

Appendix C4
Utah Water Demand
Scenario Quantification

Appendix C4—Utah 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 Utah and presents the results of quantification. As presented in figure C4-1, Utah is divided into a number of planning areas that align with Colorado River Basin (Basin) tributaries (Uintah, West Colorado River, Southeast Colorado River, and Kanab Creek/Virgin River) as well as adjacent areas that are served by Colorado River water. Data collection and development were completed at the planning area level.

The following sections present background information that summarizes the state's 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 Utah Study Area summary, followed by Colorado River demand by geography and finally by category.

2.0 Background

The Utah Division of Water Resources (DWR) is responsible for regional and state-level water resource planning in Utah. The DWR has led numerous water resource planning studies that include individual river basins (planning areas) as well as state-wide efforts. Information presented in this summary was largely obtained from DWR's planning studies.

DWR coordinated Utah'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 Supply and Demand Study (Study) required information not developed as part of the regional planning effort.

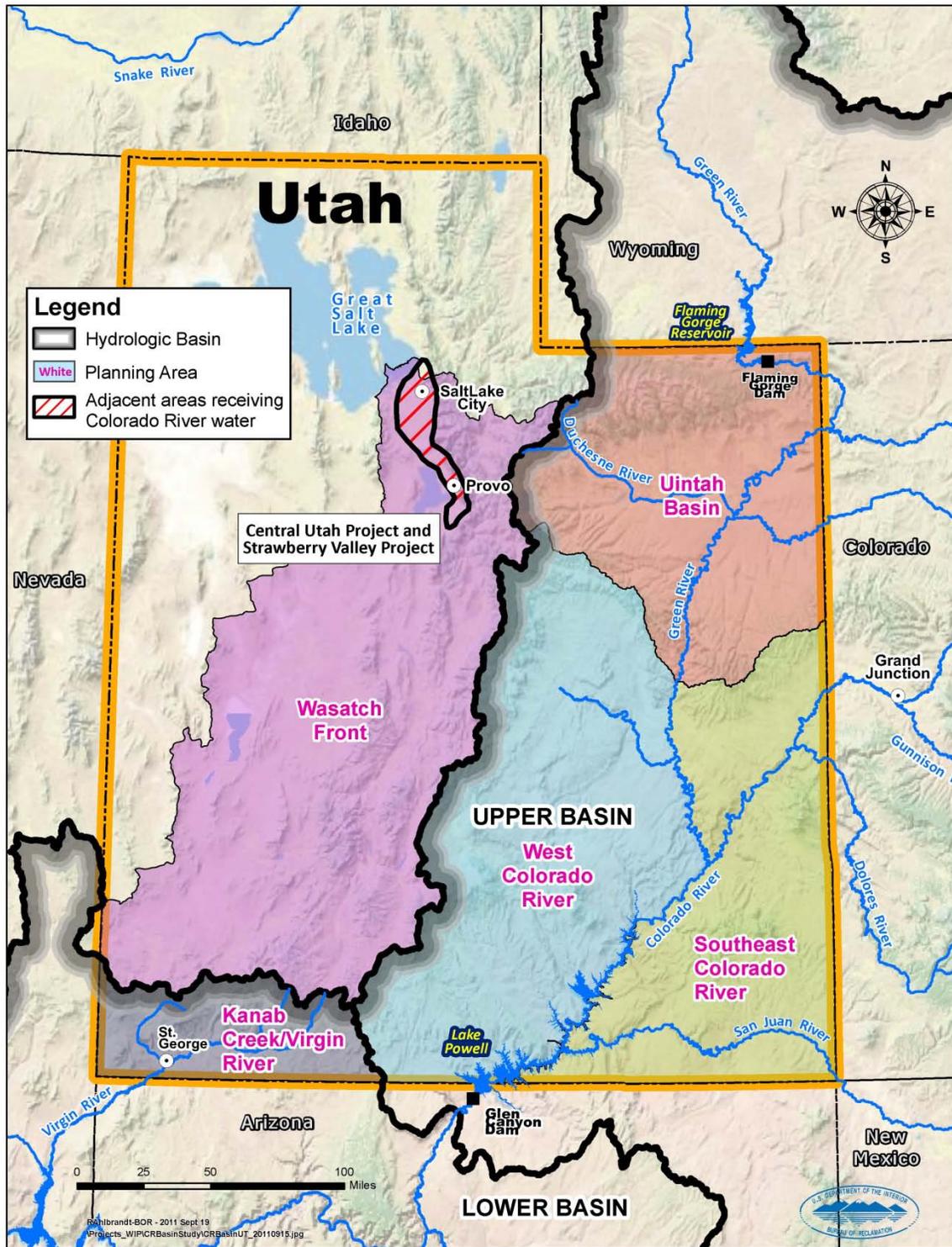
2.1 Data Sources for Quantification

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:** Irrigated acreage and agricultural applied water use were derived from *Utah's Water Resources Planning for the Future* (DWR, 2001a). Consumptive demand is derived from Colorado River Simulation System (CRSS).

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

FIGURE C4-1
Colorado River Hydrologic Basin and Export Service Areas in Utah



- **Municipal and Industrial (M&I):** Population estimates for all planning areas were derived from the Governor’s Office of Planning and Budget’s 2008 baseline projections. For all planning areas, per capita usage was derived from Colorado River demands, population, and consumptive use factors derived from *State of Utah Municipal and Industrial Water Supply and Use Studies, Summary 2005* (DWR, 2009).

Consumptive demands for hydrologic basin planning areas, except Kanab Creek/Virgin River, were derived from CRSS, whereas Kanab Creek/Virgin River consumptive demands were derived from the *State Water Plan* (DWR, 2001b.). For Wasatch Front, diversion demands are derived from *Utah’s Water Resources Planning for the Future* (DWR, 2001a).

- **Energy:** Energy demands were derived from the 2007 Upper Colorado River Commission demand schedule.
- **Minerals:** Minerals demands were derived from the 2007 Upper Colorado River Commission demand schedule.
- **Fish, Wildlife, and Recreation:** Fish, wildlife, and recreation demands were derived from the 2007 Upper Colorado River Commission demand schedule.
- **Tribal:** Tribal demands were provided by the Ute Indian Tribe of the Uintah and Ouray Reservation and the Navajo Nation.

3.0 Results of Water Demand Scenario Quantification²

This section summarizes Utah’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 local groundwater and imports from the Sevier River Basin. The communities within the Colorado River Basin also rely on non-tributary groundwater for a portion of their supply. To develop estimates of the Colorado River demand, the Study Area demand was reduced by estimates of available supply from other sources. This appendix focuses on Colorado River demands, but includes discussion of the Study Area parameters that led to these demands. Lower Colorado River Basin demands are not included. CRSS would need to be extended and natural flow data sets would need to be developed in order to include the Lower Basin tributaries in the analysis.

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.

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 C4-2 to C4-7 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 other supplies. Table C4-1 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 distinguishes the scenarios, the resulting Study Area demands, and finally the Colorado River demands by category. Because other supplies may vary among scenarios, trends observed in the parameters and Study Area demands may not be reflected identically in Colorado River demand trends.

Utah estimates that about 2.4 million people will be in Utah's Study Area by 2015. This number is expected to increase to 3.7 to 6.2 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 (3.7 million by 2060), but still represents a growth of about 55 percent over 2015 estimates.

The growing municipal population, however, will continue to be more efficient in its per capita water use than today. Per capita water use, based solely on passive or existing conservation targets, is expected to be 14 to 25 percent less in 2060 than in 2015. Usage rates as well as per capita reductions vary across Utah's planning areas.

Irrigated acreage is projected to decrease through 2060 under all scenarios. Irrigated acreage decreases by between 66,000 acres (Current Projected [A], Slow Growth [B], and Enhanced Environment [D1 and D2] scenarios) and 113,000 acres (Rapid Growth [C1 and C2] scenarios), or 8 to 13 percent from 2015 irrigated acreage. Water delivery per acre decreases in all scenarios, with decreases ranging from less than 1 percent (Slow Growth [B] scenario) to 15 percent (Rapid Growth [C2] and Enhanced Environment [D2] scenarios). Water delivery per acre varies across planning areas, but reductions in water delivery per acre are consistent across most planning areas except the Wasatch Front, which has a greater reduction than the other planning areas.

TABLE C4-1
 Summary Results of Utah 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)	2.4	4.9	3.7	6.2	6.2	4.9	6.2
Change in per capita water usage (%), from 2015	–	-14%	-14%	-14%	-21%	-23%	-25%
Irrigated acreage (millions of acres)	0.86	0.80	0.80	0.75	0.75	0.80	0.80
Change in per acre water delivery (%), from 2015	–	-3%	-0%	-3%	-15%	-3%	-15%
Study Area Demand (thousand acre-ft)							
	2015 ¹	2060 Scenario Demands					
		A	B	C1	C2	D1	D2
Ag demand	2,040	1,760	1,822	1,654	1,396	1,760	1,486
M&I demand	790	1,382	1,036	1,727	1,514	1,154	1,405
Energy demand	47	60	60	66	59	54	59
Minerals demand	0	0	0	0	0	0	0
FWR demand	0	0	0	0	0	0	0
Tribal demand ²	170 - 272	259	259	337	337	259	337
Total Study Area Demand³	3,136	3,460	3,176	3,784	3,307	3,226	3,287
Colorado River Demand (thousand acre-ft)							
	2015 ¹	2060 Scenario Demands					
		A	B	C1	C2	D1	D2
Ag demand	457	493	492	466	442	492	469
M&I demand	236	342	274	409	384	304	347
Energy demand	47	60	60	66	59	54	59
Minerals demand	0	0	0	0	0	0	0
FWR demand	0	0	0	0	0	0	0
Tribal demand ²	170 - 272	259	259	337	337	259	337
Total Colorado River Demand³	911 - 1012	1,154	1,084	1,277	1,222	1,109	1,212

1. If range across scenarios is less than 10%, Current Projected (A) scenario is presented. Otherwise, range (min–max) is presented.
2. The diversion and depletion associated with the demand for the Ute Indian Tribe of the Uintah and Ouray Reservation is dependent upon the re-ratification of the Revised Ute Indian Compact of 1990 by the Tribe and the state of Utah.
3. Excludes potential losses (reservoir evaporation, phreatophytes, and/or operational inefficiencies) that may be charged to state.

Study Area demand for energy is projected to increase under all scenarios due to the growing need for electricity generation. The greatest increases in Study Area demand for energy are anticipated in the Uintah and West Colorado River planning areas, with a combined increase of about 11,500 to 12,500 acre-feet per year (afy) (25 percent) for all scenarios except the Rapid Growth (C1) scenario, which has an increase of about 18,500 afy (40 percent).

There is no reported projected Study Area demand for minerals under the scenarios considered in the Study.

Study Area demand for tribal use is projected to remain constant in the Current Project (A) and Enhanced Environment (D1) scenarios and increases under the remaining scenarios. Under Slow Rapid Growth (C1 and C2) and Enhanced Environment (D2) scenarios, demand increases by about 24 percent. In the Slow Growth (B) scenario, tribal Study Area demand is projected to increase by about 52 percent.

Figure C4-2 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 increases from about 3.0 million acre-feet (maf) in 2015 to between 3.2 and 3.8 maf in 2060. The range in Study Area demand growth across scenarios in 2060, however, is projected to be as low as 129 thousand acre-feet (kaf) or as high as 634 kaf. About 63 to 67 percent of the Study Area demand is expected to be met by other supplies.

Panel two provides a view of the range across scenarios of Colorado River demand. Colorado River demand is calculated as Study Area demand minus other supplies. The Study and the results in this section focus on the resulting Colorado River demand. Colorado River demand³ increases from about 911 kaf in 2015 to between 1,084 and 1,277 kaf in 2060 (or 19 to 26 percent), depending on the scenario. This difference results in a Colorado River demand range of about 193 kaf across the scenarios in 2060 or about 18 percent.

Panel three shows how specific categories affect the projected change in Colorado River demand by scenario. Growth in M&I and tribal demands results in the greatest increase in demand.

Figure C4-3 ties historical water use to the range of Colorado River demand in the quantified scenarios. The 193 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.

³ Losses to reservoir evaporation are not part of this total.

FIGURE C4-2
 Study Area, Colorado River, and Change in Colorado River Demand

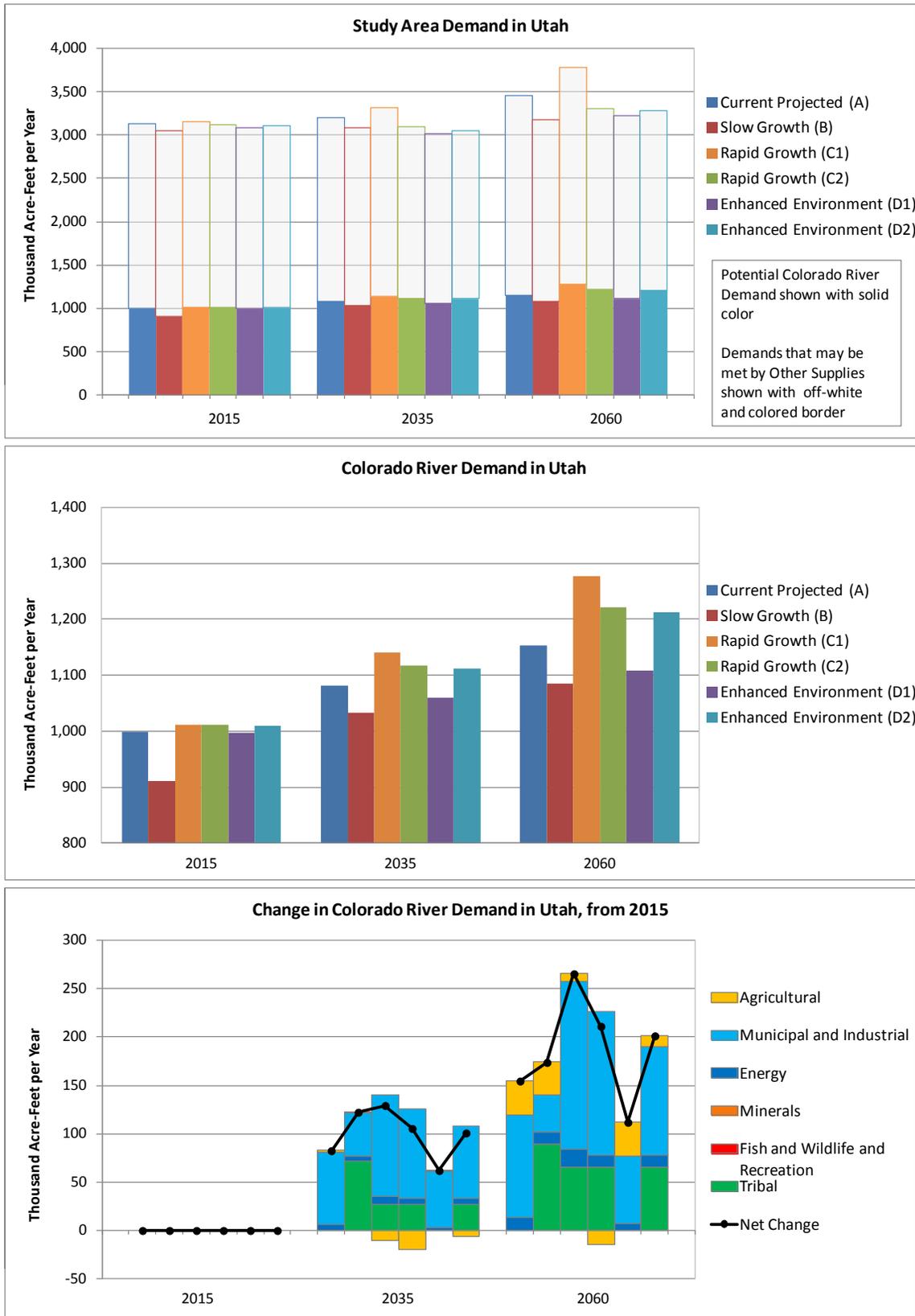
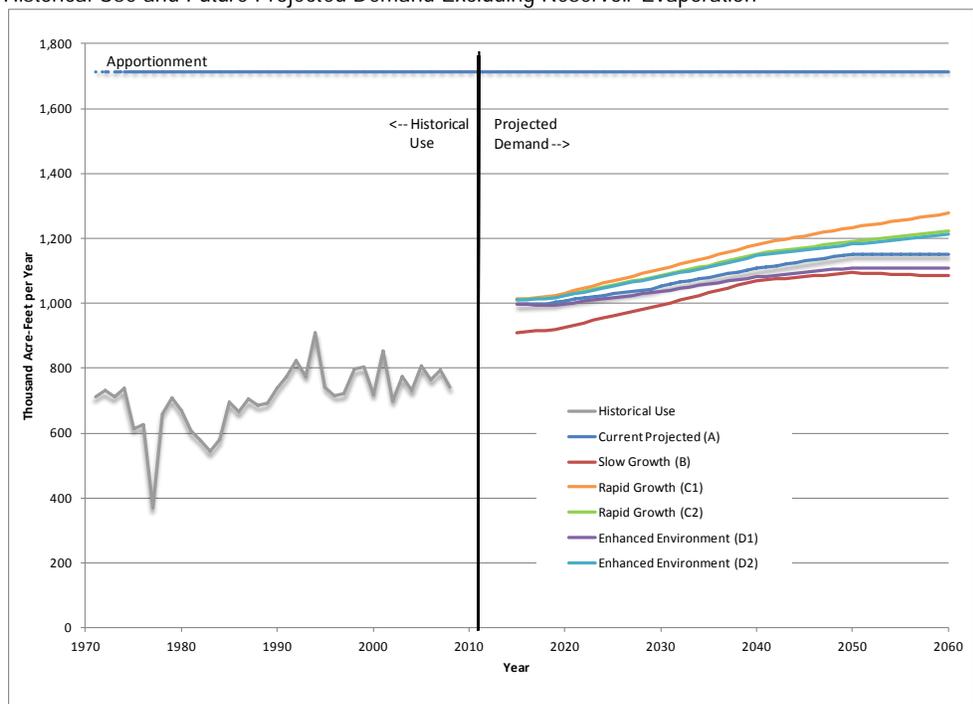


FIGURE C4-3
 Historical Use and Future Projected Demand Excluding Reservoir Evaporation¹



¹Reservoir evaporation on the order of 190 kaf is not included in this plot.

3.2 Colorado River Water Demand by Geography

Colorado River water demand for areas served by the Colorado River is presented in figures C4-4 and C4-5. These figures show two geographic levels: Study Area in Utah, 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.

When demands by category are examined in figure C4-5, the mix of demand categories in the hydrologic basin and adjacent areas are different, with agricultural and tribal demand dominating the hydrologic basin and M&I demand dominating the adjacent areas.

Figure C4-6 shows the change in Colorado River demand by category from 2015 across the scenarios. The change in both magnitude and percentage change of Colorado River demand⁴ in Utah varies considerably across the planning area. The Uintah Basin shows the greatest magnitude, rate, and variability of overall growth in Colorado River demand from 2015 to 2060 across the scenarios, with about 2 and 115 kaf making up between 1 and 66 percent of the total growth in Utah. This growth comes primarily from tribal demands, and is partially offset in some scenarios by a decrease in agricultural demands. Demands for the Kanab Creek/Virgin River planning area are projected to grow by about 74 kaf across all scenarios, with the growth primarily coming from increased population. Demands for the Wasatch Front, which are primarily M&I, have variable changes through time, ranging from a decrease of about 33 kaf (Slow Growth [B] scenario) to an increase of about 90 kaf (Rapid Growth [C1] scenario), while Study Area M&I demand increases across all scenarios in the Wasatch Front (the portion that is Colorado River demand decreases in some scenarios due to changing assumptions of other supplies).

⁴ 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 C4-4
 Colorado River Demand in Utah

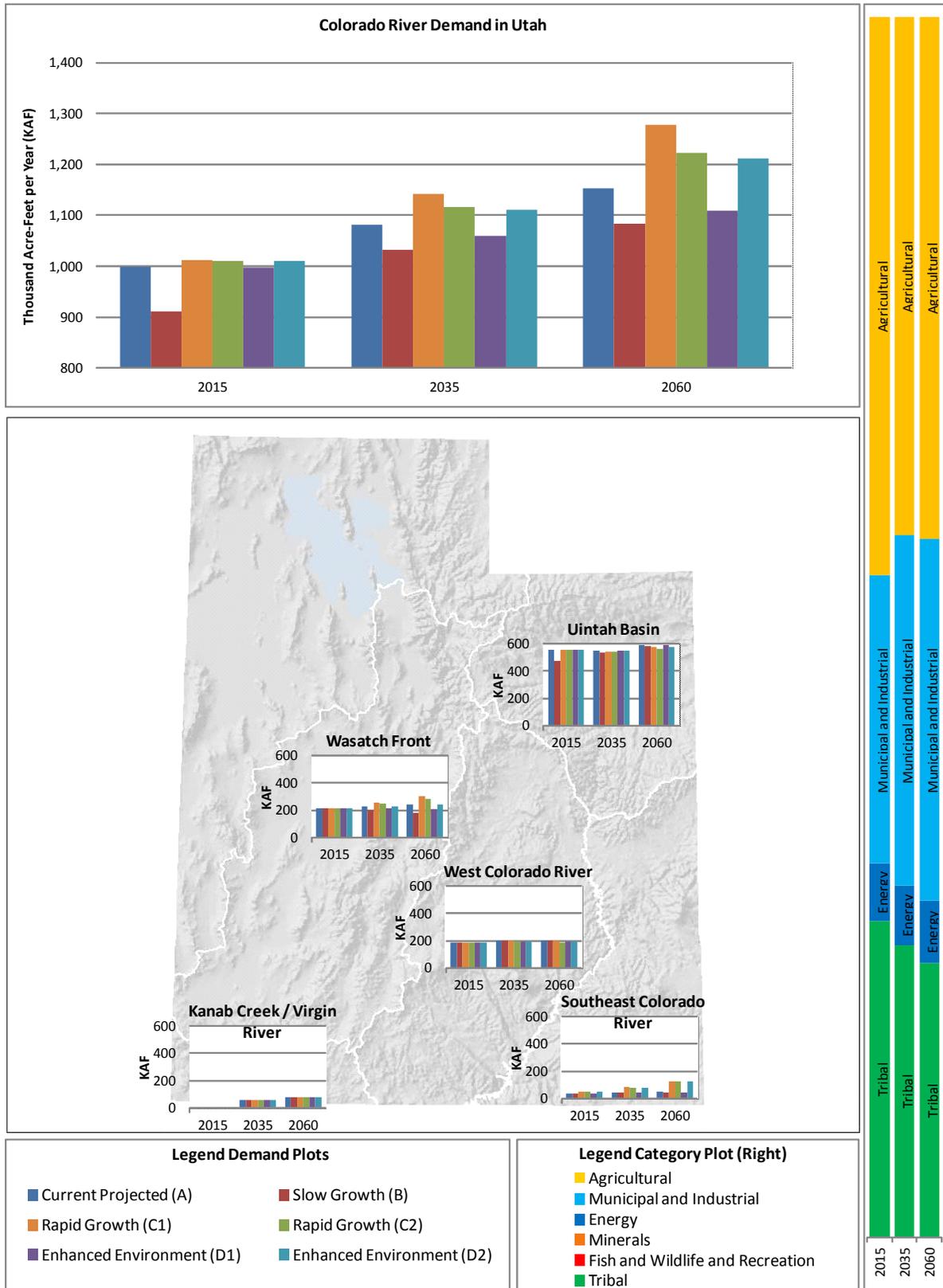


FIGURE C4-5
Colorado River Demand by Category

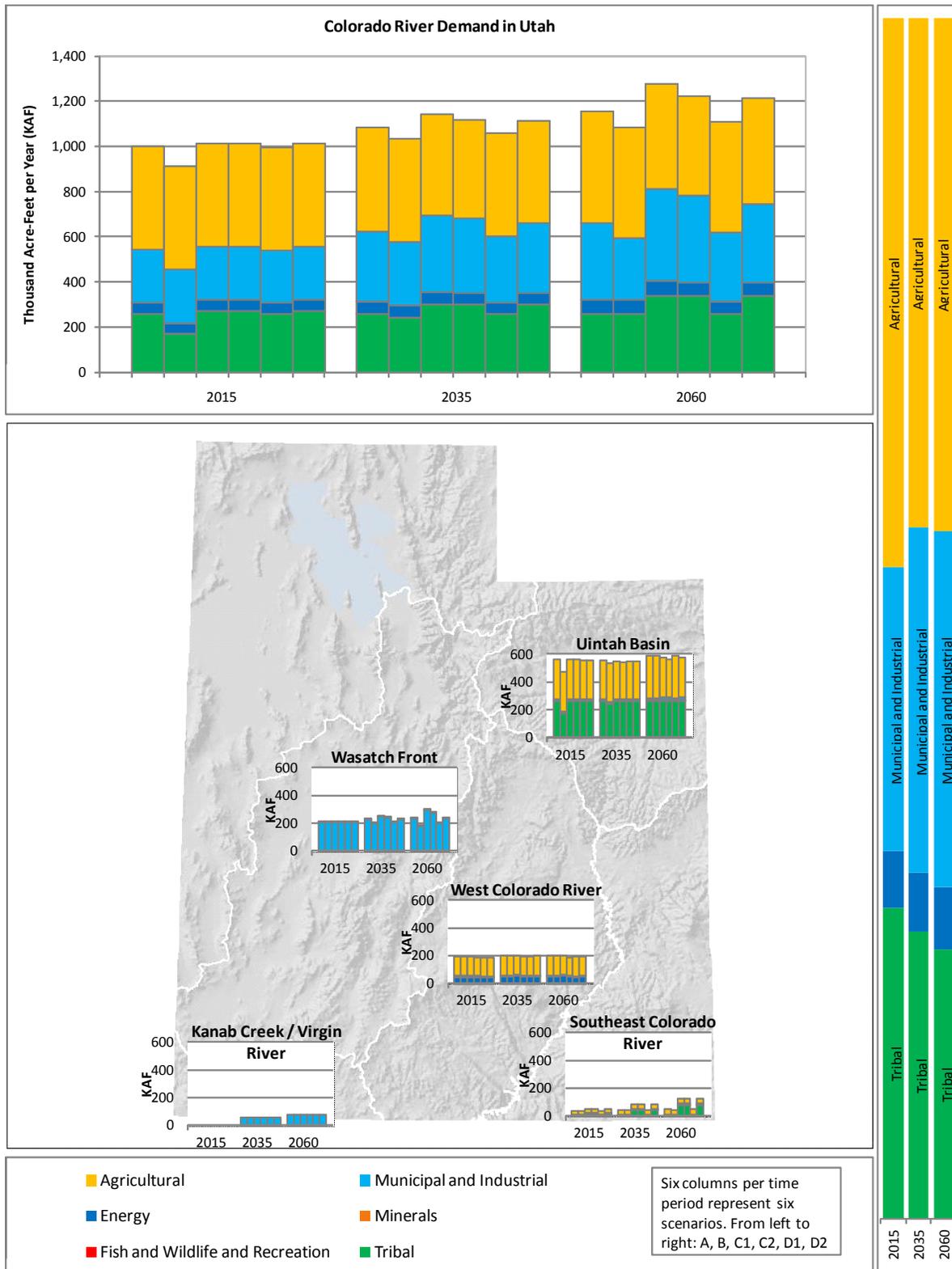
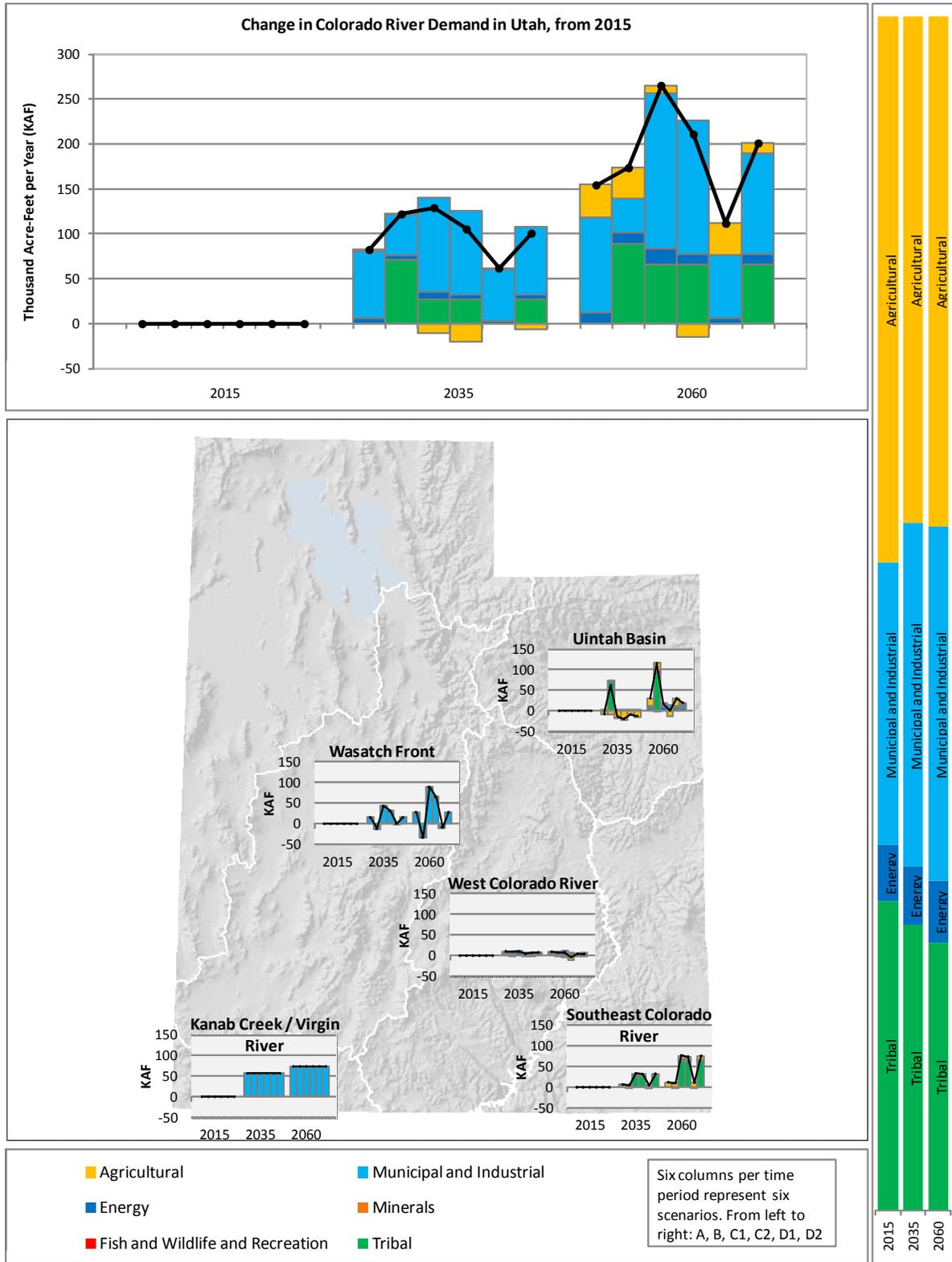


FIGURE C4-6
 Change in Colorado River Demand in Utah from 2015 by Category



3.3 Colorado River Demand by Category

3.3.1 Agricultural

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, and seepage), and on-farm losses that are made up of evaporation, crop irrigation requirements, and tail water (return). Each of these factors will vary by location (precipitation, growing season, etc.), irrigation method, and crop type.

Figure C4-7 presents the following by scenario in 2015, 2035, and 2060:

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

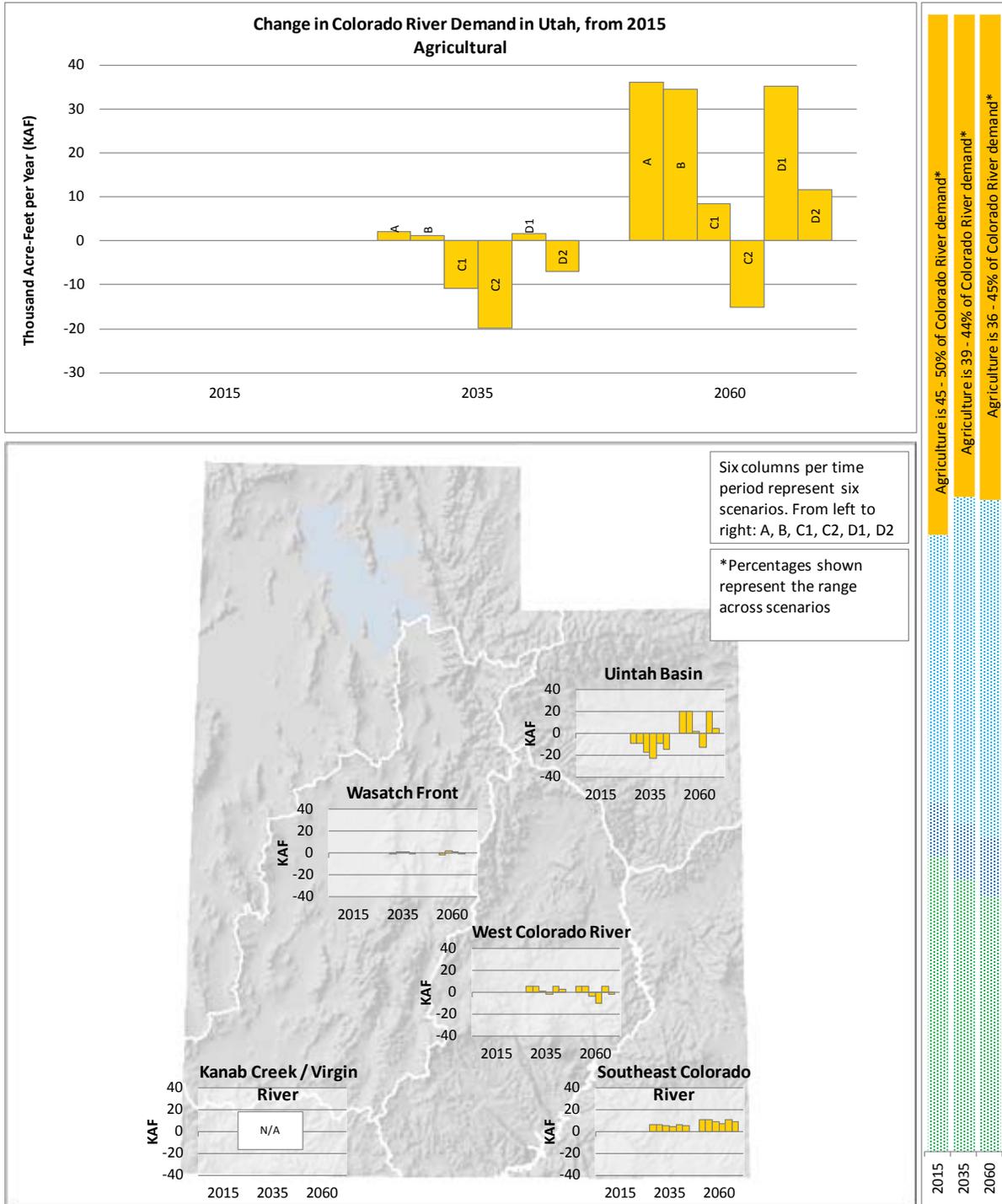
As can be seen from figure C4-7, agricultural water demand is the largest component of Colorado River demand in Utah, dropping from about 50 percent in 2015 to between 36 and 45 percent of demand in 2060, depending on which scenario is considered. This drop results primarily from an increase in other categories of demand; agricultural demand increases or remains the same in all scenarios except the Rapid Growth (C2) scenario, in which it decreases.

For all scenarios, agricultural demand generally increases through time in Uintah and Southeast Colorado River planning areas. Agricultural demand increases or decreases depending on the scenario in the Wasatch Front and West Colorado River planning areas.

The drivers for change in agricultural demand vary across planning areas. Across all scenarios and all planning areas, irrigated acreage is forecast to decrease through time by varying amounts. In the Southeast Basin, the decrease in irrigated acreage is offset by an increase in applied water use, resulting in demand increasing through time across all scenarios. In the Uintah Basin, irrigated acreage increases by varying amounts across the scenarios. Increases in agricultural demand occur in the Current Projected (A), Slow Growth (B), Rapid Growth (C1), and Enhanced Environment (D1 and D2) scenarios due to increases in water delivery per acre. Decreased demand occurs in the Rapid Growth (C2) scenario where both irrigated acreage and water delivery per acre decrease.

A strong driver for loss of agricultural acreage is urbanization, leading to physical loss of acreage and market pressure for transfer of water rights. Increases in water delivery per acre are due to better delivery mechanisms or storage, allowing for more use of water on the same acreage in a given growing season.

FIGURE C4-7
 Change in Colorado River Demand in Utah from 2015 for Agriculture



3.3.2 Municipal and Industrial

M&I water demand can be estimated from population and M&I per capita water use; there is no self-served industrial demand in Utah in the scenarios examined. M&I per capita water 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 water use of a given community, including the amount of industrial demand, climate, number of institutional facilities, and number of visitors.

Figure C4-8 presents the following by scenario in 2015, 2035, and 2060:

- Change in M&I demand for Colorado River water in the Study Area
- Change in 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)

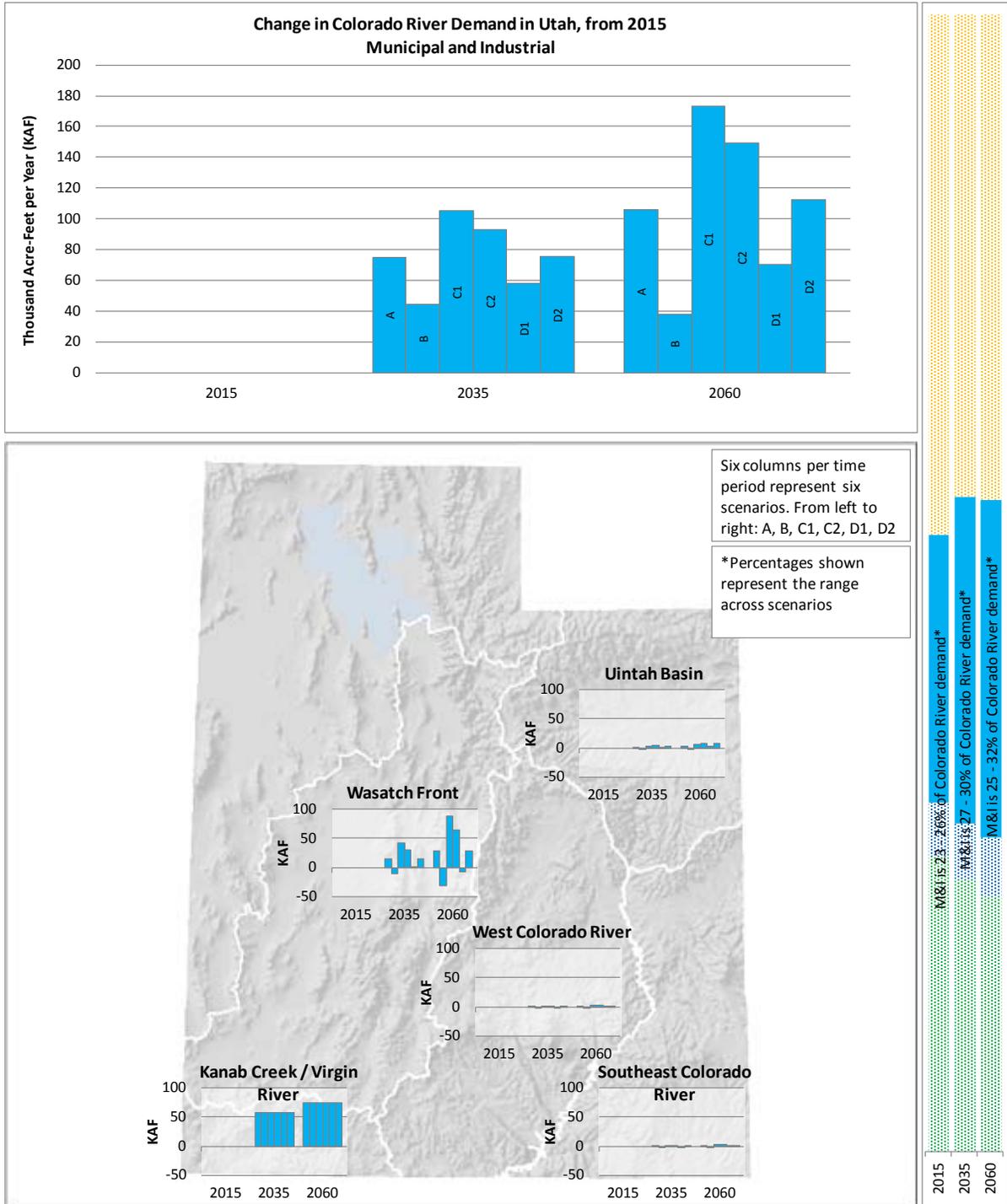
As can be seen from figure C4-8, M&I water demand is the second largest component of Colorado River demand, changing from about 26 percent in 2015 to between 25 and 32 percent of Colorado River demand in 2060, depending on which scenario is considered.

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 M&I per capita water use decreases over time across all scenarios.

In examining the planning areas, the Kanab Creek/Virgin River and Wasatch Front planning areas make up the majority of increase in M&I demand for Colorado River water from 2015 to 2060. In the Kanab Creek/Virgin River planning area, the increase is relatively consistent across scenarios, and is the result primarily of increasing population. In the Wasatch Front planning area, population increases across all scenarios, but changes in assumptions of other supplies results in variable increases, and in some scenarios a decrease, in Colorado River demand.

Increases in population are somewhat tempered by decreases in M&I per capita water use in all scenarios, with reductions ranging from 14 to 25 percent by 2060.

FIGURE C4-8
 Change in Colorado River Demand in Utah 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 and therefore potentially represent exports or imports of water from the Study Area to meet these distributed needs.

Figure C4-9 presents the following by scenario in 2015, 2035, and 2060:

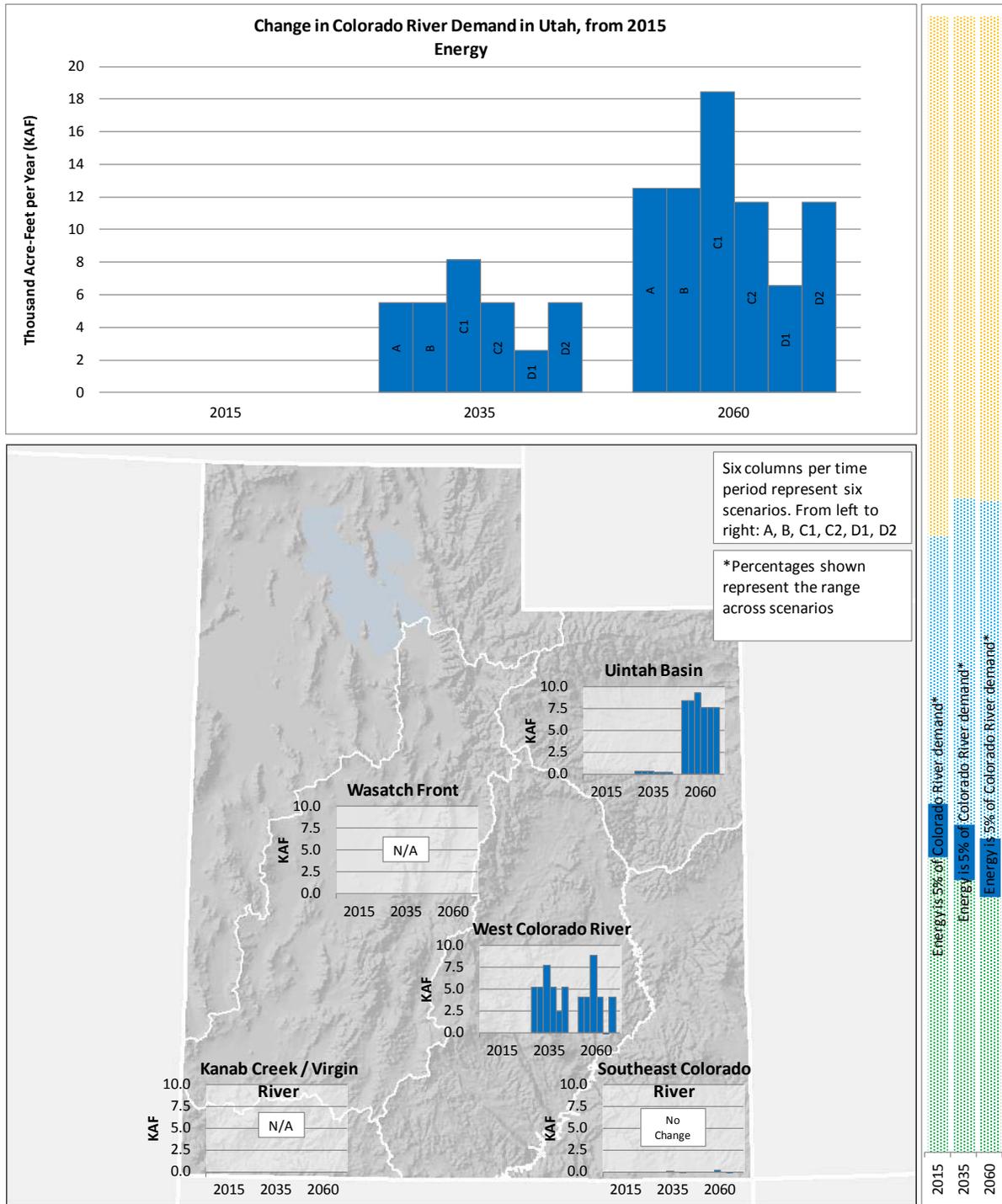
- Change in energy demand for Colorado River water
- Change in energy demand for Colorado River water in individual planning areas
- Energy demand as a portion of Colorado River water demand (right hand side of graph)

As can be seen from figure C4-9, energy water demand is a relatively small fraction of Colorado River demand, making up about 5 percent of Colorado River demand through time, depending on which scenario is considered.

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

Energy demands are shown in the Uintah and West Colorado River planning areas. The Uintah Basin shows relatively consistent increases through time across scenarios of about 8 kaf. The West Colorado River planning area shows increases through time of 4 kaf for all scenarios except the Rapid Growth (C2) scenario, which shows an increase through time of about 9 kaf.

FIGURE C4-9
 Change in Colorado River Demand in Utah from 2015 for Energy



3.3.4 Minerals Extraction

Minerals extraction is included in Utah's estimate of M&I demand discussed above. Utah's State Water Plan (DWR, 2001b), suggests that about 1,000 afy of the M&I demand is for minerals extraction.

3.3.5 Fish, Wildlife, and Recreation

There are no reported consumptive fish, wildlife, and recreation demands on Colorado River water in Utah under the scenarios analyzed for the Study.

3.3.6 Tribal

Tribal water demands were provided by the Ute Indian Tribe of the Uintah and Ouray Reservation and the Navajo Nation. The projected Navajo Nation demands were provided by the Navajo Nation Department of Water Resources and modified to fit the storyline narratives regarding tribal use under each scenario.

Figure C4-10 presents the following by scenario in 2015, 2035, and 2060:

- Change in tribal demand for Colorado River water
- Change in tribal demand for Colorado River water in individual planning area
- Tribal demand as a portion of Colorado River demand (right hand side of graph)

As can be seen from figure C4-10, tribal water demand slightly decreases as a component of Colorado River demand in Utah, from about 27 percent in 2015 to between about 22 and 28 percent of Colorado River demand in 2060, depending on which scenario is considered.

Colorado River tribal demand occurs in the Uintah Basin and Southeast Colorado River planning areas, and increases over time from 2015 to 2060 across all scenarios.

For additional information on tribal demands, see appendix C9.

3.4 Summary Tables of Parameters and Demands by Category

Tables C4-2 to C4-7 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.

FIGURE C4-10
 Change in Colorado River Demand in Utah from 2015 for Tribal

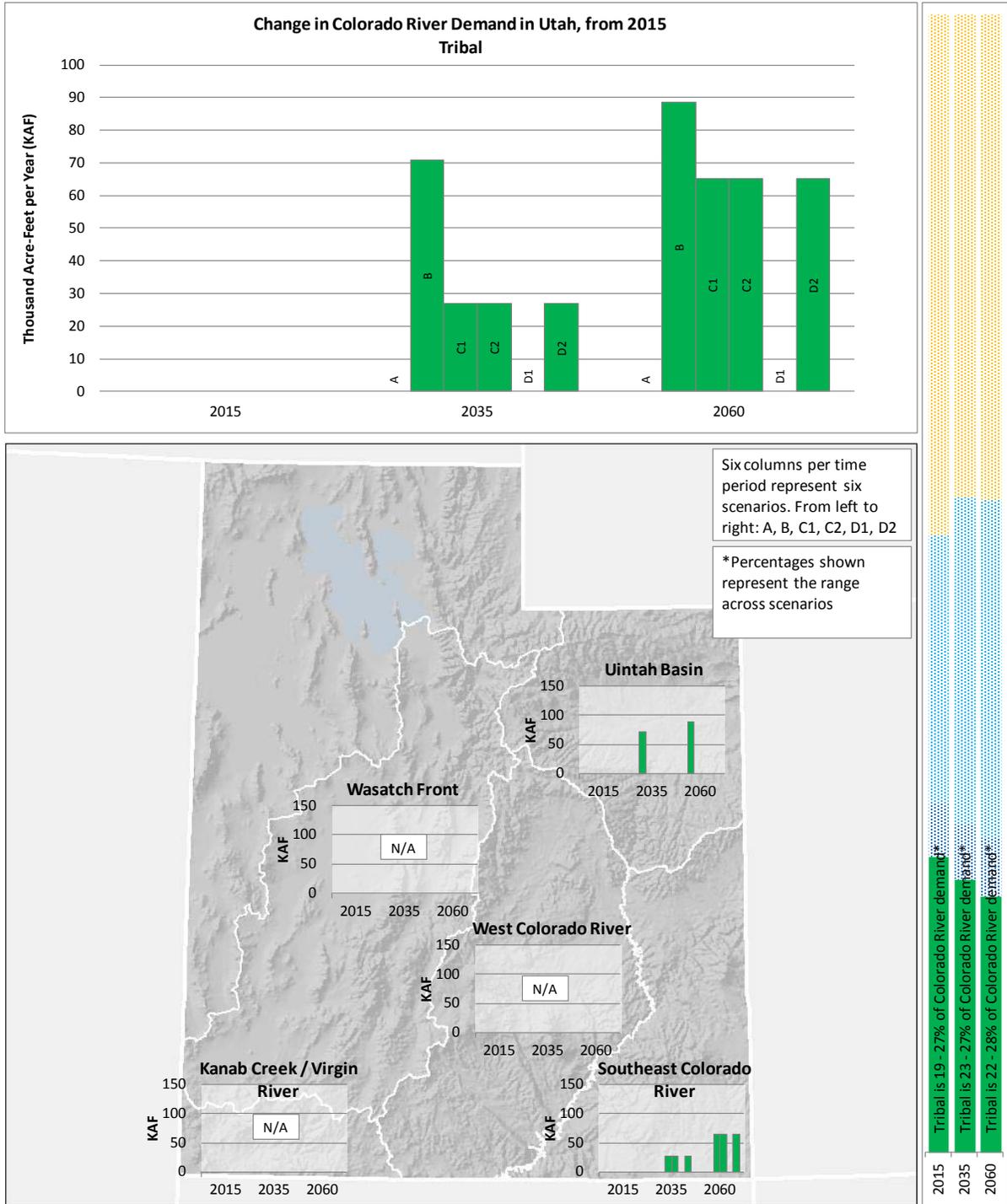


TABLE C4-2
 Total Demand within Study Area under Current Projected (A) Scenario

Hydrologic Basin	Planning Area	Year	Uintah Basin			Southeast Colorado River			West Colorado River			Kanab Creek / Virgin River			Wasatch Front			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	197,922	197,401	196,750	18,501	18,338	18,134	83,453	83,164	82,802	18,867	17,700	14,500				318,743	316,603	312,186	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	2.90	2.82	3.12	2.93	3.61	4.20	3.27	3.41	3.42	4.56	4.36	4.55				3.10	3.10	3.33	2)
	Consumptive factor	%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%				50%	50%	50%	3)
	Demand (Consumptive)	af/yr	287,222	278,095	307,064	27,113	33,113	38,113	136,530	141,680	141,680	43,017	38,569	33,010				493,882	491,457	519,867	3)
Municipal and Industrial	Population		53,223	69,159	89,079	27,304	32,113	38,125	41,966	47,599	54,640	259,870	510,920	824,733				382,363	659,791	1,006,577	4)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	308	265	220	337	315	284	250	229	201	284	240	223				287	246	224	5)
	Consumptive factor	%	73%	73%	73%	56%	56%	56%	69%	69%	69%	44%	44%	44%				52%	50%	48%	6)
	Municipal and Industrial Demand (Consumptive)	af/yr	13,422	15,004	15,996	5,776	6,354	6,804	8,103	8,442	8,500	36,361	60,492	90,656				63,662	90,292	121,956	7), 8)
	Self Served Industrial Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	8)
	Demand (Consumptive)	af/yr	13,422	15,004	15,996	5,776	6,354	6,804	8,103	8,442	8,500	36,361	60,492	90,656				63,662	90,292	121,956	8)
Energy	Demand (Consumptive)	af/yr	0	260	8,464	2,250	2,250	2,250	44,850	50,090	48,886	0	0	0				47,100	52,600	59,600	9)
Minerals	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	10)	
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	11)	
Tribal	Demand (Consumptive)	af/yr	258,943	258,943	258,943	0	0	0	0	0	0	0	0				258,943	258,943	258,943	12)	
Total Hydrologic Basin	Demand (Consumptive)	af/yr	559,587	552,302	590,467	35,139	41,717	47,167	189,483	200,212	199,066	79,378	99,061	123,666	0	0	0	863,587	893,292	960,366	
Adjacent Areas																					
Agricultural	Irrigated Acreage	acres												542,634	514,166	483,680	542,634	514,166	483,680	13)	
	Per-Acre Water Delivery (Diversion)	af/ac/yr												2.85	2.62	2.56	2.85	2.62	2.56	2)	
	Consumptive factor	%												50%	50%	50%	50%	50%	50%	2)	
	Demand (Diversion)	af/yr												1,546,507	1,349,184	1,239,663	1,546,507	1,349,184	1,239,663	14)	
	Demand (Consumptive)	af/yr												773,254	674,592	619,832	773,254	674,592	619,832	15)	
Municipal and Industrial	Population													2,005,507	2,837,444	3,940,593	2,005,507	2,837,444	3,940,593	15)	
	Municipal and Industrial Per Capita Use (Diversion)	gpcd												323	303	285	323	303	285	16)	
	Consumptive factor	%												59%	59%	59%	59%	59%	59%	17)	
	Municipal and Industrial Demand (Diversion)	af/yr												726,114	963,238	1,259,642	726,114	963,238	1,259,642	17)	
	Self Served Industrial Demand (Diversion)	af/yr												0	0	0	0	0	0	18)	
	Demand (Diversion)	af/yr												726,114	963,238	1,259,642	726,114	963,238	1,259,642	18)	
	Demand (Consumptive)	af/yr												428,407	568,310	743,189	428,407	568,310	743,189	18)	
Energy	Demand (Diversion)	af/yr												0	0	0	0	0	0		
Minerals	Demand (Diversion)	af/yr												0	0	0	0	0	0		
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr												0	0	0	0	0	0		
Tribal	Demand (Diversion)	af/yr												0	0	0	0	0	0		
Total Adjacent Areas	Demand (Diversion)	af/yr	0	0	0	0	0	0	0	0	0	0	0	2,272,621	2,312,422	2,499,305	2,272,621	2,312,422	2,499,305		
Total Demand in the Study Area		af/yr	559,587	552,302	590,467	35,139	41,717	47,167	189,483	200,212	199,066	79,378	99,061	123,666	2,272,621	2,312,422	2,499,305	3,136,208	3,205,714	3,459,671	19)
Demand that may be met by Other Supplies		af/yr	0	0	0	0	0	0	0	0	0	79,378	42,061	49,666	2,057,771	2,082,122	2,256,505	2,137,149	2,124,183	2,306,171	20)
Potential Colorado River Demand		af/yr	559,587	552,302	590,467	35,139	41,717	47,167	189,483	200,212	199,066	0	57,000	74,000	214,850	230,300	242,800	999,059	1,081,531	1,153,500	21)
Agricultural	Colorado River Demand	af/yr	287,222	278,095	307,064	27,113	33,113	38,113	136,530	141,680	141,680	0	0	0	6,292	6,292	6,292	457,157	459,180	493,149	22)
Municipal and Industrial	Colorado River Demand	af/yr	13,422	15,004	15,996	5,776	6,354	6,804	8,103	8,442	8,500	0	57,000	74,000	208,558	224,008	236,508	235,859	310,808	341,808	
Energy	Colorado River Demand	af/yr	0	260	8,464	2,250	2,250	2,250	44,850	50,090	48,886	0	0	0	0	0	0	47,100	52,600	59,600	
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tribal	Colorado River Demand	af/yr	258,943	258,943	258,943	0	0	0	0	0	0	0	0	0	0	0	0	258,943	258,943	258,943	

999 From States
 999 Calculated
 999 From State Plans
 999 From Study Team

Source and Comments

- Utah's Water Resources Planning for the Future, 2001. Linear interpolation from 2000, 2020, and 2050 values.
- Utah's Water Resources Planning for the Future, 2001. Estimated based on statewide reported agriculture depletion divided by agriculture water use.
- USBR Colorado River Simulation System (CRSS) Demand Input Tool (DIT), 2011. Water users were delineated into UT basin planning areas based on location relative to CRSS nodes in DIT to obtain depletions. Demands based on Upper Colorado River Commission schedule dated 1/11/08.
- Governor's Office of Planning and Budget, 2008 Baseline Projections. Linear or exponential interpolation (based on better r-squared) from 2010, 2020, 2030, 2040, 2050, and 2060 values.
- Calculated based on depletion, consumptive factor, and population.
- State of Utah Municipal and Industrial Water Supply and Use Studies, Summary, 2005. Consumptive use factor calculated based on reported diversion / depletion (i.e. 20,441/46,483 = 44%)
- Kanab Creek/Virgin - M&I consumptive use calculate from interpolated diversion values and consumptive use percentages derived from State Water Plan.
- USBR CRSS DIT, 2011. Water users were delineated into UT basin planning areas based on location relative to CRSS nodes in DIT to obtain depletions. Demands based on Upper Colorado River Commission schedule dated 1/11/08.
- USBR CRSS DIT, 2011. Water users were delineated into UT basin planning areas based on location relative to CRSS nodes in DIT to obtain depletions. Demands based on Upper Colorado River Commission schedule dated 1/11/08.
- USBR CRSS DIT, 2011. Water users were delineated into UT basin planning areas based on location relative to CRSS nodes in DIT to obtain depletions. Demands based on Upper Colorado River Commission schedule dated 1/11/08.
- USBR CRSS DIT, 2011. Water users were delineated into UT basin planning areas based on location relative to CRSS nodes in DIT to obtain depletions. Demands based on Upper Colorado River Commission schedule dated 1/11/08.
- Utah: personal communication, Ute Indian Tribe of the Uintah and Ouray Reservation, April 16, 2012.
- Utah's Water Resources Planning for the Future, 2001. Linear interpolation from 2000, 2020, and 2050 values.
- Utah's Water Resources Planning for the Future, 2001. Linearly interpolated from 2000, 2020, and 2050 diversion values.
- Governor's Office of Planning and Budget, 2008 Baseline Projections. Linear or exponential interpolation (based on better r-squared) from 2010, 2020, 2030, 2040, 2050, and 2060 values.
- Calculated based on diversion and population.
- State of Utah Municipal and Industrial Water Supply and Use Studies, Summary, 2005. Consumptive use factor calculated based on reported diversion / depletion.
- Utah's Water Resources Planning for the Future, 2001. Linear interpolation from 2000, 2020, and 2050 diversion.
- Calculated from the sum of Hydrologic Basin (Consumptive) Demand and Adjacent Areas (Diversion) Demand.
- Values input by study team based on DIT and State reports. For Wasatch Front and Kanab/Virgin, values calculated as the difference in Study Area Demand and Potential Colorado River Demand.
- USBR CRSS DIT, 2011, agriculture water use export plus municipal water use export in DIT (considered 100% depletion for CRB).
- For Kanab/Virgin, all Potential Colorado River Demand is M&I (LP pipeline). For Wasatch Front, all Potential Colorado River Demand is M&I, except for one AG export. M&I is computed as total export minus AG user schedule.

TABLE C4-3
Total Demand within Study Area under Slow Growth (B) Scenario

Hydrologic Basin	Planning Area	UTAH			Southeast Colorado River			West Colorado River			Kanab Creek / Virgin River			Wasatch Front			STATE TOTAL			Source and comments	
		Year	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035		2060
Agriculture	Irrigated Acreage	acres	197,922	197,401	196,750	18,501	18,338	18,134	83,453	83,164	82,802	18,867	17,700	14,500				318,743	316,603	312,186	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	2.90	2.82	3.12	2.93	3.61	4.20	3.27	3.41	3.42	4.56	4.36	4.55				3.10	3.10	3.33	2)
	Consumptive factor	%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%				50%	50%	50%	
	Demand (Consumptive)	af/yr	287,222	278,095	307,064	27,113	33,113	38,113	136,530	141,680	141,680	43,017	38,569	33,010				493,882	491,457	519,867	
Municipal and Industrial	Population		53,223	60,860	66,809	27,304	28,259	28,594	41,966	41,887	40,980	259,870	449,610	618,550				382,363	580,616	754,933	3)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	308	265	220	337	315	284	250	229	201	284	240	223				287	246	224	4)
	Consumptive factor	%	73%	73%	73%	56%	56%	56%	69%	69%	69%	44%	44%	44%				52%	50%	48%	
	Municipal and Industrial Demand (Consumptive)	af/yr	13,422	13,204	11,997	5,776	5,592	5,103	8,103	7,429	6,375	36,361	53,233	67,992				63,662	79,457	91,467	
	Self Served Industrial Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	5)	
	Demand (Consumptive)	af/yr	13,422	13,204	11,997	5,776	5,592	5,103	8,103	7,429	6,375	36,361	53,233	67,992				63,662	79,457	91,467	
Energy	Demand (Consumptive)	af/yr	0	260	8,464	2,250	2,250	2,250	44,850	50,090	48,886	0	0	0				47,100	52,600	59,600	6)
Minerals	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	7)	
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	8)	
Tribal	Demand (Consumptive)	af/yr	170,450	241,246	258,943	0	0	0	0	0	0	0	0				170,450	241,246	258,943	9)	
Total Hydrologic Basin	Demand (Consumptive)	af/yr	471,094	532,805	586,468	35,139	40,955	45,466	189,483	199,199	196,941	79,378	91,802	101,002	0	0	0	775,094	864,760	929,877	
Adjacent Areas																					
Agriculture	Irrigated Acreage	acres																542,634	514,166	483,680	10)
	Per-Acre Water Delivery (Diversion)	af/ac/yr																2.85	2.68	2.69	11)
	Consumptive factor	%																50%	50%	50%	
	Demand (Diversion)	af/yr																1,546,507	1,376,168	1,301,646	
	Demand (Consumptive)	af/yr																773,254	688,084	650,823	
Municipal and Industrial	Population																	2,005,507	2,496,951	2,955,445	12)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd																323	303	285	13)
	Consumptive factor	%																59%	59%	59%	
	Municipal and Industrial Demand (Diversion)	af/yr																726,114	847,649	944,732	
	Self Served Industrial Demand (Diversion)	af/yr																0	0	0	14)
	Demand (Diversion)	af/yr																726,114	847,649	944,732	
	Demand (Consumptive)	af/yr																428,407	500,113	557,392	
Energy	Demand (Diversion)	af/yr																0	0	0	15)
Minerals	Demand (Diversion)	af/yr																0	0	0	16)
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr																0	0	0	17)
Tribal	Demand (Diversion)	af/yr																0	0	0	18)
Total Adjacent Areas	Demand (Diversion)	af/yr	0	0	0	0	0	0	0	0	0	0	0	2,272,621	2,223,817	2,246,378	2,272,621	2,223,817	2,246,378		
Total Demand in the Study Area		af/yr	471,094	532,805	586,468	35,139	40,955	45,466	189,483	199,199	196,941	79,378	91,802	101,002	2,272,621	2,223,817	2,246,378	3,047,715	3,088,577	3,176,255	
Demand that may be met by Other Supplies		af/yr	0	0	0	0	0	0	0	0	0	79,378	34,802	27,002	2,057,771	2,021,000	2,065,000	2,137,149	2,055,802	2,092,002	19)
Potential Colorado River Demand		af/yr	471,094	532,805	586,468	35,139	40,955	45,466	189,483	199,199	196,941	0	57,000	74,000	214,850	202,817	181,378	910,566	1,032,775	1,084,253	
Agricultural	Colorado River Demand	af/yr	287,222	278,095	307,064	27,113	33,113	38,113	136,530	141,680	141,680	0	0	0	6,292	5,542	4,701	457,157	458,430	491,558	20)
Municipal and Industrial	Colorado River Demand	af/yr	13,422	13,204	11,997	5,776	5,592	5,103	8,103	7,429	6,375	0	57,000	74,000	208,558	197,276	176,677	235,859	280,500	274,152	
Energy	Colorado River Demand	af/yr	0	260	8,464	2,250	2,250	2,250	44,850	50,090	48,886	0	0	0	0	0	0	47,100	52,600	59,600	
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tribal	Colorado River Demand	af/yr	170,450	241,246	258,943	0	0	0	0	0	0	0	0	0	0	0	0	170,450	241,246	258,943	

Source and Comments

- 1) No changes from current projected
- 2) No changes from current projected per the regional trends matrix
- 3) A 25% population decrease from current projected by 2060 was estimated based on regional trends (per census data)
- 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) USBR Colorado River Simulation System (CRSS) Demand Input Tool (DIT), 2011. Water users were delineated into UT basin planning areas based on location relative to CRSS nodes in DIT to obtain depletions. Demands based on Upper Colorado River Commission schedule dated 1/11/08.
- 10) No changes from current projected
- 11) A two percent increase in 2035 and a five percent increase in 2060 from current projected was used per the regional trends matrix
- 12) A 25% population decrease from current projected by 2060 was estimated based on regional trends (per census data)
- 13) No changes from current projected
- 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) Assume other sources are unchanged from current projected
- 20) For Kanab/Virgin, all Potential Colorado River Demand is M&I (LP pipeline). For Wasatch Front, all Potential Colorado River Demand is M&I, except for one AG export. M&I is computed as total export minus AG user schedule.

TABLE C4-4
 Total Demand within Study Area under Rapid Growth (C1) Scenario

Hydrologic Basin	Planning Area	Year	UTAH			Southeast Colorado River			West Colorado River			Kanab Creek / Virgin River			Wasatch Front			STATE TOTAL			Source and comments
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agriculture	Irrigated Acreage	acres	197,922	191,479	184,945	18,501	17,788	17,046	83,453	80,669	77,834	18,867	17,169	13,630				318,743	307,105	293,455	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	2.90	2.82	3.12	2.93	3.61	4.20	3.27	3.41	3.42	4.56	4.36	4.55				3.10	3.10	3.33	2)
	Consumptive factor	%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%				50%	50%	50%	
	Demand (Consumptive)	af/yr	287,222	269,752	288,640	27,113	32,120	35,826	136,530	137,430	133,179	43,017	37,412	31,029				493,882	476,713	488,675	
Municipal and Industrial	Population		53,223	77,458	111,349	27,304	35,967	47,656	41,966	53,311	68,300	259,870	572,230	1,030,916				382,363	738,966	1,258,221	3)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	308	265	220	337	315	284	250	229	201	284	240	223				287	246	224	4)
	Consumptive factor	%	73%	73%	73%	56%	56%	56%	69%	69%	69%	44%	44%	44%				52%	50%	48%	
	Municipal and Industrial Demand (Consumptive)	af/yr	13,422	16,804	19,995	5,776	7,116	8,505	8,103	9,455	10,625	36,361	67,751	113,320				63,662	101,127	152,445	
	Self Served Industrial Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	5)
Demand (Consumptive)	af/yr	13,422	16,804	19,995	5,776	7,116	8,505	8,103	9,455	10,625	36,361	67,751	113,320				63,662	101,127	152,445		
Energy	Demand (Consumptive)	af/yr	0	273	9,310	2,250	2,363	2,475	44,850	52,595	53,775	0	0	0				47,100	55,230	65,560	6)
Minerals	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	7)	
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	8)	
Tribal	Demand (Consumptive)	af/yr	258,943	258,943	258,943	13,102	39,938	78,346	0	0	0	0	0	0				272,045	298,881	337,289	9)
Total Hydrologic Basin	Demand (Consumptive)	af/yr	559,587	545,773	576,889	48,241	81,537	125,152	189,483	199,479	197,579	79,378	105,163	144,349	0	0	0	876,689	931,951	1,043,969	
Adjacent Areas																					
Agriculture	Irrigated Acreage	acres															542,634	498,741	454,659	10)	
	Per-Acre Water Delivery (Diversion)	af/ac/yr															2.85	2.62	2.56	11)	
	Consumptive factor	%															50%	50%	50%		
	Demand (Diversion)	af/yr															1,546,507	1,308,708	1,165,283		
Demand (Consumptive)	af/yr																773,254	654,354	582,642		
Municipal and Industrial	Population																2,005,507	3,177,937	4,925,741	12)	
	Municipal and Industrial Per Capita Use (Diversion)	gpcd															323	303	285	13)	
	Consumptive factor	%															59%	59%	59%		
	Municipal and Industrial Demand (Diversion)	af/yr															726,114	1,078,827	1,574,553		
	Self Served Industrial Demand (Diversion)	af/yr															0	0	0	14)	
Demand (Diversion)	af/yr															726,114	1,078,827	1,574,553			
Demand (Consumptive)	af/yr															428,407	636,508	928,986			
Energy	Demand (Diversion)	af/yr															0	0	0	15)	
Minerals	Demand (Diversion)	af/yr															0	0	0	16)	
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr															0	0	0	17)	
Tribal	Demand (Diversion)	af/yr															0	0	0	18)	
Total Adjacent Areas	Demand (Diversion)	af/yr	0	0	0	0	0	0	0	0	0	0	0	2,272,621	2,387,535	2,739,836	2,272,621	2,387,535	2,739,836		
Total Demand in the Study Area		af/yr	559,587	545,773	576,889	48,241	81,537	125,152	189,483	199,479	197,579	79,378	105,163	144,349	2,272,621	2,387,535	2,739,836	3,149,310	3,319,486	3,783,805	
Demand that may be met by Other Supplies		af/yr	0	0	0	0	0	0	0	0	0	79,378	48,163	70,349	2,057,771	2,130,000	2,436,000	2,137,149	2,178,163	2,506,349	19)
Potential Colorado River Demand		af/yr	559,587	545,773	576,889	48,241	81,537	125,152	189,483	199,479	197,579	0	57,000	74,000	214,850	257,535	303,836	1,012,161	1,141,323	1,277,455	
Agricultural	Colorado River Demand	af/yr	287,222	269,752	288,640	27,113	32,120	35,826	136,530	137,430	133,179	0	0	0	6,292	7,037	7,874	457,157	446,338	465,520	20)
Municipal and Industrial	Colorado River Demand	af/yr	13,422	16,804	19,995	5,776	7,116	8,505	8,103	9,455	10,625	0	57,000	74,000	208,558	250,498	295,961	235,859	340,874	409,086	
Energy	Colorado River Demand	af/yr	0	273	9,310	2,250	2,363	2,475	44,850	52,595	53,775	0	0	0	0	0	0	47,100	55,230	65,560	
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tribal	Colorado River Demand	af/yr	258,943	258,943	258,943	13,102	39,938	78,346	0	0	0	0	0	0	0	0	0	272,045	298,881	337,289	

Source and Comments

- 1) Estimates are within regional trends range, but less than twice the passive (CPs) rate
- 2) No changes from current projected
- 3) A 25% population increase from current projected by 2060 was estimated based on regional trends (per census data)
- 4) No changes from current projected
- 5) No changes from current projected
- 6) Assume 10% increase relative to current projected by 2060. Increased demand is not offset by new technology.
- 7) No changes from current projected
- 8) No changes from current projected
- 9) Uintah: No changes from current projected; Southeast Colorado: personal communication, Navajo Nation, Apr. 16, 2012
- 10) Estimates are within regional trends range, but less than twice the passive (CPs) rate
- 11) No changes from current projected
- 12) A 25% population increase from current projected by 2060 was estimated based on regional trends (per census data)
- 13) No changes from current projected
- 14) No changes from current projected
- 15) Assume 10% increased demand from current projected by 2060 is not offset by new technology
- 16) No changes from current projected
- 17) No changes from current projected
- 18) No changes from current projected
- 19) Assume other sources are unchanged from current projected
- 20) For Kanab/Virgin, all Potential Colorado River Demand is M&I (LP pipeline). For Wasatch Front, all Potential Colorado River Demand is M&I, except for one AG export. M&I is computed as total export minus AG user schedule.

TABLE C4-5
Total Demand within Study Area under Rapid Growth (C2) Scenario

Hydrologic Basin	Planning Area	Year	UTAH			Southeast Colorado River			West Colorado River			Kanab Creek / Virgin River			Wasatch Front			STATE TOTAL			Source and comments
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agriculture	Irrigated Acreage	acres	197,922	191,479	184,945	18,501	17,788	17,046	83,453	80,669	77,834	18,867	17,169	13,630				318,743	307,105	293,455	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	2.90	2.76	2.97	2.93	3.54	3.99	3.27	3.34	3.25	4.56	4.27	4.33				3.10	3.04	3.16	2)
	Consumptive Factor	%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%				50%	50%	50%	
	Demand (Consumptive)	af/yr	287,222	264,357	274,208	27,113	31,477	34,035	136,530	134,681	126,520	43,017	36,664	29,478				493,882	467,179	464,241	
Municipal and Industrial	Population		53,223	77,458	111,349	27,304	35,967	47,656	41,966	53,311	68,300	259,870	572,230	1,030,916				382,363	738,966	1,258,221	3)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	301	263	220	325	284	258	234	204	186	284	240	223				284	242	222	4)
	Consumptive factor	%	73%	73%	73%	56%	56%	56%	69%	69%	69%	44%	44%	44%				52%	50%	48%	
	Municipal and Industrial Demand (Consumptive)	af/yr	13,086	16,636	19,995	5,562	6,419	7,706	7,584	8,415	9,796	36,361	67,751	113,320				62,594	99,222	150,817	
	Self Served Industrial Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	5)
	Demand (Consumptive)	af/yr	13,086	16,636	19,995	5,562	6,419	7,706	7,584	8,415	9,796	36,361	67,751	113,320				62,594	99,222	150,817	
Energy	Demand (Consumptive)	af/yr	0	247	7,618	2,250	2,250	2,250	44,850	50,090	48,886	0	0	0				47,100	52,587	58,754	6a), 6b)
Minerals	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	7)
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	8)
Tribal	Demand (Consumptive)	af/yr	258,943	258,943	258,943	13,102	39,938	78,346	0	0	0	0	0	0				272,045	298,881	337,289	9)
Total Hydrologic Basin	Demand (Consumptive)	af/yr	559,251	540,184	560,764	48,027	80,084	122,336	188,964	193,186	185,202	79,378	104,415	142,798	0	0	0	875,621	917,869	1,011,100	
Adjacent Areas																					
Agriculture	Irrigated Acreage	acres													542,634	498,741	454,659	542,634	498,741	454,659	10)
	Per-Acre Water Delivery (Diversion)	af/ac/yr													2.85	2.41	2.05	2.85	2.41	2.05	11)
	Consumptive factor	%													50%	50%	50%	50%	50%	50%	
	Demand (Diversion)	af/yr													1,546,507	1,204,012	932,227	1,546,507	1,204,012	932,227	
	Demand (Consumptive)	af/yr													773,254	602,006	466,113	773,254	602,006	466,113	
Municipal and Industrial	Population														2,005,507	3,177,937	4,925,741	2,005,507	3,177,937	4,925,741	12)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd													311	273	247	311	273	247	13)
	Consumptive factor	%													59%	59%	59%	59%	59%	59%	
	Municipal and Industrial Demand (Diversion)	af/yr													699,248	972,023	1,363,562	699,248	972,023	1,363,562	
	Self Served Industrial Demand (Diversion)	af/yr													0	0	0	0	0	0	14)
	Demand (Diversion)	af/yr													699,248	972,023	1,363,562	699,248	972,023	1,363,562	
	Demand (Consumptive)	af/yr													412,556	573,493	804,502	412,556	573,493	804,502	
Energy	Demand (Diversion)	af/yr													0	0	0	0	0	0	15)
Minerals	Demand (Diversion)	af/yr													0	0	0	0	0	0	16)
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr													0	0	0	0	0	0	17)
Tribal	Demand (Diversion)	af/yr													0	0	0	0	0	0	18)
Total Adjacent Areas	Demand (Diversion)	af/yr	0	0	0	0	0	0	0	0	0	0	0	0	2,245,755	2,176,035	2,295,789	2,245,755	2,176,035	2,295,789	
Total Demand in the Study Area		af/yr	559,251	540,184	560,764	48,027	80,084	122,336	188,964	193,186	185,202	79,378	104,415	142,798	2,245,755	2,176,035	2,295,789	3,121,376	3,093,903	3,306,889	
Demand that may be met by Other Supplies		af/yr	0	0	0	0	0	0	0	0	0	79,378	47,415	68,798	2,030,905	1,930,000	2,016,000	2,110,283	1,977,415	2,084,798	19)
Potential Colorado River Demand		af/yr	559,251	540,184	560,764	48,027	80,084	122,336	188,964	193,186	185,202	0	57,000	74,000	214,850	246,035	279,789	1,011,093	1,116,488	1,222,092	
Agricultural	Colorado River Demand	af/yr	287,222	264,357	274,208	27,113	31,477	34,035	136,530	134,681	126,520	0	0	0	6,292	6,722	7,251	457,157	437,238	442,014	20)
Municipal and Industrial	Colorado River Demand	af/yr	13,086	16,636	19,995	5,562	6,419	7,706	7,584	8,415	9,796	0	57,000	74,000	208,558	239,312	272,538	234,791	327,783	384,035	
Energy	Colorado River Demand	af/yr	0	247	7,618	2,250	2,250	2,250	44,850	50,090	48,886	0	0	0	0	0	0	47,100	52,587	58,754	
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tribal	Colorado River Demand	af/yr	258,943	258,943	258,943	13,102	39,938	78,346	0	0	0	0	0	0	0	0	0	272,045	298,881	337,289	

Source and Comments

- 1) Estimates are within regional trends range, but less than twice the passive (CPs) rate
- 2) Five percent decrease from current projected by 2060 based on regional trends matrix
- 3) A 25% population increase from current projected by 2060 was estimated based on regional trends (per census data)
- 4) Assume 12.5% reduction in 2020 and 25% reduction by 2050 (relative to actual 2011 use) and stable trends after 2050
- 5) No changes from current projected
- 6a) Uintah Basin: Assume 10% decreased demand from current projected by 2060 due to new technology
- 6b) Assume increased demand from current projected is offset by new technology in the Southeast Colorado River and West Colorado River planning areas
- 7) No changes from current projected
- 8) No changes from current projected
- 9) Uintah: No changes from current projected; Southeast Colorado: personal communication, Navajo Nation, Apr. 16, 2012
- 10) Estimates are within regional trends range, but less than twice the passive (CPs) rate
- 11) Twenty percent decrease from current projected by 2060 based on regional trends matrix
- 12) A 25% population increase from current projected by 2060 was estimated based on regional trends (per census data)
- 13) Assume 12.5% reduction in 2020 and 25% reduction by 2050 (relative to actual 2011 use) and stable trends after 2050
- 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) Assume other sources are unchanged from current projected
- 20) For Kanab/Virgin, all Potential Colorado River Demand is M&I (LP pipeline). For Wasatch Front, all Potential Colorado River Demand is M&I, except for one AG export. M&I is computed as total export minus AG user schedule.

TABLE C4-6
 Total Demand within Study Area under Enhanced Environment (D1) Scenario

Hydrologic Basin	Planning Area	Year	UTAH			Southeast Colorado River			West Colorado River			Kanab Creek / Virgin River			Wasatch Front			STATE TOTAL			Source and comments
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agriculture	Irrigated Acreage	acres	197,922	197,401	196,750	18,501	18,338	18,134	83,453	83,164	82,802	18,867	17,700	14,500				318,743	316,603	312,186	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	2.90	2.82	3.12	2.93	3.61	4.20	3.27	3.41	3.42	4.56	4.36	4.55				3.10	3.10	3.33	2)
	Consumptive Factor	%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%				50%	50%	50%	
	Demand (Consumptive)	af/yr	287,222	278,095	307,064	27,113	33,113	38,113	136,530	141,680	141,680	43,017	38,569	33,010				493,882	491,457	519,867	
Municipal and Industrial	Population		53,223	69,159	89,079	27,304	32,113	38,125	41,966	47,599	54,640	259,870	510,920	824,733				382,363	659,791	1,006,577	3)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	293	239	220	316	258	245	227	185	176	281	229	217				279	228	216	4)
	Consumptive factor	%	73%	73%	73%	56%	56%	56%	69%	69%	69%	44%	44%	44%				51%	49%	48%	
	Municipal and Industrial Demand (Consumptive)	af/yr	12,751	13,504	15,996	5,412	5,191	5,858	7,374	6,821	7,438	35,961	57,649	88,389				61,498	83,165	117,681	
	Self Served Industrial Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	5)
Demand (Consumptive)	af/yr	12,751	13,504	15,996	5,412	5,191	5,858	7,374	6,821	7,438	35,961	57,649	88,389				61,498	83,165	117,681		
Energy	Demand (Consumptive)	af/yr	0	247	7,618	2,250	2,124	2,025	44,850	47,285	43,997	0	0	0				47,100	49,656	53,640	6a), 6b)
Minerals	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	7)	
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	8)	
Tribal	Demand (Consumptive)	af/yr	258,943	258,943	258,943	0	0	0	0	0	0	0	0	0				258,943	258,943	258,943	9)
Total Hydrologic Basin	Demand (Consumptive)	af/yr	558,916	550,789	589,621	34,775	40,428	45,996	188,754	195,786	193,115	78,978	96,218	121,399	0	0	0	861,422	883,221	950,131	
Adjacent Areas																					
Agriculture	Irrigated Acreage	acres												542,634	514,166	483,680	542,634	514,166	483,680	10)	
	Per-Acre Water Delivery (Diversion)	af/ac/yr												2.85	2.62	2.56	2.85	2.62	2.56	11)	
	Consumptive factor	%												50%	50%	50%	50%	50%	50%		
	Demand (Diversion)	af/yr													1,546,507	1,349,184	1,239,663	1,546,507	1,349,184	1,239,663	
Demand (Consumptive)	af/yr													773,254	674,592	619,832	773,254	674,592	619,832		
Municipal and Industrial	Population													2,005,507	2,837,444	3,940,593	2,005,507	2,837,444	3,940,593	12)	
	Municipal and Industrial Per Capita Use (Diversion)	gpcd												303	247	235	303	247	235	13)	
	Consumptive factor	%												59%	59%	59%	59%	59%	59%		
	Municipal and Industrial Demand (Diversion)	af/yr													681,095	785,039	1,036,685	681,095	785,039	1,036,685	
	Self Served Industrial Demand (Diversion)	af/yr													0	0	0	0	0	0	14)
Demand (Diversion)	af/yr													681,095	785,039	1,036,685	681,095	785,039	1,036,685		
Demand (Consumptive)	af/yr													401,846	463,173	611,644	401,846	463,173	611,644		
Energy	Demand (Diversion)	af/yr												0	0	0	0	0	0	15)	
Minerals	Demand (Diversion)	af/yr												0	0	0	0	0	0	16)	
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr												0	0	0	0	0	0	17)	
Tribal	Demand (Diversion)	af/yr												0	0	0	0	0	0	18)	
Total Adjacent Areas	Demand (Diversion)	af/yr	0	0	0	0	0	0	0	0	0	0	0	2,227,602	2,134,223	2,276,348	2,227,602	2,134,223	2,276,348		
Total Demand in the Study Area		af/yr	558,916	550,789	589,621	34,775	40,428	45,996	188,754	195,786	193,115	78,978	96,218	121,399	2,227,602	2,134,223	2,276,348	3,089,024	3,017,444	3,226,479	
Demand that may be met by Other Supplies		af/yr	0	0	0	0	0	0	0	0	0	78,978	39,218	47,399	2,012,752	1,919,000	2,070,000	2,091,730	1,958,218	2,117,399	19)
Potential Colorado River Demand		af/yr	558,916	550,789	589,621	34,775	40,428	45,996	188,754	195,786	193,115	0	57,000	74,000	214,850	215,223	206,348	997,295	1,059,226	1,109,080	
Agricultural	Colorado River Demand	af/yr	287,222	278,095	307,064	27,113	33,113	38,113	136,530	141,680	141,680	0	0	0	6,292	5,880	5,348	457,157	458,768	492,205	20)
Municipal and Industrial	Colorado River Demand	af/yr	12,751	13,504	15,996	5,412	5,191	5,858	7,374	6,821	7,438	0	57,000	74,000	208,558	209,343	201,001	234,094	291,859	304,292	
Energy	Colorado River Demand	af/yr	0	247	7,618	2,250	2,124	2,025	44,850	47,285	43,997	0	0	0	0	0	0	47,100	49,656	53,640	
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tribal	Colorado River Demand	af/yr	258,943	258,943	258,943	0	0	0	0	0	0	0	0	0	0	0	0	258,943	258,943	258,943	

Source and Comments

- 1) No changes from current projected
- 2) No changes from current projected
- 3) No changes from current projected
- 4) Assume 16% reduction in 2020 and 25% reduction by 2035 (relative to actual 2011 use) and two percent reduction per decade after 2035
- 5) No changes from current projected
- 6a) Uintah Basin: Assume 10% decreased demand from current projected by 2060 due to new technology
- 6b) Assume increased demand from current projected is offset by new technology in the Southeast Colorado River and West Colorado River planning areas
- 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) Twenty percent decrease from current projected by 2060 based on regional trends matrix
- 12) No changes from current projected
- 13) Assume 16% reduction in 2020 and 25% reduction by 2035 (relative to actual 2011 use) and two percent reduction per decade after 2035
- 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) Assume other sources are unchanged from current projected
- 20) For Kanab/Virgin, all Potential Colorado River Demand is M&I (LP pipeline). For Wasatch Front, all Potential Colorado River Demand is M&I, except for one AG export. M&I is computed as total export minus AG user schedule.

TABLE C4-7
Total Demand within Study Area under Enhanced Environment (D2) Scenario

Hydrologic Basin	Planning Area	Year	UTAH			Southeast Colorado River			West Colorado River			Kanab Creek / Virgin River			Wasatch Front			STATE TOTAL			Source and comments
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agriculture	Irrigated Acreage	acres	197,922	197,401	196,750	18,501	18,338	18,134	83,453	83,164	82,802	18,867	17,700	14,500				318,743	316,603	312,186	1)
	Per-Acre Water Delivery (Diversion)	af/ac/yr	2.90	2.76	2.97	2.93	3.54	3.99	3.27	3.34	3.25	4.56	4.27	4.33				3.10	3.04	3.16	2)
	Consumptive Factor	%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%				50%	50%	50%	
	Demand (Consumptive)	af/yr	287,222	272,533	291,711	27,113	32,451	36,207	136,530	138,846	134,596	43,017	37,798	31,360				493,882	481,628	493,874	
Municipal and Industrial	Population		53,223	77,458	111,349	27,304	35,967	47,656	41,966	53,311	68,300	259,870	572,230	1,030,916				382,363	738,966	1,258,221	3)
	Municipal and Industrial Per Capita Use (Diversion)	gpcd	293	239	220	316	258	238	227	185	171	281	229	212				279	228	211	4)
	Consumptive factor	%	73%	73%	73%	56%	56%	56%	69%	69%	69%	44%	44%	44%				51%	49%	48%	
	Municipal and Industrial Demand (Consumptive)	af/yr	12,751	15,124	19,995	5,412	5,814	7,127	7,374	7,640	9,053	35,961	64,567	107,654				61,498	93,145	143,829	5)
Self Served Industrial Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	5)	
Demand (Consumptive)	af/yr	12,751	15,124	19,995	5,412	5,814	7,127	7,374	7,640	9,053	35,961	64,567	107,654				61,498	93,145	143,829	6a), 6b)	
Energy	Demand (Consumptive)	af/yr	0	247	7,618	2,250	2,250	2,250	44,850	50,090	48,886	0	0	0				47,100	52,587	58,754	7)
Minerals	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	8)	
Fish, Wildlife, and Recreation	Demand (Consumptive)	af/yr	0	0	0	0	0	0	0	0	0	0	0				0	0	0	8)	
Tribal	Demand (Consumptive)	af/yr	258,943	258,943	258,943	13,102	39,938	78,346	0	0	0	0	0	0				272,045	298,881	337,289	9)
Total Hydrologic Basin	Demand (Consumptive)	af/yr	558,916	546,847	578,266	47,877	80,453	123,931	188,754	196,576	192,535	78,978	102,364	139,013	0	0	0	874,524	926,241	1,033,745	
Adjacent Areas																					
Agriculture	Irrigated Acreage	acres															542,634	514,166	483,680	10)	
	Per-Acre Water Delivery (Diversion)	af/ac/yr															2.85	2.41	2.05	11)	
	Consumptive factor	%															50%	50%	50%		
	Demand (Diversion)	af/yr															1,546,507	1,241,249	991,730		
Demand (Consumptive)	af/yr															773,254	620,625	495,865			
Municipal and Industrial	Population																2,005,507	3,177,937	4,925,741	12)	
	Municipal and Industrial Per Capita Use (Diversion)	gpcd															303	247	229	13)	
	Consumptive factor	%															59%	59%	59%		
	Municipal and Industrial Demand (Diversion)	af/yr															681,095	879,244	1,261,217	14)	
Self Served Industrial Demand (Diversion)	af/yr															0	0	0			
Demand (Diversion)	af/yr															681,095	879,244	1,261,217			
Demand (Consumptive)	af/yr															401,846	518,754	744,118			
Energy	Demand (Diversion)	af/yr														0	0	0			
Minerals	Demand (Diversion)	af/yr														0	0	0			
Fish, Wildlife, and Recreation	Demand (Diversion)	af/yr														0	0	0			
Tribal	Demand (Diversion)	af/yr														0	0	0			
Total Adjacent Areas	Demand (Diversion)	af/yr	0	0	0	0	0	0	0	0	0	0	0	2,227,602	2,120,493	2,252,947	2,227,602	2,120,493	2,252,947		
Total Demand in the Study Area		af/yr	558,916	546,847	578,266	47,877	80,453	123,931	188,754	196,576	192,535	78,978	102,364	139,013	2,227,602	2,120,493	2,252,947	3,102,126	3,046,733	3,286,692	
Demand that may be met by Other Supplies		af/yr	0	0	0	0	0	0	0	0	0	78,978	45,364	65,013	2,012,752	1,890,193	2,010,147	2,091,730	1,935,557	2,075,160	19)
Potential Colorado River Demand		af/yr	558,916	546,847	578,266	47,877	80,453	123,931	188,754	196,576	192,535	0	57,000	74,000	214,850	230,300	242,800	1,010,397	1,111,176	1,211,531	
Agricultural	Colorado River Demand	af/yr	287,222	272,533	291,711	27,113	32,451	36,207	136,530	138,846	134,596	0	0	0	6,292	6,292	6,292	457,157	450,123	468,807	20)
Municipal and Industrial	Colorado River Demand	af/yr	12,751	15,124	19,995	5,412	5,814	7,127	7,374	7,640	9,053	0	57,000	74,000	208,558	224,008	236,508	234,094	309,585	346,682	
Energy	Colorado River Demand	af/yr	0	247	7,618	2,250	2,250	2,250	44,850	50,090	48,886	0	0	0	0	0	0	47,100	52,587	58,754	
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tribal	Colorado River Demand	af/yr	258,943	258,943	258,943	13,102	39,938	78,346	0	0	0	0	0	0	0	0	0	272,045	298,881	337,289	

Source and Comments

- 1) No changes from current projected
- 2) Five percent decrease from current projected by 2060 based on regional trends matrix
- 3) A 25% population increase from current projected by 2060 was estimated based on regional trends (per census data)
- 4) Assume 16% reduction in 2020 and 25% reduction by 2035 (relative to actual 2011 use) and three percent reduction per decade after 2035
- 5) No changes from current projected
- 6a) Uintah Basin: Assume 10% decreased demand from current projected by 2060 due to new technology
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- 7) No changes from current projected
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- 9) Uintah: No changes from current projected; Southeast Colorado: personal communication, Navajo Nation, Apr. 16, 2012
- 10) No changes from current projected
- 11) No changes from current projected
- 12) A 25% population increase from current projected by 2060 was estimated based on regional trends (per census data)
- 13) Assume 16% reduction in 2020 and 25% reduction by 2035 (relative to actual 2011 use) and three percent reduction per decade after 2035
- 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) Assume other sources are unchanged from current projected
- 20) For Kanab/Virgin, all Potential Colorado River Demand is M&I (LP pipeline). For Wasatch Front, all Potential Colorado River Demand is M&I, except for one AG export. M&I is computed as total export minus AG user schedule.

4.0 References

Utah Department of Natural Resources, Division of Water Resources (DWR). 2001a. *Utah's Water Resources Planning for the Future*.

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