

**Appendix C6**  
**Arizona Water Demand**  
**Scenario Quantification**

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# Appendix C6 – Arizona Water Demand Scenario Quantification

## 1.0 Introduction

This appendix summarizes the data sources used in scenario quantification for Colorado River<sup>1</sup> demand for the state of Arizona and presents the results of quantification. As presented in figure C6-1, Arizona is divided into six planning areas, all of which are in the Colorado River hydrologic basin: Mainstem, Central Arizona, North Central, Central Yavapai Highlands, Upper San Pedro, and San Juan. 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 an Arizona Study Area summary, followed by Colorado River demand by geography, and finally by category.

## 2.0 Background

The Arizona Department of Water Resources (ADWR) is the agency given authority to protect the interests and rights of the State and its citizens in matters pertaining to interstate waters. ADWR developed information intended to capture Arizona's demands on the Colorado River for use in the Colorado River Basin Water Supply and Demand Study (Study). In order to develop demands for the Study, ADWR used data from the *Arizona Water Atlas* (ADWR, 2010a), groundwater active management area assessments, the Water Resources Development Commission, Arizona Department of Commerce population projections, Reclamation's Mainstem Water Use Accounting Reports, and Bureau of Reclamation's (Reclamation) planning studies for the North Central, Central Yavapai Highlands, and Upper San Pedro areas. In addition, for the purpose of this study, ADWR developed a Central Arizona model to project demands for Phoenix, Pinal, and Tucson. New demand data were also developed for Upper San Pedro River area, the Central Yavapai Highlands area, and the North Central Arizona area. Quantification of the Basin Study scenarios used these base data.

### 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 included state, regional, and national agency reports.

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<sup>1</sup> Colorado River demand as computed by Study Area demand minus other supplies.

Colorado River Basin  
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FIGURE C6-1  
Colorado River Hydrologic Basin and Export Service Areas in Arizona



- **Agricultural Demand:** Irrigated acreage, consumptive factors, and agricultural demands were derived by ADWR using various studies and reports shown in the references section (ADWR, 2005, 2010b, 2010c, 2011b; Reclamation, 1964–2002, 1996–2008, 2003–2009, 2006, 2007a, 2009; USGS, 2007, 2009). Agricultural applied water use was calculated based on irrigated acreage, consumptive factors, and consumptive demands.
- **Municipal and Industrial (M&I): Population estimates were disaggregated from** Arizona state population (ADWR, 2011a). Demand and consumptive factors were derived by ADWR using various studies and reports (ADWR, 2005, 2010b, 2010c, 2011b; Reclamation, 1964–2002, 1996–2008, 2003–2009, 2006, 2007a, 2009; USGS, 2007, 2009), and per capita usage was calculated based on population estimates, demand, and consumptive factors.
- **Energy:** Energy demands were derived by ADWR using various studies and reports (Water Resources Development Commission, Arizona, 2011).
- **Minerals:** Minerals demands were derived by ADWR using various studies and reports (ADWR, 2010b, 2010c, 2011b).
- **Fish, Wildlife, and Recreation:** Fish, wildlife, and recreation demands were derived by ADWR using various studies and reports (ADWR, 2005; Reclamation, 1964–2002, 2003–2009, 2006; USGS, 2007, 2009).
- **Tribal:** Tribal demands were derived with input from the tribes and ADWR (ADWR, 2010b, 2010c, 2011b; Reclamation, 1964–2002, 1996–2008; Reclamation, 2003–2009, 2006).

### 3.0 Results of Water Demand Scenario Quantification

This section summarizes Arizona’s Colorado River water demand trends by category across the 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 amongst 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, a portion of the Study Area demand, particularly in the Central Arizona planning area, is satisfied from other supplies such as surface water, groundwater, and reclaimed water/effluent. 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. Gila River Basin demands are not included. The Colorado River Simulation System model would need to be extended, and natural flow data sets would need to be developed in order to include the Gila River Basin tributaries in the analysis.

The following sections summarize the results of demand scenario quantification, presenting Study Area demand and Colorado River water demand, Colorado River Demand for the state and individual planning areas across the six scenarios, and 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 included.













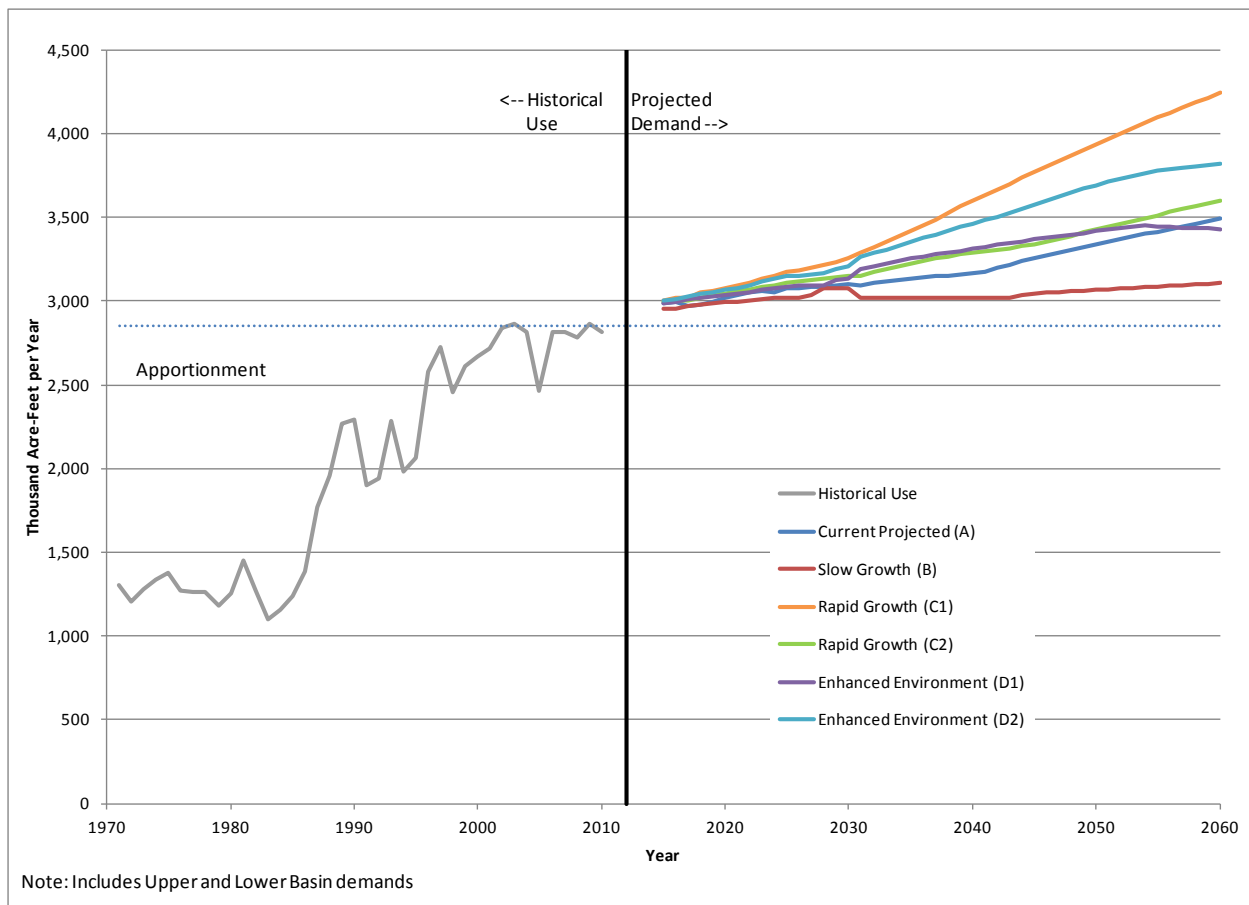
From panel one it can be seen that Study Area demand increases from about 5.3 million acre-feet (maf) in 2015 to between 5.3 and 6.7 maf in 2060. The range in Study Area demand growth across scenarios in 2060, however, is projected to be as low as 14 kaf or as high as 1,429 kaf. About 36 to 46 percent 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. This demand changes from about 3.0 maf in 2015 to between 3.1 and 4.2 maf in 2060 (or 5 to 41 percent) depending on the scenario. This difference results in a Colorado River demand range of about 1.1 maf across the scenarios in 2060, or 36 percent.

Panel three shows how specific categories affect the projected change in Colorado River demand by scenario. Growth in M&I demand across all scenarios results in the greatest increase in demand, followed by tribal demand and minerals demand. Agricultural demand decreases across all scenarios.

Figure C6-3 ties historical water use to the range of Colorado River demand in the quantified scenarios. The 1.1 maf range across scenarios in 2060 is easily discernible, with a relatively even spread over the range across the scenarios.

FIGURE C6-3  
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 C6-4 and C6-5. These figures show two geographic levels: Study Area in Arizona, and individual planning areas. Demands at each geographic level are shown across the scenarios. The columns to the right show Colorado River demand at a point in time (2015, 2035, or 2060) by relative contribution of the categories.

Colorado River demand<sup>2</sup> in Arizona is primarily in the Mainstem and Central Arizona planning areas. Demands in the Mainstem are primarily agricultural and tribal, whereas demands in Central Arizona are primarily M&I, with some tribal and agricultural.

Figure C6-6 shows the change in Colorado River demand by category from 2015 across the scenarios. Change in Colorado River demand is dominated by the Central Arizona planning area, with a large increase in M&I demands and a smaller increase in tribal demands, offset by a decrease in agricultural demands.

### 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 C6-7 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 C6-7, agricultural water demand makes up 34 to 39 percent of Colorado River demand in Arizona in 2015, and drops to 17 to 23 percent of Colorado River demand in 2060. This drop results from both a decrease in agricultural water demand and an increase in other categories of demand.

There are two Arizona planning areas with significant agricultural water use: the Mainstem and the Central Arizona planning areas. Mainstem users hold senior water rights and have the greatest demand. Lower priority water rights supply the Central Arizona planning area. Agricultural demand is forecast to decrease over the Study period by varying amounts in the Central Arizona planning area, ranging from about 330 kaf to 420 kaf, depending on the efficiency and acreage assumptions in each scenario. Some decreases are assumed to result from the conversion of agricultural lands to urban development as the Central Arizona Project agricultural pool decreases over time until it is eliminated in 2030.

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<sup>2</sup> 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 C6-4  
Colorado River Demand in Arizona

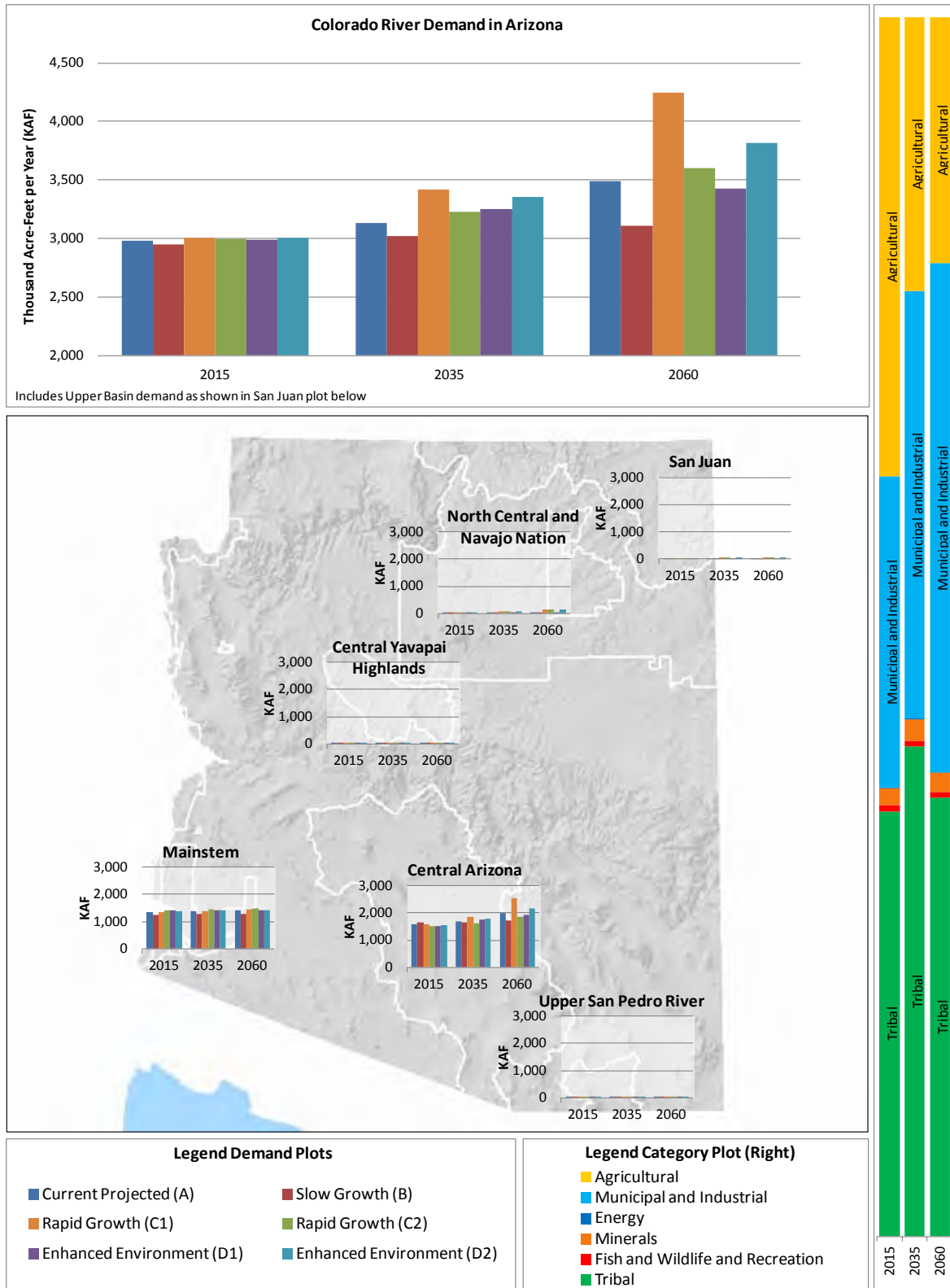


FIGURE C6-5  
Colorado River Demand by Category

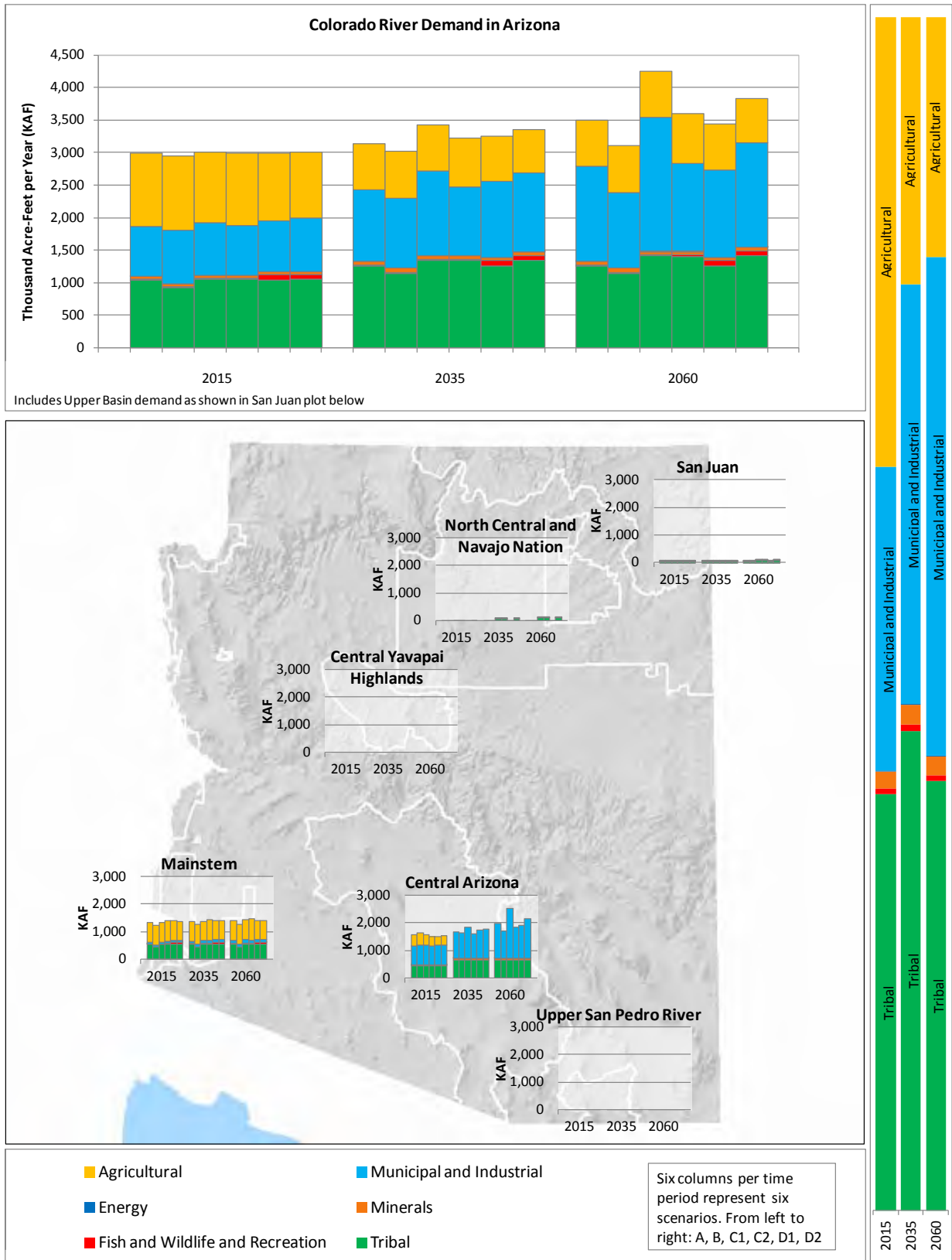
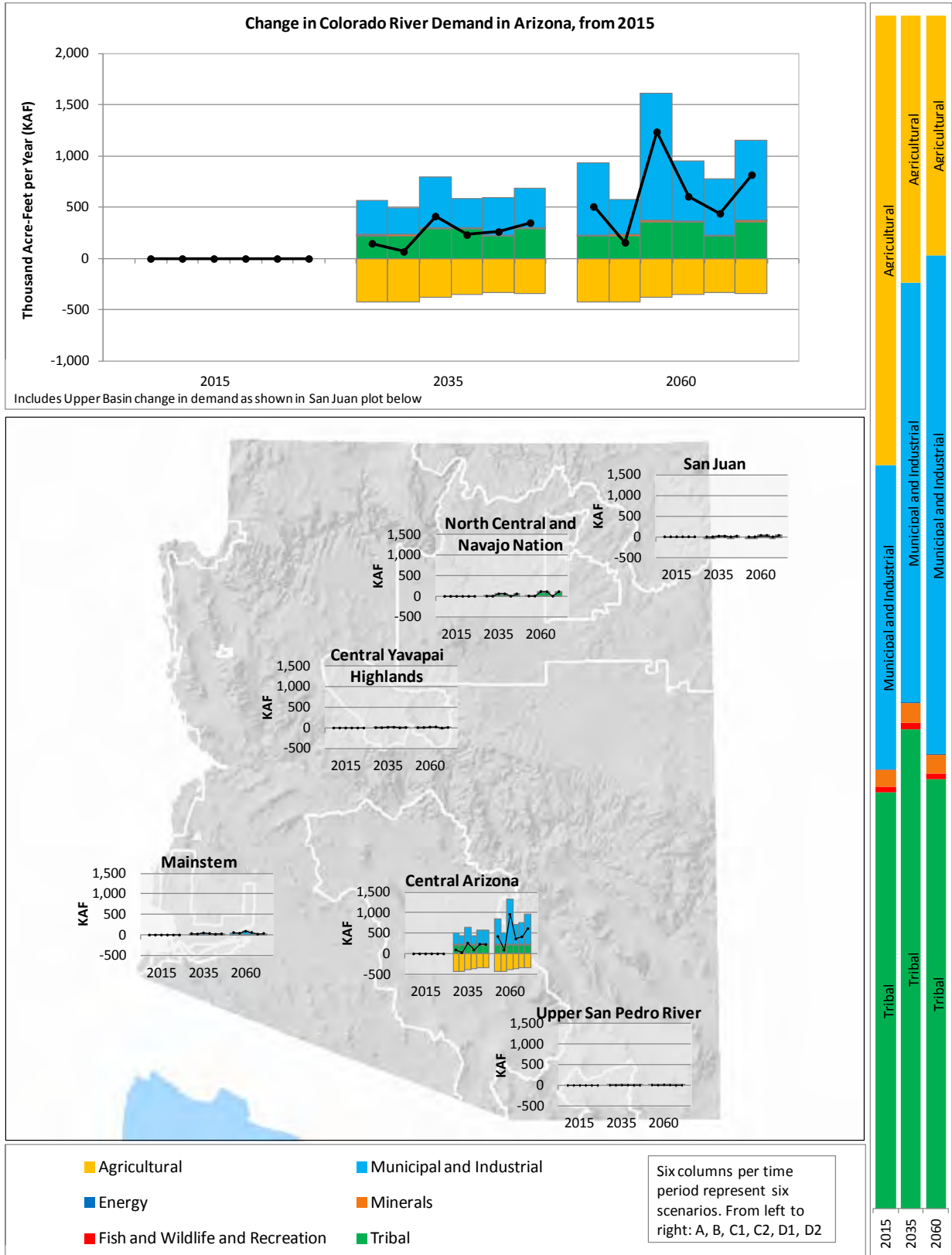


FIGURE C6-6  
Change in Colorado River Demand in Arizona from 2015 by Category





































## Notes

- 1) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Central Arizona: faster land conversion (driven by population); Other areas: no change from Current Projected.
- 2) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Mainstem: 5 percent decrease in water duties, but overall higher water duties result from consumptive use being higher for the same acreage. Central Arizona: 5 percent decrease relative to Current Projected (note that 5 percent is applied to each of 3 different AMAs in Central Arizona, which, combined with changes in acreage, results in an average difference from Current Projected that does not equal 5 percent). Other areas: 20 percent decrease from Current Projected.
- 3) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Annual population change is increased by 35 percent relative to Current Projected.
- 4) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. All areas: gpcd reduced annually by 0.44 percent. Note that this is applied to each of 3 different AMAs in Central Arizona, which, combined with changes in population, results in an average gpcd that changes at a slightly different rate than 0.44 percent; similarly, in Mainstem it is applied to individual contractors, so changes in population of individual contractors results in a slightly different rate than 0.44 percent.
- 5) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. SSI is a function of population.
- 6) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Water Resources Development Commission "low" energy use value used—decreased energy water use values from Current Projected. Note that these are per capita, so energy use is also affected by population.
- 7) No change from Current Projected.
- 8) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Mainstem: recreation contractors use full entitlement, no change to National Wildlife Refuges; Other areas: no change from Current Projected.
- 9) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Mainstem and Central Arizona: no change from Current Projected; Personal communication, Navajo Nation, Apr 16, 2012. North Central and Navajo Nation and San Juan: Nation provided demand schedules.
- 10) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. North Central: local supplies were calculated as the difference between the total demand and unmet demand; Central Yavapai Highlands and Upper San Pedro Study: based on information from Reclamation appraisal reports. Central AZ: AZ used internal models to estimate its demands met by Other Supplies and CAP deliveries. The remaining or unmet demands are represented as Potential Colorado River Basin demands, where CAP deliveries are a portion of potential Colorado River Demands in the Central AZ planning area.
- 11) For planning areas other than Central AZ, all Colorado River demand is municipal. For Central AZ, based on recent distribution of CAP water (20110510 Basin Study AZCAPBreakout.xlsx). Approach was to start with recent distribution, and then make the change in distribution the same as the change in overall demands. This was done for Current Projected only. The values for all categories but M&I were then applied to all other scenarios, with M&I used as the makeup term. The formulas also were checked to make sure Colorado River demand was not greater than total demand for each category—if so, M&I makes up the difference.

Colorado River Basin  
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TABLE C6-6  
Total Demand within Study Area under Enhanced Environment (D1) Scenario

ARIZONA			LEGEND: 999 From Current Projected Data Sheet 999 Computed																											
Units are thousand acre-feet per year, unless otherwise noted			999 Input Parameter																											
Hydrologic Basin	Planning Area	Year	Mainstem			Central Arizona			North Central and Navajo Nation			Central Yavapai Highlands			Upper San Pedro River			LOWER BASIN SUBTOTAL			San Juan			UPPER BASIN SUBTOTAL			STATE TOTAL			Notes
			2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agricultural	Irrigated Acreage [thousands]		168	168	168	447	288	189	0	0	0	7	6	4	0.1	0.1	0.1	623	462	361	0	0	0	0	0	0	623	462	361	1
	Per-Acre Water Delivery (Diversion) [af/ac/yr]		6.85	6.85	6.85	3.24	3.21	3.16	0.00	0.00	0.00	3.64	3.64	3.64	2.95	2.95	2.95	4.22	4.54	4.88	0.00	0.00	0.00	0.00	0.00	0.00	4.22	4.54	4.88	2
	Consumptive factor [%]		61%	61%	61%	100%	100%	100%	0%	0%	0%	100%	100%	100%	100%	100%	100%	83%	79%	75%	0%	0%	0%	0%	0%	0%	83%	79%	75%	
	Demand (Consumptive)		703	703	703	1,449	924	596	0	0	0	27	22	15	0.4	0.4	0.4	2,179	1,649	1,314	0	0	0	0	0	0	2,179	1,649	1,314	
Municipal and Industrial (M&I)	Population [thousands]		298	434	528	6,348	9,086	11,305	101	116	125	250	340	402	94	116	134	7,091	10,091	12,493	12	16	20	12	16	20	7,103	10,107	12,513	3
	M&I Per Capita Use (Diversion) [gpcd]		260	221	186	210	181	163	121	101	94	148	124	100	179	150	120	209	180	161	123	111	86	123	111	86	208	179	161	4
	Consumptive factor [%]		66%	67%	67%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	98%	98%	100%	100%	100%	100%	100%	100%	98%	98%	98%	
	M&I Demand (Consumptive)		57	72	74	1,497	1,843	2,064	14	13	13	41	47	45	19	19	18	1,627	1,995	2,214	2	2	2	2	2	2	1,629	1,997	2,216	
Self Served Industrial Demand (Consumptive)		5	6	6	170	220	233	0	0	0	9	13	18	1	2	2	186	242	259	0	0	0	0	0	0	186	242	259		
	Demand (Consumptive)		62	78	80	1,666	2,063	2,297	14	13	13	51	60	63	20	22	20	1,813	2,236	2,473	2	2	2	2	2	2	1,814	2,238	2,475	
Energy	Demand (Consumptive)		0.4	0.5	0.5	78	91	105	0	0	0	0	0	0	0	0	0	78	92	106	0	0	0	0	0	0	78	92	106	6
Minerals	Demand (Consumptive)		0	0	0	42	58	58	0	0	0	0	0	0	0	0	0	42	58	58	0	0	0	0	0	0	42	58	58	7
Fish, Wildlife, and Recreation	Demand (Consumptive)		78	78	78	0	0	0	0.3	0.3	0.3	0	0	0	11	11	11	89	89	89	0.3	0.3	0.3	0.3	0.3	0.3	90	90	90	8
Tribal	Demand (Consumptive)		552	556	556	535	694	688	0.7	0.8	0.8	0	0	0	0	0	0	1,087	1,251	1,244	44	43	43	44	43	43	1,131	1,294	1,287	9
<b>Total Hydrologic Basin Demand (Consumptive)</b>			<b>1,396</b>	<b>1,415</b>	<b>1,418</b>	<b>3,769</b>	<b>3,831</b>	<b>3,743</b>	<b>15</b>	<b>14</b>	<b>14</b>	<b>78</b>	<b>82</b>	<b>77</b>	<b>31</b>	<b>33</b>	<b>31</b>	<b>5,289</b>	<b>5,375</b>	<b>5,284</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>5,334</b>	<b>5,421</b>	<b>5,330</b>	
<b>Adjacent Areas</b>																														
Agricultural	Irrigated Acreage [thousands]																													
	Per-Acre Water Delivery (Diversion) [af/ac/yr]																													
	Consumptive factor [%]																													
	Demand (Diversion)																													
Municipal and Industrial (M&I)	Population [thousands]																													
	M&I Per Capita Use (Diversion) [gpcd]																													
	Consumptive factor [%]																													
	M&I Demand (Diversion)																													
Self Served Industrial Demand (Diversion)																														
	Demand (Diversion)																													
Energy	Demand (Diversion)																													
Minerals	Demand (Diversion)																													
Fish, Wildlife, and Recreation	Demand (Diversion)																													
Tribal	Demand (Diversion)																													
<b>Total Adjacent Areas Demand (Diversion)</b>			<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Total Demand in the Study Area</b>			<b>1,396</b>	<b>1,415</b>	<b>1,418</b>	<b>3,769</b>	<b>3,831</b>	<b>3,743</b>	<b>15</b>	<b>14</b>	<b>14</b>	<b>78</b>	<b>82</b>	<b>77</b>	<b>31</b>	<b>33</b>	<b>31</b>	<b>5,289</b>	<b>5,375</b>	<b>5,284</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>5,334</b>	<b>5,421</b>	<b>5,330</b>	
Demand that may be met by Other Supplies			0	0	0	2,248	2,074	1,807	11	8	6	72	72	72	14	14	14	2,344	2,168	1,899	0	0	0	0	0	0	2,344	2,168	1,899	10
<b>Potential Colorado River Demand</b>			<b>1,396</b>	<b>1,415</b>	<b>1,418</b>	<b>1,521</b>	<b>1,757</b>	<b>1,936</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>6</b>	<b>10</b>	<b>5</b>	<b>18</b>	<b>19</b>	<b>18</b>	<b>2,945</b>	<b>3,208</b>	<b>3,385</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>2,990</b>	<b>3,253</b>	<b>3,431</b>	
Agricultural	Colorado River Demand		703	703	703	333	0	0	0	0	0	0	0	0	0	0	1,036	703	703	0	0	0	0	0	0	1,036	703	703		
	Municipal and Industrial	Colorado River Demand	62	78	80	701	1,045	1,224	4	6	8	6	10	5	18	19	18	791	1,158	1,335	2	2	2	2	2	2	792	1,160	1,337	
Energy	Colorado River Demand		0.4	0.5	0.5	0.7	0.9	0.9	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	1	1		
	Minerals	Colorado River Demand	0	0	0	42	53	53	0	0	0	0	0	0	0	0	0	42	53	53	0	0	0	0	0	0	42	53	53	
Fish, Wildlife, and Recreation	Colorado River Demand		78	78	78	0	0	0	0	0	0	0	0	0	0	0	78	78	78	0.3	0.3	0.3	0.3	0.3	0.3	79	79	79		
	Tribal	Colorado River Demand	552	556	556	445	658	658	0	0	0	0	0	0	0	0	0	997	1,214	1,213	44	43	43	44	43	43	1,041	1,257	1,257	



## Notes

- 1) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. All areas: no change from Current Projected.
- 2) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. No change from Current Projected. Note that this is applied to each of 3 different AMAs in Central Arizona, which, combined with changes in acreage. Results in an average applied water rate that is slightly different from Current Projected.
- 3) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. No change from Current Projected.
- 4) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. All areas: gpcd reduced annually by 0.88 percent, with lower limit of 100 gpcd. Note that this is applied to each of 3 different AMAs in Central Arizona, which, combined with changes in population, results in an average gpcd that changes at a slightly different rate than 0.44 percent; similarly, in Mainstem it is applied to individual contractors, so changes in population of individual contractors results in a slightly different rate than 0.44 percent. There is an exception for Central Arizona and North Central and Navajo Nation in 2060, where gpcd was calculated as a 22.5 percent reduction from 2015 levels.
- 5) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. SSI is a function of population.
- 6) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Water Resources Development Commission "low" energy use value used—decreased energy water use values from Current Projected. Note that these are per capita, so energy use is also affected by population. There is an exception for Central Arizona, where a 5.6 percent reduction from the Scenario A is realized in 2035 and a 10 percent reduction in 2060.
- 7) No change from Current Projected.
- 8) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Mainstem: National Wildlife Refuges use full entitlement; Other areas: no change from Current Projected.
- 9) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. No change from Current Projected.
- 10) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. North Central: local supplies were calculated as the difference between the total demand and unmet demand; Central Yavapai Highlands and Upper San Pedro Study: based on information from Reclamation appraisal reports. Central AZ: AZ used internal models to estimate its demands met by Other Supplies and CAP deliveries. The remaining or unmet demands are represented as Potential Colorado River Basin demands, where CAP deliveries are a portion of potential Colorado River Demands in the Central AZ planning area.
- 11) For planning areas other than Central AZ, all Colorado River demand is municipal. For Central AZ, based on recent distribution of CAP water (20110510 Basin Study AZCAPBreakout.xlsx). Approach was to start with recent distribution, and then make the change in distribution the same as the change in overall demands. This was done for Current Projected only. The values for all categories but M&I were then applied to all other scenarios, with M&I used as the makeup term. The formulas also were checked to make sure Colorado River demand was not greater than total demand for each category—if so, M&I makes up the difference.

Colorado River Basin  
Water Supply And Demand Study

TABLE C6-7  
Total Demand within Study Area under Enhanced Environment (D2) Scenario

ARIZONA		LEGEND: 999 From Current Projected Data Sheet 999 Computed 999 Input Parameter																					Notes						
Units are thousand acre-feet per year, unless otherwise noted		Mainstem			Central Arizona			North Central and Navajo Nation			Central Yavapai Highlands			Upper San Pedro River			LOWER BASIN SUBTOTAL			San Juan			UPPER BASIN SUBTOTAL			STATE TOTAL			
Hydrologic Basin	Planning Area	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	2015	2035	2060	
Agricultural	Irrigated Acreage [thousands]	168	168	168	429	231	141	0	0	0	7	6	4	0.1	0.1	0.1	605	405	314	0	0	0	0	0	0	605	405	314	1
	Per-Acre Water Delivery (Diversion) [af/ac/yr]	6.51	6.51	6.51	3.19	3.01	2.98	0.00	0.00	0.00	2.91	2.91	2.92	2.33	2.33	2.33	4.11	4.46	4.87	0.00	0.00	0.00	0.00	0.00	0.00	4.11	4.46	4.87	2
	Consumptive factor [%]	61%	61%	61%	100%	100%	100%	0%	0%	0%	100%	100%	100%	100%	100%	100%	83%	76%	72%	0%	0%	0%	0%	0%	0%	83%	76%	72%	
	Demand (Consumptive)	668	668	668	1,366	695	421	0	0	0	22	17	12	0.3	0.3	0.3	2,056	1,380	1,101	0	0	0	0	0	0	2,056	1,380	1,101	
Municipal and Industrial (M&I)	Population [thousands]	313	513	675	6,685	10,738	14,452	106	137	159	263	402	514	99	137	171	7,467	11,926	15,971	12	16	20	12	16	20	7,479	11,942	15,991	3
	M&I Per Capita Use (Diversion) [gpcd]	261	220	182	209	177	162	121	101	100	148	124	100	179	150	120	207	176	160	123	111	86	123	111	86	207	175	160	4
	Consumptive factor [%]	66%	68%	69%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	98%	98%	100%	100%	100%	100%	100%	100%	98%	98%	98%	
	M&I Demand (Consumptive)	60	85	94	1,563	2,124	2,628	14	15	18	44	56	58	20	23	23	1,701	2,304	2,821	2	2	2	2	2	2	1,703	2,306	2,823	
Self Served Industrial Demand (Consumptive)		5	6	7	174	237	261	0	0	0	9	13	18	1	2	2	190	258	287	0	0	0	0	0	0	190	258	287	5a, 5b
	Demand (Consumptive)	65	91	101	1,737	2,361	2,889	14	15	18	53	69	75	21	25	25	1,891	2,562	3,108	2	2	2	2	2	2	1,892	2,564	3,110	
Energy	Demand (Consumptive)	0.4	0.5	0.7	82	107	132	0	0	0	0	0	0	0	0	0	82	107	133	0	0	0	0	0	0	82	107	133	6
Minerals	Demand (Consumptive)	0	0	0	42	58	58	0	0	0	0	0	0	0	0	0	42	58	58	0	0	0	0	0	0	42	58	58	7
Fish, Wildlife, and Recreation	Demand (Consumptive)	79	79	79	0	0	0	0.3	0.3	0.3	0	0	0	0	0	0	11	11	11	0.3	0.3	0.3	0.3	0.3	0.3	91	91	91	8
Tribal	Demand (Consumptive)	552	555	555	535	702	700	17	73	124	0	0	0	0	0	0	1,103	1,330	1,379	38	55	71	38	55	71	1,141	1,385	1,450	9
Total Hydrologic Basin Demand (Consumptive)		1,365	1,395	1,405	3,761	3,923	4,200	31	88	142	74	86	87	32	36	36	5,264	5,529	5,870	40	57	73	40	57	73	5,305	5,586	5,943	
Adjacent Areas																													
Agricultural	Irrigated Acreage [thousands]																												
	Per-Acre Water Delivery (Diversion) [af/ac/yr]																												
	Consumptive factor [%]																												
	Demand (Diversion)																												
Municipal and Industrial (M&I)	Population [thousands]																												
	M&I Per Capita Use (Diversion) [gpcd]																												
	Consumptive factor [%]																												
	Demand (Diversion)																												
Self Served Industrial Demand (Diversion)																													
	Demand (Consumptive)																												
Energy	Demand (Diversion)																												
Minerals	Demand (Diversion)																												
Fish, Wildlife, and Recreation	Demand (Diversion)																												
Tribal	Demand (Diversion)																												
Total Adjacent Areas Demand (Diversion)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Demand in the Study Area		1,365	1,395	1,405	3,761	3,923	4,200	31	88	142	74	86	87	32	36	36	5,264	5,529	5,870	40	57	73	40	57	73	5,305	5,586	5,943	
Demand that may be met by Other Supplies		0	0	0	2,204	2,138	2,029	11	9	7	72	72	72	14	14	14	2,301	2,233	2,122	0	0	0	0	0	0	2,301	2,233	2,122	10
Potential Colorado River Demand		1,365	1,395	1,405	1,557	1,785	2,171	20	79	134	2	14	15	19	23	23	2,963	3,296	3,747	40	57	73	40	57	73	3,003	3,353	3,821	
Agricultural	Colorado River Demand	668	668	668	339	0	0	0	0	0	0	0	0	0	0	0	1,007	668	668	0	0	0	0	0	0	1,007	668	668	11
	Municipal and Industrial	65	91	101	731	1,071	1,457	4	7	12	2	14	15	19	23	23	821	1,206	1,607	2	2	2	2	2	2	823	1,208	1,609	
Energy	Colorado River Demand	0.4	0.5	0.7	0.8	0.9	0.9	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	1	1	2	
	Minerals	0	0	0	42	54	54	0	0	0	0	0	0	0	0	0	42	54	54	0	0	0	0	0	0	42	54	54	
Fish, Wildlife, and Recreation	Colorado River Demand	79	79	79	0	0	0	0	0	0	0	0	0	0	0	0	79	79	79	0.3	0.3	0.3	0.3	0.3	0.3	80	80	80	
	Tribal	552	555	555	445	659	658	16	72	123	0	0	0	0	0	0	1,013	1,286	1,337	38	55	71	38	55	71	1,051	1,341	1,408	

**Notes**

- 1) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Central Arizona: faster land conversion (driven by population); Other areas: no change from Current Projected.
- 2) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Central Arizona and Mainstem: 5 percent decrease relative to Current Projected. Note that 5 percent is applied to each of 3 different AMAs in Central Arizona, which, combined with changes in acreage, results in an average difference from Current Projected that does not equal 5 percent. Other areas: 20 percent decrease from Current Projected.
- 3) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Annual population change is increased by 35 percent relative to Current Projected.
- 4) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. All areas: gpcd reduced annually by 0.88 percent, with lower limit of 100 gpcd. Note that this is applied to each of 3 different AMAs in Central Arizona, which, combined with changes in population, results in an average gpcd that changes at a slightly different rate than 0.44 percent; similarly, in Mainstem it is applied to individual contractors, so changes in population of individual contractors results in a slightly different rate than 0.44 percent.
- 5) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. SSI is a function of population.
- 6) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Water Resources Development Commission "low" energy use value used—decreased energy water use values from Current Projected. Note that these are per capita, so energy use is also affected by population.
- 7) No change from Current Projected.
- 8) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Mainstem: National Wildlife Refuges use full entitlement; Other areas: no change from Current Projected.
- 9) Personal communication, ADWR, Dec 3, 2011, and Feb 22, 2012. Mainstem and Central Arizona: no change from Current Project; Personal communication, Navajo Nation, Apr 16, 2012. North Central and Navajo Nation and San Juan: Nation provided demand schedules.
- 10) Personal communication, ADWR Dec 3, 2011, and Feb 22, 2012. North Central: local supplies were calculated as the difference between the total demand and unmet demand; Central Yavapai Highlands and Upper San Pedro Study: based on information from Reclamation appraisal reports. Central AZ: AZ used internal models to estimate its demands met by Other Supplies and CAP deliveries. The remaining or unmet demands are represented as Potential Colorado River Basin demands, where CAP deliveries are a portion of potential Colorado River Demands in the Central AZ planning area.
- 11) For planning areas other than Central AZ, all Colorado River demand is municipal. For Central AZ, based on recent distribution of CAP water (20110510 Basin Study AZCAPBreakout.xlsx). Approach was to start with recent distribution, and then make the change in distribution the same as the change in overall demands. This was done for Current Projected only. The values for all categories but M&I were then applied to all other scenarios, with M&I used as the makeup term. The formulas also were checked to make sure Colorado River demand was not greater than total demand for each category—if so, M&I makes up the difference.

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