upstream and in-delta water demand, or in-basin consumptive use of water. The magnitude of any potential effects due to water transfers facilitated by the implementation of the Alternatives would depend on a wide range of factors, including the type of transfer, size, location, timing, and duration of any potential transfers. Because of all of these factors, including the above-described regulatory constraints and the fact that the specific details and consequences of any specific transfers made possible by the availability of surplus capacity under the alternatives are unknown, it is very likely that any potential impacts due to water transfers indirectly facilitated by the alternatives would be less than significant.

Even so, DWR, as CEQA Lead Agency, out of an abundance of caution, concludes that additional water transfers indirectly facilitated by new north Delta structures could result in ***potentially significant and unavoidable*** effects. No transfers with potentially significant effects could be approved without addressing all of the practical considerations and complying with the regulatory and public review requirements described above. This result, though seemingly very unlikely, is at least theoretically possible, and is acknowledged as such. No mitigation is proposed, because any potential effects are highly speculative and would depend on the particular conditions of any specific transfer.

30.3.7 Conclusions

With respect to direct growth inducement potential, construction and operation of BDCP facilities would not contribute to the creation of additional housing or jobs within the study area because of the limited number of new jobs created to construct and operate the facilities relative to the available labor pool and housing stock.

With respect to indirect growth inducement potential associated with facility construction and operation, proposed permanent roads would not remove an obstacle to growth. The proposed roads would not provide access to substantial areas of undeveloped or agricultural land not already served by area roadways.

With respect to the indirect growth inducement associated with water delivery, implementation of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 3, 5 and (for select hydrologic regions) Alternative 9 would increase M&I deliveries to SWP contractors. While an adequate water supply is not an impetus to growth, it is a primary public service needed to support growth. Other important factors influencing growth include: economic factors (such as employment opportunities); capacity of public services and infrastructure (e.g., wastewater, public schools, roadways); local land use policies; and land use constraints such as floodplains, sensitive habitat areas, and seismic risk zones.

Growth is projected to occur in the hydrologic regions, and the above alternatives would remove a potential constraint to that growth: lack of adequate, reliable, water supplies. The analysis estimates potential increases in population based on increases in average annual M&I deliveries. This analysis makes several conservative assumptions, including the assumption that any increases in M&I deliveries would support population increases (rather than be used for other purposes).

Alternatives 6 and 7 (and for some hydrologic regions Alternative 9) would decrease supplies relative to either the Existing Conditions or the No Action Alternative; consequently, these alternatives are not considered growth inducing.

Developing housing and implementing the services needed for population increases would generate impacts at locations where that growth would occur. Identifying the specific locations and characteristics of that growth—and, consequently, the specific environmental impacts of that growth—would be speculative. However, the impacts associated with such development can be characterized generally based on reviews of environmental impacts on general plans in the areas where this growth could occur.

Under the No Action Alternative, M&I deliveries would decrease; however, assuming conditions favorable to growth were present, growth would likely still occur absent projected increases in deliveries under the BDCP. Contractors would seek to develop alternative supplies. Consequently, the impacts of growth would likely still occur but would be attributable to other water supply projects.

Reductions in SWP and CVP deliveries to agricultural and M&I contractor export service areas resulting from implementation of the BDCP could result in a range of potential responses, including increased groundwater pumping and surface water storage, fallowing of agricultural land, increased use of water transfers, curtailment of certain water uses, and expansion of water recycling and desalination. While past responses to extended droughts and increased water costs provide insights into the potential indirect effects of reduced SWP/CVP deliveries in export areas, such effects are speculative at this time.

DWR and Reclamation lack the authority to approve or deny development projects or to impose mitigation to address significant environmental impacts associated with development projects; that authority resides with local cities and counties. In addition, numerous federal, state, regional and local agencies are specifically charged with protecting environmental resources, and ensuring that planned development occurs in a sustainable manner. Together, these agencies exercise the authority to reduce the effects of development on the environment; however, unavoidable impacts would still be expected to occur.

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