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2005 URBAN WATER MANAGEMENT PLAN
CRESCENT CITY, CALIFORNIA

DECEMBER 2006

PREPARED FOR:
PUBLIC WORKS DEPARTMENT
CITY OF CRESCENT CITY
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CRESCENT CITY, CA 95531

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CITY OF CRESCENT CITY
URBAN WATER MANAGEMENT PLAN
CRESCENT CITY, CALIFORNIA
2006

CONTACT SHEET

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WATER SUPPLIER IS A:	**MUNICIPALITY**
UTILITY SERVICES PROVIDED BY THE WATER SUPPLIER INCLUDE:	**WATER**
IS THIS AGENCY A BUREAU OF RECLAMATION CONTRACTOR:	**NO**
IS THIS AGENCY A STATE WATER PROJECT CONTRACTOR:	**NO**

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1.0 PUBLIC PARTICIPATION

Law 10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published ... After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

The City of Crescent City actively encourages community participation in its urban water management planning efforts. For this update to the Urban Water Management Plan, a public hearing was held. Formal public sessions were held for review and comment on the draft plan before the City Council's approval.

Legal public notices for each meeting were published in the city newspaper. Copies of the draft plan were available at the City's Public Works offices.

1.1 Plan Adoption

Winzler & Kelly Consulting Engineers, in cooperation with the City of Crescent City, prepared this Urban Water Management Plan update for the City of Crescent City during the summer of 2006. The updated plan was adopted by City Council on December 18, 2006 and submitted to the California Department of Water Resources upon Council approval. Attached to the cover letter addressed to the Department of Water Resources and as Appendix B are copies of the signed Resolution of Plan Adoption. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning).

1.2 Agency Coordination

Law 10620 (d) (2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

1.2.1 Coordination within the City

City water department staff met and coordinated the development of this plan with the City Department of Public Works, City Engineering and the City Fire Department.

TABLE 1. COORDINATION AND PUBLIC INVOLVEMENT

Entities	Coordination and Public Involvement Actions					
	Helped write the plan	**Was contacted for assistance**	**Was sent a copy of the draft**	**Commented on the draft**	**Attended public meetings**	**Was sent a notice of intention to adopt**
Retailers		✓	✓	✓	✓	✓
Wastewater Agency	✓	✓	✓	✓	✓	✓
Special Interest Groups		✓	✓	✓	✓	✓
Citizen Groups		✓	✓	✓	✓	✓
General Public			✓	✓	✓	✓
Public Library						✓
County of Del Norte			✓	✓	✓	✓

1.3 Supplier Service Area

Law 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631. (a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

1.3.1 Climate

Winter snow is rare on the coast, but common at inland elevations of Del Norte County. Winter rains bespeak the City's location at the edge of the Northwest USA. Sunshine is limited near the coast during the summer due to fog; the coastal fog clears just inland. Summer temperatures are seldom higher than 80 degrees on the coast with 60 to 70 degrees as average. Winter temperatures are typically 40 to 50 degrees. The average annual precipitation is approximately 66 inches, with a majority of rainfall occurring between the months of October and April.

Table 2 below summarizes average temperature, rainfall, and evapotranspiration rates common in the Crescent City area.

TABLE 2. SUMMARY OF CLIMATE DATA FOR CRESCENT CITY, CA.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average Temp (°F)	47.5	48.7	48.9	50.2	53.1	56.3	58.1	59.0	58.5	55.4	51.1	47.8	52.9
Average Rainfall (in)	10.9	8.9	8.6	4.8	3.2	1.4	0.6	0.7	1.7	5.4	9.0	10.5	65.8
Average ET_0 (in)	0.93	1.40	2.48	3.30	4.03	4.50	4.65	4.03	3.30	2.48	1.20	0.62	33.0

1.3.2 Other Demographic Factors

Crescent City is located on Hwy 101 on the Northern California coast about 20 miles south of the Oregon border, and is the only incorporated city in Del Norte County. Crescent City is 1.4 square miles in size. Del Norte County is characterized by rugged mountains split by meandering streams and rivers that flow to the ocean. It has a rugged, "untamed" nature about it, with sequoia/redwood forests prevalent throughout the area.

Fishing, agriculture, tourism, timber and government form the economic backbone of the area. The economic influence of the timber and fishing industries is dwindling, and their future is uncertain. The California Department of Corrections (CDC) opened Pelican Bay State Prison in the area in December 1989 and it is estimated that, when at 100% capacity, 4000 inmates will be housed there with a staff of over 1500. The area's largest employers are federal, state and local government agencies.

The total population of Del Norte County changed little between 1980 and 1985, with a net increase of only 1.2%. Population actually declined from 1984 to 1985 because of poor employment opportunities. An influx of retired and semi-retired people had partially offset out-migration of the work force, particularly those between 20 and 40 years of age. Crescent City has a current estimated population of 7,700, including the Pelican Bay State Prison population. The population of the surrounding urban service area is approximately 15,000. The opening of the CDC prison in the area in 1989 created unique population/economic growth trends such that historical patterns of use, etc. could no longer be utilized for projection of future use patterns. Consequently, the task of accessing historical records (back to 1970) was not warranted in the preparer's opinion. Table 3 shows the census population totals for the County and City from 1970 to 2005. The population of the City in 2005 including the prison population was approximately 7,700. The population served by the City's water system, which includes Crescent City, the Pelican Bay Prison and unincorporated areas, is approximately 14,000.

TABLE 3. U.S. CENSUS POPULATION DATA

	Year				
	1970	1980	1990	2000	2005
Del Norte County	14,580	18,217	23,460	27,507	29,118
Crescent City*	2,586	3,075	4,380	4,079	4,239

*Excludes the population of Pelican Bay State Prison.

Most of the growth in the Crescent City area occurred between 1986 and 1990 and was directly attributable to the construction and opening of the state prison. Table 4 shows population projections for the County and City at 5-year increments to the year 2025. The projections for Crescent City are scaled from county population projections made by the State of California Department of Finance (CDF), assuming the population of the City is about 15% that of the county (average over the last five years). The CDF used a decreasing rate of increase model for making population projections for Del Norte County.

TABLE 4. POPULATION PROJECTIONS

	Year			
	2010	**2015**	**2020**	**2025**
Del Norte County	29,628	30,573	31,295	32,227
Crescent City*	4,369	4,508	4,615	4,752

*Excluding the population of Pelican Bay State Prison.

1.3.3 Past Drought, Water Demand, and Conservation Information

The City supplies water to three water districts as well as customers in the urban services area and within the City jurisdictional area. The districts hire by contract the City crews and staff to maintain their system and to perform the accounting. The districts are Meadowbrook, Churchtree and Bertsch Oceanview.

The water source for the service area is from the Smith River located to the north of Crescent City, which provides an abundant supply of high quality, fresh water for the system and is the City's sole source of water. The low flow period occurs in the late summer or early fall, usually September or October. The City system has not experienced any water shortages during any past or more recent drought periods, nor has it experienced any regular or frequent supply deficiencies during the period of record.

Since 1997 the City's water demand has remained relatively stable. The City annually supplies 2,500 – 3,100 acre-feet of water per year to residential, commercial and industrial customers inside and outside the City limits, including the Pelican Bay State Prison. The current water demand growth rate is less than 1%, due to low population growth rates and in part to a depressed regional economy. As of 2002, the CDF estimated there was an average of 2.4 persons per household (persons per residential service connection) in Crescent City. From 1990 to 2000 the population of Del Norte County increased at an average rate of approximately 1.75%. However, from 2000 to 2005 Del Norte County's population increased at an average annual rate of only 0.7% in both the county and incorporated Crescent City, according to the CDF.

Past growth in the Crescent City area has created the need to expand the City's water system. As of 1992, the transmission system and pumping capacity were insufficient to provide consumptive water to maintain reservoir levels and to provide resident needs. During peak demand days of summer in the late 1980's and early 1990's the flow reaching the City had been less than the demand, and pressures had dropped to unacceptably low levels. In addition, service to unincorporated areas of Del Norte County was demanding an increasing volume of potable

water, and land use planning is projecting an increasing percentage of planned growth to occur outside of present City boundaries, but within the service area.

In 1992 the City entered into a contract with HGE Engineers to provide a Water System Master Plan Update evaluating the needs of the existing water system to provide required levels of service for the City and making recommendations for system improvements. Sizing and capacity determinations for areas remote from the City distribution and transmission system were outside the scope of the study. At the time the Master Plan was completed, continued population growth throughout the 1980's and early 1990's had pushed the existing water system to the point where existing facilities were inadequate to maintain quality water service for consumptive and fire protective demands.

Improvements to the City's water distribution and supply system began in May 2000 and were completed in August 2002. The improvements were aimed at increasing water supply and storage capacity to meet future system demands through the construction of new transmission mains and storage reservoirs, eliminating low-pressure regions within the service area through pump station improvements, and reducing operating costs through energy savings from improved storage capacity and reduced pumping.

The city has committed to the purchase of a 7.5 acre piece of property for the reconstruction of the Chlorine Building and the emergency generation facilities. The city has also taken proposals for the construction of a parallel 18" pipeline from the Chlorine Building to the proposed new-elevated tank.

In the past the City supported water conservation through a low-flush toilet replacement program. Water users were provided a $225 per toilet rebate for replacing older "high-flow" toilets with newer low-flow toilets provided they also install low-flow showerheads and faucets. All users located within the City jurisdictional, including commercial and industrial, were able to use the low-flow rebate program. That program was discontinued in 2006 after the older homes in the community, which needed new toilets, were supplied. In addition, other means of support for conservation system wide are metered services, uniform rate structure and leak detection program.

2.0 WATER SOURCES (SUPPLY)

Law 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments [to 20 years or as far as data is available.]

2.1 Groundwater

The City of Crescent City's only water source is provided by groundwater from the Smith River aquifer. The Smith River provides an abundant supply of high quality, fresh water. The drainage basin of the Smith River, which covers about 700 square miles, produces runoff of about 2.9 million acre-feet per year (AFY), making it the greatest water-producing drainage in California based on runoff per square mile.

Improvements to the City's water distribution and supply system began in May 2000 and were completed in August 2002. The improvements, described in more detail below, were aimed at increasing water supply transmission capacity to meet future system demands, eliminating low-pressure regions within the service area, and reducing operating costs. The capacity of the upgraded transmission and storage system is about 6,700 AFY. Under the California Water Resources Control Board water rights permit, the appropriation from the Smith River is specified as an average of 9.8 cubic feet per second (cfs). The City Permit further states that "It is further ordered that the total annual diversion allowed under said Permit 11475 be and the same is hereby limited to 2600 acre-feet". The CDC has also secured water rights that allows a diversion of 3.0 cubic feet per second and an annual diverted amount not to exceed 1,066 acre-feet per year. This sums to a diversion rate of 12.8 cfs and an annual diverted amount not to exceed 3666 AFY. This total of 3666 AFY is the total amount of water permitted for both the City and Pelican Bay State Prison.

Water is supplied to the City from the Smith River via a well point type structure known and patented as a "Ranney Well." The Ranney Well, the Elevated Reservoir (a 50,000-gallon storage reservoir), and the transmission lines supplying the City's water system were constructed in 1958. The well is located on the river's bank approximately 8.5 miles north of the City limits. The Ranney Well is capable of producing about 6,700 AFY. Water is pumped from the source to a chlorination and fluoridation facility off Kings Valley Road approximately one mile from the Smith River. Chlorination (disinfection) is presently the only treatment the raw water requires. The chlorination building houses dual chlorinators, fluoride injection equipment, chemical storage area and an emergency power generator.

In approximately 1989, the Department of Corrections, upgraded the pumps at the Ranney Collector and constructed an 18-inch transmission main parallel to the original 14-inch main, between the Ranney Collector and Pelican Bay Prison's 12-inch service lateral. Just south of and after the chlorination/fluoridation facility the lateral tees from the 18-inch and interconnects by cross fitting to the 1958 14-inch transmission main, which continues to the 50,000-gallon Elevated Tank. The other section reduces to 12-inches and supplies the prison.

From the Ranney Collector and through the chlorination facility, water is pumped to the 50,000-gallon Elevated Reservoir, an equalization-storage tank located some 14,750 feet from the Ranney Well. The most recent work on the Ranney Collector was done in 1989, and involved replacing two pumps and rebuilding the third. Each pump is capable of moving approximately 1,680 gallons per minute (gpm) at 235 feet of total dynamic head. Field pump flow testing indicated that the three pumps together produce between 6.0 and 6.2 MGD (million gallons per day).

From the Elevated Reservoir water flows by gravity approximately two miles through a recently upgraded 24-inch water transmission main to the City's distribution system and storage reservoirs. The 12-inch and 24-inch transmission mains start at the Elevated Tank and run southwesterly along Wonder Stump Road. At the Wonder Stump Road-Elk Valley Cross Road intersection, the 24-inch main turns west on Elk Valley Cross Road and heads to Lake Earl Drive. The 12-inch main reduces to 10 inches and continues southerly along the railroad right of way. At the Lake Earl Drive intersection the alignment heads southerly along Lake Earl Drive, which turns into Northcrest Drive. At the Northcrest Drive-Washington Street intersection the pipe goes west one block and turns south at the Oregon Street intersection. At the Oregon Street-Washington Street intersection the 24-inch main interconnects with an existing 10-inch main. From this intersection the 24-inch main alignment heads southerly to the Oregon Street-Harding Street intersection, where it then goes one block west to California Street. The main then goes south on California Street to the Cemetery. The pipe enters Cooper Street at the cemetery access entrance and runs westerly along Cooper Street until Amador Street where it turns southerly to the 1.5 million gallon tank. At the Amador St. Reservoir the 24-inch main reduces to two 16-inch supply lines: one heads westerly in Macken Ave. to Joaquin St. and then south to Pacific Avenue where it connects to the distribution grid on the westerly side of the system. The other supply line goes south along Butte, from the Macken-Butte intersection, turning easterly at Pacific for one block and taking a southerly heading on G Street, interconnecting to the existing distribution grid at 9th Street and G Street. A schematic of the water transmission system is included as Appendix E.

The Washington Blvd. storage reservoir and pumping facility was constructed in 1963. In 2001 the original 1 million gallon storage reservoir at this facility was replaced with a 4 million gallon reservoir. The upgrade equalizes supply and demand, provides sufficient supply for fire protection, and furnishes supply during periods of maintenance and repair. The station's two pumps were replaced with three 75 HP pumps, and a new auxiliary power system was also installed. The pumps maintain adequate pressures within the distribution system. The Washington Blvd. pump station is controlled via the Amador pump station master control panel.

The Amador pumping facility was installed in 1982 to increase the volume of storage in Crescent City and to improve pressures, flows and fire demands within the distribution system. Three identical 75 HP pumps are provided to deliver flow volumes to the distribution system, in conjunction with the Washington Blvd. pumping system. Auxiliary power is provided for this station by a 300 kW Onan generator. The Amador St. Reservoir is a welded steel reservoir built in 1982 to increase the City's storage. It has a total capacity of 1.5 million gallons.

During the water system upgrade, which took place between 2000 and 2002, approximately 4,600 linear feet of distribution lines were added with 16-inch high-pressure distribution piping.

The City produces all its own water, but also provides water to customers of other water agencies in county unincorporated areas. These are the districts of Meadowbrook, Churchtree and Bertsch Oceanview. The City provides water to these districts' customers. Production from the Smith River is currently 2,500 to 3,000 AFY, well below the permitted amount. Table 5 summarizes current and projected water supplies for Crescent City.

TABLE 5. PROJECTED WATER SUPPLIES (AFY)[1]

Water Supply Source	Year				
	2005	2010	2015	2020	2025
City Produced Groundwater	3,666[2]	3,666	3,666	3,666	3,666
Other	0	0	0	0	0
Total	3,666	3,666	3,666	3,666	3,666

[1] – Values are inclusive of water use by Meadowbrook, Churchtree, and Bertsch Oceanview agencies.
[2] – The 3,666 AFY represents the maximum amount of water permitted to the City and Pelican Bay.

An extensive groundwater basin, estimated to be about 99,000 acre-feet between depths of 10 to 35 feet, underlies the Smith River floodplain. Use of this groundwater includes irrigation, domestic and industrial supply, and is estimated to be about 3,666 AFY. The basin is recharged by fall and winter rains through highly permeable, sandy soils near the coastline and by subsurface inflow from higher elevations.

The DWR does not project the Smith River Basin to be in overdraft, according to DWR Bulletin 118, 2003.

2.2 Recycled Water

The City is responsible for wastewater collection and treatment for wastewater generated within the City limits and in the surrounding districts served by the City. The City operates a conventional wastewater treatment facility consisting of grit removal and screening, primary settling, rotating biological contactors, secondary settling, chlorination and dechlorination. Solids are further treated by anaerobic digestion, dewatered by a belt press and disposed of at a landfill. Secondary treated and disinfected effluent is discharged into the ocean south of Battery Point. Due to the proximity of Beachfront Park to the City's wastewater treatment facility, the possibility of using reclaimed wastewater for park irrigation has been considered. However, it is not economical due to the additional treatment of the effluent that would be required to produce non-potable irrigation water compared to the current cost of delivering water from the Smith River. In addition, the large annual rainfall received in the area does not warrant reclamation. Other than City parks, there are few potential large irrigation users for reclaimed water.

2.3 Desalination

The City, being located on the Pacific coast of California, has the potential and opportunity, if needed, to develop desalinated water from ocean and brackish supplies. These sources could serve as long-term supplies for the City.

3.0 RELIABILITY PLANNING

Law 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.

10631 (c) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.

10631 (c) Provide data for each of the following:
(1) An average water year, (2) A single dry water year, (3) Multiple dry water years.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (b) An estimate of the minimum water supply available during each of the next three-water years based on the driest three-year historic sequence for the agency's water supply.

3.1 Reliability

Reliability is a measure of a water service system's expected success in managing water shortages. Due to the abundance of water available from the Smith River aquifer source and the recent water system upgrades the short-term and long-term reliability of the source and any climatologic effects are not major concerns for the City now or in the next 10 to 20 years.

Water is collected for the City and surrounding area through a Ranney Collector well. To ensure the long-term functionality and production of the City's water collection system the well is inspected on a semi-regular basis. The last inspection and report regarding the condition of the well and laterals was performed in approximately 1998. It should be noted that due to the high quality of the source water, the well has required minimal maintenance since its installation in 1958.

In addition to climate, other factors that can cause water supply shortages are earthquakes, major fire emergencies, and water outages due to loss of power, localized flooding, water contamination and acts of sabotage. These issues are addressed in the Water Shortage Contingency Plan section of this report.

3.2 Frequency and Magnitude of Supply Deficiencies

The current and future supply projections through 2025 are shown above in Table 5. The future supply projections assume normal flows in the Smith River and average annual recharge to the Smith River aquifer. The City water system has not been affected by past droughts, but was affected by a supply deficiency due to an inadequately sized transmission main. Due to the recent water system upgrades, the City does not expect to have any supply deficiencies within the next 20 years.

3.3 Plans to Assure a Reliable Water Supply

The City maintains and updates an Emergency/Disaster Response Plan detailing how the City will respond to disasters and/or emergencies that occur within and affect the water system's service area. The Plan discusses responsible personnel, available resources, agency coordination and response procedures. In the event of a power outage all pump stations in the water system are equipped with emergency power generators, and the City maintains enough supplies (pipe, valves, etc.) in stock to replace any single portion of the Crescent City Water System that may be damaged in a disaster.

3.4 Reliability Comparison

The Law requires that a water supplier estimate the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply. Table 6 details estimated water supply projections associated with several water supply reliability scenarios. The table outlines the volume of water available on an average water year, and the forecasted supply available for subsequent dry years. Because of the City's abundant water supply, the reliability of the source is not a major concern for the City through the year 2025 and possibly beyond, therefore water shortages are shown as 0%.

TABLE 6. SUPPLY RELIABILITY (AFY) [1]

		Multiple Dry Water Years		
Average/ Normal Water Year 2000 (Volume)	**Single Dry Water Year (Volume)**	**Year 1 (Volume) 2001**	**Year 2 (Volume) 2002**	**Year 3 (Volume) 2003**
3,666	3,666 (0%)	3,666 (0%)	3,666 (0%)	3,666 (0%)

[1] – Values are inclusive of water use by Meadowbrook, Churchtree, and Bertsch Oceanview agencies.

3.5 Three Year Minimum Water Supply

Due to the abundant supply of high quality water from the Smith River, the City does not recognize a need to forecast a 3-year minimum water supply availability for its source of water. The current source is expected to meet the City's consumptive and industrial water needs through at least the year 2025.

3.6 Transfer or Exchange Opportunities

Law 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

3.6.1 Water Transfers

The City does not have any current or future plans or options to purchase or exchange water from other sources or agencies in the event of a water shortage. There are presently no other sources or agencies from which to purchase or exchange water from.

4.0 WATER USE PROVISIONS

Law 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and (I) Agricultural.

(2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.

4.1 Past, Current and Projected Water Use

Since the last Urban Water Management Plan was written in 2003, annual residential growth in Crescent City has been minimal and is averaging about 1%. In addition, since then the CDF has updated its population projections for Del Norte County and Crescent City and have significantly decreased their forecasted growth in the area. Prison and industrial sector water use have remained relatively stable over the past ten years and will likely continue to do so.

Unaccounted for losses or non-metered water in the system are caused by leakage within the distribution system, unauthorized use or connection without meters, inaccurate water meters, water for fire fighting and operational use, City park irrigation, and other approved, but non-metered water uses. The City uses approximately 0.5-1 AFY for firefighting needs, while City park irrigation uses about 50 AFY. A grant was presented to the City by the California Department of Water Resources for infrastructure rehabilitation and improvements. That rehabilitation and reconstruction is underway now. The overall goal of the project is to reduce water system losses due to leaking old distribution pipes. The primary source of unaccounted for loss is system leakage due to old pipes. The major source of unmetered water use is landscape irrigation for parks and for the cemetery in the City limits. At present, the City does not meter water used by the City for landscape irrigation.

CDF population projections for Crescent City (without prison) and their persons per household estimates were used to estimate future service connections. Average water usage rates by customer category were also used to estimate future water use. Several additional assumptions were required to develop these service connection and water use projections and are listed below. Similar methodologies were used for service meter projections both in and outside of city limits.

- The CDF figure of 2.44 persons per household was used for single family residences within Crescent City city limits. The CDF figure of 2.66 persons per household was used for single family residences outside of city limits.
- Multi-family residential units were assumed to contain twice as many people as single-family residential units, both in and outside the city limits.
- Since multi-family residential and commercial/institutional categories were combined on the Public Water System Statistics worksheets, 80% of these meters are assumed to be multi-family residential and the remaining 20% are commercial/institutional.
- Inside city limits, one-third of all new residential meters will serve multi-family residential units, while two-thirds of new meters will serve single-family residential units. One new industrial meter will be added every ten years.
- Outside city limits, 45% of new population growth will be served by Crescent City, while the remainder will be served by private water sources. Only about 10% of new meters will serve multi-family residential units.

Table 7 illustrates past, current and projected water usage by customer type, while Table 8 shows past, current and projected water service connections by customer type.

TABLE 7. PAST, CURRENT AND PROJECTED WATER USE BY CUSTOMER TYPE (AFY) [1]

Water Use Sectors	1995	2000	2005	2010	2015	2020	2025
Single family residential	806	864	831	929	965	993	1,028
Multi-family residential*							
Commercial/Institutional*	643	625	691	762	794	818	849
Industrial	100	120	50	86	97	108	119
Landscape	50	50	50	50	50	50	50
Prison	738	868	774	762	762	762	762
Agricultural							
Unaccounted-for System Losses	448	14	153	67	71	74	78
Total	**2,786**	**2,542**	**2,549**	**2,656**	**2,739**	**2,805**	**2,887**

*Categories combined

[1] – Values are inclusive of water use by Meadowbrook, Churchtree, and Bertsch Oceanview agencies.

TABLE 8. PAST, CURRENT AND PROJECTED SERVICE CONNECTIONS BY CUSTOMER TYPE

Water Use Sectors	1995	2000	2005	2010	2015	2020	2025
Single family residential	3,156	3,210	3,651	3,729	3,874	3,985	4,129
Multi-family residential*							
Commercial/Institutional*	472	486	576	589	614	633	657
Industrial	6	7	7	8	9	10	11
Landscape							
Prison	1	1	1	1	1	1	1
Agricultural							
Other (Recycled Water)							
Total	**3,635**	**3,704**	**4,235**	**4,328**	**4,498**	**4,629**	**4,798**

*Categories combined

4.1.1 Residential Sector

As of calendar year 2005, there were approximately 3,651 single-family residential service connections served by the City. Data on multi-family residential meters are currently collected and reported by the City in conjunction with commercial/institutional meters on Public Water System Statistics forms. However, it is estimated that there are about 460 multi-family residential connections served by the City. The State of California Department of Finance estimates approximately 2.44 customers per household within city limits, and 2.66 customers per household in unincorporated county areas. The average flow per single-family residential service connection is about 220 gallons/day, and the per capita water usage is about 91 gallons/day. To help reduce residential water consumption, the City of Crescent City offers a rebate of $225 for every low-flow toilet replacement, provided the customer also installs low-flow faucets and showerheads.

4.1.2 Commercial Sector

The City has a complex mix of commercial customers, ranging from markets, restaurants, antique stores, insurance offices, beauty shops, and gas stations to office buildings, regional shopping centers, and restaurants and other facilities serving the visitor population. The sector is stable but growing at less than 1% per year, driven particularly by the need for services by an increasing permanent population and the growing tourist industry. This trend is expected to continue through 2025. Growth in the commercial sector is stable and increasing slowly. Low-flow toilet rebates, metered water connections and rate structure applies to the commercial sector.

4.1.3 Industrial Sector

The City has a very small industrial sector. In the last 10 years the industrial sector has declined with the closure of lumber mills and fish processing plants. Currently, the only active industrial customer is a cheese factory. Low-flow toilet rebates, metered water connections and rate structure applies to the industrial sector. There have been times when a seafood processing plant, located within the city has been in operation. That is the only other industrial city meter.

There are a number of meters at the Hambro Forest Products facility, located within the county. The county also has several functioning and non-functioning seafood processing plants.

4.1.4 Institutional/Governmental Sector

The City has a stable institutional/governmental sector, primarily local and state governmental agencies, schools, visitor serving public facilities, and a public hospital. This sector will keep pace with the growth of the City.

4.1.5 Landscape/Recreational Sector

City parks require substantial water for irrigation. Recommendations have been made for the implementation of a park and cemetery irrigation schedule that would restrict watering times to early morning or evening when evaporation is lower, or implement automatic sprinkler systems so irrigation can be done at night when water demand is at a minimum. The City does not currently meter water deliveries for park and cemetery landscape irrigation purposes within the City limits. However, City staff estimate 160,000 gpd are used for about 100 days per year, totaling approximately 50 AFY.

4.1.6 Agricultural Sector

The City does not supply water for agricultural purposes.

5.0 SUPPLY AND DEMAND COMPARISON PROVISIONS

Law 10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier.

5.1 Supply and Demand Comparison

Table 9 compares current, and projected water supply and demand in 5 year increments through the year 2025 for normal, single dry and multiple dry water years. Available supplies are believed to be unaffected by single and/or multiple dry years (as shown previously in Table 6) due to the significant storage reserves of the Smith River aquifer. The table below indicates that for normal water years, a single dry water year, and multiple dry water years the City of Crescent City has a more than adequate supply of water to meet its customers' needs through 2025 and possibly beyond.

TABLE 9. CURRENT AND PROJECTED SUPPLY AND DEMAND (AFY)

	2005	2010	2015	2020	2025
Supply totals	3,666	3,666	3,666	3,666	3,666
Demand totals	2,616	2,666	2,749	2,815	2,897
Difference	1,050	1,000	917	851	769

6.0 WATER DEMAND MANAGEMENT MEASURES

Law 10631 (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following demand management measures (DMM).

The City of Crescent City is committed to implementing water conservation programs. This Section discusses water conservation. The City is currently not a member of the California Urban Water Conservation Council (CUWCC).

For the purpose of responding to the Urban Water Management Planning Act, the City will address the 14 demand management measures, outlined in Water Code section 10631. Descriptions of the City's water conservation programs are below.

6.1 DMM A – Water Survey Programs for Single Family Residential and Multi-Family Residential Customers

Due to the abundance of water available from the Smith River, the City does not currently perform surveys of water use for municipal water users. The City does provide information to water users on how to reduce water usage, including a low-flow toilet rebate program. The City began this program in 2003. Refer to DMM N for further information regarding expenditures and water savings from the low-flow toilet rebate program. There are no revenue reduction effects of water conservation savings on the City revenue for DMM A.

6.2 DMM B – Residential Plumbing Retrofit

The City distributes showerheads and aerators as a condition of its low-flow toilet rebate program. The City began this program in 2003.

TABLE 10. SUMMARY OF DMM B ACCOMPLISHMENTS.

Year	2003	2004	2005	2006	2007	2008	2009	2010
Yearly Expenditures	$4,500	$7,700	$2,700	$0	$3,500	$2,000	$1,500	$1,000
# Showerheads/Aerators Distributed	180	308	108	0	140	80	60	40
Estimated Water Savings (AFY)	6.0	10.3	3.6	0.0	4.7	2.7	2.0	1.3

Although per capita water use may decline, the revenue reduction effects of water conservation savings resulting from DMM B are expected to be negligible since very few customers currently use more than 500 cubic feet of water each month. See DMM E.

6.3 DMM C – System Water Audits, Leak Detection and Repair

The City does perform leak detection and repair service on a regular basis. Expenditures for this program are not readily available, as this type of maintenance is lumped into a larger operation and maintenance fund in the water budget. Therefore, it is more difficult to assess expenditures from 2003 until now; likewise it is difficult to project expenditures through 2010. Sufficient money is available in the general operation and maintenance fund to fund these activities into the future.

The most recent water audit and leak detection and repair program was completed in December 2002. Upon completion of this water audit, approximately 31.35 miles of mains were surveyed, including all intersecting lines. A total of 16 leaks were located during the survey, with a leakage loss of approximately 85.8 AFY or about 3% of current system production. The City is currently addressing the leaks found during the survey. The City conducted a leak detection and repair program in November of 2003. A total of 30.06 miles of mains were surveyed, 7 leaks were located, and leakage losses were estimated to be 101.9 AFY. The City contracted to conduct another leak detection and repair program in August of 2006. Approximately 50.07 miles were surveyed, 4 leaks were identified, and leakage losses were estimated at 17.3 AFY.

Overall system water losses were estimated using data from the Public Water System Statistics that are submitted annually to the Department of Water Resources (DWR) by the City. Losses were calculated as total water treated minus total metered deliveries. Losses include water used for irrigation of parks and the cemetery, since these uses are unmetered. A review of the data shows a decreasing trend in system water losses decreasing from 28% of total annual water use in 1999 to 8% in 2005. The most recent value represents approximately 213 AFY. Assuming irrigation usage is relatively constant from year to year, it is likely that leaks in the deteriorating pipes, which are the source of the majority of the water losses, are increasing in severity as time passes. The City has a grant with the DWR to replace the worst pipes in the system. The contractor is currently working at that task with a completion scheduled by the end of the year.

The City recently completed a transmission and distribution system upgrade, which included transmission improvements from the Elevated Tank to the distribution system, increased system storage, and the replacement of 4,600 linear feet of distribution lines with 16-inch, 12-inch and 8-inch high-pressure distribution piping. The total cost of the upgrades, which included new transmission mains, distribution mains, storage reservoirs, pump station and telemetry improvements was approximately $6.7 million. The upgrades were expected to result in an estimated energy savings of $90,000 per year due to reduced pumping requirements.

6.4 DMM D – Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

Table 11 summarizes the average annual water usage per service connection for each customer type from 2000-2005, including averages for that time period. The number of active service connections by customer type is shown previously in Table 8. The City's water source is metered and readings are recorded daily. All customer accounts are metered and read monthly. Water production records are reviewed on a regular basis. The water system facilities, including storage tank levels, system pressure, and pump operations are inspected daily. Industrial water use is monitored daily.

TABLE 11. RECENT ANNUAL WATER USAGE BY CUSTOMER CATEGORY

Category	Year						Average
	2000	2001	2002	2003	2004	2005	
Single Family Residential	0.27	0.25	0.25	0.25	0.25	0.23	0.25
Multi Family Residential/Commercial and Institutional	1.29	1.24	1.26	1.37	1.34	1.20	1.28
Industrial	17.17	12.14	6.41	7.57	7.57	7.17	9.67
Prison	868.12	756.20	779.98	771.55	771.55	773.68	786.85

The City is fully metered for all customers, including separate meters for single-family residential, commercial, and all institutional/governmental facilities and the prison. As of calendar year 2005 there were approximately 1,100 single-family residential service connections, 396 combined multi-family residential and commercial/institutional service connections, and 2 industrial connections within the City limits. Outside the City limits there were 2,532 single-family residential service connections, 180 combined multi-family residential and commercial/institutional service connections, and 5 industrial connections.

The water rate structure and new connection fee for each customer type is based on consumption. This represents a conservation pricing scheme. The water rate for each meter depends on whether the customer is inside or outside City limits. The City recently reviewed its water rate structure in 2005 and plans to review rates every five years. Table 12 summarizes the water use charges for each meter size. Most single-family residences have 3/4 inch meters.

TABLE 12. CURRENT WATER USE CHARGES

Meter Size	Monthly Minimum* ($)		New Connections** ($)	
	City	County	City	County
3/4 inch	9.20	12.30	2,700	2,700
1 inch	12.95	17.70	4,800	4,800
1 1/2 inch	20.60	27.10	10,800	10,800
2 inch	31.45	40.40	19,200	19,200
3 inch	46.35	63.80	***	***
4 inch	60.55	88.45	***	***
6 inch	86.35	110.80	***	***

* The minimum charge is for 500 cubic feet of water; usage above 500 cubic feet is charged as follows: City $1.06 per 100 cubic feet, County $1.57 per 100 cubic feet.

** The connection fee is for system expansion and is in addition to any costs to the City for installation.

*** Connection charge to be determined by estimated usage figured at a single family equivalency of 250 gallons per day at a rate of $2,700 per single family equivalency.

As of 2006, the water rate for the Pelican Bay State Prison was $0.759 per 100 cubic feet.

Sewer rates are specified by customer type and customer location. Table 13 summarizes the sewer use charge for each customer type as of August 1, 2006.

TABLE 13. CURRENT SEWER USE CHARGES

Category	First 500 cubic feet of water ($)	Each additional 100 cubic feet of water ($)
Light commercial City & Harbor	23.50	4.70
Light commercial County	20.11	4.35
Heavy commercial City & Harbor	35.50	7.10
Heavy commercial County	31.80	6.36
Multi-family residential City & Harbor	21.60	4.32
Multi-family residential County	18.00	3.92
Single family residential City	40.95 (flat rate)	-
Single family residential County	33.95 (flat rate)	-

There is no data available on conservation with respect to this DMM as metering is universal and rates have been consistent for a long time. The City has used a level block rate structure since the 1950s.

6.5 DMM E – Large Landscape Conservation Programs and Incentives

Currently, all landscape water users are metered within the City and charged for water use under a level block rate structure. This type of structure qualifies as a conservation promoting rate structure. All unmetered water use is in City parks.

The City estimates it uses approximately 50 AFY to water its parks, of which there is a total of approximately 35 acres. This translates to a current irrigation rate of approximately 1.4 feet per acre per year. However, the City plans to conduct a water scheduling analysis to identify further potential conservation on its large landscapes by 2010. It is estimated that the City could reduce its water usage on its large landscapes to 0.75 feet per acre per year, totaling approximately 24 acre-feet of water savings per year. The City could save approximately $7,500 per year with these conservation measures.

6.6 DMM F – High-Efficiency Washing Machine Rebate Programs

The City plans on implementing a high-efficiency washing machine rebate program by 2010. The City will begin pursuing grant options through the DWR and other appropriate agencies to fund this program. There are slight revenue reduction effects of water conservation savings on the City revenue for DMM F; however this revenue reduction is believed to be offset from savings through reduced flows at the wastewater treatment facility.

6.7 DMM G – Public Information Programs

The City distributes information to the public regarding water rates, water use and conservation information in customer's monthly water bills. The City also distributes an annual water report to its customers, which provides information on water chemistry, rates, and water usage. In addition, the City posts important notices in the local newspapers. Actual costs related to these efforts are minimal. Expenditures for these programs are difficult to estimate, as they are built into the City's water fund. The City has no method to quantify the savings of DMM G, but believes that this program is in the public's interest.

6.8 DMM H – School Education Programs

The City does not currently work with the local school districts, but plans to begin promoting water conservation in the schools by 2010. The City will begin working with the local school districts and providing teachers with educational materials for use in grades K-12. Several educational materials are currently available from California Project W.E.T., Water Education for Teachers that can be used in the classroom. The City believes it would currently be difficult to estimate the effects of water conservation savings on the City revenue for DMM H.

6.9 DMM I – Conservation Programs for Commercial, Industrial and Institutional Accounts

The City plans on implementing conservation programs for commercial, industrial, and institutional water users by 2010. The program will involve monitoring water usage from these customer types to identify the largest water users within the City. These customers will be directly contacted and offered free water use audits. Water use audits will also be available to other commercial, industrial, and institutional customers upon request. There will likely be some revenue reduction effects of water conservation savings on the City revenue for DMM I.

6.10 DMM J – Wholesale Agency Programs

The City is not a wholesale agency and is therefore exempt from this water demand management measure. There are no revenue reduction effects of water conservation savings on the City revenue for DMM J.

6.11 DMM K – Conservation Pricing

Due to the abundant supply of source water, the City does not expect to be affected by drought conditions within the next 20 years. Conservation pricing is currently implemented in the City in the form of a level block rate structure and has been since the 1950s. It is believed that water conservation pricing has positive effects on City revenue.

6.12 DMM L – Water Conservation Coordinator

The coordinator in charge of the Crescent City water conservation program is the Director of Public Works. The water conservation program began in 2003. It is estimated that the Director of Public Works dedicates approximately 25 hours per year to the water conservation program. Expenditures are estimated at $1,000 per year. The City has no method to quantify the savings of DMM L but believes that this program is in the public's interest.

6.13 DMM M – Water Waste Prohibition

Due to the abundant supply of source water, the City does not presently have a need for enforcing water conservation. However, the City has adopted a "no waste" ordinance. The City has historically, during times of inadequate distribution system supply to meet demand, requested that customers refrain from landscape watering, which has been effective. No actual site visits have occurred since 2003, and they are not expected to occur before 2010 unless a major interruption to water supply occurs. In this event, the City's "no waste" ordinance goes

into effect, at which point site visits would be conducted if needed. There are no revenue reduction effects of water conservation savings on the City revenue for DMM M.

6.14 DMM N – Residential Ultra-Low Flush Toilet Replacement Program

The City supports water conservation through a low-flush toilet replacement program. Water users are provided a $225 per toilet rebate for replacing older "high-flow" toilets with newer low-flow toilets provided they also install low-flow fixtures within their homes or businesses. Table 14 below summarizes expenditures and water savings achieved through DMM N.

TABLE 14. SUMMARY OF DMM N ACCOMPLISHMENTS.

Year	2003	2004	2005	2006	2007	2008	2009	2010
Yearly Expenditures	$40,500	$69,300	$24,300	$0	$31,500	$18,000	$13,500	$9,000
# Toilets Replaced	180	308	108	0	140	80	60	40
Estimated Water Savings (AFY)	3.0	5.2	1.8	0.0	2.4	1.3	1.0	0.7

Slightly over 10 AFY have been conserved as a result of this program. Most "high-flow" toilets have already been replaced through this program; therefore, expenditures are predicted to decrease in the coming years. Although per capita water use may decline, the revenue reduction effects of water conservation savings resulting from DMM N are expected to be negligible since very few customers currently use more than 500 cubic feet of water each month. See DMM D (Section 6.5) for metering rates. The program has replaced approximately 600 toilets since 2003.

There is no mandatory toilet retrofit on resale ordinance in effect in the City.

6.15 Agricultural Water Conservation Programs

The City does not supply water for agricultural purposes.

7.0 WATER SHORTAGE CONTINGENCY PLAN

7.1 Preparation for Catastrophic Water Supply Interruption

Law 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

7.1.1 Water Shortage Emergency Response

When responding to emergencies that can cause water supply shortages, the City of Crescent City has in place an Emergency/Disaster Response Plan defining how it will respond to emergencies and/or disasters that are likely to affect its water supply operations. The plan identifies the following service goals:

- To continue minimum service levels and mitigate the public health risks from drinking water contamination that may occur during a disaster or other emergency event, and
- To provide reliable water service and minimize public health risks from unsafe drinking water during those events.

The Crescent City Emergency/Disaster Response Plan designates responsible personnel and chain of command and identifies responsibilities. An inventory of system resources that are used for normal operations and available for emergencies, including maps and schematic diagrams of the water system, lists of emergency equipment, equipment supplies and emergency contract agreements are kept at the water system office. The Public Works office has been designated as the communication network emergency operations center for the City.

Coordination procedures with governmental agencies for health and safety protection, technical, legal and financial assistance and public notification procedures are continually being developed and updated through regulation and experience and will be added as necessary to the Emergency/Disaster Response Plan.

In the event of an emergency, responsible personnel will, as quickly as possible, determine the status of other employees, assess damage to water system facilities, provide logistics for emergency repairs, monitor progress of repairs and restoration efforts and communicate with health officials and water users (according to "Emergency Notification" on file with the Department of Health Services or Del Norte Environmental Health), and document damage and repairs.

The City has in place the steps that will be taken to resume normal operations in the event of the following types of service interruptions:

- Leaks or service interruption (result of earthquake, etc.)
- Low system pressure (result of earthquake, fire, storm)
- Power outage
- Contamination of source and/or transmission/distribution system
- Physical destruction of facility (sabotage)

The City has enough supplies (pipe, valves, etc.) in stock to perform spot repairs in the Crescent City Water System.

All significant water outages (widespread and lasting more than eight hours) or disinfection failure will be reported to the Department of Health Services District Office or Local Primary Agency by telephone or equally rapid means. All emergencies will be documented along with action taken, and kept in the files of the water system office. Acts of sabotage will be reported to the local law enforcement agency.

7.1.2 Supplemental Water Supplies

The City maintains supplemental water supplies in the form of storage within the transmission and distribution system and water system storage reservoirs. The City maintains a total storage of 6.355 million gallons in six reservoirs: the Elevated Reservoir (50,000 gallons), the Washington Blvd. Reservoir (4 million gallons), the Amador St. Reservoir (1.5 million gallons), Bertsch Oceanview District Tank (750,000 gallons), Wigley Tank (25,000 gallons) and Churchtree District Tank (30,000 gallons).

7.1.3 Water Transfers

The City does not presently engage in the purchase or exchange of water supplies from other agencies, nor does it have plans to initiate any new water transfers in the near future.

7.1.4 Long Term Additional Water Supply Options

The City's current water supply is sufficient to meet the consumptive, irrigation and industrial water needs of its customers through the year 2025, and probably beyond. Future water supply options will likely involve the construction of one or more additional Ranney Collector Wells near the Smith River, thereby increasing the available water supply.

7.2 Water Shortage Contingency Ordinance/Resolution

Law 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (h) A draft water shortage contingency resolution or ordinance.

7.2.1 City of Crescent City Water Shortage Response

The City of Crescent City prepared a Water Shortage Contingency Plan in 1993 in compliance with Assembly Bill (AB) 11 as required by the California Department of Water Resources. In accordance with the State Water Code, the City has made this plan available to the public and has conducted a public hearing on the Water Shortage Contingency Plan. The Plan was developed prior to the recent transmission and distribution system upgrades, and was based on the probability that a water shortage emergency would be caused by transmission capacity limits and not supply deficiencies or by other disaster related event impacting the water supply.

The City has never experienced a water source deficiency. In theory, the worse case situation was the water system transmission capacity's inability to meet consumer demand. However, with the recent upgrades to the City's water transmission system the probability of this situation occurring has lessened from what it was prior to the upgrades.

The Water Shortage Contingency Plan is included in Appendix F.

7.3 Stages of Action

Law 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply and an outline of specific water supply conditions which are applicable to each stage.

7.3.1 Rationing Stages and Reduction Goals

The City has developed a four stage rationing plan to invoke during declared water shortages. The action stages and trigger levels have been developed to implement the Water Shortage Contingency Plan. The rationing plan includes voluntary and mandatory rationing, depending on the causes, severity, and anticipated duration of the water supply shortage. The rationing stages are currently triggered by water levels in the City's Washington and Amador storage facilities. However, since the Washington St. reservoir has recently been replaced with a larger tank the triggering of a water shortage is less likely to occur.

Unforeseeable circumstances may cause declaration of a higher action stage or postponement of an action stage other than when trigger levels occur. The Director of Public Works will determine the action stage. All restrictions under each applicable action stage will be implemented immediately upon declaration of such stage. Lifting of an emergency action stage and resumption to the normal operating stage will be determined by the Director of Public Works based on current conditions affecting the water supply. The rationing stages are described in detail below.

Stage I—Voluntary Conservation Measures. Voluntary compliance with conservation measures.

The City may initiate a water conservation program to provide public information on ways to reduce water use. Water customers and the community will be made aware of the emergency action stages and restrictions under the Water Shortage Contingency Plan.

Customers are encouraged to reduce water usage by taking the following voluntary water conservation measures:

1) Refrain from landscape watering between the hours of 10:00am and 6:00pm;
2) Refrain from allowing water run off any lawns, landscapes, or garden into adjoining streets, gutters, sidewalks, parking lot or alley;
3) Refrain from hosing or washing sidewalks, walkways, driveways, parking lots, or other hard surfaced areas;
4) Refrain from washing cars, boats, trailers, or other vehicles except by hose with a shutoff nozzle and bucket;
5) Equip any hose with a shutoff nozzle and bucket;
6) Promptly repair all leaks in plumbing fixtures, water lines, and sprinkler systems;
7) Equip ornamental fountains, ponds, or lakes with a water recycling system;
8) Equip commercial car washes with a water recycling system;
9) Refrain from filling or refilling a swimming pool, spa, or hot tub;
10) Install low flow shower heads, low flush water closets, and faucet aerators;
11) Operators of restaurants provide on each table a notice of water emergency and refrain from serving drinking water except upon specific request of a customer;
12) Operators of hotels and motels provide in each room a notice of water emergency.

This will be the normal operating stage for the water system.

Stage II—Mandatory Conservation Measures. Mandatory implementation of conservation measures.

Customers shall comply with Stage I measures 1) – 12).

Customers will be notified via news media and other methods of this stage of water shortage emergency and implementation of mandatory conservation measures.

Industrial water users will be specifically notified via telephone and City staff will make every attempt to keep them informed of the status of the water emergency so they can prepare for a possible shutdown of production.

Stage III—Serious Water Shortage. Mandatory reduction

Customers will be notified via news media and other methods of this stage of water shortage emergency. Industrial users will be notified specifically via telephone and will be asked to voluntarily shutdown production during a Stage III water emergency.

City staff will make every attempt to keep the industrial users informed of the status of a water emergency prior to the declaration of a Stage III water emergency so they can prepare for a possible shutdown of production.

The following water uses will be prohibited for all water users:

1) Landscape irrigation or watering of lawns or gardens;
2) Washing of cars, boats, trailers or other vehicles;
3) Washing down of driveways, sidewalks, buildings, windows, or any outdoor surface;
4) Filling of swimming pools or hot tubs;
5) Serving of drinking water at restaurants unless requested;
6) Filling or operating of ornamental fountains, ponds, or lakes;
7) Sewer system maintenance, fire protection training, or flushing of hydrants;
8) Street cleaning or dust control;
9) Use of hydrant meters for construction purposes.

Stage IV—Disaster Shortage/Rationing. Major catastrophe or contamination of the water supply. Priorities for all water use will be for human consumption, sanitation, and fire protection.

All water users will be limited to amounts required for human consumption, sanitation, and fire protection. No water will be available for nonessential use or for commercial or industrial processes.

Customers will be notified via news media and other methods of this stage of water shortage emergency.

If contamination of the water supply occurs, consult with County/State health officials on the need to institute a boil order before use of any water.

7.3.2 Priority by Use

The City does not have a priority for use of available potable water based on customer type during a water shortage emergency. Water conservation and water use measures apply to all customers.

7.3.3 Health and Safety Requirements

The City will provide information to its customers regarding health and safety requirements during a water shortage emergency when the water shortage occurs. Customers will be notified via news media and other methods regarding important health and safety requirements.

7.3.4 Water Shortage Stages and Triggering Mechanisms

As the water purveyor, the City of Crescent City must provide the minimum health and safety water needs of the community at all times. The rationing program triggering levels shown below were established to ensure that this goal is met. In the event of loss of power, the Ranney well

pumps can be operated by backup generators. In the event of a non-power related catastrophe, all pumps would likely cease to work, representing a 100% reduction in water supply. However, the City has more than one week of water supply in its storage tanks to get through this unlikely yet possible situation. Therefore, triggering levels have been tied to tank storage levels, rather than supply source reductions.

Stage I This will be the normal operating stage for the water system.

Stage II This stage will take effect when the tank levels at the Washington and/or Amador storage facilities fall below 50% of their storage capacity.

Stage III This stage will take effect when the tank level at the Washington storage facility falls below 35% of storage capacity and/or the tank level at the Amador storage facility falls below 26% of storage capacity.

Stage IV This stage will take effect either when tank levels at the Washington and/or Amador facilities fall below 25% of storage capacity or when a disaster related event impacting the water supply occurs.

7.3.5 Water Allotment Methods

The City does not have a method of allocating water based on customer type during a water shortage emergency. Water conservation and water use measures apply to all customers, and specific customers (i.e., industrial) will be contacted directly by the City regarding water allotment and conservation measures.

7.4 Prohibitions, Consumption Reduction Methods and Penalties

Law 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

10632 (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

10632 (f) Penalties or charges for excessive use, where applicable.

7.4.1 Mandatory Prohibitions on Water Wasting

The City of Crescent City has adopted a "No Waste" Ordinance, which includes prohibitions on various wasteful water uses such as lawn watering during mid-day hours, washing sidewalks and driveways with potable water, and filling pools and hot tubs.

Table 15 summarizes some of the consumption reduction methods which the City will use to reduce water use during a declared water shortage.

TABLE 15. CONSUMPTION REDUCTION METHODS

Examples of Consumption Reduction Methods	Stage When Method Takes Effect
Demand reduction program	All Stages
Reduce pressure in water lines	IV
Flow restriction	II, III, IV (for violators only)
Restrict building permits	III, IV
Restrict for only priority uses	IV
Use prohibitions	II, III, IV
Water shortage pricing	II, III, IV (for violators only)
Allotment by customer type	IV
Plumbing fixture replacement	All Stages
Voluntary rationing	I
Mandatory rationing	II, III, IV
Incentives to reduce water consumption	All Stages
Education Program	All Stages

7.4.2 Excessive Use Penalties

The penalties for excessive water use and water wasting during a declared water shortage are set forth in the City's "No Waste" Ordinance. Any customer violating the regulations and restrictions on water use set forth in the "No Waste" Ordinance shall receive a written warning for the first such violation. Upon a second violation, the customer shall receive a second written warning and the City may, at its discretion, install a flow-restricting device on the customer's water service. All costs to install and remove the flow-restricting device shall be paid by the violating customer. Any willful violation after issuance of the second written warning shall constitute a misdemeanor and the City may, at its discretion disconnect the water service. Any violator receiving a second written notice will be assessed a water service use surcharge for any "excessive use of water" which is defined as water use that exceeds the average water use for the account for the prior 24 months. The surcharge for the "excessive use of water" shall be double the account billing rate. For violations resulting in third written notices and continued excessive use of water, the City may, at its discretion, disconnect water service and not reinstate service until a specific water conservation plan has been developed with the violating customer.

7.5 Revenue and Expenditure Impacts and Measures to Overcome Impacts

Law 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier.

10632 (g) [An analysis of the impacts of each of the] proposed measures to overcome those [revenue and expenditure] impacts, such as the development of reserves and rate adjustments.

Revenues earned by the City from water service are set aside for capital improvements, contingency, operating reserves and debt services. The money is also used to fund additional financing for City water system improvements and projects.

The City is aware that declaration of water shortage stages could have a profound impact on revenues and expenditures. The City plans on performing an analysis to determine the effects of water shortage stages on revenue generation and expenditures. The City does not plan on implementing rate increases during these shortages, but rather plans on maintaining sufficient reserves to cope with decreased revenues and increased expenditures that may arise from a water shortage.

7.6 Reduction Measuring Mechanism

Law 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

7.6.1 Mechanism to Determine Reductions in Water Use

The City's water source is metered and readings are recorded daily. All customer accounts are metered and read monthly. Water production records are reviewed on a regular basis.

The water system facilities, including storage tank levels, system pressure, and pump operations are inspected daily.

Industrial water use is monitored daily.

When emergency action Stages II, III, and IV are in effect, system facilities will be monitored as often as needed each day with the results reported to the Director of Public Works.

Existing record keeping and monitoring methods will allow the City to determine actual reductions in water use during a water shortage emergency.

8.0 WATER RECYCLING

8.1 Wastewater System Description

Law 10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (a) A description of the wastewater collection and treatment systems in the supplier's service area...

8.1.1 Participation in a Regional Recycled Water Planning

Because of the City's abundant supply of water from the Smith River, it does not participate in any regional recycled water planning programs.

8.1.2 WateReuse Association Membership

The City is not an active member of the California WateReuse Association or any other water reuse agencies.

8.1.3 Wastewater Collection and Treatment in Crescent City

The City of Crescent City manages wastewater collection and treatment for Crescent City and nearby areas within Del Norte County including Bertsch Ocean View and the Northcrest County area (collectively referred to as County Service Area #1). The Harbor District also contributes wastewater to the plant. The City of Crescent City owns, operates and maintains the wastewater collection system within the City limits and the wastewater treatment plant (WWTP). The County of Del Norte owns and maintains the collection systems that serve the areas outside the City limits. Table 16 summarizes the average wastewater flows to the treatment plant in million gallons per day (mgd) for a period of record between January 2000 and December 2005.

TABLE 16. AVERAGE WASTEWATER FLOWS

Flow Statistic	Flowrate
Average Dry Weather Flow	1.4 MGD
Average Wet Weather Flow	1.9 MGD
Average Annual Daily Flow	1.7 MGD
Total Annual Flow	621.7 MG

The annual average daily flow was 1.7 mgd. The dry weather season was defined as May 1 through September 30. The wet weather season was defined as October 1 through April 30.

It is estimated that during the dry weather season 41% of the total flow originates within the City limits and 59% from outside the City limits. It is also estimated that during the dry weather season 41% is from residential land uses (single family homes and apartments) and 59% is from commercial and industrial activities.

Currently, a large portion of the existing collection system is old and the pipe material and construction practices of the time have contributed to excessive rain-derived inflow and infiltration (RDII). During past rainy seasons, excessive RDII has caused surcharging in some areas of the system as well as hydraulic overflows at the WWTP, both of which are not permitted under the City's current National Pollution Discharge Elimination System (NPDES) permit. Hydraulic overflows at the WWTP do not occur any longer because of upsizing and effluent pumps in 2002. A new WWTP is planned to be online in 2007, which will address all hydraulic concerns.

In addition to the problems associated with RDII, the existing WWTP has insufficient hydraulic and organics removal capacity to adequately treat current wastewater flows and organic loading. Historically, the plant has exceeded NPDES discharge limits, particularly concentration and mass loading limits for biochemical oxygen demand (BOD) and to a lesser extent, fecal coliform and total suspended solids (TSS).

The Regional Water Quality Control Board (RWQCB) ordered the City to cease violations of its discharge requirements by issuing Cease and Desist Order (CDO) No. 97-17 in February 1997. The City responded by enacting a prohibition on new connections to the system, and undertaking investigations of the plant performance and loading characteristics. The Wastewater Treatment Plant Evaluation Report, completed in September 1997, contained several recommended actions that have been implemented by the City since completion of the report. In 1998, a revised CDO was issued allowing 220 additional connections. A new plant is scheduled to be online in 2007 with a planned life of 20 years.

8.1.4 Wastewater Treatment Processes

A schematic diagram showing wastewater treatment is attached (Appendix D). Current wastewater treatment at the Crescent City WWTP includes the following processes:

1) Headworks and Influent Pumping
2) Pre-Aeration and Primary Clarifiers
3) Rotating Biological Contactors
4) Secondary Clarifiers
5) Disinfection
6) Effluent Pumping and Ocean Outfall
7) Gravity Thickening
8) Anaerobic Digestion
9) Sludge Dewatering

8.2 Wastewater Generation, Collection & Treatment

Law 10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (a) A [...] quantification of the amount of wastewater collected and treated...

8.2.1 Crescent City Wastewater Treatment Plant (WWTP)

The original Crescent City WWTP was constructed in the 1950's and consisted of headworks, influent wet well, pump house, cursory solids separation, and gravity outfall facilities. The first major plant expansion occurred in 1973 with the addition of pre-aeration, primary clarification, chlorine contact basin, storm water effluent pumps, new plant electrical and control systems, sludge digesters and sludge thickening. In 1979 the plant was again expanded to include new raw wastewater pumps, rotating biological contactors, a secondary clarifier, new chlorine contact basin and chlorination facilities, relocated effluent pumps, enlarged and reconfigured outfall and a new digester. Other modifications/additions include replacing the comminutor with a self-cleaning bar screen and constructing several by-pass lines to increase hydraulic capacity (1991), installing a new dewatering facility (1993) and adding new chlorinator/sulfonators (1996). The effluent outfall pumping station was upsized in 2002 to handle a maximum flow of approximately 6.5 MGD. A new 24" outfall was constructed in 2006 that expands the outfall capacity to over 10.0 MGD.

Table 17 outlines the quantity of wastewater collected and the amount treated for present and five-year interval projections through 2025.

TABLE 17. CURRENT AND PROJECTED WASTEWATER FLOWS

Year	2005	2005	2010	2015	2020	2025
Average Daily Flow (MGD)	1.70	1.73	1.76	1.82	1.86	1.92
% Flow That Meets Title 22 Recycled Water Standards	0	0	0	0	0	0

8.3 Wastewater Disposal and Recycled Water Uses

Law 10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (a) A description of the [...] methods of wastewater disposal.

10633 (b) A description of the recycled water currently being used in the supplier's service area, including but not limited to, the type, place and quantity of use.

10633 (c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

10633 (d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years.

8.3.1 Recycled Water Currently Being Used

Due to the abundance of water available from the Smith River, the City does not use recycled water for irrigation or other purposes. The cost of implementing a water recycling program, which would require upgrading the existing wastewater treatment facility to produce tertiary quality effluent and construction of a recycled water distribution system, is currently prohibitive for the City. In addition, the large annual rainfall received in the area does not warrant reclamation.

8.3.2 Potential Uses of Recycled Water

Currently, there are no wastewater reuse or recycling programs in effect, however under consideration as a treatment process at the new WWTP is membrane bioreactor (MBR) technology, which is Title 22 certified. The city is attempting to finance a reconstruction of the wastewater treatment plant and hopes to secure funds and install an MBR by 2015. The City hopes to then have a recycled water distribution system in place by 2020.

It is the intent of the city to irrigate Beachfront Park with this water. The local Rancheria is also considering the construction of a golf course, which will consume about 1.0 MGD Title 22 water.

Table 18 summarizes wastewater disposal and potential uses for recycled water through 2025.

TABLE 18. POTENTIAL RECYCLED WATER USES THROUGH 2025

Destination	Treatment Level	Time of Use	WASTEWATER FLOW (MGD)				
			2005	2010	2015	2020	2025
Ocean Outfall	Secondary or better	All year	1.73	1.76	1.82	0.76	0.77
City Landscape	Tertiary	Jun – Sep	0	0	0	0.1	0.15
Rancheria Landscape	Tertiary	Jun - Sep	0	0	0	1	1
Total			1.73	1.76	1.82	1.86	1.92

8.4 Encouraging Recycled Water Use

Law 10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

The City plans on having recycled water production at its WWTP in 2015 and distributing this recycled water to its customers by 2020. When the recycled water system is in place, the City plans on offering recycled water at discounted rates as compared to potable water, in order to encourage its use. The City also plans on being proactive in public education regarding the safety, reliability, and benefits of recycled water.

By 2020, the City plans on delivering approximately 1.1 MGD of recycled water to the local Rancheria for irrigation of its golf course and irrigation of City parks. This volume represents about 60% of the total wastewater generated at the WWTP. Additional customers may be identified as the recycled water system is further developed.

8.5 Recycled Water Optimization Plan

Law 10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems and to promote recirculating uses.

Once funding is secured for adding an MBR process to the WWTP, the City plans on identifying potential customers and performing feasibility analyses concerned with serving these potential customers with recycled water. The City then plans on performing cost benefit analyses to identify which customers are most feasible to serve and which project components would result in the greatest benefit to the City. The findings of these analyses will be used to develop a recycled water optimization plan for the City.

Appendix A
List of Groups Who Participated in the Development of this Plan

City of Crescent City

Winzler & Kelly Consulting Engineers

Appendix B

Resolution to Adopt the Urban Water Management Plan

TO BE FILLED IN FOLLOWING ADOPTION OF THE UWMP

Appendix C
Council Agendas and Public Notices

TO BE FILLED IN FOLLOWING ADOPTION OF THE UWMP