Chapter 4

PAST, CURRENT, AND PROJECTED WATER USE

This chapter describes the City's customer classification system and the water use characteristics of the different customer groups, summarizes ongoing trends in water consumption, and presents projections of water use out to the year 2030. This chapter also provides a detailed description and calculations for the City's baseline daily per capita water use and future water use targets, in accordance with technical methods developed by the California Department of Water Resources, as required by Water Code section 10608.

4.1 Customer Classification System

The City divides its water customers into eight major classes and one miscellaneous category, as follows:

Single Family Residential: Individually metered residential units (regardless of housing type).

Multiple Family Residential*:* Any residential account with more than one dwelling unit served by one water meter.

Business: Commercial establishments including restaurants, hotel/motel, retail, medical, schools, offices, churches and mixed-use buildings. This category also includes county and state government accounts.

Industry/UCSC: This category is comprised of one primary customer - the University of California, Santa Cruz - and a small number of manufacturing businesses.

Municipal: These are City-owned and operated facilities such as city offices, parks, police and fire stations, wastewater treatment plant, street medians, and parking lots.

Irrigation: Dedicated water services for landscape irrigation associated with large multiple residential complexes and homeowners associations, or with commercial, industrial, and institutional sites, including schools, churches, parks, etc.

Golf Irrigation: Accounts serving the two golf courses in the service area.

Coast Irrigation: Agricultural accounts receiving untreated water on the north coast.

Other: Miscellaneous uses such as temporary construction accounts, hydrant meters, and bulk water sales.

No water is presently sold to other agencies, or used for groundwater recharge, saline water intrusion barriers, conjunctive use, or any combination thereof.

4.2 Water Use by Customer Category

The number of active water service accounts and annual water consumption volumes from 2000 to 2010 are provided in Tables 4-1 and 4-2, according to customer category. As of calendar year 2010, there are currently 24,341 active, metered service accounts on the City water system. The water system has no unmetered service connections.

Table 4-1. Number of Water Service Accounts

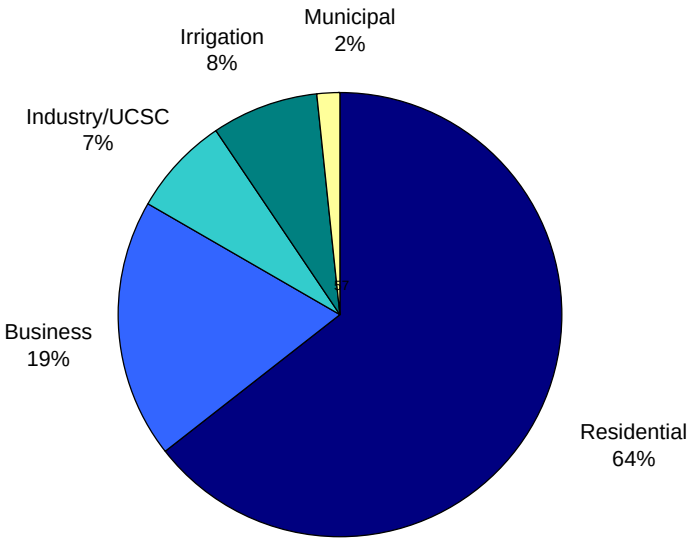
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Single Residential	17,870	17,984	18,182	18,290	18,352	18,443	18,566	18,746	18,759	18,816	18,862
Multiple Residential	2,573	2,584	2,583	2,602	2,636	2,668	2,675	2,697	2,702	2,713	2,726
Business	1,927	1,898	1,891	1,893	1,886	1,881	1,886	1,881	1,878	1,888	1,885
Industrial	60	60	60	57	56	55	52	52	52	52	50
Municipal	217	224	224	229	230	230	229	222	205	227	224
Irrigation	351	358	385	400	412	418	427	432	433	441	444
Golf Course Irrigation	6	6	6	6	6	6	6	6	6	6	6
Coast Irrigation	22	34	31	30	36	30	32	33	29	36	34
Other	144	162	229	217	185	193	223	236	164	131	120
TOTAL	**23,170**	**23,310**	**23,591**	**23,724**	**23,799**	**23,924**	**24,096**	**24,305**	**24,228**	**24,310**	**24,351**

Table 4-2. Water Consumption by Customer Category (million gallons)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Single Residential	1,469	1,486	1,503	1,502	1,521	1,424	1,359	1,357	1,374	1,217	1,185
Multiple Residential	873	859	836	812	815	798	752	728	735	687	691
Business	733	717	696	666	678	671	630	636	610	554	527
Industrial	377	342	233	247	249	229	236	238	240	185	227
Municipal	58	63	60	64	63	55	53	59	66	46	49
Irrigation	121	130	129	132	138	124	118	131	137	91	96
Golf Course Irrigation	94	110	114	108	111	80	83	111	120	91	78
Coast Irrigation	28	48	41	68	81	62	76	26	26	18	21
Other	3	3	4	3	4	5	4	3	4	4	2
TOTAL	3,755	3,757	3,615	3,603	3,660	3,448	3,311	3,287	3,311	2,893	2,875

A breakdown of total water used by these major customer categories, based on an average over the last 5 years, is presented below in Figure 4-1. In this chart, the two residential categories are combined together into one residential sector, as are three irrigation categories to show five principal customer sectors.

Figure 4-1. Percentage of Total Water Use by Customer Category, 2006-2010



The single family residential class is the City's largest customer category in terms of both the number of accounts and total amount of water consumed. This group of customers represents about 41 percent of metered system water use. The multiple family residential category constitutes another 23 percent of system use. Together, residential use accounts for almost two thirds of the total water supplied by the Santa Cruz water system.

The majority of water used in this category is for interior domestic purposes such as showering, bathing, flushing, cooking, cleaning, and clothes washing, as well as for outdoor uses including landscape and garden irrigation, spas and swimming pools, and car washing. Figure 4-2 below provides a breakdown of average residential water use into indoor and outdoor components. The overall proportion of residential water use going to outdoor purposes in single family homes in Santa Cruz - about 25 percent - is considerably lower than the statewide average of about 53 percent due to the City's local maritime climate and other factors (Aquacraft Engineering, 2011). Within individual homes, this breakdown between indoor and outdoor usage, as well as overall water usage, varies widely depending on the number of residents, the type of water using fixtures and appliances, the size of the lot, and type of landscaping.

Figure 4-2. Average Indoor and Outdoor Water Use

The remaining one-third of system water use goes to local businesses and industry, large landscape irrigation, coast agriculture, and municipal water accounts. The University of California currently represents about 6 percent of system demand. The coast irrigation category uses 2 percent for the cultivation of commercial agriculture crops, including Brussels sprouts, strawberries, and organic herbs and vegetables. The municipal category also uses about 2 percent of the City water supply, most of which goes to turf watering and landscape irrigation at the City's 23 regional and neighborhood parks. County parks are included within the irrigation category.

4.3 Annual Trends in Water Consumption

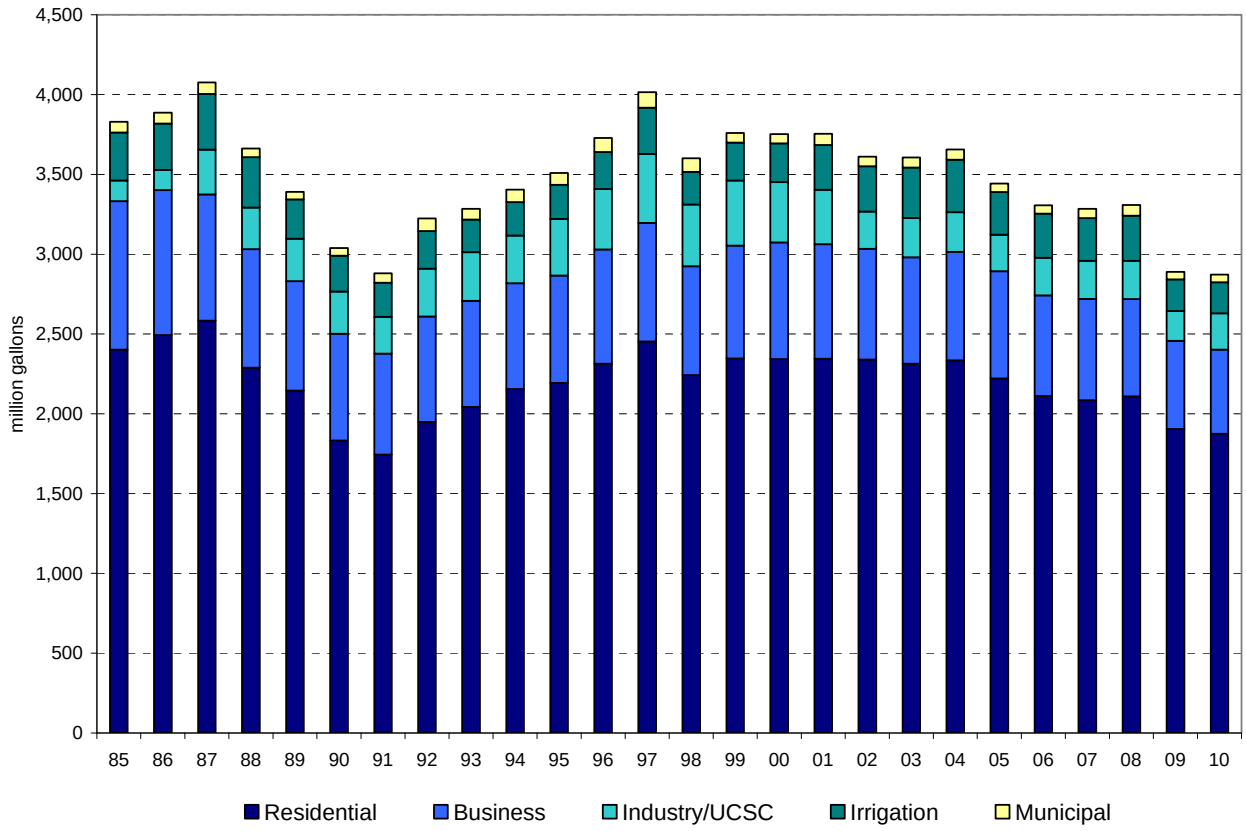
Figure 4-3 shows the trend in total annual metered water use over the last twenty-five years, by major customer category. During this period, water use has fluctuated from a high of 4.1 billion gallons per year (bgy) in 1987 to its current low of 2.9 bgy.

The steep decline in water use from 1987 to 1991 was due to water use restrictions and rationing imposed during the 1987-92 drought. After restrictions ended, water use gradually recovered over a period of several years and then stabilized at a level of about 3.75 bgy at the beginning of the decade. Aside from the slight drop that occurred between 2001 and 2002 resulting from the closure of the Texas Instruments plant, overall water consumption remained remarkably steady during a six-year period from 1999 through 2004.

Since then, total water use has declined, in two distinct steps. The first downturn, which began in 2005, was concurrent with the introduction of a modified rate structure affecting single family and two-unit residential customers, the first of several phased rate increases for all customers, and a transition to monthly from bimonthly billing frequency inside the City. Between 2005 and 2008, total water use declined by about

340 million gallons per year or about 8 percent compared to levels existing in the early 2000s. This decline was broad-based and reflected in almost every major customer category to a varying degree.

Figure 4-3. Annual Water Consumption, by Customer Category (million gallons)



The second recent downturn in overall water consumption occurred in 2009. This drop is mostly attributable to mandatory water restrictions and temporary demand reduction measures imposed as a result of a City-declared Stage 2 water shortage following a third consecutive year of below normal rainfall and runoff. As a result, total annual water use fell below 3.0 bgy in 2009. It remained low through 2010, even though restrictions had been rescinded, reflecting abnormally cool and foggy weather conditions.

Other factors influencing the observed downturn in water consumption since 2000 include ongoing water conservation efforts and effects from both the housing market collapse and recent economic recession. Overall water use in 2010 is almost 900 mgy or 23 percent less than it was in 2000, despite a 6 percent increase in population over that same time. This reduction is greater in magnitude than the total amount of water used by the City's multiple family residential category back in the early 2000s. As

occurred after the 1976-77 and 1987-92 droughts, it is expected that water use will eventually recover at least to levels experienced prior to 2009 and reach a new equilibrium with time. How long that may take, however, remains uncertain.

4.4 Unmetered Water Use and System Losses

Total system water demand includes not only metered water sales but also authorized, unmetered uses from fire hydrants such as main flushing, fire fighting, street sweeping, and sewer flushing, as well as losses due to underground leaks. The difference between the amount of water produced at the City's two water treatment plants entering the distribution system and the amount of water consumed, including both metered and unmetered uses, is referred to as system water losses. System losses have two components: physical losses from leaking service lines and water mains, and apparent losses in which actual consumption is underreported due to sales meter inaccuracies and other factors.

The City has conducted audits of the distribution system annually since the late 1990's to account for unmetered water uses and to track how much water is lost to leakage over time. Authorized unmetered uses over the last 10 years have ranged from 21 to 44 mgy and average 33 mgy. Physical losses from underground leakage in service lines, water mains, valves, and distribution system controls have ranged from 124 to 256 mgy and average 200 mgy or 5.6 percent over the last ten years. In addition, it is estimated that another 65 mgy or about 1.8 percent of water entering the distribution system is used but not captured on the billing system due to sales meter underregistration.

The City uses AWWA water balance software to help quantify and track water losses associated with the water distribution system and identify areas for improved efficiency and cost recovery.

4.5 Baseline and Target Per Capita Water Use

Water Code section 10608.20(e) requires water suppliers to:

> *"…include in its urban water management plan …the baseline daily per capital water use, urban water use target, interim water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data."*

4.5.1 Background Information

In February 2008, Governor Schwarzenegger introduced a seven-part comprehensive plan for improving the Sacramento-San Joaquin Delta. As part of this effort, the Governor directed state agencies to develop a plan to reduce statewide per capita water use by 20 percent by the year 2020.

The 20x2020 Water Conservation Plan was designed to address several key questions, including the following:

- What is per capita use?
- How does it vary across the state?
- What is the conservation potential from current measures and new actions?
- Is it feasible to expect a 20 percent reduction in per capita water use?

The final 20x2020 Water Conservation Plan was issued February 2010 (DWR, 2010). It reported urban water use currently varies between **152 gpcd** in the Central Coast region (Region 3) to **346 gpcd** in the Colorado River region (Region 10) and averages **192 gpcd** statewide**.** The report concluded that California could achieve a 20 percent reduction in urban per capita water use to an average of **154 gpcd** using current and new conservation actions. It also established for water resources planning purposes baseline values and future water use targets for each of the state's ten hydrologic regions, summarized in Table 4-3 and Figure 4-4.

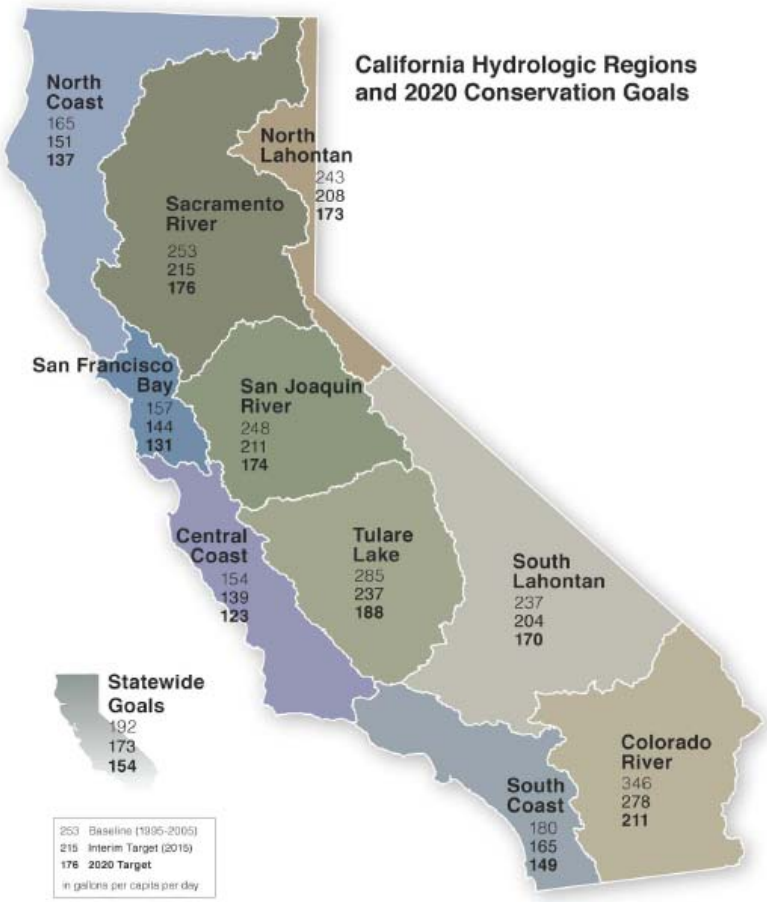
Table 4-3. Regional Urban Water Use Targets (gallons per capita per day)

	DWR Hydrologic Region									
	1 North Coast	**2** San Francisco Bay	**3** Central Coast	**4** South Coast	**5** Sacra-mento River	**6** San Joaquin River	**7** Tulare Lake	**8** North Lahontan	**9** South Lahontan	**10** Colorado River
Baseline (1995-2005)	165	157	154	180	253	248	285	243	237	346
Interim 2015 Target	151	144	139	165	215	211	237	208	204	278
2020 Target	137	131	123	149	176	174	188	173	170	211

The 20x2020 Water Conservation Plan recognized even within hydrologic regions, there is significant variation in use due to climatic, demographic, or economic factors as well as differing levels of conservation implementation. It also recognized that available data were not complete and accuracy levels vary significantly among water suppliers. Accordingly, it cautioned that the analyses in the report are to be viewed as initial

estimates, and that an important step in implementing the plan will be to improve and standardize the data collection process.

Figure 4-4. Regional Urban Water Use Targets



4.5.2 SBx7-7, the Water Conservation Act of 2009

In November 2009, California placed the 20x2020 goal into statute with the enactment of Senate Bill x7-7 as part of an historic package of water reforms. The legislation sets a goal of reducing urban per capita water use by 20 percent by December 31, 2020 and mandates water conservation targets and efficiency improvements for urban water suppliers. A copy of the law is included as Appendix B.

To provide for consistent implementation of the law, suppliers are required to conform to Technical Methodologies prepared by the CA Department of Water Resources, which detail the process that urban water suppliers are to follow and the options available for

complying with the legislation (DWR, February 2011). Water suppliers have some flexibility in setting and revising water use targets. For instance, a water supplier may set its water use target and comply individually, or as part of a regional alliance. The City of Santa Cruz is electing to report as an individual retail supplier.

The baseline and target water use development process consists of four basic steps, which are summarized below and detailed in a flow chart in Appendix F.

Step 1: Determine Base Daily Per Capita Water Use
Step 2: Determine Urban Water Use Target
Step 3: Confirm Urban Water Use Target
Step 4: Determine Interim Urban Water Use Target

4.5.3 Step 1 - Determine Base Daily Per Capita Water Use

Under SBx7-7, water suppliers must define two baseline periods. The first is a continuous 10-year baseline period (or 15-year period if more than 10 percent of system water demand is met through recycled water) ending no earlier than December 2004 and no later than December 2010. The City does not provide recycled water service so the 15-year baseline period does not apply. The 10-baseline period selected by the City of Santa Cruz is **2001-2010**.

The second is a five-year baseline period ending no earlier than December 2007 and no later than December 2010. This second baseline period pertains in Step 3. The 5-baseline period selected by the City of Santa Cruz is **2003-2007**.

4.5.3.1 Gross Water Use

The calculation of per capita water use involves two basic factors: 1) the gross amount of water supplied to a distribution system over a specified period of time, and, 2) service area population[1]. Gross water use includes not just residential consumption but all the other uses of water in a community, including schools, parks, and commercial buildings such as restaurants, hotels, and office buildings. It also captures water used for public purposes, such as firefighting and water main flushing, and losses that arise from leaks on the water system.

[1] The terms “gross water use” as used in this chapter and “net water production” used in Chapter 3 mean effectively the same thing; i.e., they both refer to treated water production volumes supplied to the distribution system.

Gross water use within the City of Santa Cruz water service area is presented on a **calendar year basis** for the period 2000 through 2010 in Table 4-4 [2]. Gross water use was determined in a manner that is consistent with the definition in Water Code section 10608.12(g) and the method outlined in the AWWA Manual M36 as part of the City's annual distribution system water audit process. These annual water use figures represent the total amount of treated water entering the distribution system from the City's Graham Hill and Live Oak treatment plants, after corrections have been applied to adjust for both production meter accuracy and net change in distribution system storage at the beginning and end of the year.

Table 4-4. Gross Water Use (a)

Base Period Year:		Million gallons per year (mgy)	Million gallons per day (mgd)	Gallons per day
Sequence Year	Calendar Year			
0	2000	3,987	10.9	10,924,356
1	**2001**	3,962	10.9	10,854,986
2	**2002**	3,909	10.7	10,708,219
3	**2003**	3,898	10.7	10,679,890
4	**2004**	3,895	10.7	10,672,274
5	**2005**	3,567	9.8	9,771,315
6	**2006**	3,570	9.8	9,780,219
7	**2007**	3,590	9.8	9,836,411
8	**2008**	3,565	9.8	9,767,699
9	**2009**	3,169	8.7	8,681,123
10	**2010**	3,103	8.5	8,501,074

Notes:
(a) For the City of Santa Cruz, gross water use is entirely based on volumes from its own sources; no water is imported into or exported out of the service area nor is recycled water used, directly or indirectly, within the service area.

4.5.3.2 Service Area Population

Estimates of the City's water service area population area based on data published by the U.S. Census Bureau and the California Department of Finance (DOF). Because the City's service area boundary does not coincide neatly with census tract or blocks, estimates must be derived using a Geographic Information System. A map showing the City's service area boundary and census tracts is provided in Appendix G.

[2] The 10-year baseline period selected by the City is 2001-2010; however the analysis of per capita water use is extended back to the year 2000 to capture both the 2000 and 2010 US census.

Population data is readily available on an annual and decennial basis only for the City of Santa Cruz as a whole. Outside the City limits, however, in the parts of unincorporated Santa Cruz County and the City Capitola that are served by the City water system, population data are available only every ten years through the census. In such situations, it is standard practice among water utilities to estimate population growth in non-census years by applying a locally derived ratio of persons per residential connection to changes in active single and multi-family residential connections over time. Between 2000 and 2010, approximately 425 residential accounts, mostly single family residential, were added to the system outside the City limits. But because census data indicates that the overall population outside the City actually declined during this period, this approach was not considered to be applicable or appropriate. Therefore, annual estimates of the outside city population were derived simply by interpolating between the 2000 and 2010 census years.

Table 4-5 provides estimated population inside the City of Santa Cruz, outside the City and total service area on an annual basis for the period 2000-2010.

Table 4-5. City of Santa Cruz Water Service Area Population

Base Period Year		Santa Cruz City Population (a)	Outside City Population (b)	Service Area Population
Sequence Year	Calendar Year			
0	2000 (c)	54,588	31,609	**86,197**
1	**2001**	54,451	31,583	**86,034**
2	**2002**	54,660	31,556	**86,216**
3	**2003**	55,361	31,530	**86,891**
4	**2004**	56,048	31,503	**87,551**
5	**2005**	56,394	31,477	**87,871**
6	**2006**	56,692	31,451	**88,143**
7	**2007**	57,352	31,424	**88,776**
8	**2008**	58,002	31,398	**89,400**
9	**2009**	59,016	31,371	**90,387**
10	**2010**	59,946	31,345	**91,291**

Notes:

(a) Source: US Census, DOF http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2001-10/documents/E-4_2010.xls

(b) Source: US Census only, 2000 and 2010

(c) Year 2000 is included for reference purposes only since it was a Census year

4.5.3.3 Base Daily Per Capita Water Use

The calculation of base daily per capita water use combines information provided in Tables 4-4 and 4-5, and is expressed in gallons per capita per day in Table 4-6.

Table 4-6. Base Daily Per Capita Water Use Calculation For Section 10608.20

Base Years	Service Area Population	Gross Water Use (gal per day)	Daily Per Capita Water Use (gpcd)
2001	86,034	10,854,986	**126.2**
2002	86,216	10,708,219	**124.2**
2003	86,891	10,679,890	**122.9**
2004	87,551	10,672,274	**121.9**
2005	87,871	9,771,315	**111.2**
2006	88,143	9,780,219	**111.0**
2007	88,776	9,836,411	**110.8**
2008	89,400	9,767,699	**109.3**
2009	90,387	8,681,123	**96.0**
2010	91,291	8,501,074	**93.1**
		Total of Column (4):	**1126.6**
		Divide Total by Number of Base Years:	**112.7**

Over the last ten year period, per capita water use has declined from about **126 gpcd** in 2001 to **93 gpcd** in 2010. The City's 10-year base daily per capita water use (ending 2010), as determined in accordance with the technical methodologies, is **113 gpcd**. This level of per capita water use is substantially lower than average values of **192 gpcd** for the state as a whole or **154 gpcd** for the Central Coast Region reported in the 20x2020 plan.

Per capita water use and estimated service area population are presented graphically in Figure 4-5. A breakdown of the City's per capita water use by major customer sector is provided in Figure 4-6.

4.5.4 Step 2 - Determine Urban Water Use Target

Under SBx7-7, urban water suppliers must next set a 2020 water use target using one of the following four methods:

Figure 4-5. Per Capita Water Use and Service Area Population

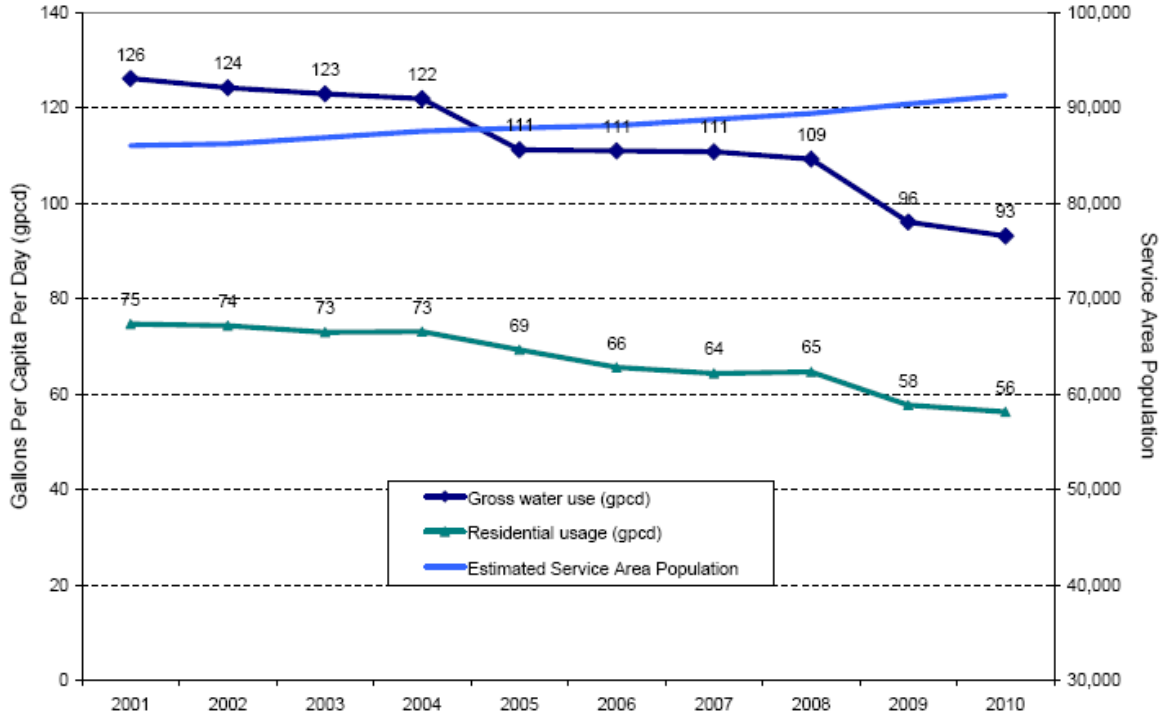
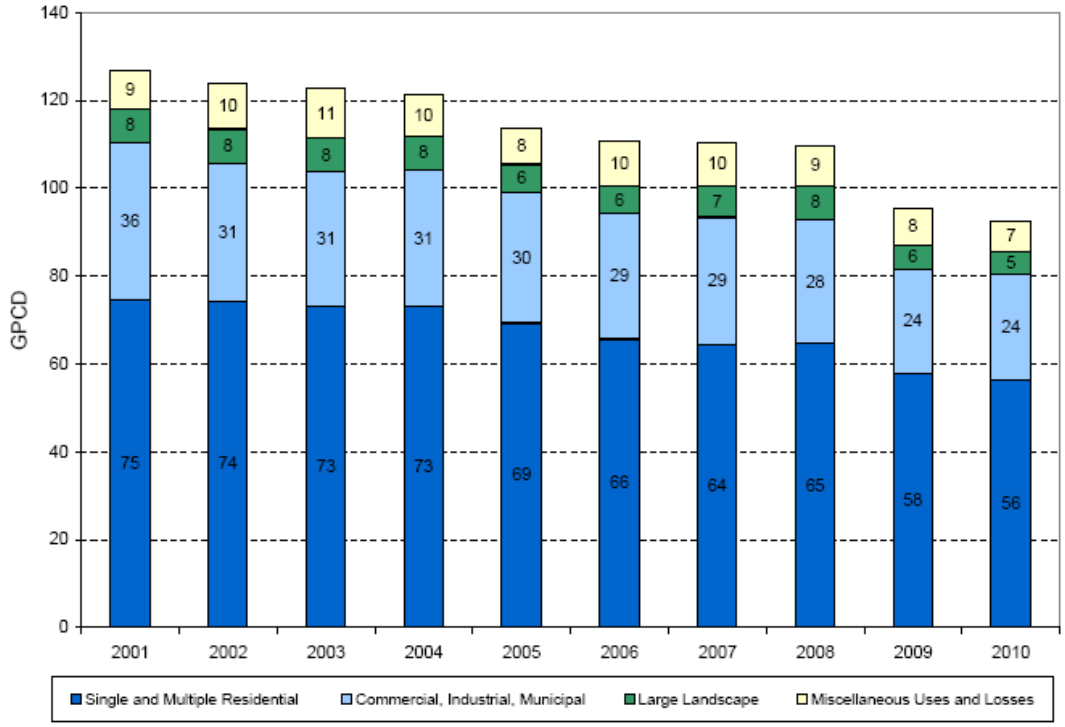


Figure 4-6. Per Capita Water use by Sector



Method 1: Eighty percent of the water supplier's baseline per capita water use.

Method 2: Per capita daily water use estimated using the sum of performance standards applied to indoor residential use; landscaped area water use; and commercial, industrial and institutional water uses.

Method 3: Ninety-five percent of the applicable state hydrologic region target as stated in the States' April 30, 2009, draft 20x2020 Water Conservation Plan (see Table 4-3).

Method 4: A provisional method developed by CA DWR that assumes savings due to metering of unmetered connections and achieving water conservation measures in three water use sectors.

The City of Santa Cruz is opting to use Method 3. Options 2 and 4 were considered and not selected because they require intensive data not currently being collected within the City's service area, and there is no rational basis at this time that the City could achieve another sustainable 20 percent reduction under Option 1 by 2020 given its already low per capita water use.

For the Central Coast Region, 95 percent of the region's 2020 target is **117 gpcd** (0.95 x 123 gpcd = 117 gpcd). Clearly the City has achieved a level of water use that is more efficient than this future target already, since both the City's 10-year baseline use of 113 gpcd and its current level of use of 93 gpcd are already lower than the 2020 target using Method 3.

4.5.5 Step 3 - Confirm Urban Water Use Target

Water Code section 10608.22 requires water suppliers to achieve at least a 5 percent minimum reduction in per capita water use, as compared to a different, 5-year baseline period, as mentioned earlier in section 4.5.3. The 5-year baseline period may end no earlier than December 2007 and no later than December 2010. The 5-year baseline period selected by the City of Santa Cruz is **2003-2007**.

The City's 5-year baseline water use calculates out to be **116 gpcd** (Table 4-7)**.** Accordingly, the City's maximum allowable gpcd target in 2020 (per section 10608.22) is **110 gpcd** (0.95 x 116 gpcd = 110 gpcd).

Table 4-7. Base Daily Per Capita Water Use Calculation For Section 10608.22

Base Years	Service Area Population	Gross Water Use (gal per day)	Daily Per Capita Water Use (gpcd)
2003	86,891	10,679,890	**122.9**
2004	87,551	10,672,274	**121.9**
2005	87,871	9,771,315	**111.2**
2006	88,143	9,780,219	**111.0**
2007	88,776	9,836,411	**110.8**
		Total of Column (4):	**577.8**
		Divide Total by Number of Base Years:	**115.6**

4.5.6 Step 4 - Determine Interim Urban Water Use Target

The last step in complying with SBx7-7 requires calculating an interim urban water use target, meaning the midpoint between the base daily per capita water use and the 2020 target water use for measuring progress in the year 2015. The City's interim urban water use target is:

Interim Urban Water Use Target = (113 gpcd + 110 gpcd)/2 = **111.5 gpcd**

4.5.7 Meeting State Targets for Urban Water Conservation

In summary, the standards for per capita water use for the City of Santa Cruz are as follows:

Table 4.8 Interim and Urban Water Use Targets for the City of Santa Cruz

	Year	Per Capita Water Use (gpcd)
Baseline Daily Per Capita Water Use	2001-10	113
Interim Urban Water Use Target	2015	111.5
Urban Water Use Target	2020	110

What the foregoing calculations mean is that the City of Santa Cruz is not mandated to reduce its per capita water use a full 20 percent by year 2020 because water use is already at a comparatively low level compared to elsewhere in California. It was the intent of the Legislature to recognize and provide credit to water suppliers like the City of Santa Cruz that have already made substantial investments in water conservation. It simply means the City will need to maintain gross water use at a level equivalent to or

below 111.5 gpcd in 2015 and 110 gpcd in 2020 to comply with state law. This low level of water use was already reached beginning in 2005. In 2010, the City's water use was 15 percent or 17 gpcd below this future target.

All water suppliers are required to report compliance with their adopted interim and 2020 urban water use targets in the next two Urban Water Management Plan reporting cycles.

4.6 Projected Water Demand

Water Code section 16631(e) (1) requires water suppliers to:

> "…provide water use projections in five year increments to 20 years or as far as data is available."

The last time the City updated its water demand forecast was in 2005, as part of the previous Urban Water Management Plan. There were two "scenarios" developed at the time, one based on a continuation of existing trends at a growth rate of 0.4 percent annually and another, higher forecast reflecting the potential for housing growth contained on local plans involving an 0.8 percent annual growth rate. The forecast horizon extended only to the year 2020, given the fact that the City was operating under a General Plan adopted in 1992 with a planning horizon of 2005. These scenarios suggested that system water demand would hold nearly constant at close to 4.0 bgy or rise to over 4.3 bgy in year 2020. This forecast was later extended to year 2030 and used in developing a Water Supply Assessment for the Sphere of Influence Amendment EIR (Erler and Kalinowski, Inc., 2009). For reasons mentioned above, actual water use in the five year period since then has declined instead of staying level or rising gradually.

As described earlier in Chapter 2, the City of Santa Cruz now is well along in the process of completing a comprehensive update to its General Plan. The new General Plan will extend to 2030, corresponding with the timeline for this Urban Water Management Plan. As part of the process of developing the City's draft General Plan 2030, a "buildout" projection was prepared that provides new information about residential and commercial development potential foreseen in the City over the next 20 years (DC&E, 2009, Appendix H). Given this new information about land use changes and its potential to shape future water demand, and in acknowledgement of changes in water use that have taken place over the past several years, a decision was made to prepare new water demand projections for this reporting cycle. The analysis that follows is meant to help the Water Department plan for the infrastructure and services that will be needed to support community growth and change through 2030.

4.6.1 Forecast Approach

Like the previous Urban Water Management Plan, two possible scenarios were developed, both extending from 2010 to 2030 and presented in five year increments. Each scenario consists of two major components: 1) existing water demand, and 2) potential new water demand. The service area is further broken down into two major geographic components: 1) inside Santa Cruz City and 2) outside the City, which includes unincorporated Santa Cruz County, the City of Capitola, and the north coast. Within these two basic geographic areas, water use is itemized separately for each major customer category.

4.6.1.1 Existing Water Demand

The two future scenarios differ primarily according to assumptions made about the level of water use at existing accounts. Both discount the most recent downturn in water use beginning in 2009 as a temporary condition caused primarily by water restrictions, which is not considered indicative of normal use going forward.

The lower scenario (Scenario 2) is based on average water use for each customer sector (expressed in gallons per account per day) that occurred during the 2007-08 period just prior to the recent water restrictions. The higher scenario (Scenario 1) is based on levels during an earlier period from 1999 through 2004, when overall water consumption was highly stable for many years prior to several changes that took place with regard to weather, water rates, and the economic downturn. Both scenarios represent actual usage levels in the relatively recent past. In both scenarios, the analysis uses data on the number of existing accounts beginning in 2010 obtained from the utility billing system, and average usage in gallons per account per day specific to each customer category and location (inside/outside city) obtained from the Water Demand Modeling and Analysis report/models prepared by Weber Analytical (2010). All data were normalized for weather effects. A detailed breakdown of this of these values is provided in Appendix I.

The first column (2010) in Tables 4-10 and 4-11 represents existing water demands. These volumes are held constant, for planning purposes, throughout the 2030 planning horizon.

4.6.1.2 Potential New Water Demand

Different methods were used inside the City and outside the City to quantify potential new water demand.

- Land use changes envisioned in the General Plan 2030 (not including the University) serve as the basis for water demand projections within the City limits.

- Water demands for UCSC are based on the University's 2005 LRDP, as modified by the final EIR for the 2005 LRDP and the Comprehensive Settlement Agreement resulting from litigation of the EIR.

- Estimates of population growth developed by the AMBAG serve as the basis for water demand projections for the portion of the City's service water area outside the Santa Cruz city limits.

City of Santa Cruz Adoption and implementation of the proposed General Plan 2030 would not directly result in increased new development. However, the draft General Plan includes policies and a land use map that support and accommodate additional development. This potential development could result in development of 3,350 residential units, 3,140,000 square feet of commercial, office and industrial development and 300 new hotel rooms.

Within the City, water duties were developed from the utility billing system for each of the various residential and commercial sectors listed in the General Plan 2030 buildout analysis. These water duties were combined with 2030 land use projections to estimate water demands associated with new development, presented in Table 4-9.

Table 4-9. General Plan 2030 Water Demand

	Buildout Projections (a)	**Water Factor**	**Water Demand (mgy)**
Single Residential (b)	840	194 gal/unit/day	59.6
Multiple Residential (b)	2,510	70 gal/unit/day	64.3
Business/Industry:			
- Commercial Sq Ft	1,087,983	66 gals/ft^2/year	71.8
- Hotel Rooms	311	93 gal/room/day	10.6
- Office Sq Ft	1,273,913	18 gal/ ft^2/year	22.9
- Industrial Sq Ft	776,926	12 gal/ ft^2/year	9.3
Total			**238.5**

Notes:

(a) Source DC&E, 2009

(b) Assumes a breakdown of 75% MFR and 25% SFR for 3,350 new dwelling units

In addition to these uses, it is estimated that water demands in the irrigation and municipal categories would add another 12 mgy by 2030. Thus, the additional incremental water demand in the City associated with development and growth under the proposed General Plan 2030 is estimated to be 251 mgy.

University of California The City of Santa Cruz recently completed a Water Supply Assessment (WSA) and certified an EIR for the City of Santa Cruz Sphere of Influence Amendment ("SOI Amendment EIR," Santa Cruz, 2010). The WSA for the SOI Amendment EIR included an estimate of water demands for UCSC through 2020, based on the University's 2005 LRDP and the Comprehensive Settlement Agreement resulting from litigation of the EIR for the 2005 LRDP (Settlement Agreement, 2008). Total UCSC water demand to 2020 was estimated as 338 mgy. The University's 2005 LRDP extends through 2020, and any further development plans beyond 2020 are unknown. To calculate water demand from 2020 through 2030 for UCSC, the student enrollment growth rate was calculated from historical enrollment at the University, and a demand factor was calculated from historical water usage data from this same time period. Based on the assumed student enrollment growth rate and demand factor, it is estimated that water demand for the UCSC campus will increase by 10 mgy from 2020 to 2030. Total UCSC demand at 2030 would be 348 mgy, which represents a net increase of 136 mgy over existing water use.

Outside the City of Santa Cruz To estimate potential new demand in unincorporated Santa Cruz County and the City of Capitola, existing water demands within the single family residential, multi-family residential and business and industrial, and irrigation customer categories were scaled in proportion with the approximately 8 percent population growth estimated by AMBAG between 2010 and 2030.

Miscellaneous Water Uses and System Losses An additional line was added to account for miscellaneous uses (construction accounts and bulk water use), authorized unmetered uses, and system water losses to develop the total annual water requirements for the entire water service area going forward. These uses and losses are estimated at 7.5 percent of overall treated water production, which represents the average level experienced on the city water system over the past 10 years.

4.6.2 Projected Water Demands

Results of the two water demand forecast scenarios are presented in Tables 4-10 and 4-11, and are illustrated graphically relative to historic water demands in Figure 4-7.

Table 4-10. Water Demand Forecast, Scenario 1 (a)

Location:	Customer Class	2010	2015	2020	2025	2030
City of Santa Cruz	Single Residential	965	980	995	1,010	1,025
	Multiple Residential	472	488	504	520	536
	Business/Industry	448	477	506	535	563
	Municipal	56	56	57	57	58
	Irrigation/Golf	128	131	133	136	138
	UC Santa Cruz	212	276	339	344	349
Inside City Subtotal		**2,281**	**2,407**	**2,534**	**2,601**	**2,669**
Outside City: *County, Capitola, & North Coast Irrigation*	Single Residential	581	593	605	617	629
	Multiple Residential	408	417	425	434	442
	Business/Industry	273	278	284	290	295
	Municipal	-	-	-	-	-
	Irrigation/Golf	146	149	152	155	158
Outside City Subtotal		**1,409**	**1,437**	**1,466**	**1,495**	**1,524**
Other miscellaneous uses including water losses		303	316	328	336	344
Total System Water Demand		**3,993**	**4,161**	**4,329**	**4,433**	**4,537**

Notes:

(a) Assumes existing (2010) water demands recover to previous levels experienced in early 2000s

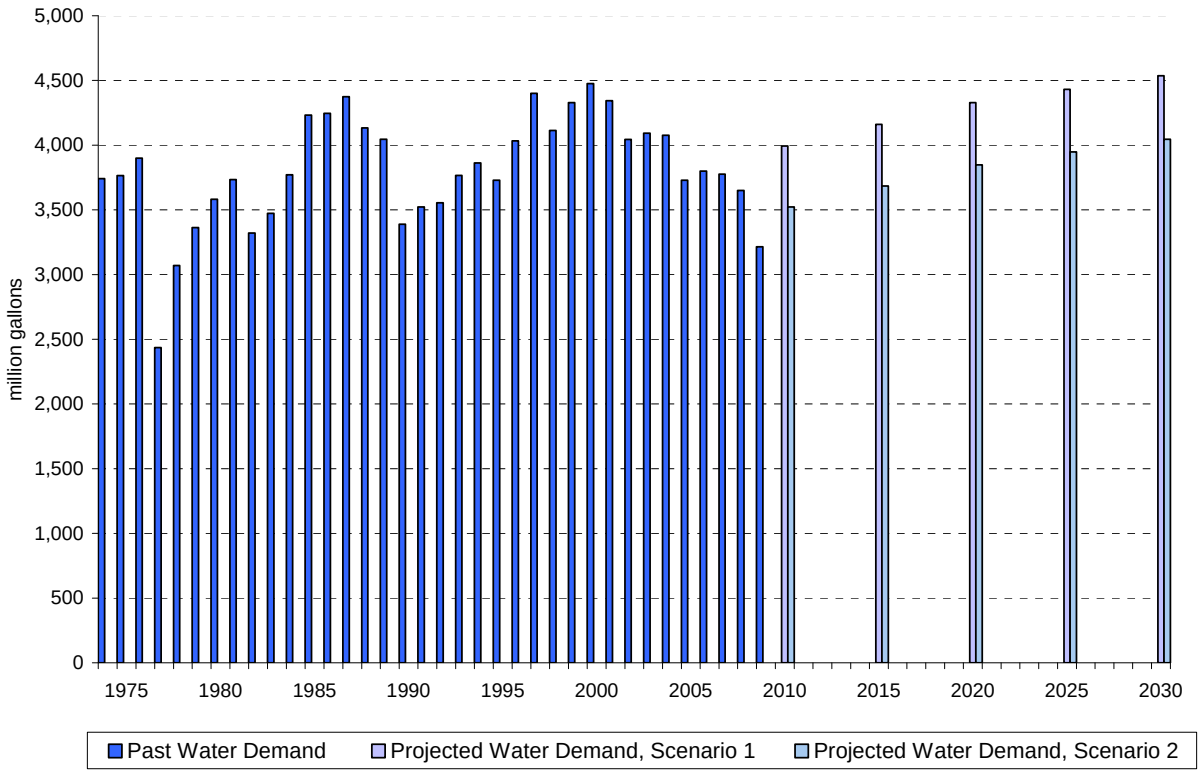
Table 4-11. Water Demand Forecast, Scenario 2 (a)

Location:	Customer Class	2010	2015	2020	2025	2030
City of Santa Cruz	Single Residential	839	854	869	884	899
	Multiple Residential	408	424	440	456	472
	Business/Industry	425	454	483	511	540
	Municipal	54	54	55	55	56
	Irrigation/Golf	115	118	120	122	125
	UC Santa Cruz	212	276	339	344	349
Inside City Subtotal		**2,055**	**2,180**	**2,306**	**2,373**	**2,441**
Outside City: *County, Capitola, & North Coast Irrigation*	Single Residential	502	513	523	533	543
	Multiple Residential	336	343	350	357	364
	Business/Industry	231	236	240	245	250
	Municipal	-	-	-	-	-
	Irrigation/Golf	130	133	135	138	141
Outside City Subtotal		**1,199**	**1,224**	**1,248**	**1,273**	**1,297**
Other miscellaneous uses including water losses		268	280	292	300	307
Total System Water Demand		**3,522**	**3,684**	**3,847**	**3,946**	**4,046**

Notes:

(a) Assumes existing (2010) water demands recover to 2007-08 levels

Figure 4-7. Actual and Projected Water Demand, 1974-2030



As indicated above, the existing water demand for the entire City's water service area is estimated to be 3,993 mgy based on Water Demand Forecast, *Scenario 1*, and 3,522 mgy based on Water Demand Forecast, *Scenario 2*. The projected water demand by 2030 for the entire City's water service area is estimated to be 4,537 mgy based on Water Demand Forecast, *Scenario 1*, and 4,046 mgy based on Water Demand Forecast, *Scenario 2*. In both scenarios, potential new water demand associated with community growth and development over the next 20 years amounts to about 500 mgy.

It is notable that, as illustrated in 4-7, even with anticipated population growth and community development, total system demand under Scenario 1 in year 2030 would be about equal to the level of water demand experienced in year 2000, while under Scenario 2, system demand in 2030 would be roughly equivalent to the level of water demand experienced in the mid 1970's and less than levels seen between 1985 and 2004[3].

It is also possible, perhaps even likely, that these scenarios of future water demand will be inaccurate given the number of assumptions inherent in projecting water demand,

[3] Figure 4-7 is provided for illustrative purposes, but due lack of consistent production reporting, it is not possible to compare past and future water requirements in exactly the same manner. Past water demand is represented by gross water production, whereas future water demand is equivalent to net water production. This discrepancy overstates past water production by a small percent.

the variables affecting water use, and uncertainties about community growth. For example, not all the land use changes envisioned in the City's next General Plan or in the University's LRDP may materialize or they may develop over a longer time frame than presently expected. Likewise, future population growth in the unincorporated area may not track at the same rate predicted by AMBAG, as was the case over the last ten years. Nor do these projections take into account effects on water use from future conservation programs or possible future price-related changes or strategies, which are unknown at this time. One possible outcome, given the recent decline in water consumption and relatively low rate of growth in the service area experienced over the last decade is that water demand may stabilize and drift around a level of 3.5 bgy for the foreseeable future. This outcome assumes that new demands from population growth and community development continue to be compensated for by water use efficiency improvements made by other, existing users, as they have been over the last decade. How long that trend may hold is uncertain.

One way to test the likelihood of these two scenarios is to examine the results expressed on a per capita basis. Table 4-12 below shows projected water use for the two scenarios on a per capita basis, for both gross water use and residential water use. Scenario 1 results in a gross water use ranging between 118 and 122 gpcd, while Scenario 2 results in gross water use ranging between 105 and 109 gpcd. Given the state mandate to comply with a target water use of 110 gpcd in 2020 under SBx7-7, and in recognition of the ongoing trend in low water use, we conclude that Scenario 2 best reflects the most reasonable of the 2 scenarios for the City to use for water management planning purposes going forward.

Table 4-12. Projected Water Use (GPCD)

	2010	2015	2020	2025	2030
Gross Water Use (gpcd):					
Scenario 1	119	118	121	122	122
Scenario 2	105	105	108	108	109
Residential Water Use (gpcd):					
Scenario 1	72	70	71	71	71
Scenario 2	62	61	61	61	61

Estimated water savings achieved through various water conservation programs to date and the process for quantifying remaining water conservation potential are discussed later in Chapter 6. While the City is committed to continuing to implement ongoing water conservation programs and pursuing additional programs that provide a reliable gain in

supply, the City does not have an estimate at this time of the likely additional water savings that could be achieved in the next 10 to 20 year time frame. As discussed in Chapter 6, a process is underway to develop such an estimate. The impact of additional long-term water savings would be to lessen future water demand projections presented above by helping compensate for any increase in water demand that does occur going forward to due continuing development and population growth in the service area. To the extent that there is considerable water savings yet to be realized, future water demand could be closer to 3.5 bgy than 4.0 bgy in 2030, but it is speculative to say at this time. Any additional conservation savings would also have the additional effect of tempering the increase in the size and frequency of potential water shortages between 2010 and 2030, discussed in the following chapter.

4.7 Water for Low Income Housing Units

Water Code section 10631.1(a) requires water suppliers to provide the estimated lower income water use projections for single and multifamily housing units identified in the housing elements of the General Plans applicable to the water supplier's service area. Table 2-5 indicates a potential for 436 such low income housing units under current City and County housing elements. Assuming equal numbers of single and multi-family units and using water demand factors in Table 4-9 equates to a total projected water use for low income units of 21 mgy, of which 12.7 mgy potentially would be located in the City of Santa Cruz and 8.3 mgy located in unincorporated Santa Cruz County or the City of Capitola. These demands are included in the projections listed above in Tables 4-10 and 4-11.

The City's written policy concerning water service for affordable housing is included in Appendix J.