

Appendix C7
California Water Demand
Scenario Quantification

Appendix C7—California Water Demand Scenario Quantification

1.0 Introduction

This appendix summarizes the data sources used in scenario quantification for Colorado River demand¹ for the state of California and presents the results of quantification. As presented in figure C7-1, California is divided into two planning areas in the hydrologic basin (Mainstem and Palo Verde Irrigation District [PVID]), and three planning areas in the adjacent area that are served by Colorado River water (Metropolitan Water District of Southern California [MWD], Coachella Valley Water District [CVWD], and Imperial Irrigation District [IID]). Data collection and development were completed at the planning area level.

The following sections present background information that summarizes the planning areas as well as data sources used to quantify demand scenarios by category. Following the background section, results of demand scenario quantification are presented. The results section is broken out into a California Study Area summary, followed by Colorado River demand by geography and finally by category.

2.0 Background

The Colorado River Board (CRB) of California was established in 1937 and coordinates efforts among its members in planning for future Colorado River water demands. CRB has developed plans such as the draft *California's Colorado River Water Use Plan* (CRB, 2000).

CRB and member agencies coordinated California's efforts to provide information for scenario quantification. These efforts largely relied on information previously generated through regional plans and demographic studies. However, new assumptions and/or data development were required where the assumptions of the Colorado River Basin Water Demand and Supply Study (Study) required information not developed as part of the regional planning effort.

2.1 Data Sources for Quantification

This section discusses data sources for demand quantification by use category. Some category projections were based on relevant parameter data, while other category projections were developed directly as water demand. Sources include state, regional, and national agency reports.

- **Agricultural Demand:** Agricultural parameters and demand were derived differently for each planning area. For PVID, irrigated acreage and demand were derived from personal communication (PVID, 2011), and water delivery per acre is calculated based on acreage, consumptive demand, and a consumptive factor.

¹ Potential Colorado River demand as computed by Study Area demand minus other supplies.

FIGURE C7-1
Colorado River Hydrologic Basin and Export Service Areas in California



For Mainstem, agricultural demand was provided by personal communication with CRB (CRB, 2011), water delivery per acre was assumed to be the same as PVID, and acreage was calculated based on demand, water delivery per acre, and a consumptive factor.

For IID, irrigated acres were derived from *IID Crop Report* (IID, 2011a), demand was derived from Exhibit B of the *Colorado River Water Delivery Agreement* (Secretary of the Interior, 2003), and water delivery per acre was calculated.

For MWD, agricultural demand was derived from MWD's *The Regional Urban Water Management Plan* (MWD, 2010); water delivery per acre was based on an irrigated acreage estimate from Southern California Association of Governments (2005) and San Diego Association of Governments (2007) data. Demands in 2060 are assumed to be the same as 2010.

For CVWD, demand was derived from the *Coachella Valley Water Management Plan* (CVWMP) (CVWD, 2010a); water delivery per acre was calculated based on 2010 acreage reported in *2010 Crop and Water Report* (CVWD, 2010b) and assumed to be constant through time, and acreage was then calculated based on demand and water delivery per acre.

- **Municipal and Industrial (M&I):** M&I parameters and demand were derived differently for each planning area. For PVID there is no M&I demand.

For Mainstem, population was derived from 2010 census data. Consumptive demand was derived from the Colorado River Simulation System, and per capita usage was calculated based on an assumed consumptive factor.

For IID, population was derived from IID Integrated Regional Water Planning (preliminary data); per capita use was based on 2011 population and demand; and demand was calculated as population times per capita use.

For MWD, population and demands were derived from *The Regional Urban Water Management Plan* (MWD, 2010), for 2015 and 2035 and from the *Report of the Blue Ribbon Committee for 2060* (Blue Ribbon Committee, 2011) and per capita usage was calculated.

For CVWD, population, M&I demands, and self-served industrial (SSI) demands were derived from CVWMP (CVWD, 2010a), and per capita usage was calculated.

- **Energy:** IID energy demands were derived from IID Integrated Regional Water Management Planning (preliminary data; IID, 2011b).
- **Minerals:** There are no reported Colorado River minerals demands in California.
- **Fish, Wildlife, and Recreation:** Fish, wildlife, and recreation demands were derived from personal communication with IID (2011b), the Bureau of Land Management (2012), and from the CVWMP table 3-2 (CVWD, 2010a).
- **Tribal:** Tribal demands for the Mainstem area were derived from discussions with federally recognized tribes and Reclamation's 2005 to 2009 Decree Accounting Report (Reclamation 2007 and 2010).

3.0 Results of Water Demand Scenario Quantification²

This section summarizes California’s Colorado River water demand trends by category across the initial scenarios. The purpose of this section is to describe changes in demands, both temporally and geographically, parameters that influence changes in demands, and how the parameters and demands differ among scenarios.

Demands were first developed for areas that may be potentially served by Colorado River water (“Study Area” demands); independent of the source of supply. However, for areas outside of the hydrologic basin, a portion of the Study Area demand is satisfied from other supplies such as the California State Water Project (MWD and CVWD), and local groundwater (MWD and CVWD). To develop estimates of the Colorado River demand, the Study Area demand was reduced by estimates of the demand that may be met by supplies from other sources. This appendix focuses on Colorado River demands, but includes discussion of the Study Area parameters that led to these demands.

Sections 3.1 through 3.3 summarize the results of demand scenario quantification, with section 3.1 presenting Study Area demand and Colorado River water demand, section 3.2 presenting Colorado River Demand for the state and individual planning areas across the six scenarios, and section 3.3 presenting Colorado River water demand by category across the six scenarios. Parameters and demands for all categories and all scenarios, along with references for data sources, are detailed in tables C7-2 through C7-7 in section 3.4.

3.1 Summary Results of Scenario Quantification

Values were developed for Study Area parameters to quantify Study Area demand for each of the scenarios. Colorado River demand was calculated as Study Area demand minus the demand that may be met by supplies from other sources. Table C7-1 presents summary results for the demand scenarios considered in the Study. The table presents agricultural and M&I demand parameters for the entire Study Area that distinguish the scenarios, the resulting Study Area demands, and finally the Colorado River demands by category. Because demands that may be met by supplies from other sources may vary among scenarios, trends observed in the parameters and Study Area demands may not be reflected identically in Colorado River demand trends.

² By definition, scenarios representing future, projected, estimated, or potential demands are uncertain and are only one possible realization of unknown events. All scenarios represent potential Colorado River Water demand. However, for readability purposes, potential Colorado River water demand will also be varyingly referred to as Colorado River demand, or in some cases, just demand.

TABLE C7-1
 Summary Results of California Water Demand Scenario Quantification by 2060

Key Study Area Demand Scenario Parameters							
	2015 ¹	2060 Scenario Parameters					
		A	B	C1	C2	D1	D2
Population (millions)	20.4	27.6	19.8	34.6	34.6	27.6	34.6
Change in per capita water usage (%), from 2015	--	-12%	-9%	-13%	-13%	-18%	-13%
Irrigated acreage (millions of acres)	0.71	0.69	0.69	0.69	0.69	0.69	0.69
Change in per acre water delivery (%), from 2015	–	-1%	-1%	-1%	-1%	-1%	-1%
Study Area Demand (thousand acre-ft)							
	2015 ¹	2060 Scenario Demands					
		A	B	C1	C2	D1	D2
Ag demand	3,519	3,414	3,414	3,414	3,414	3,414	3,414
M&I demand ²	4,117	5,312	4,035	6,435	6,426	4,961	6,426
Energy demand	52 - 61	157	157	285	160	139	139
Minerals demand	0	0	0	0	0	0	0
FWR demand	126	36.1	36.1	36.1	37.9	39.1	39.1
Tribal demand	92	92	92	92	92	92	92
Total Study Area Demand	7,908	9,011	7,734	10,261	10,129	8,645	10,110
Colorado River Demand (thousand acre-ft)							
	2015 ¹	2060 Scenario Demands					
		A	B	C1	C2	D1	D2
Ag demand	3,230	3,159	3,158	3,159	3,159	3,158	3,158
M&I demand ²	1,481	1,765	1,744	1,770	1,760	1,744	1,760
Energy demand	52 - 61	156	156	284	159	138	139
Minerals demand	0	0	0	0	0	0	0
FWR demand	124	31.7	31.7	31.7	33.5	34.7	34.7
Tribal demand	92	92	92	92	92	92	92
Total Colorado River Demand	4,979	5,203	5,182	5,336	5,203	5,168	5,184

1. If range across scenarios is less than 10%, Current Projected (A) is presented. Otherwise, range (min - max) is presented.
2. M&I totals equal sum of M&I (parameter-based) and "other" categories.

The California agencies estimate that about 20.4 million people will reside in California's Study Area by 2015. This number is expected to change to 19.8 to 34.6 million by 2060. The greatest population growth is associated with the Rapid Growth (C1 and C2) Scenarios. The Slow Growth (B) scenario has the lowest population growth of the scenarios in 2035 and an overall population decline to 19.8 million by 2060, reflecting a shift of population from the Study Area to other areas of the state.

The growing municipal population, however, will continue to be more efficient in its per-capita water use than today. Per capita water use, based on passive or existing conservation targets or continuing implementation of utility-funded conservation, is expected to be 9 to 18 percent less in 2060 than in 2015. Usage rates and per capita reductions vary across California's planning areas.

Under all scenarios, irrigated acreage is projected to decrease by about 16,000 acres through 2060, representing a 2 percent decrease. Water delivery per acre is projected to decline slightly across all scenarios. Due to variability across the planning area, these changes result in a 3 percent decline in agricultural demand in the Study Area.

Study Area demand for energy is projected to increase under all scenarios due to the growing need for energy sources (solar and geothermal). The greatest increases in Study Area demand for energy are anticipated in the IID planning area, ranging from 95 thousand acre-feet (kaf) to 139 kaf. A notable increase of 85 kaf also occurs in the Mainstem planning area under the Rapid Growth (C1) scenario.

There is no reported Study Area demand for minerals extraction under the scenarios analyzed for the Study.

Study Area demands for tribal use are projected to remain constant through time across all scenarios. For additional information on tribal demands, see appendix C9.

Figure C7-2 presents demands across the scenarios in three panels as follows: 1) Study Area demand with other supplies and Colorado River demand identified, 2) Colorado River demand, and 3) change in Colorado River demand by demand category.

From panel one it can be seen that Study Area demand changes from about 7.9 million acre-feet (maf) in 2015 to between 7.7 and 10.3 maf in 2060. Between about 33 percent and 49 percent of the 2060 Study Area demand may be met by supplies from other sources.

Panel two provides a view of the range across scenarios of Colorado River demand. This demand increases from about 5.0 maf in 2015 to between 5.2 and 5.3 maf in 2060 (or 4 to 7 percent), depending on the scenario. This difference results in a Colorado River demand range of about 168 kaf across the scenarios in 2060, or about 3 percent.

Panel three shows how specific categories affect the projected change in Colorado River demand by scenario. Growth in M&I and energy demand across all scenarios are offset by decreases in agricultural demand and demand for fish, wildlife, and recreation.

Figure C7-3 ties historical water use to the range of Colorado River demand in the quantified scenarios. The 168 kaf range across scenarios in 2060 is easily discernible, with a relatively even spread over the range across the scenarios. In addition, it appears that the quantified scenarios track well with the peaks in historical uses that likely represent the least supply limited conditions or actual demand.

FIGURE C7-2
 Study Area, Colorado River, and Change in Colorado River Demand

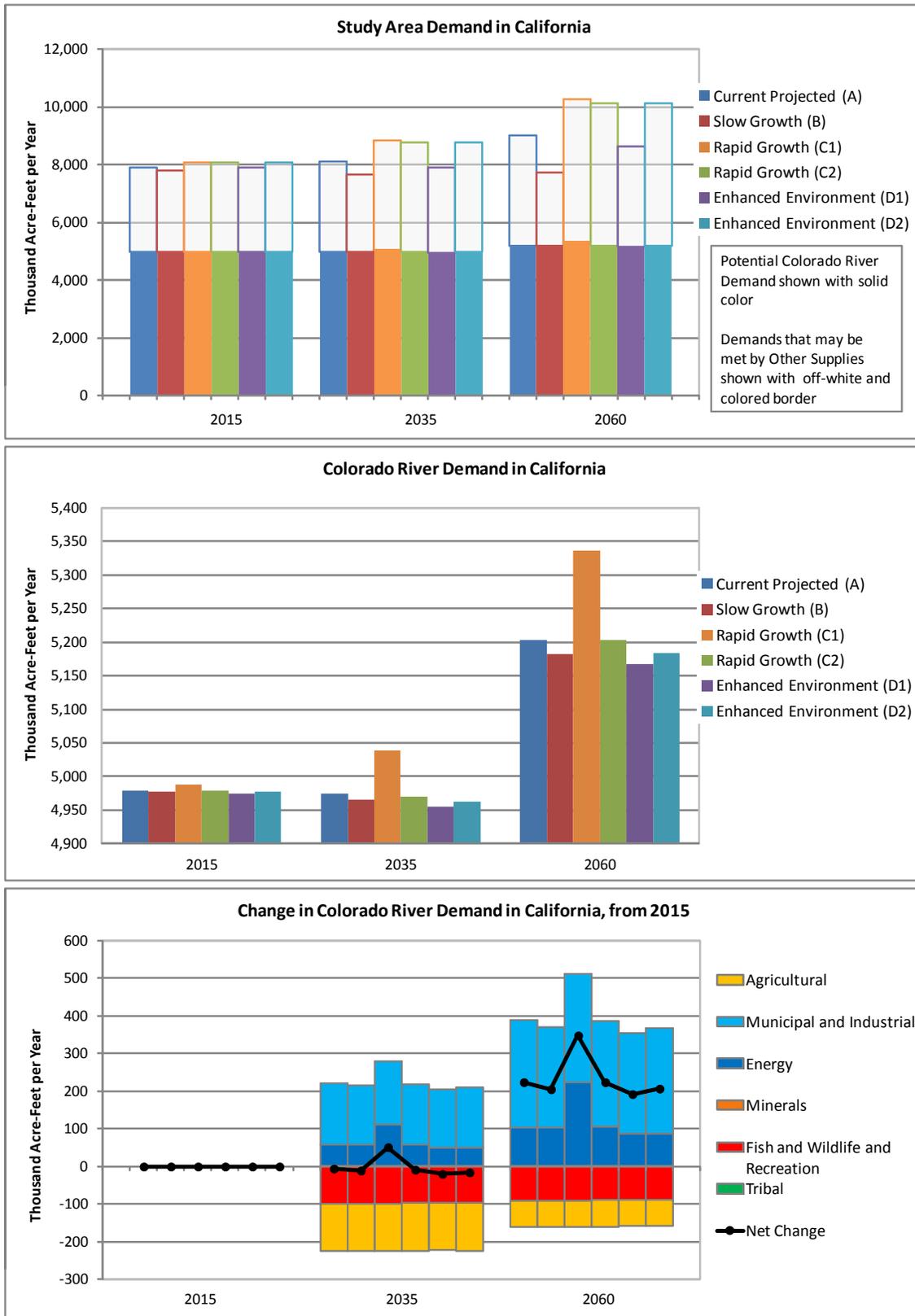
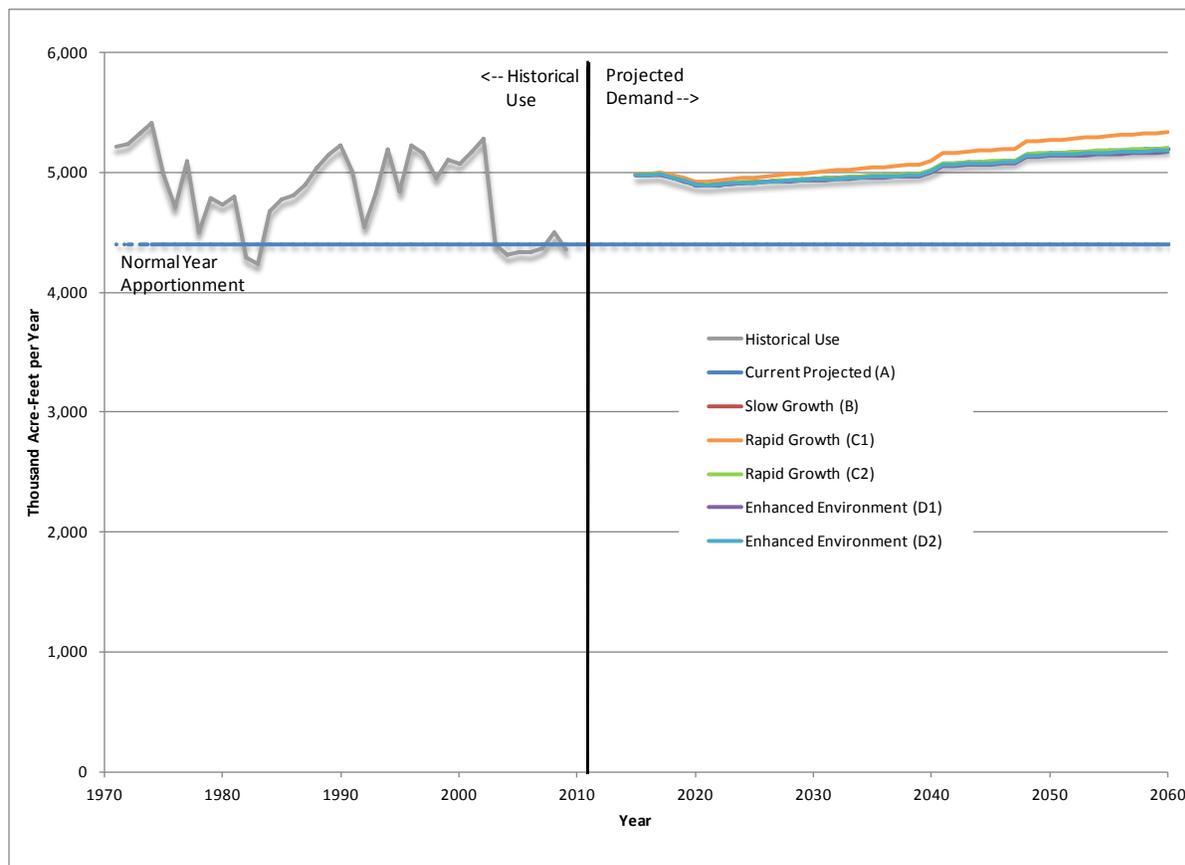


FIGURE C7-3
Historical Use and Future Projected Demand



3.2 Colorado River Water Demand by Geography

Colorado River water demand for areas served by the Colorado River is presented in figures C7-4 and C7-5. These figures show two geographic levels: Study Area in California, and individual planning areas. Demands at each geographic level are shown across the scenarios. The columns to the right show the Colorado River demand at a point in time (2015, 2035, or 2060) by relative contribution of the categories.

The greatest Colorado River demand³ in California is in the IID planning area, followed by MWD. Lesser demands exist in CVWD, PVID, and Mainstem planning areas. Demand categories vary across planning areas, with IID and PVID being primarily agricultural and MWD being primarily M&I. Demands in the Mainstem area are primarily tribal, and demands in CVWD are a mix of agricultural and M&I.

Figure C7-6 shows the change in Colorado River demand by category from 2015 across the scenarios. Increase in Colorado River demand is driven by increases in M&I demands (primarily in CVWD) and energy demands (primarily in IID). These are partially offset by decreases in agricultural (primarily in CVWD) and fish, wildlife, and recreation (primarily in IID) demands.

³ Potential Colorado River demand is based on changes in parameters such as population and for the purpose of the Study is not limited by apportionment.

FIGURE C7-4
 Colorado River Demand in California

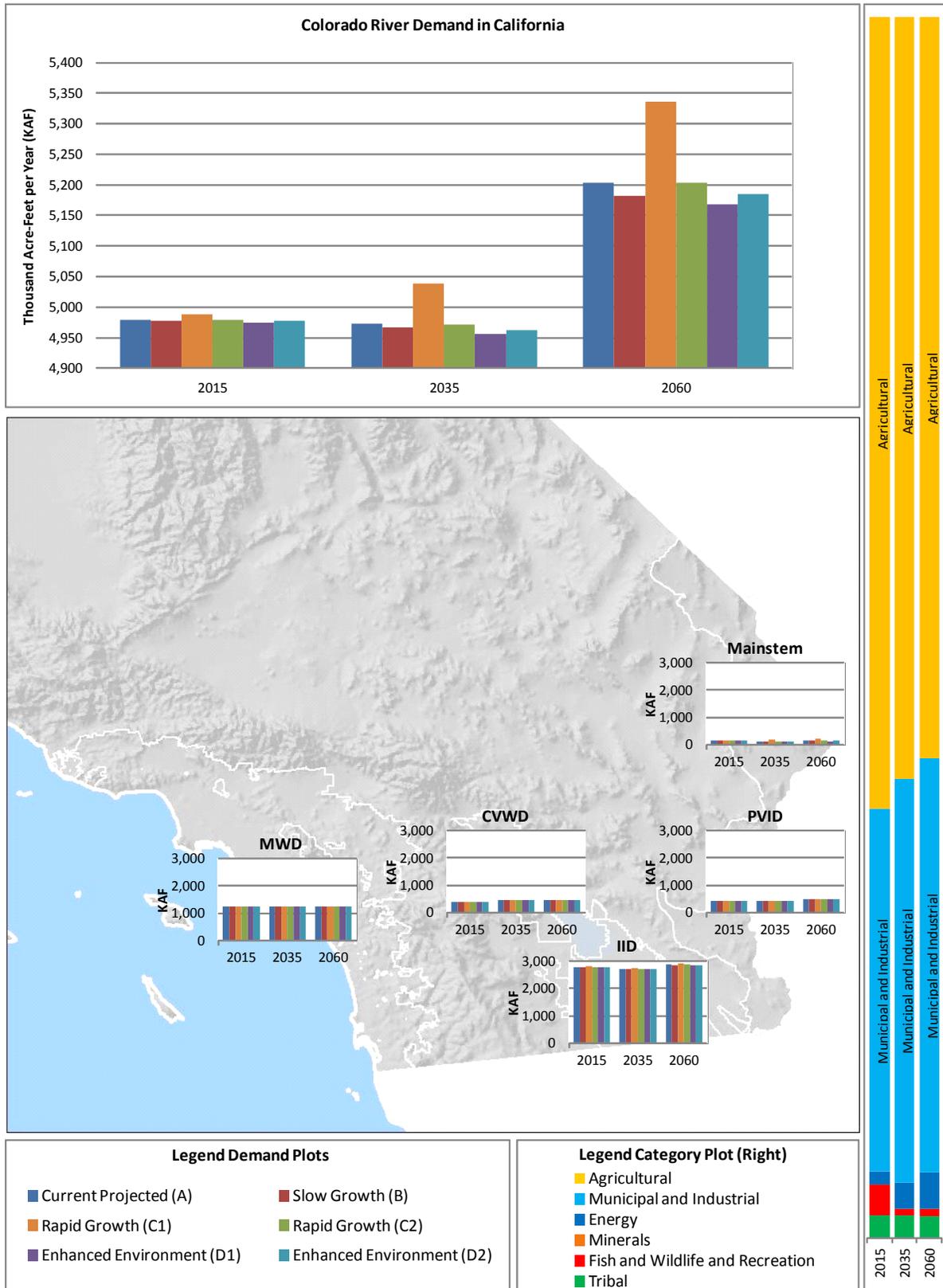
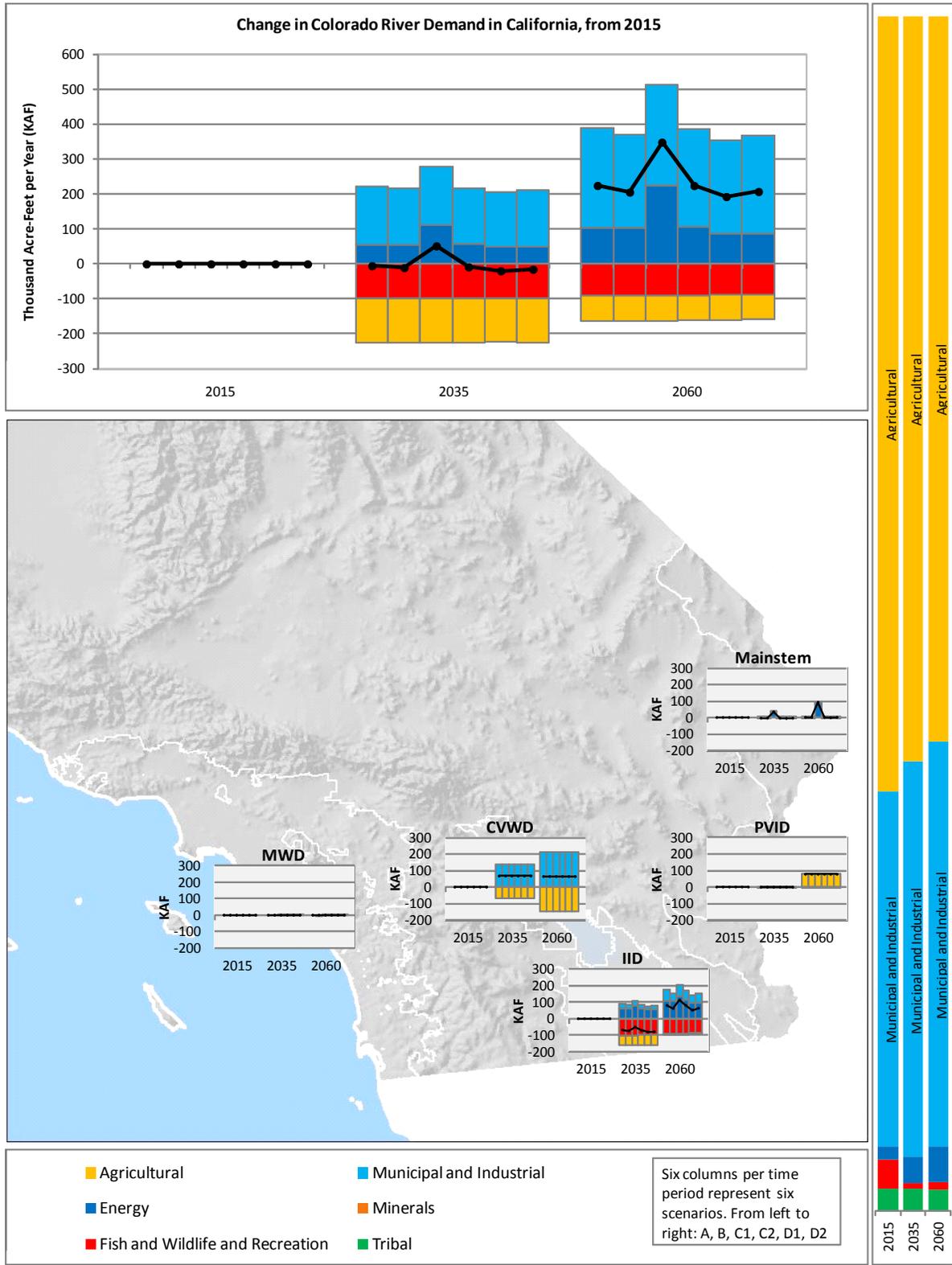


FIGURE C7-6
 Change in Colorado River Demand in California from 2015 by Category



3.3 Colorado River Demand by Category

3.3.1 Agriculture

Agricultural water demand is driven by irrigated acreage and water delivery per acre. Water delivery per acre is the amount of water diverted per irrigated acre. Components of this use include transmission and delivery losses (surface evaporation, riparian demand, seepage, and canal spills), and on-farm losses that are made up of evaporation, crop irrigation requirements, and tail and tile water (return). Each of these factors will vary by location (precipitation, growing season, etc.), irrigation method, and crop type.

Figure C7-7 presents the following by scenario in 2015, 2035, and 2060:

- Agricultural demand for Colorado River water
- Agricultural demand for Colorado River water by planning area
- Agricultural demand as a portion of Colorado River water demand (right hand side of graph)

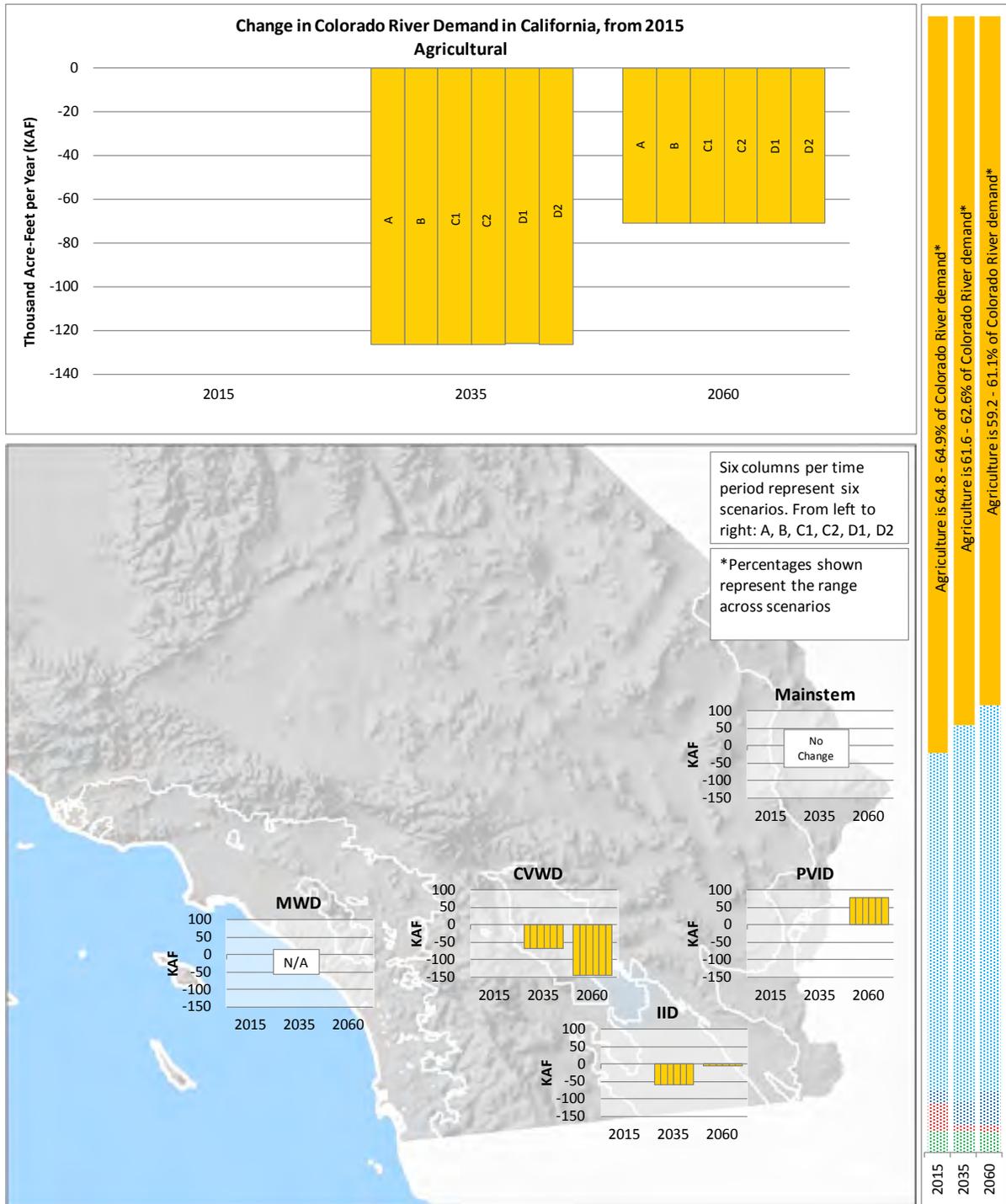
As can be seen from figure C7-7, agricultural water demand is the largest component of Colorado River demand in California, dropping from about 65 percent in 2015 to between 59 and 61 percent demand in 2060, depending on which scenario is considered. This drop results from both a decrease in agricultural water demand and an increase in other categories of demand, principally M&I.

Colorado River demand for agricultural use decreases over time from 2015 to 2060 in all scenarios. The decreases are primarily due to a loss of irrigated acreage as water delivery per acre decreases slightly across all scenarios.

In examining the planning areas, agricultural demand consistently decreases in all scenarios in the CVWD and IID and increases in all scenarios in PVID, with variability in planning area to planning area in the remaining scenarios. Agricultural demand for the Mainstem area is constant across all scenarios. More than 2.5 maf, or 80 percent, of California's agricultural demand is projected to occur in IID in 2060.

A strong driver for loss of agricultural acreage is urbanization, leading to physical loss of acreage.

FIGURE C7-7
 Change in Colorado River Demand in California from 2015 for Agriculture



3.3.2 Municipal and Industrial

M&I water demand can be estimated from population and M&I per capita use, with the addition of self-served industrial (SSI) demand. M&I per capita use is a measure of the amount of water produced or diverted per person in a given municipality. Because this measure examines all water produced by a given municipality, it often includes industrial, commercial, and institutional demand as well as residential demand. A number of factors may influence the M&I per capita use of a given community, including the amount of industrial demand, climate, number of institutional facilities, and number of visitors.

SSI are industries located in a given area that have their own water supply systems and are therefore not directly related to local measures of population and M&I per capita water use.

Figure C7-8 presents the following by scenario in 2015, 2035, and 2060:

- M&I demand for Colorado River water in the Study Area
- M&I demand for Colorado River water in individual planning areas
- M&I demand as a portion of Colorado River water demand (right hand side of graph)

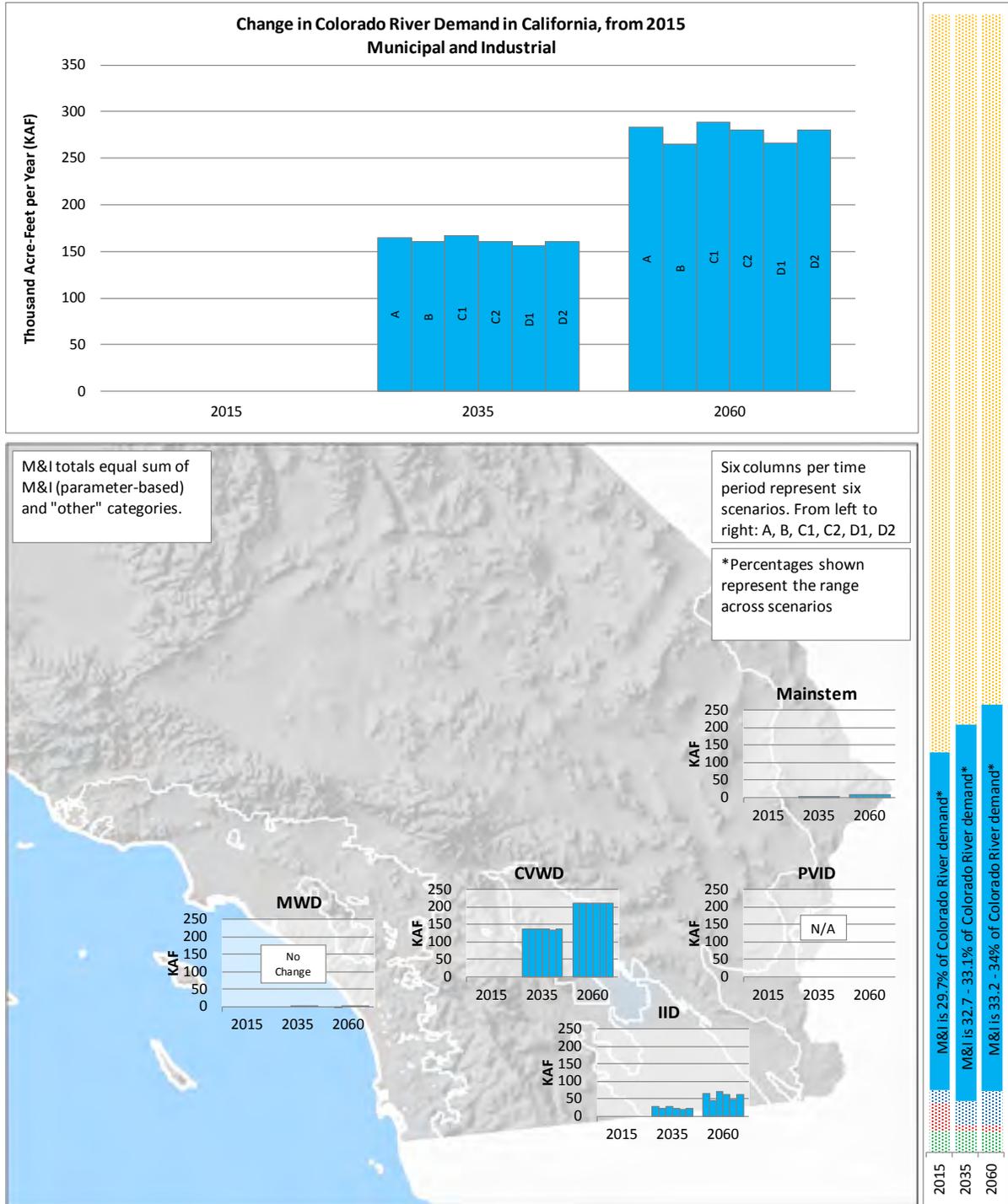
As can be seen from figure C7-8, M&I water demand is the second largest component of Colorado River demand, increasing from about 30 percent in 2015 to between 33 and 34 percent of Colorado River demand in 2060, depending on which scenario is considered.

Colorado River demand for M&I use increases over time from 2015 to 2060 across all scenarios. The increase is primarily due to population increase as Study Area M&I per capita use decreases over time across all scenarios and SSI demand is less than 10 percent of M&I demand.

In examining the planning areas, about 75 percent of the increase in M&I demand for Colorado River water from 2015 to 2060 over time is due to population increase in CVWD. The remaining increase in demand is primarily from M&I demand in the IID service area, with a small increase in the Mainstem planning area. While these planning areas show the greatest increase, MWD represents about 71 percent of the total M&I demand. Population growth occurs in the MWD planning area, but growth in Colorado River demand is limited by existing infrastructure and remaining demands will be met by supplies from other sources.

Increases in population are somewhat tempered by decreases in M&I per capita use. Per capita water use decreases in all scenarios with reductions ranging from 9 to 18 percent by 2060.

FIGURE C7-8
 Change in Colorado River Demand in California from 2015 for M&I



3.3.3 Energy

Water demand for energy can be estimated through known plans for new power plants or through applying a per capita energy water use factor. Power facilities often serve areas remote from their locations.

Figure C7-9 presents the following by scenario in 2015, 2035, and 2060:

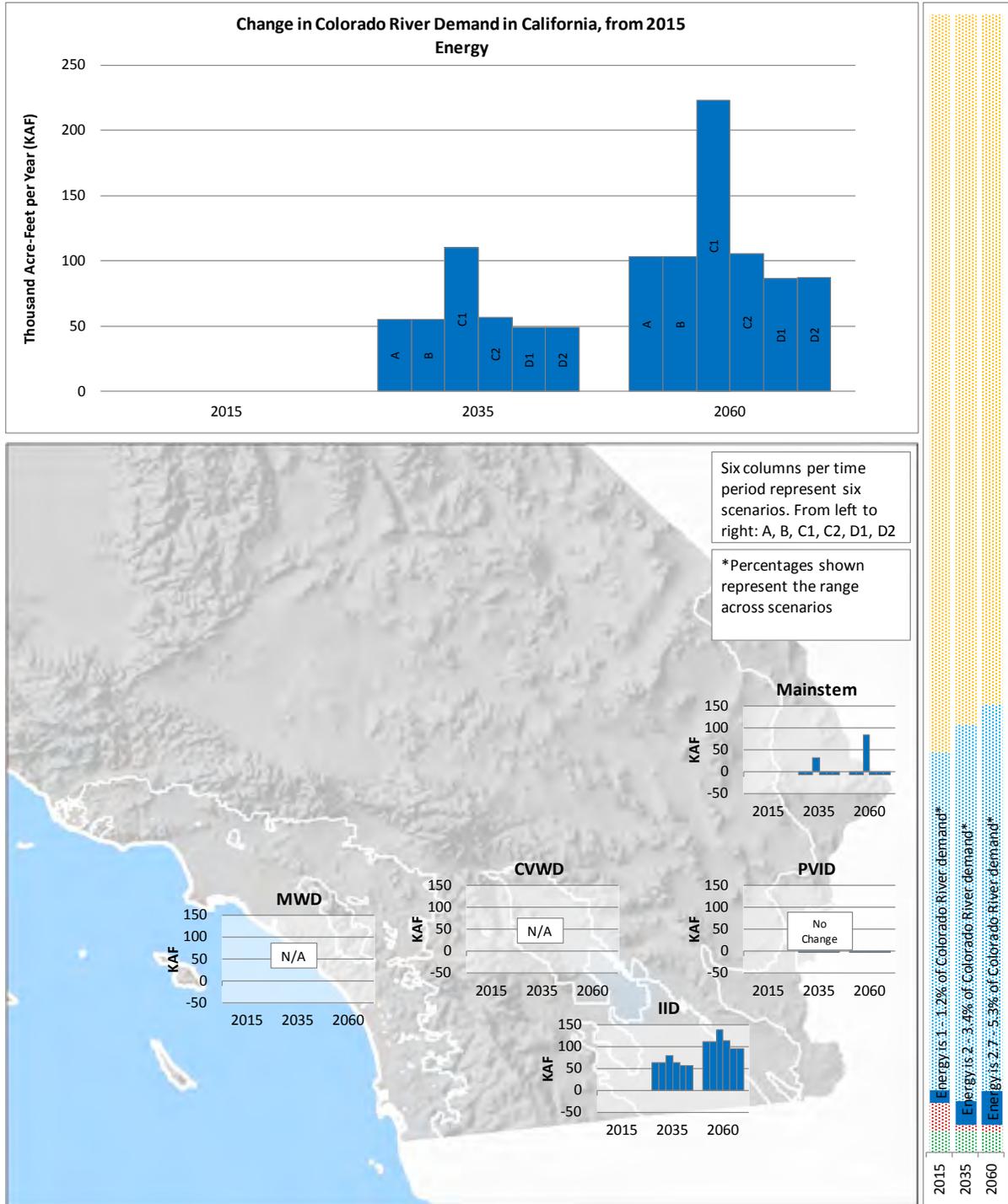
- Energy demand for Colorado River water
- Individual planning area energy demand for Colorado River water
- Energy demand as a portion of Colorado River water demand (right hand side of graph)

As can be seen from figure C7-9, energy water demand is a small fraction of Colorado River demand, increasing from about 1 percent in 2015 to between 2.7 and 5 percent of demand in 2060, depending on which scenario is considered.

Energy demand for Colorado River water increases over time from 2015 to 2060 across all scenarios with notable increases for the Rapid Growth (C1) scenario.

Energy demands are shown only in the IID and Mainstem planning areas. Consistent increases occur in the IID planning area across all scenarios. The Mainstem planning area shows significant increases in energy demand in the Rapid Growth (C1) scenario and nominal decreases in the remaining scenarios. Growth in the IID planning area represents all of the increase in energy demand for water in all scenarios but the Rapid Growth (C1) scenario, where growth in the IID planning area is about 60 percent of the total growth. The water demand increases for energy are primarily due to expansion of geothermal and solar energy.

FIGURE C7-9
 Change in Colorado River Demand in California from 2015 for Energy



3.3.4 Minerals Extraction

California does not report use of Colorado River water for minerals extraction.

3.3.5 Fish, Wildlife, and Recreation

Water demand for fish, wildlife, and recreation is estimated from existing agreements or known consumptive use associated with this demand category. Non-consumptive demands associated with fish, wildlife, and recreation are represented through the metrics portion of the Study presented in *Technical Report D – System Reliability Metrics* (Reclamation, 2012).

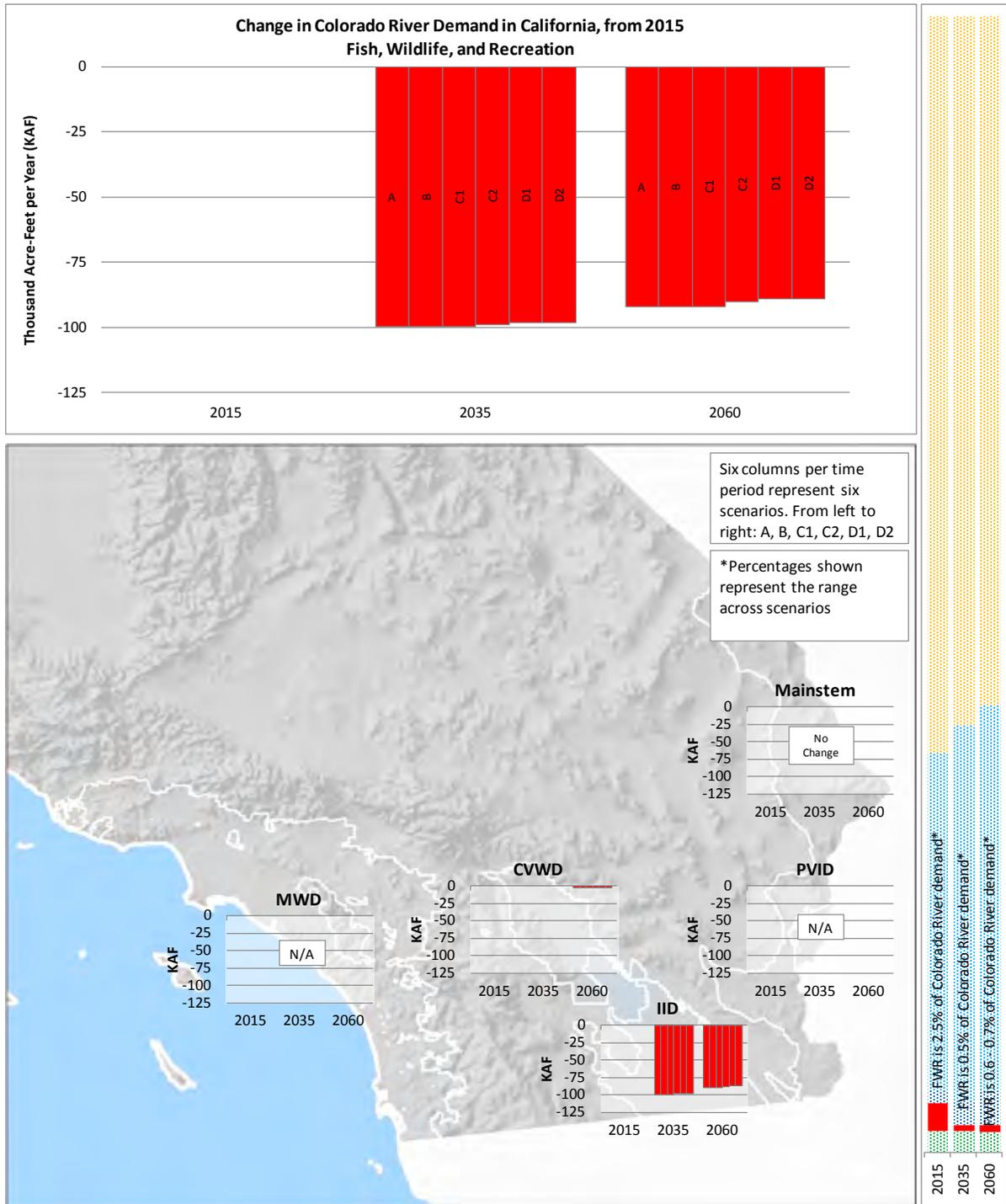
Figure C7-10 presents the following by scenario in 2015, 2035, and 2060:

- Change in fish, wildlife, and recreation demand for Colorado River water
- Change in fish, wildlife, and recreation demand for Colorado River water in individual planning areas
- Fish, wildlife, and recreation demand as a portion of Colorado River demand (right hand side of graph)

As can be seen from figure C7-10, fish, wildlife, and recreation water demand is a small fraction of Colorado River demand, decreasing from 2.5 percent in 2015 to between 0.6 and 0.7 percent of Colorado River demand in 2060 across all scenarios.

Total decrease in fish, wildlife, and recreation demands is about 90 kaf. These decreases are dominated by decreases in the IID planning area associated with the Salton Sea mitigation. Total demand decreases from about 124 kaf in 2015 to between 32 and 35 kaf in 2060.

FIGURE C7-10
 Change in Colorado River Demand in California from 2015 for Fish, Wildlife, and Recreation



3.3.6 Tribal

The following federally recognized tribes divert Colorado River water under water rights assigned to reservations in California:

- Fort Mojave Indian Tribe
- Chemehuevi Tribe
- Colorado River Indian Tribes
- Quechan Indian Tribe

Tribal water demands relied on information submitted by the Ten Tribes Partnership for use in the *Colorado River Interim Surplus Criteria Final Environmental Impacts Statement* (Reclamation, 2000) and used in the more recent *Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead Final EIS* (Reclamation, 2007) and Reclamation's 2005 to 2009 Decree Accounting Report (Reclamation, 2007 and 2010).

Tribal demands are forecast to remain constant through time and across scenarios, at about 92,000 acre-feet per year.

For additional information on tribal demands, see appendix C9.

3.4 Summary Tables of Parameters and Demands by Category

Tables C7-2 to C7-7 present the specific parameter data collected by planning area. Each table is a complete set of data for a given scenario. These data were used to develop Study Area demands and subsequently Colorado River demands once other supplies were considered. These tables provide the specific information used in the creation of the summary and category plots previously discussed and provide reference information for the data provided.

TABLE C7-2
 Total Demand within Study Area under Current Projected (A) Scenario

Hydrologic Basin	Planning Area	Year	IID			MWD			CVWD			PVID			Mainstem			STATE TOTAL			Source and comments
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agricultural	Irrigated Acreage	acres																			
	Per-Acre Water Delivery (Diversion)	af/ac/yr																			
	Consumptive factor	%																			
	Demand (Consumptive)	af/yr																			
Municipal and Industrial	Population																				
	Municipal and Industrial Per Capita Use (Diversion)	gpcd																			
	Consumptive factor	%																			
	Demand (Consumptive)	af/yr																			
Energy	Demand (Consumptive)	af/yr																			
	Demand (Consumptive)	af/yr																			
	Demand (Consumptive)	af/yr																			
	Demand (Consumptive)	af/yr																			
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr																			
	Demand (Consumptive)	af/yr																			
	Demand (Consumptive)	af/yr																			
	Demand (Consumptive)	af/yr																			
Total Hydrologic Basin	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	416,847	416,177	494,504	128,912	125,102	130,454	545,759	541,279	624,958
Adjacent Areas																					
Agricultural	Irrigated Acreage	acres	476,667	485,000	490,000	62,117	50,355	50,355	74,262	52,922	40,119										
	Per-Acre Water Delivery (Diversion)	af/ac/yr	5.4	5.2	5.2	3.57	3.57	3.57	4.0	4.0	4.0										
	Consumptive factor	%	2,566,800	2,509,800	2,562,800	221,800	179,800	179,800	300,150	213,900	162,150										
	Demand (Consumptive)	af/yr	180,833	250,000	360,000	19,956,000	22,474,000	26,200,000	295,000	598,966	1,039,944										
Municipal and Industrial	Population		185	187	144	172	162	144	452	425	423										
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	37,433	54,600	75,600	3,850,000	4,091,000	4,234,000	149,445	285,025	493,020										
	Consumptive factor	%	0	0	0	0	0	0	30,071	61,821	105,821										
	Demand (Consumptive)	af/yr	37,433	54,600	75,600	3,850,000	4,091,000	4,234,000	179,516	346,846	598,841										
Energy	Demand (Consumptive)	af/yr	32,567	96,000	144,000	0	0	0	0	0	0										
	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0										
	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0										
	Demand (Consumptive)	af/yr	115,000	15,000	25,000	10,500	10,500	10,500	0	0	0										
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0										
	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0										
	Demand (Consumptive)	af/yr	48,000	58,000	75,000	0	0	318,200	0	0	0										
	Demand (Consumptive)	af/yr	2,799,800	2,733,400	2,882,400	4,071,800	4,270,800	4,732,000	490,166	571,246	771,491										
Total Adjacent Areas	Demand (Consumptive)	af/yr	2,799,800	2,733,400	2,882,400	4,071,800	4,270,800	4,732,000	490,166	571,246	771,491	0	0	0	0	0	0	7,361,766	7,575,446	8,385,891	
Total Demand in the Study Area	Demand (Consumptive)	af/yr	2,799,800	2,733,400	2,882,400	4,071,800	4,270,800	4,732,000	490,166	571,246	771,491	416,847	416,177	494,504	128,912	125,102	130,454	7,907,525	8,116,725	9,010,849	
Demand that may be met by Other Sources	Demand (Consumptive)	af/yr	8,500	10,000	10,000	2,821,800	3,020,800	3,482,000	98,166	112,246	315,491	0	0	0	0	0	0	2,928,466	3,143,046	3,807,491	
Potential Colorado River Demand	Demand (Consumptive)	af/yr	2,791,300	2,723,400	2,872,400	1,250,000	1,250,000	1,250,000	392,000	459,000	456,000	416,847	416,177	494,504	128,912	125,102	130,454	4,979,059	4,973,679	5,203,358	
Agricultural	Colorado River Demand	af/yr	2,559,007	2,500,618	2,553,909	0	0	0	240,039	171,870	95,841	411,673	411,673	490,000	18,787	18,787	18,787	3,229,506	3,102,948	3,158,537	
	Colorado River Demand	af/yr	37,320	54,400	75,338	1,250,000	1,250,000	1,250,000	143,564	278,693	353,953	0	0	0	2,280	5,443	10,795	1,433,164	1,588,536	1,690,086	
	Colorado River Demand	af/yr	32,468	95,649	143,500	0	0	0	0	0	0	5,174	4,504	4,504	15,238	8,265	8,265	52,880	108,418	156,269	
	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Municipal and Industrial	Colorado River Demand	af/yr	114,651	14,945	24,913	0	0	0	8,397	8,437	6,206	0	0	0	612	612	612	123,660	23,994	31,731	
	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91,995	91,995	91,995	
	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Colorado River Demand	af/yr	47,854	57,788	74,740	0	0	0	0	0	0	0	0	0	0	0	0	47,854	57,788	74,740	

Source and Comments

- PVID: Roger Henning, personal communication, Aug 19, 2011; in 2015 assumed 25,947 acres in the Forbearance and Following Program with MWD; in 2035 assume 23,352 acres in the Forbearance and Following Program with MWD.
- Mainstem: computed as consumptive demand divided by consumptive factor divided by per-acre water delivery.
- Mainstem: applied water use as determined for PVID in 2015, 2035 and 2060.
- PVID: Derived from Reclamation's Decree Accounting reports. The 2015 and 2035 factors are based on the 1964 to 2004 excluding following years. The 2060 factor is the maximum historic value.
- PVID: Roger Henning, personal communication, Aug 19, 2011; in 2015 assume 78,327 acre-ft provided to MWD under Forbearance and Following Program; in 2035 assume 78,327 acre-ft provided to MWD under Forbearance and Following Program.
- Mainstem: Chris Harris, personal communication. Provided as Colorado River Simulation System input, includes Miscellaneous Agricultural Present Perfected Rights and Bard Unit.
- Mainstem: population projections for city of Needles based on personal communication Dave Brownlee; 2015 Winterhaven projected increase from 2010 census based on 2010 to 2015 increase reflected in Population Projection from Table 3, USBR Lower Colorado Water Supply Study, California, Planning Report (USBR 1986). 2035 and 2060 Winterhaven projected increase based on 2010 to 2015 increase in USBR 1986 continuing in each five-year period through 2060, and Big River CDP projected increase based on growth rate computed from the 2000 and 2010 census.
- Mainstem: calculated based on population, consumptive demand, and consumptive factor.
- Mainstem: Based on aggregate consumptive factor determined from Reclamation's 2010 Decree Accounting reports for Needles and Winterhaven, and the 2009 Decree Accounting Report for miscellaneous Present Perfected Rights.
- Mainstem M&I: Values from CRSS demand input tool (DIT) for city of Needles, Winterhaven and Miscellaneous Domestic Present Perfected Rights and Lower Colorado Water Supply Project Municipal and Industrial Use.
- Mainstem Fish, Wildlife and Recreation: 612 ac-ft for BLM county park leases.
- Mainstem: Chris Harris, personal communication. Provided as Colorado River Simulation System input, includes Fort Mohave, Chemehuevi, Colorado River, and Quechan Native American Tribes.
- IID: 2035: IID 2011 Crop Report plus additional 10,000 acres of reclaimed lands; 2060: IID 2011 Crop Report plus additional 15,000 acres reclaimed lands.
- MWD: Irrigated Acreage for 2015, 2035, and 2060 equal to Agricultural Demand divided by MWD per-acre water delivery.
- CVWD: Form 7-2045 2010 Crop and Water Report. 2010 Irrigable Acres from Form 7-2045; 2015, 2035 and 2060: determined from demand over 2010 water use.
- IID, CVWD: computed simply as agricultural Demand (Diversion) divided by irrigated acres in 2011. In CVWD, values assumed to be the same for other years. In IID, other years are computed in same fashion as 2011. Actual Applied Water Use varies throughout IID depending on factors such as soil type and cropping patterns.
- MWD per-acre water delivery (af/ac/yr) for 2015, 2035, and 2060 assumed to be the same as for 2010. 2010 per-acre water delivery equal to Agricultural Demand (Diversion) divided by Irrigated Acreage estimate from Southern California Association of Governments 2005 and San Diego Association of Governments 2007 data.
- IID: Exhibit B CRWDA. Revised w/+5 kaf for IID/MWD and +50 kaf in 2060 for MWD obligation to CVWD; less M&I, FWR, Other, and existing (2011) energy demands.
- MWD: 2015 and 2035 from MWD Regional Urban Water Management Plan (RUWMP) (2010). Determined as 2015 and 2035 demands from Page A.1-10, Table A.1-7; 2035 value assumed constant through 2060. Approximately 7% of Metropolitan's retail demands are used for agricultural purposes. Agricultural uses are expected to decline through 2030. For example, irrigated acreage declined by 51,361 acres between 2001-2007.
- CVWD: 2010 Coachella Valley Water Management Plan (CVWMP) Update. Page 3-14, Table 3-2.
- IID: IID Integrated Regional Water Management Planning (preliminary data).
- MWD: 2015 and 2035: RUWMP 2010 Table A.1-2; 2060: provided by J. Matusak. Report of the Blue Ribbon Committee (BRC), The Metropolitan Water District of Southern California, April 12, 2011, based on moderate demand, sustained imports scenario 40% increase from 2010.
- CVWD: 2010 Coachella Valley Water Management Plan Update. 2010, 2015, 2035, 2045 Page 3-6, Table 3-1, East Valley Population. 2060 assumed as 1.5 times growth from 2035 to 2045.
- MWD: Future changes assume continued water savings due to conservation measures such as water savings resulting from plumbing codes, price effects, and the continuing implementation of utility funded conservation Best Management Practices.
- IID: 2035 and 2060: calculated based on M&I efficiency from 2011 and years population, where 2011 M&I efficiency was calculated as AF/person/year based on 2011 population and M&I demand in ac-ft. 2015: interpolated from 2011 and 2035 estimate.
- MWD: 2015, 2035: RUMMP 2010, Table A.1-6; 2060: BRC Report, Table B.2, Scenario 1.
- CVWD: 2010 Coachella Valley Water Management Plan (CVWMP) Update, Table 3-2, Page 3-14.
- CVWD: 2010 Coachella Valley Water Management Plan (CVWMP) Update, and CVWD annual report on golf course water use. Total Industrial Table 3-2, Page 3-14 times % of population in East Valley plus golf course water use. Assumed all golf growth occurs in east valley.
- IID: IID Integrated Regional Water Management Planning (preliminary data). Based on conservative preliminary planning data from IID Integrated Regional Water Management Planning efforts.
- IID: values from Mike King personal communication, Oct 7, 2011; includes water sent to the Salton Sea via an exchange with SDCWA and CVWD to mitigate for QSA transfers through 2017. The transfer to San Diego is accounted for as a deduction to IID's priority 3 consumptive use cap.
- CVWD: 2010 Coachella Valley Water Management Plan (CVWMP) Update. Total Fish Farms and Duck Clubs Table 3-2, Page 3-14.
- IID: Tina Shields personal communication, Aug 3, 2011; accounts for service pipes and miscellaneous uses, assumes 1% annual increase.
- MWD: Represents demand of 268,200 acre-feet for seawater barrier and groundwater replenishment, and 50,000 acre-feet to account for uncertain regional growth and water demand projections. The demands shown are based on the April 12, 2011 "Report of Blue Ribbon Committee, The Metropolitan Water District of Southern California".
- Calculated from the sum of Hydrologic Basin (Consumptive) Demand and Adjacent Areas (Diversion) Demand. Adjacent Areas (Diversion) Demand is net of return flows to the Colorado River, (ie. Depletions).
- CVWD: Patti Reyes personal communication, Aug 11, 2011; Groundwater and recycled water.
- MWD: 2015, 2035 and 2060 assume nearly full Colorado River Aqueduct.
- All values presented in table are contingent on the continued implementation of the QSA.
- For MWD, all Potential Colorado River Demand is M&I. For IID and CVWD, distribute CO River demand amongst categories according to distribution of total study area demand.

TABLE C7-3
Total Demand within Study Area under Slow Growth (B) Scenario

Hydrologic Basin	Planning Area	Year	CALIFORNIA									STATE TOTAL			Source and comments					
			IID			MWD			CVWD			PVID				Mainstem				
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060
Agricultural	Irrigated Acreage	acres										90,886	90,886	107,103	4,148	4,148	4,106	95,034	95,034	111,209
	Per-Acre Water Delivery (Diversion)	af/ac/yr										10.29	10.29	9.34	10.29	10.29	9.34	10.29	10.29	9.34
	Consumptive factor	%										44%	44%	49%	44%	44%	49%	44%	44%	49%
	Demand (Consumptive)	af/yr										411,673	411,673	490,000	18,787	18,787	18,787	430,460	430,460	508,787
Municipal and Industrial	Population											0	0	0	6,673	14,148	27,578	6,673	14,148	27,578
	Municipal and Industrial Per Capita Use (Diversion)	gpcd										0	0	0	442	505	522	442	505	522
	Consumptive factor	%										0%	0%	0%	69%	68%	67%	69%	68%	67%
	Municipal and Industrial Demand (Consumptive)	af/yr										0	0	0	2,280	5,443	10,795	2,280	5,443	10,795
	Self Served Industrial Demand (Consumptive)	af/yr										0	0	0	0	0	0	0	0	0
	Demand (Consumptive)	af/yr										0	0	0	2,280	5,443	10,795	2,280	5,443	10,795
Energy	Demand (Consumptive)	af/yr										5,174	4,504	4,504	15,238	8,265	8,265	20,412	12,769	12,769
Minerals	Demand (Consumptive)	af/yr										0	0	0	0	0	0	0	0	0
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr										0	0	0	612	612	612	612	612	612
Tribal	Demand (Consumptive)	af/yr										0	0	0	91,995	91,995	91,995	91,995	91,995	91,995
Total Hydrologic Basin	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	416,847	416,177	494,504	128,912	125,102	130,454	545,759	541,279	624,958
Adjacent Areas																				
Agricultural	Irrigated Acreage	acres	476,667	485,000	490,000	62,117	50,355	50,355	74,262	52,922	40,119							613,046	588,277	580,473
	Per-Acre Water Delivery (Diversion)	af/ac/yr	5.38	5.17	5.23	3.57	3.57	3.57	4.04	4.04	4.04							5.04	4.94	5.00
	Demand (Diversion)	af/yr	2,566,800	2,509,800	2,562,800	221,800	179,800	179,800	300,150	213,900	162,150							3,088,750	2,903,500	2,904,750
Municipal and Industrial	Population		169,983	228,800	270,000	19,424,119	19,943,344	18,426,871	295,003	598,966	1,039,944							19,889,105	20,771,110	19,736,815
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	185	184	180	172	162	144	452	425	423							176	170	159
	Municipal and Industrial Demand (Diversion)	af/yr	35,187	47,087	54,432	3,747,387	3,630,338	2,977,839	149,445	285,025	493,020							3,932,020	3,962,450	3,525,291
	Self Served Industrial Demand (Diversion)	af/yr	0	0	0	0	0	0	30,071	61,821	105,821							30,071	61,821	105,821
	Demand (Diversion)	af/yr	35,187	47,087	54,432	3,747,387	3,630,338	2,977,839	179,516	346,846	598,841							3,962,091	4,024,271	3,631,112
Energy	Demand (Diversion)	af/yr	32,567	96,000	144,000				0	0	0							32,567	96,000	144,000
Minerals	Demand (Diversion)	af/yr	0	0	0				0	0	0							0	0	0
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr	115,000	15,000	25,000				10,500	10,500	10,500							125,500	25,500	35,500
Tribal	Demand (Diversion)	af/yr	0	0	0				0	0	0							0	0	0
Other	Demand (Diversion)	af/yr	48,000	58,000	75,000	0	0	318,200	0	0	0							48,000	58,000	393,200
Total Adjacent Areas	Demand (Diversion)	af/yr	2,797,554	2,725,887	2,861,232	3,969,187	3,810,138	3,475,839	490,166	571,246	771,491	0	0	0	0	0	0	7,256,908	7,107,271	7,108,562
Total Demand in the Study Area		af/yr	2,797,554	2,725,887	2,861,232	3,969,187	3,810,138	3,475,839	490,166	571,246	771,491	416,847	416,177	494,504	128,912	125,102	130,454	7,802,667	7,648,550	7,733,520
Demand that may be met by Other Sources		af/yr	8,500	10,000	10,000	2,719,187	2,560,138	2,225,839	98,166	112,246	315,491	0	0	0	0	0	0	2,825,853	2,682,384	2,551,330
Potential Colorado River Demand		af/yr	2,789,054	2,715,887	2,851,232	1,250,000	1,250,000	1,250,000	392,000	459,000	456,000	416,847	416,177	494,504	128,912	125,102	130,454	4,976,814	4,966,166	5,182,190
Agricultural	Colorado River Demand	af/yr	2,559,001	2,500,593	2,553,843	0	0	0	240,039	171,870	95,841	411,673	411,673	490,000	18,787	18,787	18,787	3,229,500	3,102,923	3,158,471
Municipal and Industrial	Colorado River Demand	af/yr	35,080	46,914	54,242	1,250,000	1,250,000	1,250,000	143,564	278,693	353,953	0	0	0	2,280	5,443	10,795	1,430,925	1,581,051	1,668,989
Energy	Colorado River Demand	af/yr	32,468	95,648	143,497	0	0	0	0	0	0	5,174	4,504	4,504	15,238	8,265	8,265	52,880	108,417	156,266
Minerals	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish, Wildlife, and Recreation	Colorado River Demand	af/yr	114,651	14,945	24,913	0	0	0	8,397	8,437	6,206	0	0	0	612	612	612	123,660	23,994	31,731
Tribal	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	91,995	91,995	91,995	91,995	91,995	91,995
Other	Colorado River Demand	af/yr	47,854	57,787	74,738	0	0	0	0	0	0	0	0	0	0	0	0	47,854	57,787	74,738

Source and Comments

- 1) No changes from current projected
- 2) No changes from current projected
- 3) No changes from current projected
- 4) No changes from current projected
- 5) No changes from current projected
- 6) No changes from current projected
- 7) No changes from current projected
- 8) No changes from current projected
- 9) No changes from current projected
- 10) No changes from current projected
- 11) No changes from current projected
- 12a) IID: Based on regional trends, assume 2060 population is 25% less than that of current projected.
- 12b) MWD: Population projections extrapolated from California Department of Water Resources low growth county population projections for California Water Plan Update, 2009
- 13a) Based on very slow reduction to satisfy the California 20X2020 statute for the IID planning area
- 13b) No changes from current projected for other planning areas
- 14) No changes from current projected
- 15) No changes from current projected
- 16) No changes from current projected
- 17) No changes from current projected
- 18) No changes from current projected
- 19) MWD: Reduced from current projected to reflect lower demand with lower population projection. Others: no changes from current projected
- 20) For MWD, all Potential Colorado River Demand is M&I. For IID and CVWD, distribute CO River demand amongst categories according to distribution of total study area demand

TABLE C7-4
 Total Demand within Study Area under Rapid Growth (C1) Scenario

Hydrologic Basin	Planning Area	Year	CALIFORNIA									Source and comments									
			IID			MWD			CVWD				PVID			Mainstem			STATE TOTAL		
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agricultural	Irrigated Acreage	acres										90,886	90,886	107,103	4,148	4,148	4,106	95,034	95,034	111,209	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr										10.29	10.29	9.34	10.29	10.29	9.34	10.29	10.29	9.34	2)
	Consumptive factor	%										44%	44%	49%	44%	44%	49%	44%	44%	49%	
	Demand (Consumptive)	af/yr										411,673	411,673	490,000	18,787	18,787	18,787	430,460	430,460	508,787	
Municipal and Industrial	Population											0	0	0	6,673	14,148	27,578	6,673	14,148	27,578	3)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd										0	0	0	442	505	522	442	505	522	4)
	Consumptive factor	%										0%	0%	0%	69%	68%	67%	69%	68%	67%	
	Municipal and Industrial Demand (Consumptive)	af/yr										0	0	0	2,280	5,443	10,795	2,280	5,443	10,795	5)
	Self Served Industrial Demand (Consumptive)	af/yr										0	0	0	0	0	0	0	0	0	
	Demand (Consumptive)	af/yr										0	0	0	2,280	5,443	10,795	2,280	5,443	10,795	
Energy	Demand (Consumptive)	af/yr										5,174	4,504	4,504	15,238	47,200	100,000	20,412	51,704	104,504	6)
Minerals	Demand (Consumptive)	af/yr										0	0	0	0	0	0	0	0	0	7)
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr										0	0	0	612	612	612	612	612	612	8)
Tribal	Demand (Consumptive)	af/yr										0	0	0	91,995	91,995	91,995	91,995	91,995	91,995	9)
Total Hydrologic Basin	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	416,847	416,177	494,504	128,912	164,037	222,189	545,759	580,214	716,693	
Adjacent Areas																					
Agricultural	Irrigated Acreage	acres	476,667	485,000	490,000	62,117	50,355	50,355	74,262	52,922	40,119							613,046	588,277	580,473	10)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	5.38	5.17	5.23	3.57	3.57	3.57	4.04	4.04	4.04							5.04	4.94	5.00	11)
	Demand (Diversion)	af/yr	2,566,800	2,509,800	2,562,800	221,800	179,800	179,800	300,150	213,900	162,150							3,088,750	2,903,500	2,904,750	
Municipal and Industrial	Population		191,683	291,200	450,000	20,742,842	26,025,685	33,117,030	295,003	598,966	1,039,944							21,229,528	26,915,851	34,606,974	12a), 12b)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	176	174	159	172	162	144	452	425	423							176	168	153	13a), 13b)
	Municipal and Industrial Demand (Diversion)	af/yr	37,695	56,871	80,325	4,001,801	4,737,522	5,351,813	149,445	285,025	493,020							4,188,941	5,079,419	5,925,158	
	Self Served Industrial Demand (Diversion)	af/yr	0	0	0	0	0	0	30,071	61,821	105,821							30,071	61,821	105,821	14)
	Demand (Diversion)	af/yr	37,695	56,871	80,325	4,001,801	4,737,522	5,351,813	179,516	346,846	598,841							4,219,012	5,141,240	6,030,979	
Energy	Demand (Diversion)	af/yr	40,709	120,000	180,000				0	0	0							40,709	120,000	180,000	15)
Minerals	Demand (Diversion)	af/yr	0	0	0				0	0	0							0	0	0	16)
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr	115,000	15,000	25,000				10,500	10,500	10,500							125,500	25,500	35,500	17)
Tribal	Demand (Diversion)	af/yr	0	0	0				0	0	0							0	0	0	18)
Other	Demand (Diversion)	af/yr	48,000	58,000	75,000	0	0	318,200	0	0	0							48,000	58,000	393,200	
Total Adjacent Areas	Demand (Diversion)	af/yr	2,808,204	2,759,671	2,923,125	4,223,601	4,917,322	5,849,813	490,166	571,246	771,491	0	0	0	0	0	0	7,521,971	8,248,240	9,544,429	
Total Demand in the Study Area		af/yr	2,808,204	2,759,671	2,923,125	4,223,601	4,917,322	5,849,813	490,166	571,246	771,491	416,847	416,177	494,504	128,912	164,037	222,189	8,067,730	8,828,454	10,261,122	
Demand that may be met by Other Sources		af/yr	8,500	10,000	10,000	2,973,601	3,667,322	4,599,813	98,166	112,246	315,491	0	0	0	0	0	0	3,080,267	3,789,568	4,925,304	19)
Potential Colorado River Demand		af/yr	2,799,704	2,749,671	2,913,125	1,250,000	1,250,000	1,250,000	392,000	459,000	456,000	416,847	416,177	494,504	128,912	164,037	222,189	4,987,463	5,038,886	5,335,818	
Agricultural	Colorado River Demand	af/yr	2,559,031	2,500,705	2,554,033	0	0	0	240,039	171,870	95,841	411,673	411,673	490,000	18,787	18,787	18,787	3,229,529	3,103,036	3,158,661	20)
Municipal and Industrial	Colorado River Demand	af/yr	37,581	56,665	80,050	1,250,000	1,250,000	1,250,000	143,564	278,693	353,953	0	0	0	2,280	5,443	10,795	1,433,425	1,590,802	1,694,798	
Energy	Colorado River Demand	af/yr	40,586	119,565	179,384	0	0	0	0	0	0	5,174	4,504	4,504	15,238	47,200	100,000	60,998	171,269	283,888	
Minerals	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fish, Wildlife, and Recreation	Colorado River Demand	af/yr	114,652	14,946	24,914	0	0	0	8,397	8,437	6,206	0	0	0	612	612	612	123,661	23,994	31,733	
Tribal	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	91,995	91,995	91,995	91,995	91,995	91,995	
Other	Colorado River Demand	af/yr	47,855	57,790	74,743	0	0	0	0	0	0	0	0	0	0	0	0	47,855	57,790	74,743	

- Source and Comments**
- 1) No changes from current projected
 - 2) No changes from current projected
 - 3) No changes from current projected
 - 4) No changes from current projected
 - 5) No changes from current projected
 - 6) Increased demand on Mainstem from current projected
 - 7) No changes from current projected
 - 8) No changes from current projected
 - 9) No changes from current projected
 - 10) No changes from current projected
 - 11) No changes from current projected
 - 12a) IID: Based on regional trends, assume 2060 population is 25% more than that of current projected.
 - 12b) MWD: Population projections extrapolated from California Department of Water Resources high growth county population projections for California Water Plan Update, 2009
 - 13a) Based on slow reduction to satisfy the California 20X2020 statute for the IID planning area
 - 13b) No changes from current projected for other planning areas
 - 14) No changes from current projected
 - 15) Increased demand from current projected based on rapid geothermal technology
 - 16) No changes from current projected
 - 17) IID: No reference.
 - 18) No changes from current projected
 - 19) MWD: Increased from current projected to reflect higher demand with higher population projection. Others: no changes from current projected
 - 20) For MWD, all Potential Colorado River Demand is M&I. For IID and CVWD, distribute CO River demand amongst categories according to distribution of total study area demand

TABLE C7-5
Total Demand within Study Area under Rapid Growth (C2) Scenario

Hydrologic Basin	Planning Area	Year	CALIFORNIA									STATE TOTAL			Source and comments						
			IID			MWD			CVWD			PVID				Mainstem					
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agricultural	Irrigated Acreage	acres																95,034	95,034	111,209	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr																10.29	10.29	9.34	2)
	Consumptive factor	%																44%	44%	49%	
	Demand (Consumptive)	af/yr																411,673	411,673	490,000	
Municipal and Industrial	Population																	6,673	14,148	27,578	3)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd																442	505	522	4)
	Consumptive factor	%																69%	68%	67%	
	Municipal and Industrial Demand (Consumptive)	af/yr																2,280	5,443	10,795	
	Self Served Industrial Demand (Consumptive)	af/yr																0	0	0	5)
	Demand (Consumptive)	af/yr																2,280	5,443	10,795	
Energy	Demand (Consumptive)	af/yr																5,174	4,504	4,504	6)
Minerals	Demand (Consumptive)	af/yr																0	0	0	7)
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr																0	0	0	8)
Tribal	Demand (Consumptive)	af/yr																0	0	0	9)
Total Hydrologic Basin	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	416,847	416,177	494,504	128,912	125,102	130,454	545,759	541,279	624,958	
Adjacent Areas																					
Agricultural	Irrigated Acreage	acres	476,667	485,000	490,000	62,117	50,355	50,355	74,262	52,922	40,119							613,046	588,277	580,473	10)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	5.38	5.17	5.23	3.57	3.57	3.57	4.04	4.04	4.04							5.04	4.94	5.00	11)
	Demand (Diversion)	af/yr	2,566,800	2,509,800	2,562,800	221,800	179,800	179,800	300,150	213,900	162,150							3,088,750	2,903,500	2,904,750	
Municipal and Industrial	Population		191,683	291,200	450,000	20,742,842	26,025,685	33,117,030	295,003	598,966	1,039,944							21,229,528	26,915,851	34,606,974	12a), 12b)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	172	150	141	172	162	144	452	425	423							176	168	153	13a), 13b)
	Municipal and Industrial Demand (Diversion)	af/yr	36,902	48,922	70,875	4,001,801	4,737,522	5,351,813	149,445	285,025	493,020							4,188,148	5,071,469	5,915,708	
	Self Served Industrial Demand (Diversion)	af/yr	0	0	0	0	0	0	30,071	61,821	105,821							30,071	61,821	105,821	14)
	Demand (Diversion)	af/yr	36,902	48,922	70,875	4,001,801	4,737,522	5,351,813	179,516	346,846	598,841							4,218,219	5,133,290	6,021,529	
Energy	Demand (Diversion)	af/yr	33,218	97,920	146,880				0	0	0							33,218	97,920	146,880	15)
Minerals	Demand (Diversion)	af/yr	0	0	0				0	0	0							0	0	0	16)
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr	115,000	15,750	26,750				10,500	10,500	10,500							125,500	26,250	37,250	17)
Tribal	Demand (Diversion)	af/yr	0	0	0				0	0	0							0	0	0	18)
Other	Demand (Diversion)	af/yr	48,000	58,000	75,000	0	0	318,200	0	0	0							48,000	58,000	393,200	
Total Adjacent Areas	Demand (Diversion)	af/yr	2,799,920	2,730,392	2,882,305	4,223,601	4,917,322	5,849,813	490,166	571,246	771,491	0	0	0	0	0	0	7,513,687	8,218,960	9,503,609	
Total Demand in the Study Area		af/yr	2,799,920	2,730,392	2,882,305	4,223,601	4,917,322	5,849,813	490,166	571,246	771,491	416,847	416,177	494,504	128,912	125,102	130,454	8,059,446	8,760,239	10,128,567	
Demand that may be met by Other Sources		af/yr	8,500	10,000	10,000	2,973,601	3,667,322	4,599,813	98,166	112,246	315,491	0	0	0	0	0	0	3,080,267	3,789,568	4,925,304	19)
Potential Colorado River Demand		af/yr	2,791,420	2,720,392	2,872,305	1,250,000	1,250,000	1,250,000	392,000	459,000	456,000	416,847	416,177	494,504	128,912	125,102	130,454	4,979,179	4,970,671	5,203,263	
Agricultural	Colorado River Demand	af/yr	2,559,008	2,500,608	2,553,909	0	0	0	240,039	171,870	95,841	411,673	411,673	490,000	18,787	18,787	18,787	3,229,506	3,102,938	3,158,536	20)
Municipal and Industrial	Colorado River Demand	af/yr	36,790	48,742	70,629	1,250,000	1,250,000	1,250,000	143,564	278,693	353,953	0	0	0	2,280	5,443	10,795	1,432,634	1,582,879	1,685,377	
Energy	Colorado River Demand	af/yr	33,117	97,561	146,370	0	0	0	0	0	0	5,174	4,504	4,504	15,238	8,265	8,265	53,529	110,330	159,139	
Minerals	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fish, Wildlife, and Recreation	Colorado River Demand	af/yr	114,651	15,692	26,657	0	0	0	8,397	8,437	6,206	0	0	0	612	612	612	123,660	24,741	33,475	
Tribal	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	91,995	91,995	91,995	91,995	91,995	91,995	
Other	Colorado River Demand	af/yr	47,854	57,788	74,740	0	0	0	0	0	0	0	0	0	0	0	0	47,854	57,788	74,740	

Source and Comments

- 1) No changes from current projected
- 2) No changes from current projected
- 3) No changes from current projected
- 4) No changes from current projected
- 5) No changes from current projected
- 6) Increased demand from current projected based on efficient geothermal technology
- 7) No changes from current projected
- 8) No changes from current projected
- 9) No changes from current projected
- 10) No changes from current projected
- 11) No changes from current projected
- 12a) IID: Based on regional trends, assume 2060 population is 25% more than that of current projected.
- 12b) MWD: Population projections extrapolated from California Department of Water Resources high growth county population projections for California Water Plan Update, 2009.
- 13a) Based on California 20X2020 statute for 20% reduction in demand by 2020 for the IID planning area
- 13b) No changes from current projected for other planning areas
- 14) No changes from current projected
- 15) Increased demand from current projected based on efficient geothermal technology
- 16) No changes from current projected
- 17) IID: No reference.
- 18) No changes from current projected
- 19) MWD: Increased from current projected to reflect higher demand with higher population projection. Others: no changes from current projected
- 20) For MWD, all Potential Colorado River Demand is M&I. For IID and CVWD, distribute CO River demand amongst categories according to distribution of total study area demand

TABLE C7-6
 Total Demand within Study Area under Enhanced Environment (D1) Scenario

Hydrologic Basin	Planning Area	Year	CALIFORNIA									Source and comments									
			IID			MWD			CVWD				PVID			Mainstem			STATE TOTAL		
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agricultural	Irrigated Acreage	acres										90,886	90,886	107,103	4,148	4,148	4,106	95,034	95,034	111,209	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr										10.29	10.29	9.34	10.29	10.29	9.34	10.29	10.29	9.34	2)
	Consumptive factor	%										44%	44%	49%	44%	44%	49%	44%	44%	49%	
	Demand (Consumptive)	af/yr										411,673	411,673	490,000	18,787	18,787	18,787	430,460	430,460	508,787	
Municipal and Industrial	Population											0	0	0	6,673	14,148	27,578	6,673	14,148	27,578	3)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd										0	0	0	442	442	442	442	442	442	4)
	Consumptive factor	%										0%	0%	0%	69%	68%	67%	69%	68%	67%	
	Municipal and Industrial Demand (Consumptive)	af/yr										0	0	0	2,280	4,764	9,149	2,280	4,764	9,149	5)
	Self Served Industrial Demand (Consumptive)	af/yr										0	0	0	0	0	0	0	0	0	
Demand (Consumptive)	af/yr										0	0	0	2,280	4,764	9,149	2,280	4,764	9,149		
Energy	Demand (Consumptive)	af/yr									5,174	4,504	4,504	15,238	7,781	7,419	20,412	12,285	11,923	6)	
Minerals	Demand (Consumptive)	af/yr									0	0	0	0	0	0	0	0	0	7)	
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr									0	0	0	612	612	612	612	612	612	8)	
Tribal	Demand (Consumptive)	af/yr									0	0	0	91,995	91,995	91,995	91,995	91,995	91,995	9)	
Total Hydrologic Basin	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	416,847	416,177	494,504	128,912	123,939	127,962	545,759	540,116	622,466		
Adjacent Areas																					
Agricultural	Irrigated Acreage	acres	476,667	485,000	490,000	62,117	50,355	50,355	74,262	52,922	40,119							613,046	588,277	580,473	10)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	5.38	5.17	5.23	3.57	3.57	3.57	4.04	4.04	4.04							5.04	4.94	5.00	11)
	Demand (Diversion)	af/yr	2,566,800	2,509,800	2,562,800	221,800	179,800	179,800	300,150	213,900	162,150							3,088,750	2,903,500	2,904,750	
Municipal and Industrial	Population		180,833	260,000	360,000	19,956,000	22,474,000	26,200,000	295,003	598,966	1,039,944							20,431,836	23,332,966	27,599,944	12a), 12b)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	172	150	141	172	155	133	452	423	423							176	162	144	13a), 13b)
	Municipal and Industrial Demand (Diversion)	af/yr	34,813	43,680	56,700	3,850,000	3,902,253	3,903,519	149,445	283,822	493,020							4,034,258	4,229,755	4,453,239	
	Self Served Industrial Demand (Diversion)	af/yr	0	0	0	0	0	0	30,071	61,821	105,821							30,071	61,821	105,821	14)
	Demand (Diversion)	af/yr	34,813	43,680	56,700	3,850,000	3,902,253	3,903,519	179,516	345,643	598,841							4,064,329	4,291,576	4,559,060	
Energy	Demand (Diversion)	af/yr	31,264	88,320	126,720				0	0	0						31,264	88,320	126,720	15)	
Minerals	Demand (Diversion)	af/yr	0	0	0				0	0	0						0	0	0	16)	
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr	115,000	16,500	28,000				10,500	10,500	10,500						125,500	27,000	38,500	17)	
Tribal	Demand (Diversion)	af/yr	0	0	0				0	0	0						0	0	0	18)	
Other	Demand (Diversion)	af/yr	48,000	58,000	75,000	0	0	318,200	0	0	0						48,000	58,000	393,200		
Total Adjacent Areas	Demand (Diversion)	af/yr	2,795,877	2,716,300	2,849,220	4,071,800	4,082,053	4,401,519	490,166	570,043	771,491	0	0	0	0	0	0	7,357,843	7,368,396	8,022,230	
Total Demand in the Study Area	af/yr	2,795,877	2,716,300	2,849,220	4,071,800	4,082,053	4,401,519	490,166	570,043	771,491	416,847	416,177	494,504	128,912	123,939	127,962	7,903,602	7,908,512	8,644,696		
Demand that may be met by Other Sources	af/yr	8,500	10,000	10,000	2,821,800	2,832,053	3,151,519	98,166	111,043	315,491	0	0	0	0	0	0	2,928,466	2,953,096	3,477,010	19)	
Potential Colorado River Demand	af/yr	2,787,377	2,706,300	2,839,220	1,250,000	1,250,000	1,250,000	392,000	459,000	456,000	416,847	416,177	494,504	128,912	123,939	127,962	4,975,136	4,955,416	5,167,686	20)	
Agricultural	Colorado River Demand	af/yr	2,558,996	2,500,560	2,553,805	0	0	0	240,039	172,233	95,841	411,673	411,673	490,000	18,787	18,787	18,787	3,229,495	3,103,253	3,158,433	
Municipal and Industrial	Colorado River Demand	af/yr	34,707	43,519	56,501	1,250,000	1,250,000	1,250,000	143,564	278,313	353,953	0	0	0	2,280	4,764	9,149	1,430,551	1,576,596	1,669,603	
	Colorado River Demand	af/yr	31,169	87,995	126,275	0	0	0	0	0	0	5,174	4,504	4,504	15,238	7,781	7,419	51,581	100,280	138,198	
Minerals	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fish, Wildlife, and Recreation	Colorado River Demand	af/yr	114,650	16,439	27,902	0	0	0	8,397	8,455	6,206	0	0	0	612	612	612	123,660	25,506	34,720	
Tribal	Colorado River Demand	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	91,995	91,995	91,995	91,995	91,995	91,995	
Other	Colorado River Demand	af/yr	47,854	57,786	74,737	0	0	0	0	0	0	0	0	0	0	0	0	47,854	57,786	74,737	

Source and Comments

- 1) No changes from current projected
- 2) No changes from current projected
- 3) No changes from current projected
- 4) No changes from current projected
- 5) No changes from current projected
- 6) Decreased demand from current projected based on increasingly efficient geothermal technology
- 7) No changes from current projected
- 8) No changes from current projected
- 9) No changes from current projected
- 10) No changes from current projected
- 11) No changes from current projected
- 12a) IID: No changes from current projected
- 12b) No changes from current projected
- 13a) MWD: Increased federal investment in water-saving technology and conservation programs results in a further substantive decrease in per capita water use (for example, WaterSmart, EnergyStar, landscape technology).
Based on California 20X2020 statute for 20% reduction in demand by 2020 for the IID planning area
- 13b) No changes from current projected for other planning areas
- 14) No changes from current projected
- 15) Decreased demand from current projected based on increasingly efficient geothermal technology
- 16) No changes from current projected
- 17) IID: No reference.
- 18) No changes from current projected
- 19) No changes from current projected
- 20) For MWD, all Potential Colorado River Demand is M&I. For IID and CVWD, distribute CO River demand amongst categories according to distribution of total study area demand

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