CHAPTER 7. COMPARISON OF WATER SUPPLY AND DEMAND

The purpose of this chapter is to compare the City's available water supply under various hydrologic conditions to the City's projected water demands. The chapter begins with a comparison of the City's historical supply and demand, then compares the City's current supply and demand, and ends with a comparison of projected supply and demand.

COMPARISON OF HISTORICAL WATER SUPPLY AND DEMANDS

As described previously in Chapter 6, on average the City has used an 82 percent to 18 percent mixture of surface water and groundwater to meet the demands of its customers for several years. This supply mixture in conjunction with the two existing treatment plants (the SRWTP and the FWTP) has allowed the City to meet its customer demands without any mandatory rationing or interruption, even during the prolonged drought conditions present between 1987 and 1992.

COMPARISON OF SUPPLY AND DEMAND IN THE CURRENT YEAR

As shown in Table 7-1, the City has sufficient supply in the current year to meet its customer demands given all potential hydrologic conditions, under normal year, Hodge year and single dry year conditions, with and without conservation. For illustrative purposes, Table 7-1 shows the City has an adequate water supply without using any groundwater at current demand levels; this reinforces the reliability of the City's water supply in the current year.

COMPARISON OF PROJECTED SUPPLY AND DEMAND

A comparison was made between projected supply and demand during three hydrologic conditions. The first hydrologic condition assumed that years 2006, 2010, 2015, 2020, 2025, and 2030 were all normal years. The second supply condition assumed that those same years were all single dry years. The third condition assumed that a multiple drought period, consisting of three consecutive dry years, occurs at the beginning of each five year increment. All future supply and demand comparisons assume the proposed Natomas Water Treatment Plant (NWTP) is available by the year 2012.

Normal Year

Table 7-2 compares the City's projected supply and demand for normal years occurring in 2006, 2010, 2015, 2020, 2025, and 2030, assuming no conservation, conservation savings at 7.5 percent, and conservation savings of 25.6 percent. As shown in Table 7-2, the City would need to pump approximately 11,000 af and 32,600 af of groundwater in 2025 and 2030, respectively, under the no conservation alternative. Both groundwater pumping quantities are less than the City's existing pumping capacity of 33,600 af.

Table 7-1. Comparison of Current 2006 Water Supply and Demand in Normal and Single Dry Years, af (DWR Table 4,8)

Type	Source	Normal Year (2006)	Hodge Year (2006)	Single Dry Year (2006)
Water Supply	Sacramento River	81,800	81,800	81,800
	American River	127,700	127,700	127,700
	Groundwater[(a)]	0	0	0
	Total Supply	209,500	209,500	209,500
Water Demand (No Conservation)	Retail	135,500	135,500	135,500
	Wholesale/Wheeling	12,300	12,300	12,300
	Total Demand	147,800	147,800	147,800
	Available Water	*61,700*	*61,700*	*61,700*
Water Demand (7.5% Conservation)	Retail	134,800	134,800	134,800
	Wholesale/Wheeling	12,000	12,000	12,000
	Total Demand	146,800	146,800	146,800
	Available Water	*62,700*	*62,700*	*62,700*
Water Demand (25.6% Conservation)	Retail	133,100	133,100	133,100
	Wholesale/Wheeling	11,200	11,200	11,200
	Total Demand	144,300	144,300	144,300
	Available Water	*65,200*	*65,200*	*65,200*

[(a)] City can use groundwater as needed; however, for UWMP planning purposes in this table, no groundwater was included in the City's total supply.

Table 7-2. Comparison of Projected Water Supply and Demand in Normal Years, af (DWR Table 4,7,8,9, 40,41,42)

Type	Source	Year					
		2006 (Current)	2010	2015	2020	2025	2030
Water Supply[a]	Sacramento River	81,800	81,800	81,800	81,800	81,800	81,800
	American River[b]	127,700	145,700	170,200	196,200	222,200	245,000
	Groundwater[c]	0	0	0	0	0	0
	Total Supply	209,500	227,500	252,000	278,000	304,000	326,800
Water Demand (No Conservation)	Retail	135,500	152,700	174,200	195,700	217,200	239,300
	Wholesale/Wheeling	12,300	30,300	52,800	75,300	97,800	120,100
	Total Demand	147,800	183,000	227,000	271,000	315,000	359,400
	Available Water	*61,700*	*44,500*	*25,000*	*7,000*	*(11,000)*	*(32,600)*
Water Demand (7.5% Conservation)	Retail	134,800	149,200	167,200	185,200	203,200	221,300
	Wholesale/Wheeling	12,000	28,800	49,800	70,800	91,800	112,000
	Total Demand	146,800	178,000	217,000	256,000	295,000	333,300
	Available Water	*62,700*	*49,500*	*35,000*	*22,000*	*9,000*	*(6,500)*
Water Demand (25.6% Conservation)	Retail	133,100	140,700	150,200	159,700	169,200	178,000
	Wholesale/Wheeling	11,200	24,800	41,800	58,800	75,800	93,000
	Total Demand	144,300	165,500	192,000	218,500	245,000	271,000
	Available Water	*65,200*	*62,000*	*60,000*	*59,500*	*59,000*	*55,800*

[a] Assumes the Natomas Water Treatment Plant is available by 2012.

[b] City's American River entitlement increases each year according to its settlement contract with the Bureau.

[c] City can use groundwater as needed; however, for UWMP planning purposes in this Table, no groundwater was included in the City's total supply.

Table 7-2 also indicates that under the 7.5 percent conservation alternative, the City must pump approximately 6,500 af of groundwater by 2030. Under all conservation scenarios, the City has sufficient water supplies, using both surface water and groundwater, to meet projected water demands during a normal year.

Single Dry Year

Table 7-3 compares the City's projected supply and demand for single dry years occurring in 2006, 2010, 2015, 2020, 2025, and 2030, assuming no conservation, conservation savings of 7.5 percent, and conservation savings of 25.6 percent.

As shown in Table 7-3, the City does not have sufficient water supplies to meet projected water demands beyond 2025 under the no conservation alternative during a single dry year.

Multiple Dry Years

Table 7-4 compares the City's projected supply and demand for multiple (3) dry years ending in 2008, 2013, 2018, 2023, and 2028, assuming no conservation, conservation savings of 7.5 percent, and conservation savings of 25.6 percent.

For planning purposes in this UWMP, multiple droughts were assumed to consist of three years: two consecutive years with Hodge Flow Criteria governing at all times, followed by a single dry year. As shown in Table 7-4, the City does not have sufficient water supplies to meet projected water demand under the no conservation alternative in the third year of the multiple drought period ending in 2023 and 2028.

Summary

The City will continue with water conservation programs to reduce demand within the City. It is likely, but not certain that the City will achieve a level of conservation that will make up the shortfalls discussed above. Measures that could increase supply, should the conservation measures not reduce demand sufficiently, could include increasing groundwater production facilities, or making modifications at the water treatment plants to maintain production in winter months (when plants are occasionally shut down), or a combination of both.

Table 7-3. Comparison of Projected Water Supply and Demand in Single Dry Years, af (DWR Table 8,9,43,44,45)

Type	Source	Year					
		2006 (Current)	2010	2015	2020	2025	2030
Water Supply[a]	Sacramento River	81,800	81,800	81,800	81,800	81,800	81,800
	American River[b]	127,700	132,213	170,200	196,200	214,013	214,013
	Groundwater	0	0	0	0	17,187	33,600
	Total Supply	209,500	214,013	252,000	278,000	313,000	329,413
Water Demand (No Conservation)	Retail	135,500	152,700	174,200	195,700	217,200	239,300
	Wholesale/Wheeling	12,300	30,300	52,800	75,300	97,800	120,100
	Total Demand	147,800	183,000	227,000	271,000	315,000	359,400
	Available Water	61,700	31,013	25,000	7,000	(2,000)	(29,987)
Water Demand (7.5% Conservation)	Retail	134,800	149,200	167,200	185,200	203,200	221,300
	Wholesale/Wheeling	12,000	28,800	49,800	70,800	91,800	112,000
	Total Demand	146,800	178,000	217,000	256,000	295,000	333,300
	Available Water	62,700	36,013	35,000	22,000	18,000	(3,887)
Water Demand (25.6% Conservation)	Retail	133,100	140,700	150,200	159,700	169,200	178,000
	Wholesale/Wheeling	11,200	24,800	41,800	58,800	75,800	93,000
	Total Demand	144,300	165,500	192,000	218,500	245,000	271,000
	Available Water	65,200	48,513	60,000	59,500	68,000	58,413

[a] Assumes the Natomas Water Treatment Plant is available by 2012.

[b] City's American River entitlement increases each year according to its settlement contract with the Bureau.

Table 7-4. Comparison of Projected Water Supply and Demand in Multiple Dry Years, af[a,b,c] (DWR Table 8,9,46-57)

Type	Source	2006 through 2010				
		2006 (Hodge)	2007 (Hodge)	2008 (Single Dry)	2009 (Normal)	2010 (Normal)
Water Supply	Sacramento River	81,800	81,800	81,800	81,800	81,800
	American River	127,700	132,200	132,213	141,200	145,700
	Groundwater	0	0	0	0	0
	Total Supply	209,500	214,000	214,013	223,000	227,500
Water Demand (No Conservation)	Retail	135,500	139,800	144,100	148,400	152,700
	Wholesale/Wheeling	12,300	16,800	21,300	25,800	30,300
	Total Demand	147,800	156,600	165,400	174,200	183,000
	Available Water	*61,700*	*57,400*	*48,613*	*48,800*	*44,500*
Water Demand (7.5% Conservation)	Retail	134,800	138,400	142,000	145,600	149,200
	Wholesale/Wheeling	12,000	16,200	20,400	24,600	28,800
	Total Demand	146,800	154,600	162,400	170,200	178,000
	Available Water	*62,700*	*59,400*	*51,613*	*52,800*	*49,500*
Water Demand (25.6% Conservation)	Retail	133,100	135,000	136,900	138,800	140,700
	Wholesale/Wheeling	11,200	14,600	18,000	21,400	24,800
	Total Demand	144,300	149,600	154,900	160,200	165,500
	Available Water	*65,200*	*64,400*	*59,113*	*62,800*	*62,000*

Type	Source	2011 through 2015				
		2011 (Hodge)	2012 (Hodge)	2013 (Single Dry)	2014 (Normal)	2015 (Normal)
Water Supply	Sacramento River	81,800	81,800	81,800	81,800	81,800
	American River	150,700	155,200	160,200	165,700	170,200
	Groundwater	0	0	0	0	0
	Total Supply	232,500	237,000	242,000	247,500	252,000
Water Demand (No Conservation)	Retail	157,000	161,300	165,600	169,900	174,200
	Wholesale/Wheeling	34,800	39,300	43,800	48,300	52,800
	Total Demand	191,800	200,600	209,400	218,200	227,000
	Available Water	*40,700*	*36,400*	*32,600*	*29,300*	*25,000*
Water Demand (7.5% Conservation)	Retail	152,800	156,400	160,000	163,600	167,200
	Wholesale/Wheeling	33,000	37,200	41,400	45,600	49,800
	Total Demand	185,800	193,600	201,400	209,200	217,000
	Available Water	*46,700*	*43,400*	*40,600*	*38,300*	*35,000*
Water Demand (25.6% Conservation)	Retail	142,600	144,500	146,400	148,300	150,200
	Wholesale/Wheeling	28,200	31,600	35,000	38,400	41,800
	Total Demand	170,800	176,100	181,400	186,700	192,000
	Available Water	*61,700*	*60,900*	*60,600*	*60,800*	*60,000*

Type	Source	2016 through 2020				
		2016 (Hodge)	2017 (Hodge)	2018 (Single Dry)	2019 (Normal)	2020 (Normal)
Water Supply	Sacramento River	81,800	81,800	81,800	81,800	81,800
	American River	175,700	180,700	186,200	191,200	196,200
	Groundwater	0	0	0	0	0
	Total Supply	257,500	262,500	268,000	273,000	278,000
Water Demand (No Conservation)	Retail	178,500	182,800	187,100	191,400	195,700
	Wholesale/Wheeling	57,300	61,800	66,300	70,800	75,300
	Total Demand	235,800	244,600	253,400	262,200	271,000
	Available Water	*21,700*	*17,900*	*14,600*	*10,800*	*7,000*
Water Demand (7.5% Conservation)	Retail	170,800	174,400	178,000	181,600	185,200
	Wholesale/Wheeling	54,000	58,200	62,400	66,600	70,800
	Total Demand	224,800	232,600	240,400	248,200	256,000
	Available Water	*32,700*	*29,900*	*27,600*	*24,800*	*22,000*
Water Demand (25.6% Conservation)	Retail	152,100	154,000	155,900	157,800	159,700
	Wholesale/Wheeling	45,200	48,600	52,000	55,400	58,800
	Total Demand	197,300	202,600	207,900	213,200	218,500
	Available Water	*60,200*	*59,900*	*60,100*	*59,800*	*59,500*

Type	Source	2021 through 2025				
		2021 (Hodge)	2022 (Hodge)	2023 (Single Dry)	2024 (Normal)	2025 (Normal)
Water Supply	Sacramento River	81,800	81,800	81,800	81,800	81,800
	American River	201,200	206,700	211,700	216,400	222,200
	Groundwater	0	0	2,100	6,100	9,000
	Total Supply	283,000	288,500	295,600	304,300	313,000
Water Demand (No Conservation)	Retail	200,000	204,300	208,600	212,900	217,200
	Wholesale/Wheeling	79,800	84,300	88,800	93,300	97,800
	Total Demand	279,800	288,600	297,400	306,200	315,000
	Available Water	*3,200*	*(100)*	*(1,800)*	*(1,900)*	*(2,000)*
Water Demand (7.5% Conservation)	Retail	188,800	192,400	196,000	199,600	203,200
	Wholesale/Wheeling	75,000	79,200	83,400	87,600	91,800
	Total Demand	263,800	271,600	279,400	287,200	295,000
	Available Water	*19,200*	*16,900*	*16,200*	*17,100*	*18,000*
Water Demand (25.6% Conservation)	Retail	161,600	163,500	165,400	167,300	169,200
	Wholesale/Wheeling	62,200	65,600	69,000	72,400	75,800
	Total Demand	223,800	229,100	234,400	239,700	245,000
	Available Water	*59,200*	*59,400*	*61,200*	*64,600*	*68,000*

Type	Source	2026 through 2030				
		2026 (Hodge)	2027 (Hodge)	2028 (Single Dry)	2029 (Normal)	2030 (Normal)
Water Supply	Sacramento River	81,800	81,800	81,800	81,800	81,800
	American River	226,700	231,700	214,013	240,700	245,000
	Groundwater	13,200	16,900	33,600	25,300	29,400
	Total Supply	321,700	330,400	329,413	347,800	356,200
Water Demand (No Conservation)	Retail	221,500	225,800	230,100	234,400	239,300
	Wholesale/Wheeling	102,300	106,800	111,300	115,800	120,100
	Total Demand	323,800	332,600	341,400	350,200	359,400
	Available Water	*(2,100)*	*(2,200)*	*(11,987)*	*(2,400)*	*(3,200)*
Water Demand (7.5% Conservation)	Retail	206,800	210,400	214,000	217,600	221,300
	Wholesale/Wheeling	96,000	100,200	104,400	108,600	112,000
	Total Demand	302,800	310,600	318,400	326,200	333,300
	Available Water	*18,900*	*19,800*	*11,013*	*21,600*	*22,900*
Water Demand (25.6% Conservation)	Retail	171,100	173,000	174,900	176,800	178,000
	Wholesale/Wheeling	79,200	82,600	86,000	89,400	93,000
	Total Demand	250,300	255,600	260,900	266,200	271,000
	Available Water	*71,400*	*74,800*	*68,513*	*81,600*	*85,200*

[a] For planning purposes in this UWMP, a multiple drought year period consists of three consecutive years: the first and second year are normal years with Hodge flow critieria governing every month of the year, and the third year is a single dry year (i.e., an extremely dry year). The multiple dry year period was assumed to start at the beginning of each five year segment.

[b] Assumes the Natomas Water Treatment Plant is available by 2012.

[c] City's American River entitlement increases each year according to its settlement contract with the Bureau; consequently, the increase in that year may be larger than the restriction due to hydrologic conditions, providing more surface water than the previous year even during a multiple-year drought condition.