Section 2: Water Supply Requirements

This section assesses the current water demand and supply for CCSD, as well as future water demands, based on projections using past billing and production data as well as an existing Geographic Information System (GIS). Water supply reliability requirements are also discussed.

2.1 Current Water Supplies

Two groundwater basins, San Simeon and Santa Rosa, currently provide a water supply for CCSD and riparian users. The basins are recharged primarily by San Simeon and Santa Rosa Creeks, respectively. The creeks also sustain high quality habitat for a variety of aquatic and terrestrial species. Both creeks terminate into lagoons that are home to both the endangered Tidewater Goby as well as the threatened South-Central Coast Steelhead. In addition, the riparian corridor provides habitat for the threatened Red-Legged Frog as well as the Southwestern Pond Turtle. Generally, Santa Rosa Creek has a much longer reach of perennial flow areas that contribute to the survival of juvenile and smolt-sized steelhead during the summer. Approximately 12 miles of such habitat exists along the Santa Rosa Creek. In contrast, San Simeon Creek is blocked by a natural rock fall, and has about one-mile of perennial habitat area in its upper reaches.[3] Additionally, CCSD recharges the underflow of San Simeon Creek with treated wastewater effluent down-gradient from its well field. To maintain a high quality water supply, and to avoid impacting fish habitat, groundwater from Santa Rosa Basin is only used sparingly by CCSD to supplement groundwater from the San Simeon Basin. Descriptions of the two basins are provided below.

The SWRCB has issued and administered diversion permits for both groundwater basins. In addition, the CCC has issued development permits that provide further limits to CCSD water withdrawals. During January of 2003, CCSD began investigating the process of adjudicating the San Simeon Basin. To date, neither basin has been adjudicated.

The United States Geological Survey (USGS) conducted a detailed study of the hydrogeology of the two groundwater basins that was later summarized in a 1998 report[4]. Although the report is dated 1998, the water budget table was based on an April 1988 through March 1989 time frame. Table 2-1 presents an update to the simulated annual water budget developed within the USGS report. In developing this table, all inflows and outflows were assumed to remain the same as in the 1998 report except for a 1991 change in operation by CCSD to its spray field system. In 1991, the CCSD converted a spray field operation into a percolation pond operation. This change decreased losses due to evaporation, and increased inflows into the San Simeon Basin by approximately 60 AF. It is also worth noting that although the water year for the 1998 USGS report was based on 1988 through 1989 CCSD demands, the current CCSD demands are very close to the same 800 AFY.

[3] D.W Alley &Associates

[4] U.S. Geological Survey. 1998. Report 98-4061; Hydrogeology, Water Quality, Water Budgets, and Simulated Responses to Hydrologic Changes in Santa Rosa and San Simeon Creek Ground-Water Basins, San Luis Obispo County, California

TABLE 2-1
FLOW SUMMARY FOR SAN SIMEON AND SANTA ROSA BASINS[(a)]

	Santa Rosa Basin			San Simeon Basin		
Budget Item	**Inflow**	**Outflow**	**Net Flow**	**Inflow**	**Outflow**	**Net Flow**
Rainfall Recharge	140	0	140	50	0	50
Creek Seepage	1,120	650	470	950	410	540
Subsurface Inflow & Outflow						
Onshore Boundaries	370	0	370	150	0	150
Ocean Boundary	0	60	-60	0	320	-320
Agricultural Water Use						
Pumpage	0	890	-570	0	450	-280
Irrigation-Return Flow	320	0		170	0	
Nonagricultural Water Use						
Municipal Pumpage	0	250		0	550	
Rural Pumpage	0	10		0	<10	
Wastewater Recharge			-240			-50
Percolation Ponds	0	0		500	0	
Septic Tanks	10	0		<10	0	
Irrigation-Return Flow	10	0		0	0	
Phreatophyte Transpiration	0	160	-160	0	30	-30
Total Net Flow			-50			+60

Note:
(a) All values rounded to the nearest 10 AFY. Positive net flow indicates flow into basin; negative net flow indicates flow out of basin.

2.1.1 San Simeon Basin

The San Simeon Basin consists of 29.0 square miles (18,560 acres). The main source of groundwater recharge is San Simeon Creek. Two other tributaries are Van Gordon Creek and Steiner Creek.

2.1.1.1 CCSD Water Rights

Under CCSD's diversion permit for the San Simeon Basin, Permit No. 17287, the following restrictions apply:

- Maximum rate of diversion: 5.0 AF/day (2.5 cubic feet per sec [cfs])
- Maximum annual diversion: 1,230 AF
- Maximum dry season diversion: 370 AF. The dry season is defined as the date surface flow ceases at the Palmer Flats gaging station until October 31 of that year.

Based on these limitations, the permitted remainder of 860 AF for diversion during the winter months could hypothetically supply CCSD for the entire current year. However, CCSD lacks seasonal storage and cannot store the water for the dry season. Additionally, the permitted winter diversion value does not account for drought conditions such as carry-over capacity needed from one dry year to the next. The start of the dry season varies each year and is predicated upon flow at the Palmer Flats flow gage. CCSD pumped 321 AF from the San

Simeon Basin in the wet season for 2001. Assuming the start of the dry season at May 1, 2002 (a conservatively early date), and the end of the dry season at October 31, CCSD would have pumped 424 AF during this period in 2001, and 384 AF during this period in 2002. Although both of these later amounts are above the permitted value of 370 AF, the diversion permit on San Simeon Creek ties the start of the dry season to when flow at the Palmer Flats stream gage stops as opposed to the May 1 calendar date. Therefore, the actual start of the dry season on the San Simeon creek varies depending upon the winter rainfall amount and late season rainfall patterns. Thus, the start of the actual dry season on San Simeon can be as late as June or July, depending on the preceding winter rainfall season.

CCSD owns three groundwater wells in the San Simeon basin: SS-1, SS-2, and SS-3. Each well has a pumping capacity of 450 to 500 gallons per minute (gpm), for a total pumping capacity of 1,350 to 1,500 gpm (2,183 to 2,425 AFY.)

Although it has relatively high hardness, the groundwater in San Simeon Basin is of excellent quality. Wells SS-2 and SS-3 are not considered groundwater under the direct influence of surface water and thus are not subject to the Surface Water Treatment Rule (SWTR) because they are located over 150 ft from the creek water. However, well SS-1, depending on creek flow, may be within 150 ft of the creek water. During these times, SS-1 is not operated. When compared to the Santa Rosa groundwater, San Simeon groundwater tends to be lower in hardness, iron, and manganese and is, therefore, considered to be of better quality.

2.1.1.2 Riparian/Habitat Water Rights

Several riparian users also pump from San Simeon Creek upstream of CCSD. The uses mainly consist of agricultural irrigation. Certain agricultural pumpers have claimed a loss of well capacity due to CCSD's use of the San Simeon well field. As a result of these past claims, CCSD provides irrigation water to one agricultural user directly from its San Simeon wells. More recently, CCSD entered into a fallowing agreement with an agricultural user during the summer of 2002. An estimated 38 percent of water used for irrigation is returned to the basin (Table 2-1).[5]

The amount of flow needed for habitat has not been fully addressed and is a very complex issue due to the numerous factors effecting the aquatic environment (e.g., erosion and sedimentation, El Nino weather events, and canopy cover and temperature). However, restrictions by the CCC development permit place further limits on CCSD's diversion permits in an attempt to further address habitat needs. Additionally, CCSD performs routine fish surveys on both the creeks and lagoons to assess conditions as well as monitor for potential habitat impacts. San Simeon Creek, although not as productive as Santa Rosa Creek, is home to the South-Central Coast Steelhead, an evolutionary significant unit of the species, which is listed as threatened under the Federal Endangered Species Act. However, a natural rock fall in the upper reach of the creek blocks migration of the steelhead. Depending upon the timing of late season rainfall and creek flows, adult steelhead have become trapped in pools along the creek prior to completing their outgoing ocean migration. Past practices by both CCSD's certified biologist, as well as a riparian irrigator, have included relocating adult fish around restrictions. However, in recent years the California Department of Fish and Game has been reluctant to allow the fish relocation practice to continue without specific permitting in place. Opinions have also varied as to whether fish

[5] U.S. Geological Survey. 1998. Hydrogeology, Water Quality, Water Budgets, and Simulated Responses to Hydrologic Changes in Santa Rosa and San Simeon Creek Ground-Water Basins.

relocations were interfering with the natural selection process, or whether riparian and municipal pumping was necessitating the need to relocate fish. Most recently, representatives of the National Marine Fisheries Service have expressed a desire for the completion of a habitat conservation plan in order to address this issue. Additionally, CCSD has begun investigating the legal process for adjudicating the San Simeon groundwater basin in order to develop a long-term process for managing withdrawals from the aquifer.

2.1.1.3 California Coastal Commission Development Permit Limitations

During May of 1981, the CCC approved an amendment to existing developments permits that modified the annual number of water connections at 125 per year (Coastal permit number 428-10). Condition 4 of the CCC permit 428-10 limits the total combined production from both creeks to less than 1,230 AFY. Additionally, it calls for no more than 260 AF to be withdrawn from the Santa Rosa Creek between July 1 and November 20, and no more than 147 AF per month outside of this period. In addition to these conditions, the CCC has required that at least 20 percent of CCSD supply be made available for visitor serving purposes.

2.1.2 Santa Rosa Basin

The Santa Rosa Basin consists of 43.38 square miles (27,760 acres). It has two basins divided by an underground fault line or bedrock ridge. The lower basin is recharged by upper basin spillage. The upper basin is not threatened by saltwater intrusion and is of better water quality than the lower basin. The watershed provides an important habitat for the threatened South-Central Coast Steelhead. It also supports the Tidewater Goby, Red-Legged Frog and Southwestern Pond Turtle. Vegetation found in the watershed includes Cottonwoods, Sycamores, Coast Live Oak, White Alder, California Laurel, Willows, and non-native Blue Gum.

2.1.2.1 CCSD Water Rights

Similar to San Simeon Creek, the SWRCB has issued a diversion permit specifying allowed withdrawals by the CCSD for the Santa Rosa Creek. SWRCB Permit No. 20387 covers CCSD's use of the Santa Rosa aquifer and contains the following restrictions:

- Maximum rate of diversion: 5.3 AF/day (2.7 cfs)
- Maximum annual diversion: 518 AF
- Maximum dry season (May 1 to October 31) diversion: 260 AF

Due to MtBE contamination in the lower Santa Rosa Basin, two wells (SR-1 and SR-3) were placed out of service. A new temporary well (SR-4) was constructed in the upper Santa Rosa Basin near the Coast Union High School, away from any known contamination. This newer well has a capacity of 450 to 500 gpm (728 to 808 AFY).

Groundwater from the Santa Rosa basin requires filtration and chemical treatment prior to potable use due to the need to meet the State's surface water treatment rule, and the need to remove high iron and manganese concentrations. Manganese and iron are the main source of taste and odor problems experienced by CCSD, as well as the cause of discoloration of fixtures. A proprietary "Pureflow" treatment system is used at well SR-4 for iron and manganese removal in conjunction with filtering aids and hypochlorite disinfection. Groundwater is chlorinated to oxidize and precipitate the manganese as well as any other source of turbidity, and passes

through a proprietary filter medium to remove any precipitate. The older wells, SR-1 and SR-3, also have a proprietary "Filtronics" treatment process for the same purpose. Due to its poor quality, groundwater from the Santa Rosa Basin is typically used to supplement and back up the San Simeon Basin groundwater supply.

2.1.2.2 Riparian/Habitat Water Rights

Several riparian users also pump from Santa Rosa Creek upstream of CCSD. Similar to San Simeon Creek, the uses mainly consist of agricultural irrigation. An estimated 36 percent of water used for irrigation is returned to the basin (Table 2-1).[6] During 2001, CCSD acquired the East/West Ranch along with the riparian water rights associated with that property. Although the East/West Ranch water rights are not appropriative, the acquisition of this property provides CCSD with a means to control agricultural use within the Ranch, and to consequentially limit or prevent any future irrigation.

As with the San Simeon Basin, the amount of flow required to address habitat needs has not been fully addressed. During the dry season of 2002, an empirical approach was developed by water operators that ceased pumping well SR-4 under certain conditions. The monitoring activity shut down the new well whenever flow in the creek was observed to be dropping in level, or slowing in velocity. Although changes in creek flow may have been due to upstream riparian pumping activities, no conclusive evidence was obtained to prove this hypothesis. Additionally, the 2002 rainy season was less than average, and little rainfall occurred during the last half of the season. As the result of these efforts, and despite the lack of rainfall, the creek flow persisted throughout the dry season of 2002. As a result, during the peak demand months of 2002, well SR-4 provided only minor production (approximately 37 AF total from July 1, 2002 through October 31, 2002).

2.1.3 Assessment of Current Water Supplies

The current water rights diversion permits from the SWRCB allow CCSD to pump a maximum of 1,118 AF during the wet season, and 630 AF during the dry season, from both the San Simeon and Santa Rosa Basins. However, the current CCC Development permit limits the total annual diversion from both creeks to no more that 1,230 AF. Additionally, the dry season start date, duration and beginning groundwater levels limit the actual availability of groundwater from both basins. The report entitled, "Baseline Water Supply Analysis," dated 2000 by Kennedy/Jenks Consultants developed a model based on historical data that projected basin response to increased levels of water demand to determine the adequacy of the groundwater supply. To interpret the model supply outputs, the following criteria were applied to determine whether water supplies appear to be adequate for the assumed water demand projections:

- The projected groundwater level at the end of the dry season in the San Simeon Basin is above the minimum groundwater level criteria for the specific hydrologic classification.

- There is at least an approximately 90 or 95 percent probability of occurrence that the groundwater level at the beginning of the dry season in the San Simeon basin is greater than the minimum groundwater level for the specified hydrologic classification.

[6] Ibid.

- The projected draw down in the Santa Rosa Basin is less than 28 ft at the existing wells SR-1 and SR-3.

- The annual and dry season water rights limitations for each basin are not exceeded.

From the model, it was determined that the current groundwater supply was marginal to inadequate to provide a 90 percent level of reliability for water demands in the year 1999 (3,796 connections) and was inadequate to provide a 95 percent reliability level for the same water demand. This conclusion was based on the following model results:

- The projected ending groundwater level in the San Simeon Basin is expected to be above the minimum groundwater level criterion if the basin is completely recharged at the beginning of the dry season.

- The probability that groundwater levels will be sufficiently high at the beginning of the Dry Season to maintain the minimum criteria is near the 90 percent reliability objective but well below the 95 percent reliability objective, particularly in critically dry years.

- The projected drawdown in the Santa Rosa Basin near wells SR-1 and SR-3 is expected to be less than 28 ft.

- The expected production requirements from each basin are within the dry season water rights limitations.

Furthermore, it was determined that the basins are not adequate to provide a 90 percent or 95 percent level of reliability for water demands greater than 10 percent of the 1999 demands (4,176 connections). Thus, the basins cannot reliably meet the increased demands of the waiting list and grandfathered connections (4,650 connections) without an additional source of recharge. A total of 286 AF of groundwater from the San Simeon Basin and 201 AF from the Santa Rosa Basin would be available with a 93 percent reliability during the dry season for a multi-dry year without causing adverse environmental impacts to the basins as determined by the model using the assumptions previously stated. However, since the Baseline report was completed in 2000, operation of well SR-4 has been minimal during the dry season due to concerns over potential habitat impacts. For this reason, dry season production is only assumed to be available from the San Simeon aquifer, and limited to approximately 286 acre ft. Table 2-2 provides an estimate of the supply availability based on the SWRCB diversion permits, the CCC Development permit, and negligible use of the Santa Rosa aquifer during the dry season.

TABLE 2-2
ESTIMATE OF EXISTING SUPPLY AVAILABILITY

Supply Availability	San Simeon (AFY)	Santa Rosa (AFY)	Total (AFY)
Annual[(a)]	1,230	518	1,230[(c)]
Dry Season[(b)]	286	201	286[(d)]
Wet Season	944	317	944[(e)]

Notes:
(a) Maximum annual availability as restricted by the SWRCB diversion permits.
(b) Dry season and wet season availability as determined from "Baseline Water Supply Analysis," 2000, by Kennedy/Jenks.
(c) 1,230 AF maximum annual amount allowed by CCC Development permit.
(d) The Santa Rosa supply is not expected to operate during the dry season and is expected to only operate as a supplemental source during the wet season. Thus is its not anticipated to increase the dry season supply availability.
(e) Difference between Annual and Dry Season availability, (1230 – 286 = 944 AF).

2.2 Current Water Demands

Table 2-3 provides a summary of annual production totals for CCSD over the last twelve years. The total potable water demand for 2002, based on CCSD water production, was 810 AF. Assuming a dry season starting May 1 and ending October 31, the total dry season demand for 2002 was approximately 459 AF. During 2002, the majority of the 459 AF pumped during the dry season, 385 AF, was pumped from the San Simeon aquifer. If the dry season actually started on May 1, 2002, CCSD would have exceeded its permitted maximum of 370 AF during the dry season by about 98 AF. However, the assumed May 1 dry season start date is a conservative estimate. For example, the dry season in 2002 actually started later in the summer, with July 7, 2002 as the start date of low flow in San Simeon Creek.

In addition to the well production used for its metered customers, CCSD also provides a 2-inch water connection from its San Simeon wells to an agricultural property that is used for agricultural irrigation. The connection to the agricultural property is based on an earlier hearing with the SWRCB, over potential impacts to an irrigation well that is jointly owned by both the agricultural property and CCSD. Well production numbers shown in Table 2-3 include the extra demand CCSD was required to deliver to the riparian users. During summer of 2001, agricultural watering occurred during the peak of the dry season in order to soften a new field for plowing. During the subsequent 2002 irrigation season, the same agricultural irrigator entered into a fallowing agreement with CCSD to suspend watering. However, the fallowing agreement was not enacted until halfway through the 2002 irrigation season.

TABLE 2-3
CCSD WATER PRODUCTION

	San Simeon Basin (AF)			Santa Rosa Basin (AF)			Total (AF)		
Year	Wet	Dry[(a)]	Total	Wet	Dry	Total	Wet	Dry	Total
1988	283.0	282.6	565.6	70.5	183.4	253.9	353.5	466.0	819.5
1989	297.9	324.5	622.4	36.8	137.8	174.6	334.7	462.3	797.0
1990	252.1	205.1	457.2	62.2	144.4	206.6	314.3	349.5	663.8
1991	178.8	226.1	404.9	67.4	83.4	150.8	246.2	309.5	555.7
1992	265.7	276.6	542.3	26.7	108.7	135.4	292.4	385.3	677.7
1993	299.6	390.9	690.5	0.8	0.1	0.9	300.4	391.0	691.4
1994	240.4	297.6	538.0	41.1	83.0	124.1	281.5	380.6	662.1
1995	283.5	392.4	675.9	1.9	0.0	1.9	285.4	392.4	677.8
1996	293.2	424.8	718.0	0.18	0.12	0.3	293.3	425.0	718.3
1997	319.0	359.5	678.5	12.6	94.7	107.3	331.6	454.2	785.8
1998	294.5	412.8	707.3	0.08	0.12	0.2	294.6	412.9	707.5
1999	306.7	467.4	774.1	0.07	0.46	0.53	306.8	467.8	774.6
2000	345.8	453.0	798.8	0.0	0.0	0.0	345.8	453.0	798.8
2001	321.3	424.0	745.3	9.0	43.7	52.7	330.3	467.7	798.0
2002	343.1	384.6	727.8	7.3	74.4	81.7	350.4	459.0	809.5

Notes:
(a) Based on the assumption of a May 1 start date and an October 31 end date for the dry season. The actual dates will vary each year depending upon creek flows and rainfall patterns.
Source: CCSD Water Operations Staff Report, December 2002.

Figures 2-1 and 2-2 summarize CCSD total production and Santa Rosa dry season production from 1988 through 2002 in comparison with the maximum production allowed by the CCC Development permit.

2.3 Projected Water Demands

In the report entitled “Task 3: Potable Water System Modeling” dated June 2004, by Kennedy/Jenks Consultants, future water demands were projected and the necessary water system improvements were evaluated. The report presented projected demands for four build-out scenarios for 2022. The four scenarios are:

1. 6,700 connections
2. 5,700 connections
3. 5,250 connections
4. 4,650 connections

Because of an expressed desire by the CCSD Board to improve “quality of life” by allowing for some future increase in unit consumption, increases of 10, 20, and 50 percent in consumption above existing baseline demands were also analyzed. The projected water demands for each scenario are summarized in Tables 2-4 and 2-5 along with quality of life increases expressed as a percentage increase above existing consumption levels. Appendix C is an excerpt from the modeling report that provides a more detailed discussion of the development of existing and projected water demands.

Figure 2-1
CCSD Historic Annual Production (1988 to 2002)

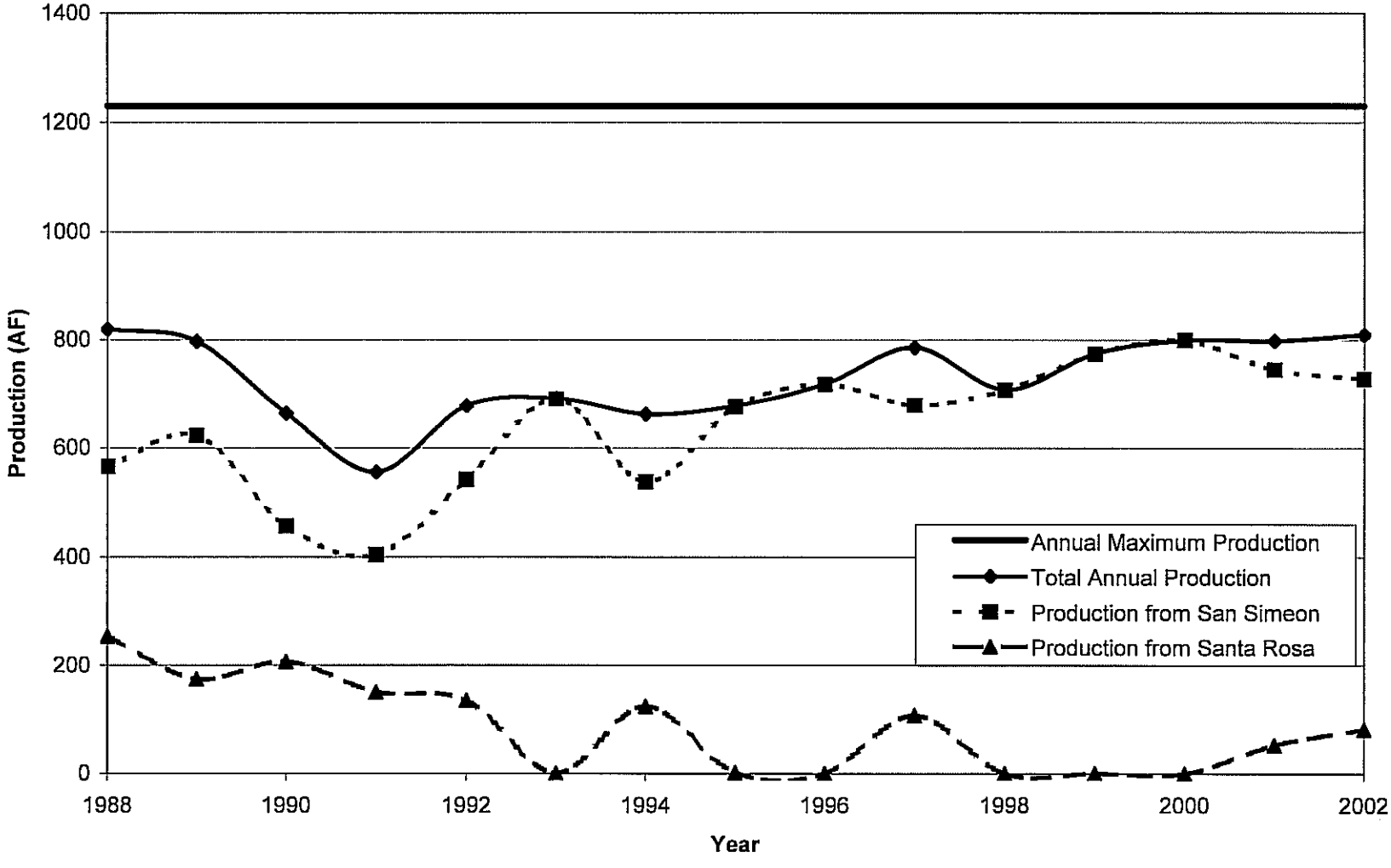
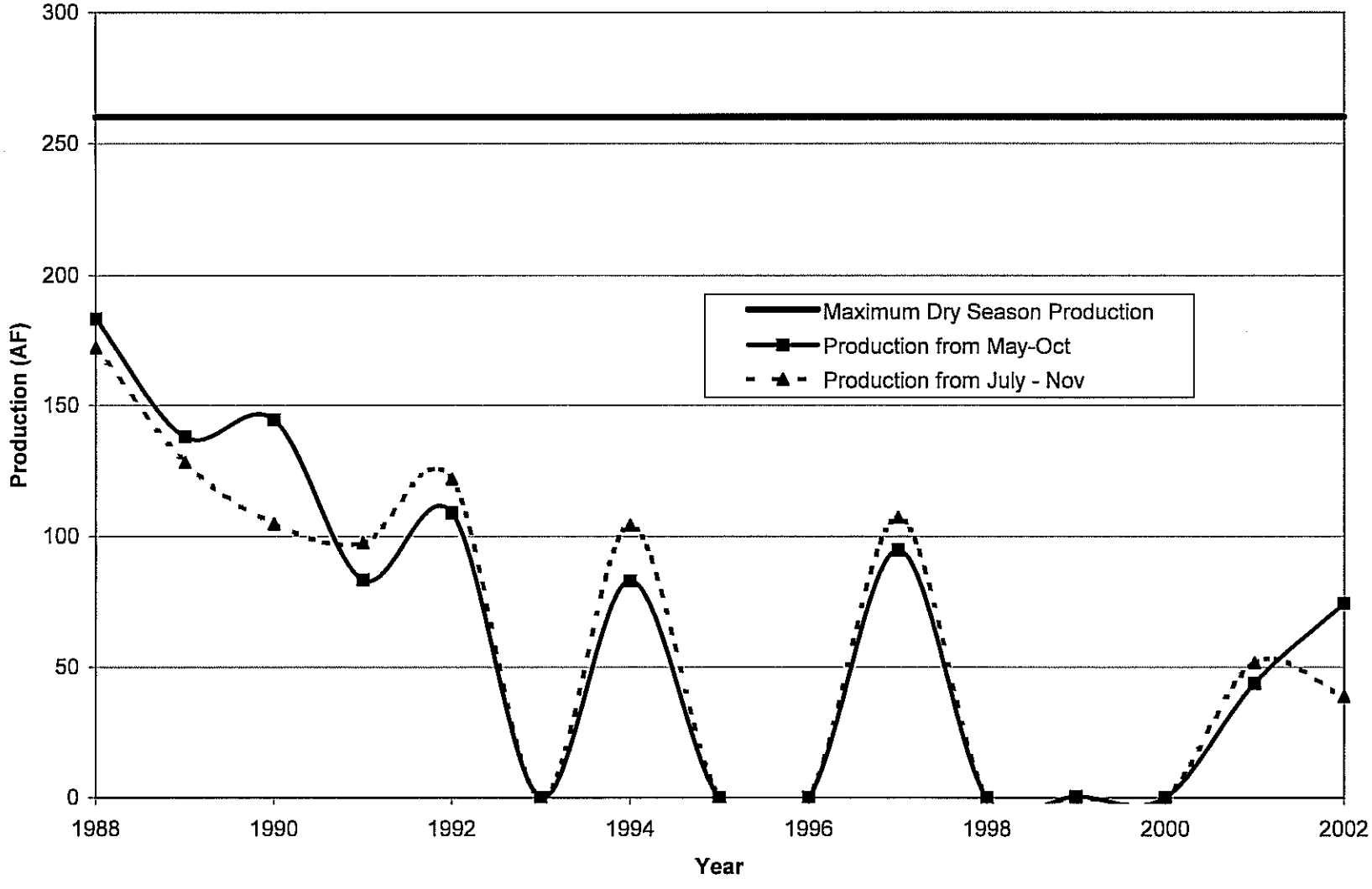


Figure 2-2
Dry Season Production (1988 to 2002) for the Santa Rosa Basin

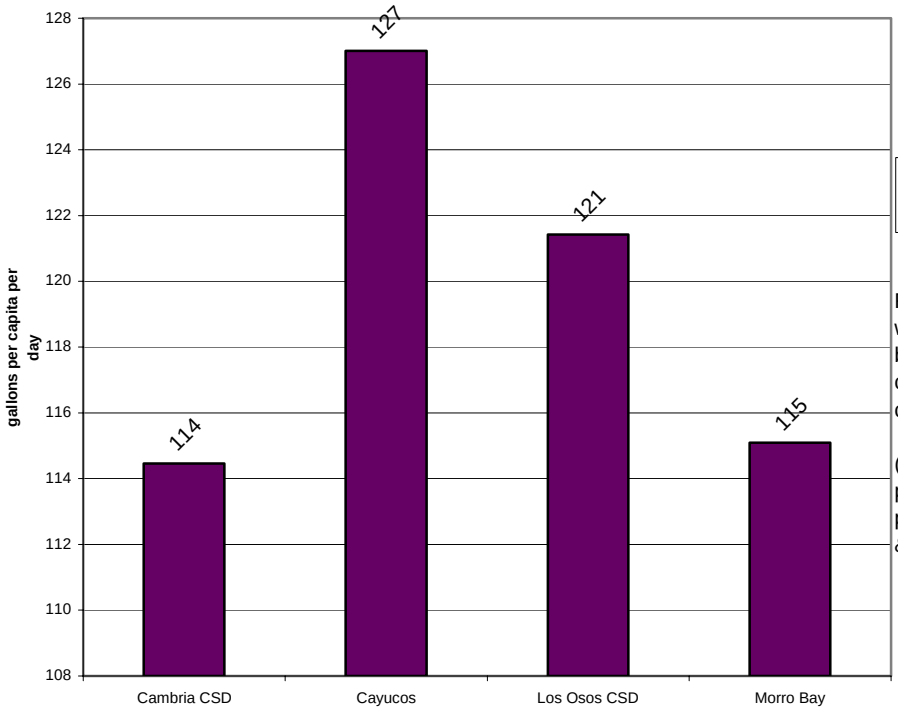


Future demand projections were developed using 1999 through 2003 billing and production data. This data was subsequently used by Kennedy/Jenks Consultants to make corrections using adjustment factors to account for differences between billing totals and actual water delivered into the distribution system from the production wells. By using this approach, both commercial and residential consumption was included. Historically, approximately 25 percent of the District's supply has gone to commercial accounts that are primarily visitor serving enterprises.

Assuming either 1.66 or 2.21 residents per household and 90 gallons per capita per day (gpcd), the total annual future demand was projected for each scenario. These future demands were then added onto the existing demands from the metered data. Because the metered data included both commercial and residential use, the future demand volumes also account for the 20 percent commercial use required by the CCC permit. These population densities are based on 2000 Census data utilizing a 75 percent and 100 percent occupancy rate, respectively. Based on a statistical analysis of historical water consumption described in the "Baseline Water Supply Analysis" dated December 8, 2000 by Kennedy/Jenks Consultants, the average water consumption is 114 gpcd (90 percent confidence level) of which, approximately 25 percent is due to commercial consumption. Accordingly, the residential consumption factor is 90 gpcd. In order to develop summer and winter demands from average demands, seasonal demand factors were developed from historic seasonal water use, which account for increased demands from summer tourism and vacation homes. Based on current wet season and dry season average day demands, future average day demands for wet and dry seasons were determined.

The projected baseline demands presented were derived based on CCSD's current consumption rate (114 gpcd), which includes extensive water demand management measures designed to reduce overall consumption. This rate differs by approximately 6 percent from the average consumption rate (121 gpcd) for other central coast communities located within the same relative microclimate (evapotranspiration zone [ET]) and approximately 10 percent from the maximum consumption rate (127 gpcd) for the same communities. These communities included Morro Bay, Cayucos, and Los Osos. Figure 2-3 compares CCSD's existing water use with the other communities.

FIGURE 2-3
COMPARSION OF WATER CONSUMPTION[(a)]



For those locations where data was availabe, the bimonthly billed amount is shown for the corresponding gpd/residential connection.

(a) total production divided by population, where total production includes commercial & retail

TABLE 2-4
PROJECTED POTABLE WATER DEMAND (AFY) FOR CCSD (1.66 PEOPLE/UNIT)

Scenario	Estimated Housing Units	Estimated Development Year	Projected Demand			Total Percent Increase		
			Wet Season	Dry Season	Total	10	20	50
Existing	3,812	2002	350	459	810	891	972	1,215
1	6,700[(a)]	2029	600	853	1,454	1,599	1,745	2,181
2	5,700[(b)]	2020	511	726	1,237	1,361	1,484	1,855
3	5,250[(c)]	2016	471	669	1,139	1,253	1,367	1,709
4	4,650[(d)]	2011	417	592	1,009	1,110	1,211	1,514

Notes:
(a) Total number of future dwelling units from GIS analysis. Includes acquisition of the East/West Ranch, non-controversial changes from the Draft 2000 North Coast Area Plan, merged single-family lots, and no subsequent lot retirements. Also included are an additional 163 mixed-use residential units within commercial land use areas, and 387 future multi-family units.
(b) Scenario 1 less the retirement of approximately 1,000 "likely non-buildable" high-density vacant single-family residential parcels.
(c) Maximum number of dwelling units permitted under a May 29, 1981 CCC Development Permit. (CCC Permit 428-10).
(d) Maximum number of dwelling units estimated by adding 3,812 existing units (estimated as of the end of 2002) plus 165 connections in process, plus 670 remaining CCSD wait listed customers. This approximates the number of dwelling units served by a proposed desalination project that was subject of an August 2000 advisory ballot.

TABLE 2-5
PROJECTED POTABLE WATER DEMAND (AFY) FOR CCSD (2.21 PEOPLE/UNIT)

Scenario	Estimated Housing Units	Estimated Development Year	Projected Demand			Total Percent Increase		
			Wet Season	Dry Season	Total	10	20	50
Existing	3,812	2002	350	459	810	891	972	1,215
1	6,700[(a)]	2029	747	1,062	1,809	1,990	2,171	2,714
2	5,700[(b)]	2020	636	903	1,539	1,693	1,847	2,309
3	5,250[(c)]	2016	585	832	1,418	1,559	1,701	2,126
4	4,650[(d)]	2011	519	737	1,256	1,381	1,507	1,883

Notes:
(a) Total number of future dwelling units from GIS analysis. Includes acquisition of the East/West Ranch, non-controversial changes from the Draft 2000 North Coast Area Plan, merged single-family lots, and no subsequent lot retirements. Also included are an additional 163 mixed-use residential units within commercial land use areas, and 387 future multi-family units.
(b) Scenario 1 less the retirement of approximately 1,000 "likely non-buildable" high-density vacant single-family residential parcels.
(c) Maximum number of dwelling units permitted under a May 29, 1981 CCC Development Permit. (CCC Permit 428-10).
(d) Maximum number of dwelling units estimated by adding 3,812 existing units (estimated as of the end of 2002) plus 165 connections in process, plus 670 remaining CCSD wait listed customers. This approximates the number of dwelling units served by a proposed desalination project that was subject of an August 2000 advisory ballot.

A density of 1.66 people/unit as determined by 2000 Census and a range of projected demand between Scenario 3 and 4 are assumed. This range was selected because it represents the minimum projected demand (Scenario 4 that includes the grand-fathered and wait list connections) and the most likely worst-case demand (Scenario 3 that is the maximum number of units permitted by the CCC for CCSD). Per the recommendation of the CCSD Board, an increase from the current 90 gpcd (12 CCF per bi-monthly billing month) to 135 gpcd (18 CCF

TABLE 2-7
SUPPLY VS. DEMAND PROJECTIONS (1.66 PERSONS/ DWELLING UNIT)

	Scenario 1			Scenario 2			Scenario 3			Scenario 4		
	6700 Residential Units			5700 Residential Units			5250 Residential Units			4650 Residential Units		
	winter	summer	annual	winter	summer	annual	winter	summer	annual	winter	summer	annual
Max Day Demand (gpm) [a]	1,128	1,577		960	1,342		884	1,236		783	1,095	
Average Day Demand (gpm) [b]	752	1,051		640	894		589	824		522	730	
Baseline Demand (AF) [c]	600	853	1,454	511	726	1,237	471	669	1,139	417	592	1,009
Supply (AF) [d]	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF) [e]	**344**	**-567**	**-224**	**433**	**-440**	**-7**	**473**	**-383**	**91**	**527**	**-306**	**221**
Demand with 10% increase (AF)	661	939	1,599	562	799	1,361	518	736	1,253	458	652	1,110
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**283**	**-653**	**-369**	**382**	**-513**	**-131**	**426**	**-450**	**-23**	**486**	**-366**	**120**
Demand with 20% increase (AF)	721	1,024	1,745	613	871	1,484	565	802	1,367	500	711	1,211
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**223**	**-738**	**-515**	**331**	**-585**	**-254**	**379**	**-516**	**-137**	**444**	**-425**	**19**
Demand with 50% increase (AF)	901	1,280	2,181	766	1,089	1,855	706	1,003	1,709	625	888	1,514
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**43**	**-994**	**-951**	**178**	**-803**	**-625**	**238**	**-717**	**-479**	**319**	**-602**	**-284**

Notes:
(a) From "Task 3: Potable Water System Modeling" prepared by Kennedy/Jenks Consultants, dated March 2004.
(b) Calculated by dividing the Max Day Demand by the Max Day Demand Factor of 1.5
(c) Conversion of gpm to AF. 181 days were assumed for the winter season and 184 days for the summer season.
(d) From Table 2-2
(e) Supply minus Demand

TABLE 2-8
SUPPLY VS. DEMAND PROJECTIONS (2.21 PERSONS/ DWELLING UNIT)

	Scenario 1 6700 Residential Units			Scenario 2 5700 Residential Units			Scenario 3 5250 Residential Units			Scenario 4 4650 Residential Units		
	winter	summer	annual	winter	summer	annual	winter	summer	annual	winter	summer	annual
Max Day Demand (gpm) [a]	1,403	1,962		1,194	1,669		1,100	1,538		974	1,362	
Average Day Demand (gpm) [b]	936	1,308		796	1,113		733	1,025		649	908	
Baseline Demand (AF) [c]	747	1,062	1,809	636	903	1,539	585	832	1,418	519	737	1,256
Supply (AF) [d]	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF) [e]	**197**	**-776**	**-579**	**308**	**-617**	**-309**	**359**	**-546**	**-188**	**425**	**-451**	**-26**
Demand with 10% increase (AF)	822	1,168	1,990	699	994	1,693	644	915	1,559	570	811	1,381
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**122**	**-882**	**-760**	**245**	**-708**	**-463**	**300**	**-629**	**-329**	**374**	**-525**	**-151**
Demand with 20% increase (AF)	897	1,274	2,171	763	1,084	1,847	703	998	1,701	622	884	1,507
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**47**	**-988**	**-941**	**181**	**-798**	**-617**	**241**	**-712**	**-471**	**322**	**-598**	**-277**
Demand with 50% increase (AF)	1,121	1,593	2,714	953	1,355	2,309	878	1,248	2,126	778	1,105	1,883
Supply (AF)	944	286	1,230	944	286	1,230	944	286	1,230	944	286	1,230
Surplus (+) / Deficit (-) (AF)	**-177**	**-1,307**	**-1,484**	**-9**	**-1,069**	**-1,079**	**66**	**-962**	**-896**	**166**	**-819**	**-653**

Notes:
(a) From the "Task 3: Potable Water System Modeling" prepared by Kennedy/Jenks Consultants, dated March 2004.
(b) Calculated by dividing the Max Day Demand by the Max Day Demand Factor of 1.5
(c) Conversion of gpm to AF. 181 days were assumed for the winter season and 184 days for the summer season.
(d) From Table 2-2
(e) Supply minus Demand

per bi-monthly billing period) was also included. This increase equates to the 50 percent quality of life increase. Additionally, this quality of life increase allows for the same percent increase in commercial consumption or for future commercial growth. Thus, the projected annual water demand, with the 50 percent increase above baseline use and 1.66 persons per household, is 1,514 AF (for build-out Scenario 4) to 1,709 AF (for build-out Scenario 3). The dry season demands, with the same 50 percent increase above baseline and 1.66 persons per household, equate to 888 AF (Scenario 4) to 1,003 AF (Scenario 3), as shown in Table 2-7 provided below.

2.4 Projected Water Supply Requirements

Table 2-6 provides a comparison of the current water supplies and projected water demands. From this comparison, it is evident that to meet projected water demand an additional water source would be required during the dry season, regardless of which demand scenario is assumed. Alternatively, sufficiently large seasonal storage to meet supplemental dry season requirements, as well as evaporative losses and dead pool requirements, could be considered. For purposes of this report, the projected dry season supplemental supply required is assumed to be in the range of 602 AF (Scenario 4 with 50 percent demand increase) to 717 AF (Scenario 3 with 50 percent demand increase) as determined from Table 2-6. As shown, these values assume the total dry season production from the San Simeon basin at 286 AF and no production from the Santa Rosa basin. With this supplemental supply provided by an alternative source, dependence on the existing basins during the critical summer months would decrease. Tables 2-7 and 2-8 provide the supplement requirements for all the projected demand scenarios.

TABLE 2-6
PROJECTED WATER SUPPLY REQUIREMENTS

	Wet Season[(a)]	Dry Season[(b)]	Total
Total Supply Available[(c)]	944 AF	286 AF	1,230 AF
Projected Water Demand[(d)]	625 to 706 AF	888 to 1,003 AF	1,514 to 1,709 AF
Projected Supplemental Water Supply Requirements	+238 to +319 AF	-602 to -717 AF	-284 to -479 AF

Notes:
(a) Wet season estimated as extending January 1 to April 31 and November 1 to December 31
(b) Dry season estimated as May 1 to October 31.
(c) From Table 2-2.
(d) Assuming 1.66 people/household, 50 percent quality of life increase, and ranging between Scenario 3 and 4.

2.5 Water Supply Reliability Requirements

Reliability is "how much one can count on a certain amount of water being delivered to a specific place at a specific time" and depends on the availability of water from the source, availability of the means of conveyance and level and pattern of water demand at the place of delivery.[7] The recommend reliability objective focuses on the ability of an alternative to provide sufficient water to CCSD during period of drought, as well as during a conveyance disruption. Currently the reliability of CCSD's water supply is dependent upon the reliability of its groundwater supply.

Reliability criteria define the maximum acceptable level of supply shortage CCSD is willing to sustain during a drought. For this study, a reliability criterion has been used to evaluate water supply plans. The recommended criterion requires water supply to be sufficient to meet

[7] DWR, 2002

projected demands 95 percent of the time. In the remaining 5 percent of the time, it is assumed that the maximum allowable supply shortage will be 5 percent of the demand. This level is recommended because a 5 percent water demand reduction was anticipated to be attainable in CCSD's service area by voluntary conservation. Typically when a shortage occurs, water customers increase their awareness of water usage and voluntarily reduce water demands, avoiding water rationing. However with CCSD's service area, customers are already actively conserving water. Thus the potential to cut additional demand via conservation practices is small. However, if improvements are made to the current demand management practices, as discussed in Section 8.7, additional reduction in potable water demand may be obtained. If a further reduction in water demand can be obtained through voluntary conservation, then the reliability criteria for CCSD's water supply can be lowered by that amount. For example, if the additional water demand management practices can reduce water demand by an additional 5 percent, then the reliability criteria can be lowered to 90 percent.