D R A F T

March 9, 2011

City of Santa Barbara

Long-Term Water Supply Plan

Prepared by Water Resources Division,
Public Works Department

Adopted:

City of Santa Barbara

Long-Term Water Supply Plan
2011

Introduction

The City of Santa Barbara provides water service to most properties within the City limits, as well as several unincorporated areas, including Mission Canyon and the Barker Pass. The service area is approximately 46 square miles with a population of approximately 94,700. The water utility is administered by the Water Resources Division of the Public Works Department. The City's potable water supply sources include surface water from Gibraltar Reservoir and Lake Cachuma, groundwater from City production wells and Mission Tunnel infiltration, State Water, and desalination. A separate recycled water system supplies treated wastewater, primarily for irrigation, to offset the need to use potable water. In addition, water conservation is a key component of water supply management due to its role in offsetting the need to develop new water supplies and reducing the demand on existing water supplies. The Water Fund budget for FY 2011 includes an Operating Budget of $31,301,242 and a Capital Program of $3,349,702, for a total budget of $34,650,944.

For the past 17 years, the water supply has been managed under the 1994 Long-Term Water Supply Program (1994 LTWSP). Important events at the time of the program's adoption included the recent end of the severe drought of 1987 to 1992, an extensive inventory and analysis of water supply alternatives, and the addition of recycled water, State Water, and desalination to the City's water supply portfolio. The program incorporated water demand estimates derived from the City's 1988 General Plan Update process and water conservation savings anticipated from a rapidly developing City Water Conservation Program. During the two decades since the drought, the City's normal year water system demand (including potable and recycled water demand) has dropped from a pre-drought amount of 16,300 AFY to 14,000 AFY, despite a population increase of approximately 6%. This is a significant consideration in the development of this updated plan and is discussed in detail in later sections.

The fundamental challenge for the City's water supply continues to be the ability to provide adequate water during an extended drought. However, the water supply situation may also be affected by potential climate change impacts on hydrology and sea level, new constraints on deliveries of State Water through the Sacramento-San Joaquin Delta, a statewide water supply deficit with an accompanying legislative mandate for water use reduction, new technologies and practices for conserving water, and increasing costs for water supply and operation of the water system.

The City has recently certified an Environmental Impact Report (EIR) for the *Plan Santa Barbara* process to update the City's General Plan. The document included an analysis

of the City's water supply, which was conducted in conjunction with the City's Water Commission in preparation for a recommendation to update the 1994 LTWSP. On _____, the City Council adopted this Long-Term Water Supply Plan as Item No. _____.

Terms and Concepts

A number of key terms and concepts play a role in water supply planning and are discussed below:

Planning Period: The period covered by this plan is from 2011 through 2030, intended to roughly correspond with the term of the anticipated General Plan update.

Water Production: Production is the amount of water treated and put into the City distribution system in order to serve City water customers, net of deductions for water that leaves the distribution system as transfers to other agencies. As such, production is a measure of the amount of water supply needed to serve City customers. Production is tracked separately for the potable and recycled distribution systems. The sum of these two is referred to as "system production."

Metered Sales: The City maintains ____ retail water meters that measure the water used from the distribution system by City water customers. The sum of usage on these meters is referred to as "metered sales." Due to system losses, distribution system flushing, and normal meter inaccuracy, this number is generally about 90% to 92% of the production amount.

Cloud Seeding: Clouds can be seeded with certain compounds that enhance the amount of precipitation generated. The City participates, with other Santa Barbara County agencies, in an annual cloud seeding program to augment precipitation and runoff into local reservoirs.

Marginal Cost: To evaluate the economic benefits of ordering more water from one supply over another, only those costs that vary with the amount of water delivered are considered. These are called the "marginal" costs, also referred to as "variable" costs. Fixed or "sunk" costs are not included since they are the same regardless of whether more water is taken from a source. For example, State Water has substantial costs for debt service and fixed operation and maintenance, but it is only the variable costs for chemicals and electricity that influence the economics of ordering additional State Water.

Avoided Cost: The cost effectiveness of a water conservation measure is evaluated by comparing the cost of the measure to the marginal cost that is avoided as a result of

implementing the conservation measure and reducing the amount of water supply required.

Critical Drought Period: A water supply is evaluated by how well it performs in meeting the target level of demand during the expected worst case water supply situation. For the Santa Barbara area, this worst case is an extended drought, characterized by multiple years of below average rainfall, resulting in minimal inflow to Lake Cachuma and declining reservoir levels. The historical critical drought period for Santa Barbara is the 5-year period of 1947 to 1951. Importantly, any year following the filling and spilling of Lake Cachuma could be the first year of a critical drought period, but this generally doesn't become apparent until about the third year.

Conservation: The City's Water Conservation Program promotes ongoing efforts to improve efficiency and reduce waste in ways that don't require lifestyle sacrifices on the part of customers. Examples include using a more efficient washing machine to do the job with less water, fixing leaks, and substituting attractive low water use plants for lawn. This type of conservation can be counted on for long-term reduction in demand, which avoids the need for procuring more water supplies with high marginal cost. For water supply planning, it is important to distinguish between these ongoing efforts, and short-term extraordinary efforts to curtail water that may be needed during an extended severe drought or other catastrophic water supply interruption. Such short-term sacrifices are related to the "acceptable shortage" concept.

Safety Margin: In addition to quantifiable estimates of water supply yield and projected water demand, there is the potential for unplanned and unquantifiable shortages in supply or increases in demand. The approach used in this plan is to make reasoned estimates of supply and demand for the planning period and then add a safety margin on top of the projected demand target to recognize that unexpected events will occur.

Acceptable Shortage: A water supply can be planned for 100% reliability (i.e. able to meet full demand under all circumstances); however, such an approach can result in significant additional cost to meet this reliability standard. Because there is short-term flexibility in water demand during extraordinary conditions, it is reasonable to count on such short-term reductions to some extent to reduce the cost of operating the water system. During the most recent local drought of 1987-1992, it became necessary to seek extraordinary reductions of up to 50%, which came at some considerable expense to the community, and were deemed excessive during the development of the 1994 LTWSP. Instead, an acceptable shortage of 10% of target demand was adopted at that time.

Water Supply Performance: A water supply plan is evaluated by whether it meets the established technical and policy goals, over the planning period. This plan looks at the period of 2011 to 2030, which matches the planning period used for the *Plan Santa Barbara* analysis. Performance of the water supply is based on assumptions for anticipated deliveries from the various sources. For the City's plan, much of this information comes from the Santa Ynez River Hydrology Model (SYRHM), a computer

model developed by the Santa Barbara County Water Agency. The model covers a 76-year period from 1918 to 1993. It uses historical weather and river flow data, along with current water supply facilities and operational strategies, to simulate the long-term yield of the river in its current state. The purpose is to illustrate how our current water supply portfolio might perform over a future period that is similar to the past. This explains why, for example, the model results include yield from Lake Cachuma in years before the reservoir actually existed.

A second important element of the performance analysis is to evaluate the relative costs of various options for meeting the supply goals. The focus is on marginal costs for the supplies that are part of the various alternatives evaluated.

Current Water Supply Portfolio

The City operates a diverse water supply. The various supply sources are summarized below. Additional discussion is included in the Final EIR for the *Plan Santa Barbara* process to update the City's General Plan.

Lake Cachuma

The federally-owned Cachuma Project on the Santa Ynez River supplies water to the City and four other member agencies. The most recent capacity survey (2008) estimated the storage capacity at 186,636 AF. The reservoir is currently operated to supply a total yield of 25,714 AFY to the five member agencies in most years. The City's current share of this annual yield is 8,277 AFY. In later years of extended dry periods (characterized by consecutive years of below average rainfall), storage typically drops below 100,000 AF and deliveries to member agencies are reduced. Historically the reservoir has filled and spilled an average of once every three years, but there occasionally are longer dry periods, the longest of which defines the critical drought period for planning purposes. Lake Cachuma is the City's primary water supply and the multi-year storage capacity provides an important buffer against dry periods.

The lake is operated by the U.S. Bureau of Reclamation pursuant to orders of the State Water Resources Control Board (SWRCB) and in compliance with a Biological Opinion issued by the U.S. Fish and Wildlife Service (USFWS) for protection of steelhead trout, which were designated as endangered in the Lower Santa Ynez River in 2003. SWRCB is considering Lake Cachuma and Santa Ynez River water rights following a major hearing on the Cachuma Project conducted in November 2003. This was a continuation of SWRCB's long-standing review of the Cachuma Project in terms of its effects on downstream water users and on Public Trust resources (i.e., steelhead trout). The SWRCB ruling has been delayed pending completion of the necessary environmental documents.

For estimating future deliveries from Lake Cachuma during the planning period, the following assumptions were used:

- Alternative 3-C of the 2003 Cachuma Water Rights hearing Draft EIR, as modeled by the SYRHM was assumed. This includes a reservoir surcharge of 3-foot elevation to provide additional water for fish releases (now in place) and operation of the reservoir in compliance with the above mentioned Biological Opinion.

- Siltation has historically averaged about 332 AFY from the time of dam construction in 1953 until the most recent reservoir survey in 2008. Though options to control such siltation will be important, it should be assumed that this rate of siltation will continue, and would result in a 5% reduction in the reservoir capacity, and a roughly similar reduction in yield, by the end of the planning

period. As a result, it could be expected that normal year deliveries would be reduced from the current amount of 8,277 AFY to 7,863 AFY by the year 2030.

- Deliveries of Cachuma water during surplus (spill) conditions are not deducted from member agency annual entitlements, meaning that spill years usually result in some accumulation of water in excess of entitlement. The excess becomes "carryover" water that continues to be available until lost to spill or evaporation. This provides increased flexibility for members, but can not necessarily be expected to increase project yield above the amount modeled. Therefore, delivery estimates do not assume increased yield as a result of the carryover accounting of water accumulated during a spill condition.

Gibraltar Reservoir

In 1920, the City completed construction of Gibraltar Dam on the Santa Ynez River upstream of where Lake Cachuma was subsequently constructed. The dam formed Gibraltar Lake, with an initial storage capacity of 15,793 AF. Water is conveyed to the City through Mission Tunnel. From the beginning, siltation has been an issue, particularly following wildfires. In 1948, siltation had reduced the volume by about half and the dam was raised 23 feet to it current height of 1,400 feet above sea level. Prior to the 2007 Zaca Fire, which burned 60 percent of the Gibraltar watershed, the volume was 6,786 AF. Erosion since the fire, particularly the heavy rainfall of January 2008, has reduced the reservoir volume to 5,251 AF as of the June 2010 lake survey.

Since before the completion of Gibraltar Dam, the City has also diverted water from Devils Canyon Creek just downstream of the dam, with long-term average annual diversions of approximately 100 AFY. The City counts Devils Canyon diversions as part of its total allowable Gibraltar diversions.

As a result of the sale of the Juncal Dam site upstream of Gibraltar Reservoir and associated water rights in the early 1900's, the City receives an annual transfer of 300 AFY from the Montecito Water District. The water is transferred to the City's account at Lake Cachuma.

Current Gibraltar Reservoir operations are based on the 1989 Upper Santa Ynez River Operations Agreement (Pass Through Agreement) by which the City agreed to defer enlargement of the reservoir in exchange for the right to receive a portion of its Gibraltar water through Lake Cachuma. The intent of this arrangement was to allow the City to stabilize the yield of Gibraltar so it would be consistent with the 1988 reservoir volume, while recognizing the interests of the Cachuma Project and other downstream users.

The City and other signatories to the Pass Through Agreement are currently working to implement the Pass Through mode of the agreement, which tracks the yield of a hypothetical "Base Reservoir" that is equal to the 1988 storage capacity of 8,567 AF, and operated under the procedures defined in the Pass Through Agreement. The Pass

Through mode allows Gibraltar Reservoir diversions (including diversions to Mission Tunnel and the portion taken through Cachuma) up to the amount that could have been diverted under the "Base Reservoir" operations. Modeling done in 1989 indicated that long-term average yield of the Base Reservoir would be 5,160 AFY. Yield under the actual Pass Through operations can be expected to be somewhat less on average, due to potential losses associated with conveyance of water between Gibraltar and Cachuma, and spill and evaporation of Pass Through water at Cachuma. [update with current estimate of Pass Through deliveries]

Mission Tunnel

Mission Tunnel conveys water from Gibraltar Reservoir through the Santa Ynez Mountains to the City, which was completed in 1910. Infiltration into the tunnel from watersheds on both sides of the mountains contributes to the City's water supply. Water supplies from infiltration to Mission Tunnel have varied from a low of 500 AFY in 1951 to a high of 2,375 AFY, with an average annual yield of 1,125 AFY based on analysis in the DEIR for the Cachuma Project water rights hearings.

State Water Project

The City is a participant in the State Water Project (SWP). Deliveries to Santa Barbara County participants are administered by the Central Coast Water Authority (CCWA). Project water is delivered into Lake Cachuma through the Coastal Branch of the State Aqueduct, and two locally-operated extensions. The SWP contract defines the maximum amount each project contractor is entitled to request each year, which is referred to as the "Table A" amount, referring to the table of that name in the contract. The City's SWP Table A amount is 3,300 AFY and has a share of pipeline capacity to deliver that amount. However, delivery of Table A amounts are subject to availability and delivery constraints.

The California Department of Water Resources produces the State Water Delivery Reliability Report every two years to assist project participants in estimating anticipated deliveries. The 2009 version (published August 2010) is the most recent. The report is based on analysis using the CALSIM II computer model developed by DWR and USBR to simulate Delta flows and predict available deliveries.

Deliveries are estimated for "current conditions" (2009) and "future conditions" (2029). Projections for this plan are based on the "future" conditions, but it is important to note that "future" conditions do not assume improvements in the ability to deliver water through the Delta. Key assumptions are listed below:

- Despite substantial efforts being made to address Delta delivery constraints, DWR's modeling assumes no improvements to the conveyance system through the Delta. For example, there is no assumption that a Peripheral Canal or other

form of “isolated facility” to convey water around or under the Delta will be in place.

- The beneficial effects of planned increases in SWP reservoir capacity are not assumed as a part of the analysis.

- Current constraints on exports, including federal biological opinions of December 2008 (Delta smelt) and June 2009 (salmon, steelhead, green sturgeon, and killer whale) are assumed to remain in place.

- The model does not assume any easing of delivery constraints associated with potential habitat improvements related to the ongoing development of the Delta Habitat Conservation and Conveyance Program, which targets the co-equal goals of ecosystem restoration and water supply conveyance.

- The model has been modified to include the projected future hydrological effects of climate change. The most important of these effects are the assumed continuation of sea level rise and a reduction in the amount of precipitation that falls as snow. The latter reduces the “storage” effect provided by snowpack and results in more concentrated runoff during winter and early spring, versus late spring and summer, which has the effect of reducing the amount of water available for delivery to SWP contractors.

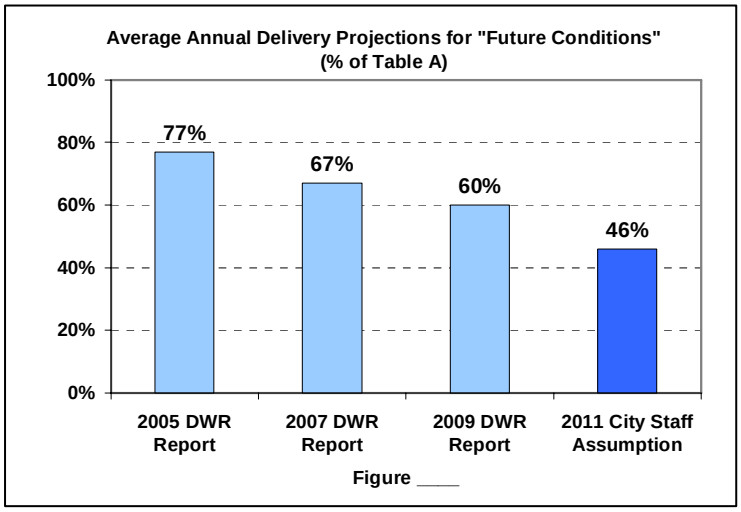


Figure ____

Based on the above assumptions for future conditions, the 2009 report projects 6-year average annual dry period deliveries of 32% to 36% of Table A amount, median deliveries of 63%, and long-term average annual deliveries of 60%. The long-term average continues a downward trend in DWR’s previous biennial reports, as shown in Figure ___, reflecting the restrictions of the biological opinions and the projected effects of climate change. Given the number of variables associated with State Water Project deliveries, staff analysis for this plan assumes annual deliveries would be limited in all years to no more than 50% of Table A amounts, reflecting experience during 2007 to 2009. This results in an average annual predicted delivery of 46% of Table A amount. (also shown in Figure __).

For comparison purposes, actual Table A availability for the past 5 years is shown in Figure ___. This period of 2005 to 2010 includes the recent moderate statewide drought. Three of the five years were classified as "dry" or "critically dry." The period also includes significant new restrictions in SWP deliveries due to environmental and endangered species issues. The 57% average delivery amount for this period suggests that the assumed deliveries are reasonably conservative.

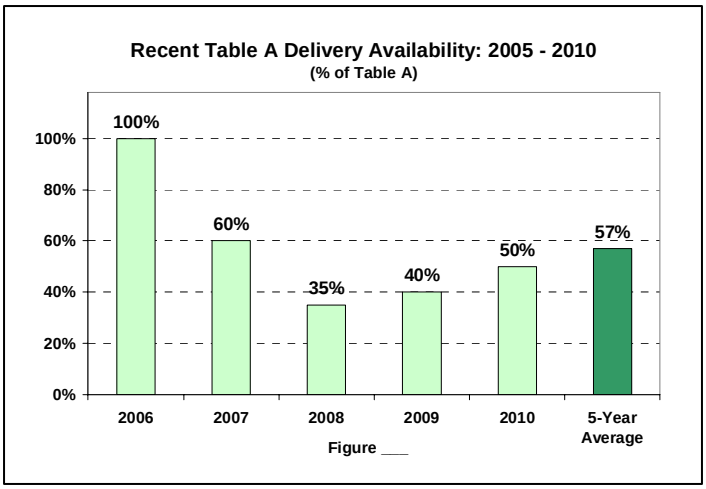
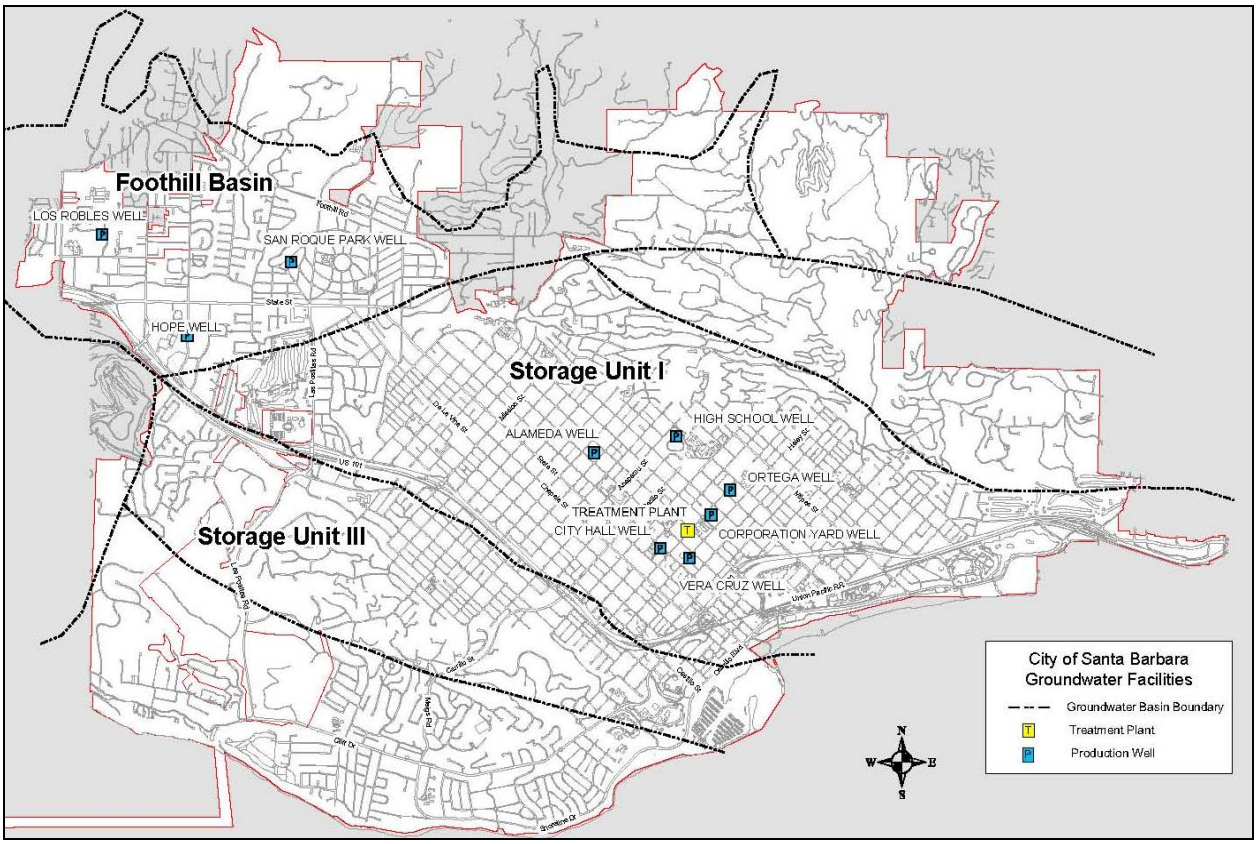


Figure ___

An additional important consideration is the ability of the SWP pipeline to convey non-project water to augment drought year supplies. These potential supplemental water supplies include the State's Dry Weather Water Purchase Program, purchase of unused Table A water available through San Luis Obispo County, or other open market water purchases, such as purchase of agricultural water.

Groundwater

City groundwater supplies are produced from two basins: Storage Unit No. 1 (downtown area) and the Foothill Basin (outer State Street area) as shown in Figure ___. The City conjunctively manages groundwater supplies, withdrawing water when needed and allowing recharge to occur following drought periods. A primary goal of this program is to attempt to utilize the perennial yield of the groundwater basins, while also managing the basins to maximize available storage to act as a back-up supply during drought periods.



The estimated long-term safe yield of these two basins is approximately 1,800 AFY. Extraction by private pumpers is estimated at 500 AFY. The City has six production wells in Storage Unit No. 1 and three in the Foothill Basin, though the wells are in need of varying degrees of maintenance or replacement. While the estimated total pumping capacity is approximately 4,500 AFY, a reduced capacity of 4,150 AFY is assumed for planning purposes. The total usable storage capacity of these two basins is estimated at 16,000 AF of City pumping.

Seawater intrusion into Storage Unit No. 1 is a key issue because the groundwater basin is in contact with seawater that can flow into the basin during periods of heavy pumping. Under normal periods of little or no pumping, the groundwater flow is toward the ocean, which stops intrusion and pushes the seawater interface seaward. The City's Multiple Objective Optimization Model (developed by USGS) was used to estimate pumping levels that represent a compromise between maximizing production and minimizing seawater intrusion. The model results in total pumping of up to about 17,800 AF during the drought period, allowing some intrusion for the last portion of the drought. It should be noted that this modeling was based on one additional well in each basin, which may have implications for future capital program needs. In Storage Unit No. 1, the assumption was that new wells would be placed further inland to minimize intrusion.

A third basin (Storage Unit No. 3 in the Las Positas Valley area) provides additional safe yield of approximately 100 AFY, but water quality is inferior and is not planned for use.

Recycled Water

Recycled water is used in the City to irrigate over 400 acres of landscaped areas, including schools, parks, and golf courses, and for toilet flushing in park restrooms. The City system as currently configured has the capacity to treat and deliver approximately 1,400 acre-feet per year (AFY) of recycled water. Current connected recycled water demand is approximately 800 AFY, plus approximately 300 AFY process water used at the wastewater treatment plant, leaving about 300 AFY of additional capacity.

To meet a City goal of no more than 300 mg/L of chloride during irrigation season, approximately 300 AFY of potable water has historically been blended into the recycled water. This is because blending is the least costly solution and potable water is currently available for this use. A ten-year history of blend amounts is shown in Figure ___.

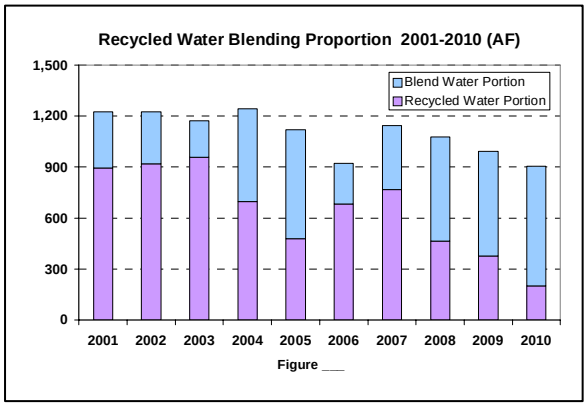


Figure ___

Secondary Process Issues: Beginning in 2004, due to challenges with the secondary treatment process, blending has increased recently to approximately 700 AFY to meet regulatory requirements. Improvements to the secondary process are being evaluated to address this recent increased use of potable water for blending. Once the secondary process is resolved, it is expected that the blend water component can be reduced.

Further Mineral Reduction: Mineral content suitable for irrigation purposes is an important part of fully utilizing the City's recycled water capacity and a standard other than the 300 mg/L chloride limit has been considered. Carollo Engineers identified an Environmental Protection Agency guideline of 1,000 mg/L of total dissolved solids (TDS) as a possible updated standard. A Carollo Engineers study on the recycled water filter rehabilitation project identified a conceptual project to meet this target without the need for blending. For a production rate of 1,910 AFY, the demineralization component was estimated to have a capital cost of $4.6 million. Annualized costs were estimated at approximately $652,000 (including the capital component) resulting in added unit cost of $341/AF of produced recycled distribution water. A blending alternative to meet the same standard was estimated to require a 30% blending component resulting in added unit cost of about $75/AF of produced water, assuming a cost of $250/AF for potable blend water. A modified blending alternative could involve blending only during the primary irrigation season, as is currently conducted to meet the chloride standard.

The recycled water system provides an important component of the City water supply, even with a partial potable water component for blending. In addition, the fact that users are signed up and connected to the separate recycled water system provides increased flexibility in how the City balances the economic and water supply aspects of this source of water.

Desalination

The Charles Meyer Desalination Facility was built in 1992 at an original capacity of 7,500 AFY. Sale of a portion of this facility reduced current production capacity to a maximum of 3,125 AFY, which is also the capacity identified in the environmental analysis and permitting to convert the facility to permanent status in 1996. Due to reduced demand and relatively wet weather since 1992, the facility has been kept in long-term storage mode. However, the facility is permitted as a permanent part of the City water supply under a Coastal Development Permit approved by the City and the Coastal Commission. The City's current Regional Water Quality Control Board National Pollutant Discharge Elimination System (NPDES) permit for discharge from the City's wastewater treatment plant includes provision for discharge of brine when the desalination facility is in operation.

The construction and operation of the Desalination Facility was approved by City voters in an advisory election held in 1991. No major technical barriers have been identified that would prevent reactivation of this facility to produce 3,125 AFY if needed. Although permit requirements would be subject to review by various regulatory agencies, the City has approval of all major permits required to operate this facility.

Reactivation of the facility at a capacity of 3,125 AFY was estimated by Carollo Engineers to cost $17.7 million. (An additional $2.5 million in distribution system improvements that would be required to operate the facility are already planned for construction due to their value in improving overall distribution of water throughout the system). Operating costs are estimated to be $1,470 per AF, including a substantial energy component estimated at 4,615 kilowatt-hours (kWh) per AF of produced water. This is lower than the original facility's energy use of 6,600 kWh per AF, but still well in excess of the energy requirements for most other City water supplies. Should the need arise, reactivation is estimated to require about 16 months from the time of approval of any required permits.

Demand Management

Demand management (i.e., water conservation), provides a viable alternative to the high marginal costs of procuring new water supplies or increased deliveries from the more expensive existing supplies. Projected water demand is a key input assumption of the water supply planning process. Balancing the assumptions of projected water demand with the projected water conservation savings is necessary to develop an accurate water demand forecast. This section reviews the history of the City's water demand, summarizes current conservation efforts, and discusses recent analysis and regulations that are relevant to the anticipated level of demand during the planning period.

Current Status

The total water system production is used to track the demand for water, since water is produced and put into the distribution system to match customer demand. The history of water demand from 1986 to present is shown in Figure __ as a moving 12-month average.

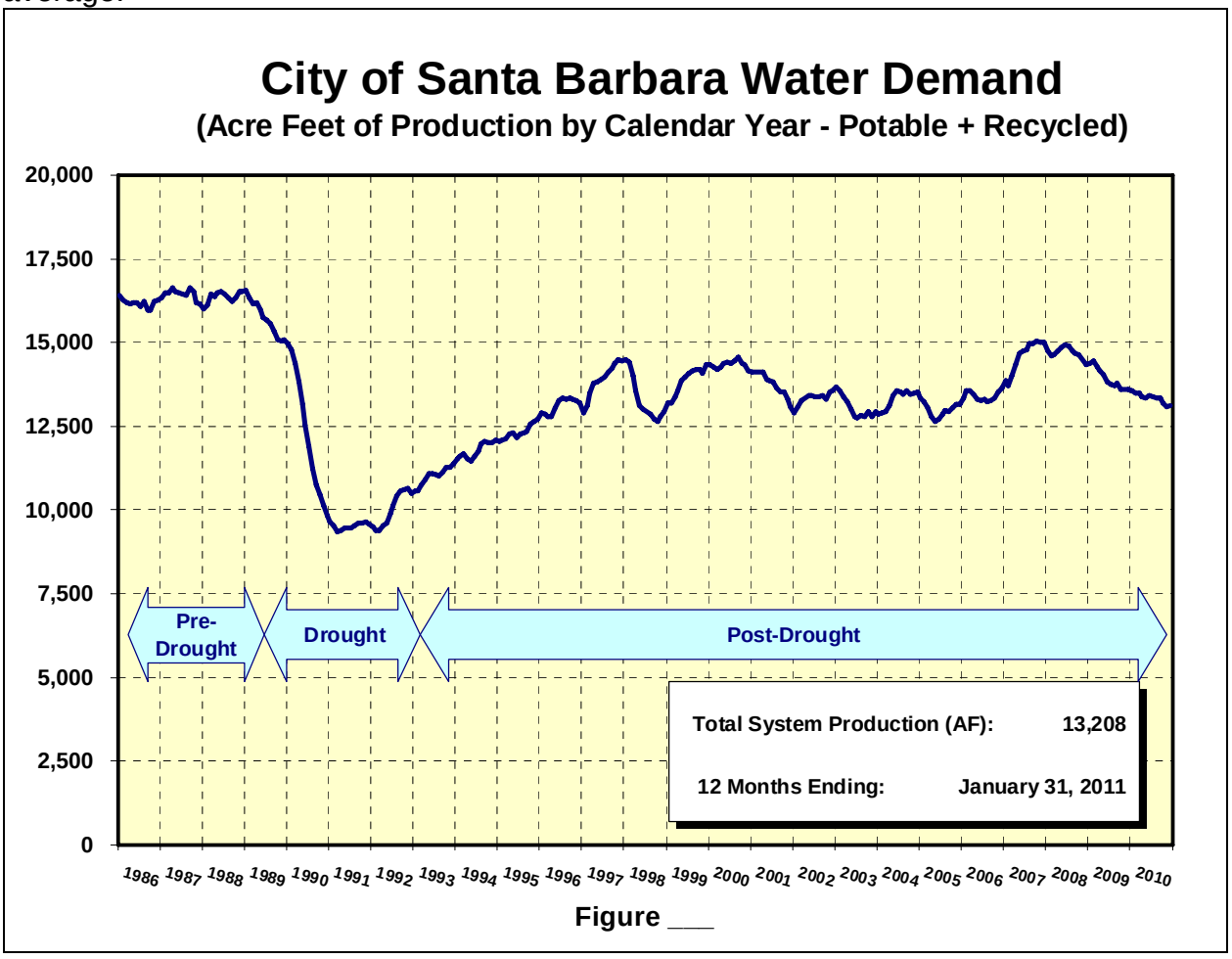


Figure ___

Moderate cutbacks in response to a Stage 1 Drought are evident during 1989 and response to the Drought Emergency is reflected in significant reductions during 1990. From 1992 to 1998, a steady post-drought recovery occurred, followed by a period of generally flat demand, but with significant fluctuations from year to year. To analyze this period of fluctuations, staff began tracking demand in relation to rainfall and evapotranspiration (ETo) data, as shown in Figure __.

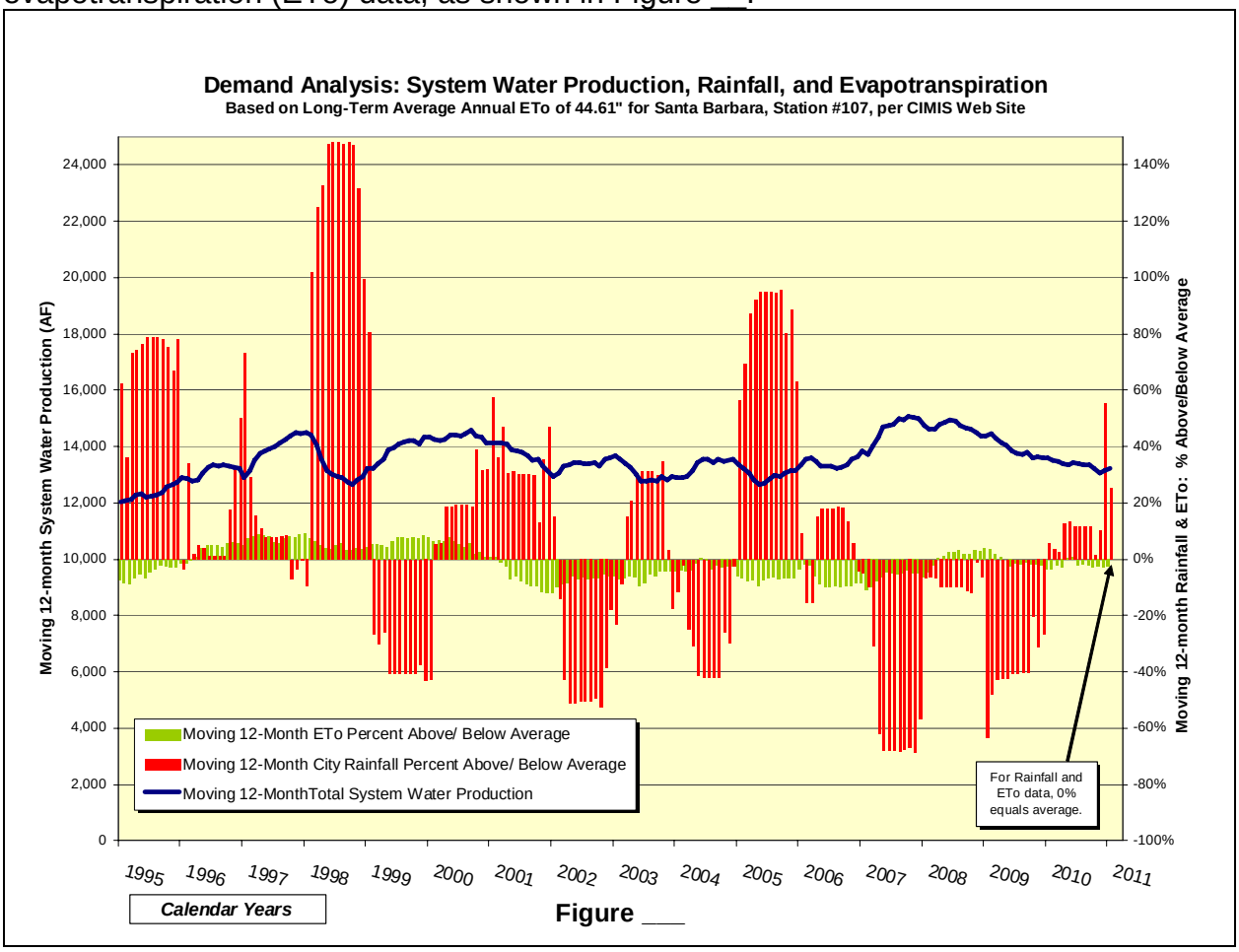


Figure ___

This information suggests that weather based fluctuations are the predominant effect on water demand. It is used to help estimate the "normal year" demand (i.e., approximately average rainfall), as the basis for planning water supply and revenue projections.

Under the 1994 LTWSP, the City's water supply was planned to meet a total water system demand of 18,200 AFY. This number was derived as 17,900 AFY of demand projected during the 1989 update of the City's General Plan, plus a 10% safety margin, for a total of 19,700 AFY, minus an assumed "supply" of 1,500 AFY from new water conservation (some rounding included). Demand without safety margin for the end of the period was projected to be 16,400 AFY, including the assumed effects of water conservation. As the 1994 LTWSP planning period comes to an end, the normal year demand is approximately 14,000 AFY, about 2,400 AFY less than projected. Demand for the 2010 water year, with rainfall about 12% above average, was 13,348 AFY.

The significant reduction in current demand compared to pre-drought levels can be attributed to a number of factors:

- An aggressive water conservation program;
- Less actual development than was projected;
- The cumulative effects of stricter plumbing codes and appliance standards on both new and existing development, and
- The relatively high cost of water, accentuated by the block rate pricing structure that charges a higher unit rate for higher levels of water usage.

The City's Water Conservation Program has developed into a comprehensive demand management effort. An important focus of the conservation program has been to comply with, and to help shape, the Best Management Practices for Urban Water Conservation (BMPs) administered by the California Urban Water Conservation Council (CUWCC). These BMPs constitute the officially recognized standard for urban water conservation. The measures satisfy contractual requirements associated with the Cachuma Project. They have become a requirement for water utilities to remain eligible for state. and federal loans and grants and Urban Water Management Plan acceptance. The City has been a signatory to the CUWC Memorandum of Understanding Regarding Urban Water Conservation since 1992 and has worked to insure that the BMPs are practical and effective in achieving cost effective conservation savings.

Highlights of the water conservation program include:

- A broad selection of up-to-date print and on-line information on indoor and outdoor water conservation for both homes and businesses, including water wise plant selection, on-line irrigation scheduling tools, sustainable landscaping, high efficiency appliances, and water use awareness;

- Rebates for installation of water wise landscaping and efficient irrigation systems, as well as high efficiency toilets, urinals, and clothes washers;

- A youth education program for elementary and secondary students, including classroom presentations, curriculum, treatment plant tours, and assemblies;

- The Green Gardener program, which trains landscape maintenance professionals in resource efficient and pollution prevention landscape maintenance;

- Practical guidelines and ordinances that reflect current technology for water conservation, including the City's Landscape Design Standards for Water Conservation;

- Targeted billing system analysis to reach customers with particularly high water usage, with particular emphasis on providing site-specific landscape water budgets and real-time irrigation demand information; and

- A residential and commercial customer assistance program, providing free water check-ups to evaluate all water uses on the property and make recommendations for improved indoor efficiency, water wise plant selections, and irrigation system upgrades.

The current program is outlined in more detail in Exhibit ___ (Water Conservation Program Summary).

The Plan Santa Barbara Process

As of the fall of 2010, the General Plan update process (*Plan Santa Barbara*) resulted in a proposed "hybrid" alternative that is similar to the originally proposed project in terms of water supply impacts. This alternative is projected to result in 2,795 new dwelling units (DU) and 1.5 million square feet of non-residential development within the City limits. Water demand for these projections is estimated as follows, based on recently updated aggregate demand factors for applicable customer classes:

Single Family Residential:	13% of 2,795 DU = 363 DU X .40 AFY/DU =	145 AFY
Multi-Family Residential:	87% of 2,795 DU = 2,432 DU X .16 AFY/DU =	389 AFY
Non-Residential:	1,500,000 ft^2 X .13 AFY per 1,000 ft^2 =	195 AFY

When 100 AFY of demand from projected added demand outside the City limits is included, the result is a projected new demand of about 830 AFY. It is important to note that using current aggregate demand factors to project future demand can be expected to overestimate demand for new development. This is because new development will be subject to new codes and standards, while aggregate demand includes a significant portion of the building stock constructed under older standards.

State and Federal Requirements

A number of factors at the State and Federal levels will affect water demand in the future:

CUWCC BMP's: As noted above, the City's ongoing implementation of the BMP's can be expected to continue to exert a downward pressure on water use.

State & Federal Plumbing Codes: Currently, Federal plumbing and appliance efficiency standards require 1.6 gpf toilets, 1.0 gpf urinals, and 2.5 gpm showerheads. Effective 2014, all toilets and urinals sold in California will need to meet the new standards of 1.28 gallons per flush for toilets and 0.5 gallons per flush for urinals. This change will

affect demand from new development, as well as demand from existing development as older fixtures are gradually replaced with models meeting the new standards. As required by the legislation, compliant models are already on sale in California at major retail and wholesale outlets. In addition, the California Green Building Standards have recently become effective and now essentially mandate the above standards for new construction. Additionally, after July 1, 2011, the 2010 California Plumbing code will require installations of 1.28 gpf toilets and .5 gpf urinals for all residential occupancy remodels. These include single family residential, dorms, hotels, apartments and basically any structure where overnight sleeping takes place.

S.B. 407 Fixture Replacement: Recent State legislation requires that new building owners be notified if the property does not have high efficiency fixtures. Implementation requirements are still unclear, but this can be expected to further the pace of conversion to high efficiency plumbing fixtures.

California's 20 X 2020 Requirement: In 2008, the Governor initiated a goal of 20% reduction in per capita urban water use by 2020. In 2009, the legislature adopted this goal into law by passing SB 7. The penalty for non-compliance is ineligibility for State grants and loans. The focus is on public potable water distribution systems only; as such, the use of recycled water helps toward meeting the requirement. Targets were established by hydrologic regions, with several options for defining the baseline and the eventual 2020 target of per capita water use. The most suitable option for the City is likely to be "Method #3" in the legislation. This results in a baseline of 154 gallons per capita per day (GPCD) and a 2020 target of 117 GPCD. The 2009 potable per capita demand for the City was 122 GPCD.

Water Conservation Technical Evaluation

In preparing this plan, it was important to evaluate all of the above factors and determine to what extent additional conservation could be relied upon during the planning period. This is in the context of meeting the State requirements of 20 X 2020 for per capita water use, meeting the CUWCC BMP requirements, and for properly identifying a cost effective role for water conservation in avoiding water supply costs.

Maddaus Water Management (MWM) is an engineering firm that is widely recognized as expert in estimating the costs and benefits of water conservation measures. MWM was hired to analyze the City's existing conservation program and use its proprietary Demand Management Decision Support System (DSS) to model current and potential conservation measures. The DSS also quantified the demand reduction effects of these measures along with the effects of plumbing codes and appliance standards. The process included a screening of 92 potential measures to identify 23 that made the most sense in Santa Barbara. These were inserted into the model, along with detailed information about the City's customer base and demand history. The project is described in more detail in the Executive Summary of the project report included as Exhibit ____ (Water Conservation Technical Evaluation – Executive Summary). Key

findings, including the effect of assumed development consistent with the Plan Santa Barbara process, are as follow:

- The 2030 demand would be expected to increase by 1,202 AFY (compared to the 2006 model reference point) to 14,825 AFY, if the effects of already adopted plumbing codes and appliance standards were not considered. (It should be noted that this is not a projection that will actually occur, but it is a useful reference point to illustrate the ongoing effect of stricter codes and standards on both new and existing development.)

- The effects of the plumbing code and appliance standards are estimated to reduce 2030 demand by 916 AFY, to 13,906 AFY, not including the effects of conservation program activities and measures.

- Conservation Program B, which includes current conservation program measures along with those that together meet a utility benefit-cost ratio of 1.0, is estimated to reduce demand by an additional 501 AFY, to 13,408 AFY.

The benefit-cost ratio was calculated on the basis of an avoided cost of $600 per AF, which is an average of the variable costs associated with State Water Project Table A deliveries, groundwater produced from the Ortega Groundwater Treatment Plant, and deliveries of purchased water through the State Water Project during non-critical drought periods.

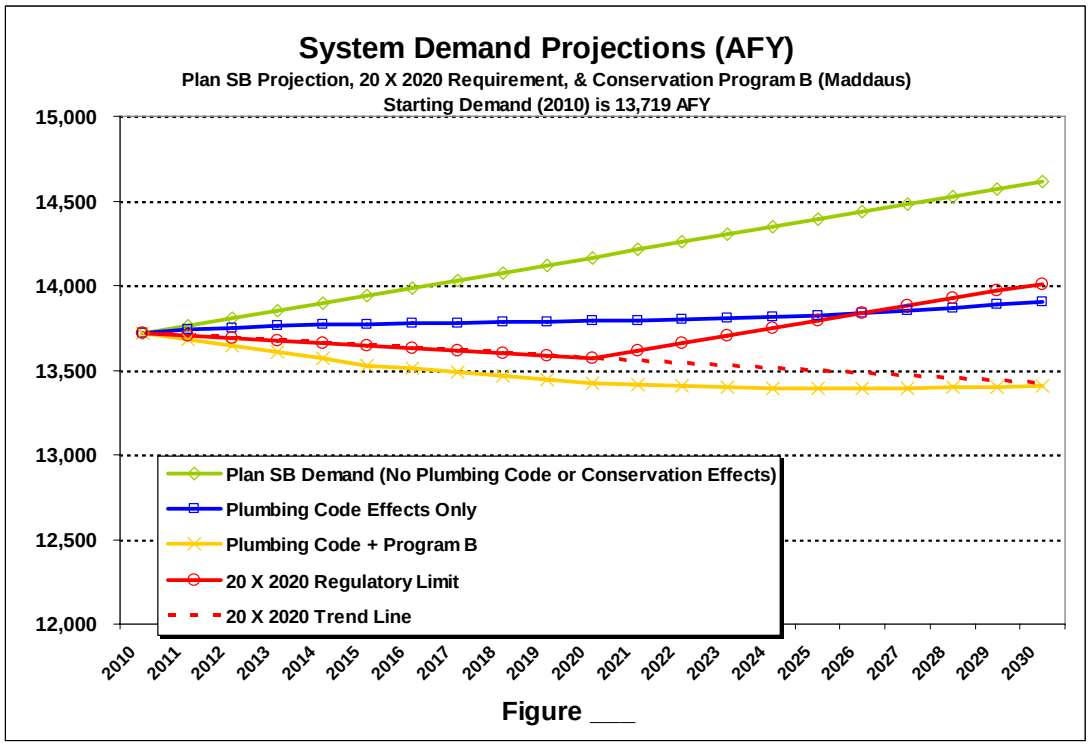


Figure ___

Figure ___ shows demand projections reflecting the various factors that will influence the City's actual water demand over the course of the planning period.

Primary Planning Issues

Given the water supply as described above, there are several key issues that shaped the water supply policy elements contained in this plan, as discussed below.

Planned Duration of Critical Drought Period

The critical drought period for the City's water supply occurs when there are multiple consecutive years of below average rainfall. This is due to the particular hydrology of the Santa Ynez River, where little or no inflow to Lake Cachuma occurs until at least average rainfall has occurred. When this condition continues for multiple years in succession, the storage level of Lake Cachuma drops and shortage in entitlements occur. Based on historical data, the critical drought period has had a duration of five years.

Climate change has the potential to impact the water supply, though it is still unclear whether this will have significant effect during the planning period. To the extent information is available for the local area, overall rainfall amounts would be expected to be similar to recent history, but an increasing frequency of extreme rainfall events can be expected. This has the potential to result in an extended irrigation season with some associated increase in demand. From a water supply perspective, more concentrated rainfall events may have the benefit of increased inflow to Lake Cachuma. Guidance from the state planning agencies is that California can expect a 20% increase in both the frequency and the duration of dry periods. For the City's water supply this would suggest a critical drought period frequency of perhaps once every 30 years, instead of 40 years, and a duration of 6 years, instead of 5 years. Even though climate change impact information is incomplete and still undergoing critical review, the six-year drought period is an reasonable test and staff has used for critical drought analysis of the water supply.

Role of Desalination

The City's desalination facility is a vital resource as a back-up for potential prolonged drought and unforeseen catastrophic interruption of the water supply and would help mitigate the economic impact of such situations. It is also a reliable source of water, once in operation. However, as noted above, reactivation of the facility will result in significant costs, if only for the planning and design work that would be needed to start the process. In recent years, a dry period of only three years has been enough to trigger the start of planning to reactivate the facility in case of continuing dry weather. In 2004, after three years of drought, the storage level at Lake Cachuma had been reduced to about 70,000 AF out of 190,000 AF (37% of capacity) and the City was beginning the process.

As a result of discussion of this issue between staff and the Water Commission, the water supply has been modeled to stretch available Cachuma supplies over a potential

6-year drought period, with the goal of deferring the reactivation process, i.e. to plan for operation in the sixth year of a critical drought period instead of the fifth year. This would significantly reduce the frequency of the planning and design effort, as well as reducing the likelihood that the substantial expense of actually rehabilitating the facility would be needed. This is another basis for the six-year critical drought period used in performance modeling.

Sedimentation Management at Reservoirs

Reservoirs on the Santa Ynez River are vulnerable to loss of storage capacity due to siltation, as are reservoirs throughout the west. Reduced storage capacity reduces the yield of the reservoir. At Gibraltar Reservoir efforts to maintain storage capacity by dredging have had marginal impact and high cost. There has been some interest on the part of federal agencies to cooperate in vegetation management using controlled burns, but budget issues have made this unlikely to occur. Implementation of the Pass Through provisions of the Upper Santa Ynez River Operations Agreement will essentially stabilize the yield of Gibraltar, despite expected continuing siltation. As such, efforts to control sedimentation at Lake Cachuma are likely to be more productive. Such efforts will require a joint effort among the Cachuma Project members, the downstream water users, and the various state and federal agencies that would have responsibility for permitting and/or implementing measures to address siltation. Issues related to such efforts are likely to be shared with numerous other reservoirs throughout the state, meaning that a coordinated statewide effort may be appropriate.

Groundwater Management

The City has initiated a three-year USGS study to update the groundwater flow and water quality models to allow more accurate management of groundwater. Better indicators of basin fullness are expected to be developed. More importantly, the modeling of seawater intrusion effects in Storage Unit No. 1 is expected to be made more accurate. This will guide placement of new wells in the basin, assist with scheduling well operation to minimize intrusion, and provide the ability to estimate the benefits of groundwater recharge for basin replenishment and creating barriers to seawater intrusion.

Recycled Water Expansion

Recycled water is a relatively expensive source of water, but it is a reliable way to extend potable water supplies, thereby deferring the expense of procuring additional potable supplies. Additionally, increased recycled water connections will allow flexibility in meeting regulatory demand management requirements, such as the State's current requirement to reduce the City's gross daily per capita water consumption. Carollo Engineers identified about 300 AFY of additional capacity in the existing system and about 300 AFY of potential new users of recycled water, some adjacent to the existing system and some that could be served with extensions of the distribution system.

These opportunities are being evaluated for their potential to cost effectively improve the reliability of the City's water supply and aid in meeting the state mandate on per capita water use. A caveat is that such expanded use will be difficult to achieve unless a reduction in salinity is included as a part of the program.

Water Supply Performance

Charts included as Exhibits ___ - ___ are based on a worksheet developed to simulate the water supply over the 76-year period now contained in the Santa Ynez River Hydrology Model and to explore the potential to defer the use of desalination at least until the sixth year of a drought. Three conditions are represented:

- The first represents "Current Conditions", with Cachuma entitlement of 8,277 AFY and no use of the safety margin.

- The second represent near-term condition with Cachuma entitlement also at 8,277, but with the safety margin included.

- The third represents 2030 conditions, with projected future Cachuma entitlement and safety margin included.

Acceptable shortages are defined as 10% in year 4, 15% in year 5, and 15% in year 6.

The worksheet uses a projected system demand of 14,000 AFY, based on the combined effects of new development during the planning period, reductions in water use due to updated plumbing codes and appliance standards, the effects of the City's water conservation program, and the statutory requirement to meet a 20% reduction in per capita daily water use by 2020. A category called "Drought Supplies" is used to indicate water that would be available as a substitute for desalination, either as unused State Water that is banked for use during dry periods or as purchase of water during the dry period. The worksheet estimates that approximately 4,400 AF of unused State Water would be available for banking if suitable contractual arrangements could be made to store the water for future use. Assuming a 50% deduction for the service of banking the water would provide about 2,200 AF of water to offset purchase of water on the open market.

The worksheet uses supplies according to the following sequence of priorities:

1. All available water from Gibraltar, Mission Tunnel and Montecito Water District, plus the 1,100 AFY of recycled water;
2. Minimum groundwater usage of 700 AFY;
3. The City's "exchange water" obligation of SWP Table A water (600 AFY);
4. Available Cachuma entitlement
5. Remaining available SWP Table A water, as needed;
6. Added groundwater pumping up to the "mid-level" amount, as needed;

7. Added pumping up to the “maximum level,” as needed;
8. Deliveries of “Drought Supplies” through SWP facilities.

The worksheet is set up to take Acceptable Shortages in years where they are allowed prior to taking delivery of Drought Supplies.

Water Supply Policy Elements

This plan has been developed to evaluate the adequacy and reliability of the City's water supply and provide a long-term view of how the City's water supplies will be managed. It is based on the best currently available projections and assumptions, and is to be considered a plan, not a prescription. New information or conditions may dictate adjustments and necessitate new policy direction. Based on the information contained and referenced herein, the City's water supply management program will be guided by the following elements:

1. Demand Projection: Water system demand for the planning period is expected to be 14,000 AFY, including potable and recycled demand. This projection includes demand growth associated with new development, which is expected to be offset by increasing water efficiency improvements in both new and existing buildings and landscapes.

2. Safety Margin: A safety margin of 10% above projected demand will be used for planning purposes to accommodate unplanned increases in demand or decreases in available supply.

3. Acceptable Shortage: An acceptable shortage of up to 15% during a critical drought period is established, to be addressed by short-term extraordinary reductions in customer water usage, in addition to the continuing promotion of water use efficiency. Such reductions would be expected to be achieved by measures such as restrictions on landscape irrigation and other water uses, a modified water rate structure, and intensive public information efforts to promote the community goal of reduced water use. This shortage is established in recognition of short-term elasticity in customer demand that can be tapped during rare emergency conditions to avoid the cost of 100% reliability of the water supply.

4. Recycled Water: State and City regulations requiring use of recycled water where available will be implemented. Capacity in the City's Water Reclamation Project will be utilized to continue to serve existing connected demand plus an additional 300 AFY of expanded use for a total of approximately 1,100 AFY. The use of potable water for blending will be tracked, with a goal of maintaining the potable blend content at or below ___%. Blending is expected to be used primarily during the summer irrigation season and to be suspended during extended drought. A contingency plan for eliminating the need for blending will be developed upon completion of current analysis of the City's wastewater treatment process, with the goal of being ready to implement the plan if economic or regulatory conditions dictate.

5. Water Conservation: The City will operate a comprehensive Water Conservation Program aimed at implementing cost effective water conservation measures to meet the requirements of the California Urban Water Conservation Council Best

Management Practices and achieve compliance with 20 X 2020 per capita water use limitations. Conservation measures will be evaluated for cost effectiveness based on avoided cost of additional water supplies.

6. Groundwater Management: Groundwater production capacity of at least 4,125 AFY will be maintained in Storage Unit No. 1 and the Foothill Basin to augment depleted surface water supplies during severe drought. Ongoing modeling will assess strategies for groundwater management, including optimal use of available recharge, injection of potable water for artificial recharge, and injection of recycled water as a barrier to sea water intrusion. Sites for new or replacement production wells will be evaluated with the goal of minimizing sea water intrusion. The City will investigate development and adoption of a Groundwater Management Plan, consistent with state law, to provide for the orderly and responsible use of the City's groundwater resources.

7. Gibraltar Pass Through Operations: Pass Through operations will be implemented for storage of Gibraltar water in Lake Cachuma pursuant to the 1989 Upper Santa Ynez Rive Operations Agreement. Implementation will include environmental review and documentation as required in support of a "Warren Act" contract between the City and the U.S. Bureau of Reclamation to provide for the necessary accounting under federal law. An updated analysis of sedimentation management will be conducted to assess whether efforts to arrest or reverse the sedimentation process at Gibraltar Reservoir are feasible, given the City's rights under the 1989 agreement.

8. Cachuma Sedimentation Management: Recognizing the ongoing reduction in capacity at Lake Cachuma due to sedimentation, the City will promote investigation of options for a long-term management strategy to minimize sedimentation in conjunction with Cachuma Project Member Units and other appropriate parties and agencies, including state and federal agencies.

9. Water Banking: The City will investigate opportunities to bank unused State Water when available, with the goal of using this water to reduce the amount of drought water purchases that may be needed during a critical drought period, and deferring the potential need for production from the desalination facility at least until the sixth year of a critical drought period.

10. Desalination Facility: The City's desalination facility is an important component of the City's water supply, despite the significant cost of activating and operating the plant. The desalination facility is retained as an official part of the City's water supply for use as may be needed during extended drought or catastrophic water supply interruption.

11. Management of Water Fund Assets: Land and equipment assets purchased with Water Fund resources will be managed for the purpose of optimizing the economic and sustainable operation of the water system.

12. Monitoring and Reporting: Ongoing monitoring and reporting of the City's water supply status will be conducted, including annual reports to City Council on the near-term drought outlook, preparation of 5-year updates of the City's Urban Water Management Plan, and an update of this plan in approximately 2030, or sooner as may be appropriate.

Based on implementation of the above management elements, the City's water supply is determined to be adequate to serve anticipated demand for the duration of the planning period.

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Water Supply Performance: **Scenario A - Current Conditions**

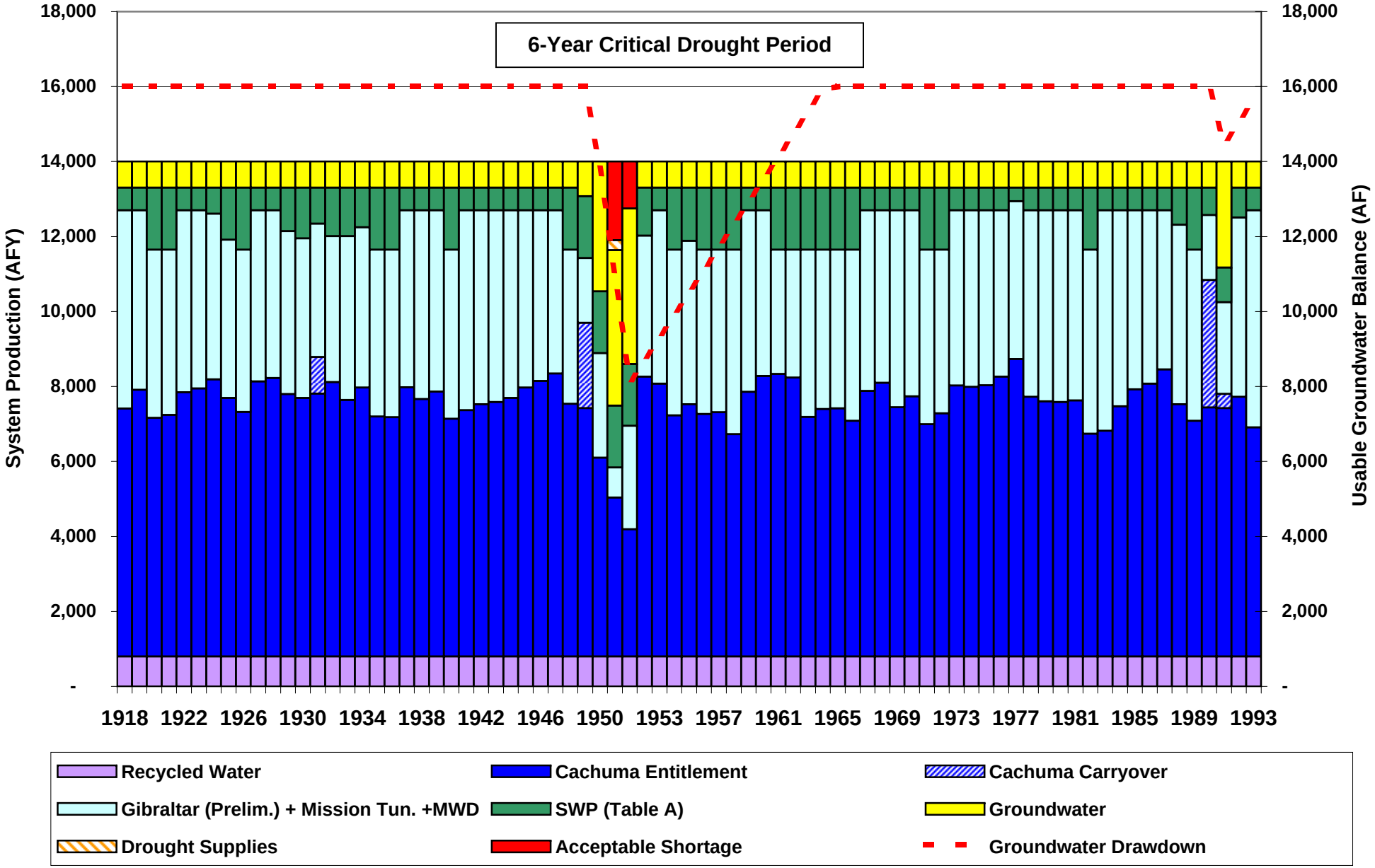
Projected System Demand (AFY): **14,000**

Water Supply Target (including Safety Margin): **14,000**

Cachuma Yield Assumption: **Current Entitlement**

Acceptable Shortages: Stage 1 **10%** Stage 2 **15%** Stage 3 **15%**

Total Critical Period Drought Supplies Required (AF): **262**



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Water Supply Performance: **Scenario B - Near Term Conditions**

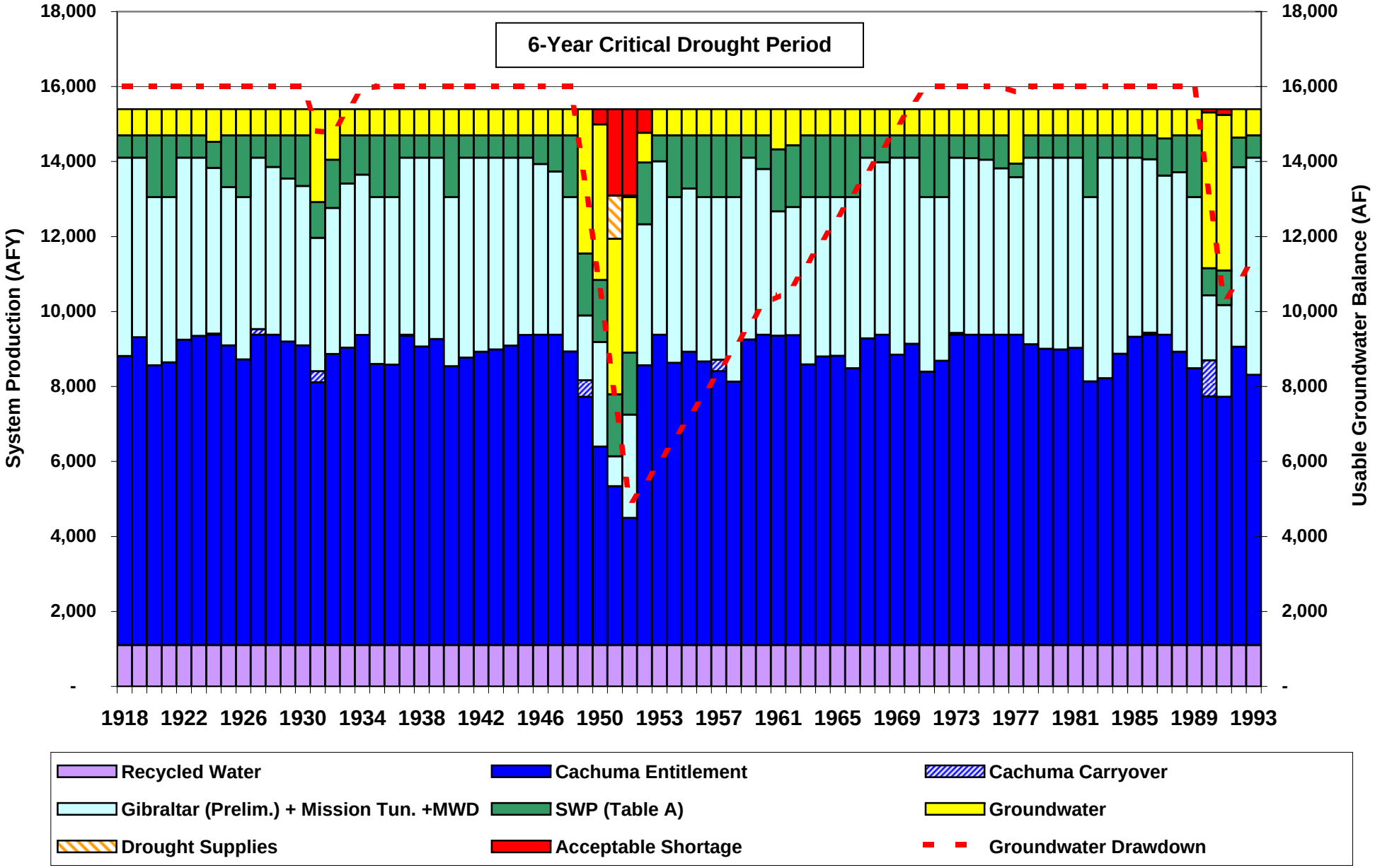
Projected System Demand (AFY): **14,000**

Water Supply Target (including Safety Margin): **15,400**

Cachuma Yield Assumption: **Current Entitlement**

Acceptable Shortages: Stage 1 **10%** Stage 2 **15%** Stage 3 **15%**

Total Critical Period Drought Supplies Required (AF): **1,195**



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Water Supply Performance: **Scenario C - 2030 Conditions**

Projected System Demand (AFY): **14,000**

Water Supply Target (including Safety Margin): **15,400**

Cachuma Yield Assumption: **Projected Entitlement**

Acceptable Shortages: Stage 1 **10%** Stage 2 **15%** Stage 3 **15%**

Total Critical Period Drought Supplies Required (AF): **2,228**