



City of Santa Barbara
Public Works Department

ITEM 7

Interoffice Memorandum

DATE: January 5, 2011
TO: Board of Water Commissioners
FROM: Bill Ferguson, Water Resources Supervisor
SUBJECT: Long-Term Water Supply Program Update

As a next step in updating the Long-Term Water Supply Program (LTWSP), we have developed a worksheet that simulates the water supply over the 76-year period now contained in the Santa Ynez River Hydrology Model. Worksheet output in table form and chart form is attached for two different water supply targets. The first is a target supply of 15,400 AFY, based on a projected 2030 normal year demand of 14,000 AFY, plus 10% safety margin. The second is based on 14,500 AFY, plus 10% safety margin. Both assume a 10% acceptable shortage during a critical drought period. As we have discussed, the demand projections developed in the Water Conservation Technical Evaluation by Maddaus Water Management, as well as the statutory requirement to meet a 20% reduction in per capita daily water use by 2020, lead staff to consider the 14,000 AFY demand projection to be the appropriate basis for supply planning. Following are notes on worksheet data sources and assumptions, which will be further discussed at our meeting on January 11, 2011:

- Assumptions for Cachuma deliveries are per model runs under Alternative 3-C of the 2003 Cachuma Water Rights hearing DEIR, including 3-foot surcharge of the reservoir (now in place) and operation according to the Lower Santa Ynez River Biological Opinion on steelhead. An estimated 5% reduction in project yield by 2030 is included to account for projected loss of reservoir volume by 2030. Mission Tunnel is estimated per the same model runs.
- Gibraltar delivery assumptions are at 70% of "Mitigation Mode" yield under the Pass Through Agreement, as a conservative estimate pending modeling results on the "Pass Through Mode."
- State Water Project deliveries of Table A amounts are based on the Final 2009 State Water Project Delivery Reliability Report. The worksheet uses the modeled results for "Future Conditions" (2029), which include future hydrology and sea level rise related to climate change, with no improvements to the Delta infrastructure (e.g. Peripheral Canal, etc.) and with restrictions associated with recent Biological Opinions affecting the Delta. In addition, we have assumed that deliveries in all years are limited to a maximum of 50% of Table A amount to reflect our recent experience with Delta delivery restrictions.
- Groundwater values assume 16,000 AF of usable storage and 1,300 AFY of recharge. Three levels of pumping are used: 1) A minimum amount of 500 AFY in all years to help maximize the yield of the basins; 2) mid-level pumping of up to the safe yield of 1,300 AFY; and maximum pumping of up to 4,150 AFY.

- A category called “Banked Water” is used to collect available unused State Water, using assumptions that we would surrender 50% of the volume going into storage as payment for banking services, and that water would expire after five years in the bank. Amounts are minimal in the attached charts, due to higher priority use of State Water to meet ongoing demand, and expiration of much of the banked water due to period of more the five years between critical drought periods.
- Non-project deliveries through the State Water Project facilities are used to make up deficiencies in excess of the planned 10% shortage.
- Desalination not included in available supplies as a way of testing the ability of the water supply to perform with out this source.
- Connected recycled demand is assumed to increase from 800 AFY to 1,200 AFY based on assumed use of currently existing capacity in the recycled water system.
- The worksheet reflects a hypothetical 6-year critical drought period, which is generally based on the five years of 1947 to 1951, with a sixth year (“1951.1”). The sixth year assumes the average of the first five for Gibraltar, Mission Tunnel, and State Water deliveries. Cachuma deliveries are assumed to decline by 20% in the third through sixth year, essentially resulting in the modeled deliveries for five years being spread out over the six year drought. This is to simulate a sixth year of average or less rainfall when we would expect only minimal inflow to Cachuma.
- A cost tabulation as the bottom of the table compares the non-base load marginal cost associated with each scenario. Note that totals are for the full 77-year period. On a 20-year basis corresponding to our planning period the amounts are about \$22 million for the 14,000 AFY demand projection, and \$27 million for the 14,500 AFY demand projection.

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

1. All available water from Gibraltar and Mission Tunnel, plus the 1,200 AFY of recycled water;
2. Minimum groundwater usage of 500 AFY (as a conservative approximation of the limit of pumping without causing landward movement of the sea water interface);
3. Our “exchange water” obligation of SWP Table A water (600 AFY);
4. Available Cachuma entitlement is used;
5. Remaining available SWP Table A water, as needed;
6. Any available banked water, as needed;
7. Added groundwater pumping up to the “mid-level” amount, as needed;
8. Added pumping up to the “maximum level,” as needed;
9. Deliveries on non-project water through SWP facilities.

This is a work-in-progress that will be helpful in finalizing the policies and assumptions upon which the recommended supply plan will be based.

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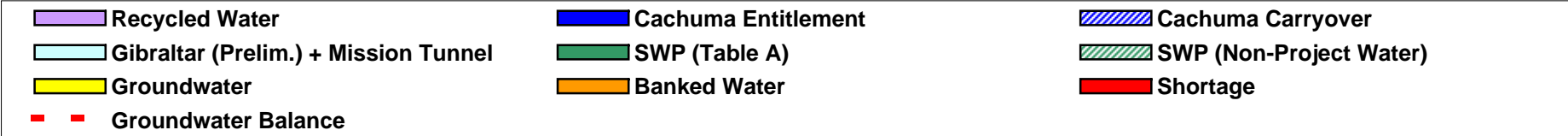
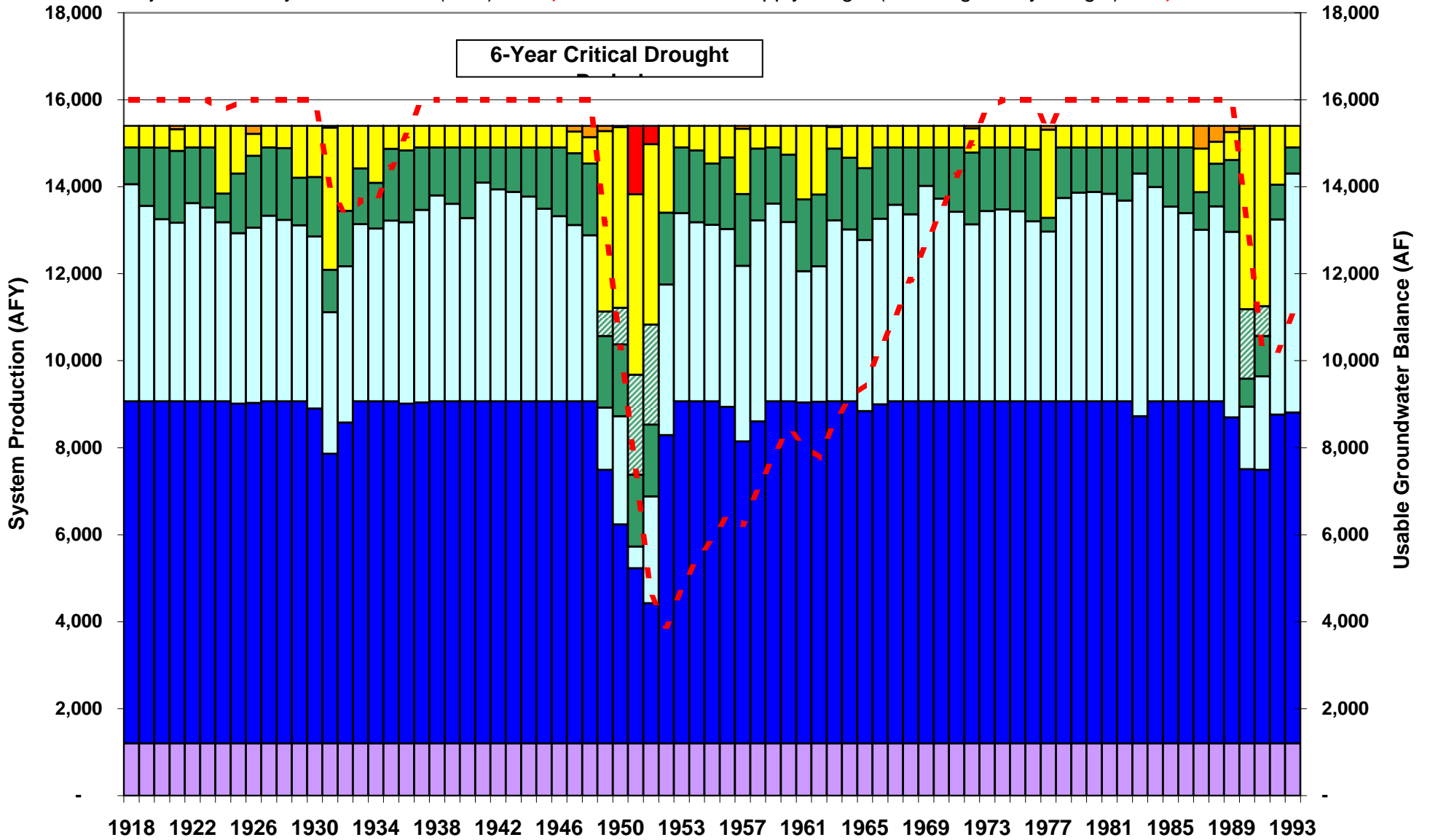
Water Supply Performance Over 77-Year Model Period

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1/5/11

Projected 2030 System Demand (AFY): **14,000**

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



2011 LTWSP Update Planning Worksheet

DRAFT

Projected 2030 Demand: 14,000 AFY

Print Date: 1/5/11

6-Year Critical Drought

Water Supply Target with Safety Margin: 15,400 AFY

- 10% = Safety Margin
- 10% = Acceptable Shortage
- 14,000 = Projected 2030 System Demand (AFY)
- 1,400 = Safety Margin (AFY)
- 15,400 = Water Supply Target (AFY)
- 600 = SWP Table A Minimum (Exchange) (AFY)
- 50% = SWP Maximum Delivery % of Table A Amount
- 2,300 = SWP Non-Project Purchases - Annual Limit (AFY)
- 500 = Groundwater Minimum Pumping (AFY)
- 1,300 = Groundwater Mid-level Pumping (AFY)
- 4,150 = Groundwater Maximum Pumping (AFY)
- 16,000 = Groundwater Useable Storage (AF)
- 1,300 = Groundwater Annual Recharge (AFY)

- 1,200 = Recycled Water Connected Demand (AFY)
- 5,000 = Banked water maximum storage (AF)
- 50% = Banked Water Discount on Entry
- 1,000 = Banked Water Annual Withdrawal Limit
- 0 = Desalination capacity assumed (AFY)

Output:	10% = Maximum % Shortage
	- = Total Cachuma Carryover Used
	2,213 = Total Banked Water Used
	8,284 = Total SWP Non-Project Water Used
	3,898 = Minimum Groundwater Balance
\$ 84,420,000	= Total Non-Base Load Marginal Cost

Water Year

	Cachuma Entitlement	Cachuma Carryover	Gibraltar (Prelim.)	Mission Tunnel	SWP (Table A)	Groundwater	Banked Water	SWP (Non-Project Water)	Desal	Recycled Water	Shortage	Shortage (%)	Total
1918	7,863	-	3,206	1,786	845	500	-	-	-	1,200	-	0%	15,400
1919	7,863	-	3,206	1,285	1,346	500	-	-	-	1,200	-	0%	15,400
1920	7,863	-	3,206	980	1,650	500	1	-	-	1,200	-	0%	15,400
1921	7,863	-	3,206	903	1,650	500	78	-	-	1,200	-	0%	15,400
1922	7,863	-	3,206	1,351	1,280	500	-	-	-	1,200	-	0%	15,400
1923	7,863	-	3,206	1,249	1,382	500	-	-	-	1,200	-	0%	15,400
1924	7,863	-	3,206	914	660	1,557	-	-	-	1,200	-	0%	15,400
1925	7,811	-	3,206	714	1,372	1,097	-	-	-	1,200	-	0%	15,400
1926	7,827	-	3,206	826	1,650	506	185	-	-	1,200	-	0%	15,400
1927	7,863	-	3,206	1,063	1,568	500	-	-	-	1,200	-	0%	15,400
1928	7,863	-	3,206	968	1,650	513	-	-	-	1,200	-	0%	15,400
1929	7,863	-	3,206	845	1,093	1,193	-	-	-	1,200	-	0%	15,400
1930	7,700	-	3,206	750	1,366	1,178	-	-	-	1,200	-	0%	15,400
1931	6,658	-	2,595	660	976	3,270	41	-	-	1,200	-	0%	15,400
1932	7,374	-	2,606	990	1,272	1,958	-	-	-	1,200	-	0%	15,400
1933	7,863	-	3,206	871	1,278	982	-	-	-	1,200	-	0%	15,400
1934	7,863	-	3,206	767	1,052	1,312	-	-	-	1,200	-	0%	15,400
1935	7,863	-	3,206	948	1,650	533	-	-	-	1,200	-	0%	15,400
1936	7,812	-	3,206	964	1,650	568	-	-	-	1,200	-	0%	15,400
1937	7,840	-	3,206	1,217	1,437	500	-	-	-	1,200	-	0%	15,400
1938	7,863	-	3,206	1,530	1,101	500	-	-	-	1,200	-	0%	15,400
1939	7,863	-	3,206	1,334	1,297	500	-	-	-	1,200	-	0%	15,400
1940	7,863	-	3,206	1,006	1,625	500	-	-	-	1,200	-	0%	15,400
1941	7,863	-	3,206	1,825	806	500	-	-	-	1,200	-	0%	15,400
1942	7,863	-	3,206	1,670	961	500	-	-	-	1,200	-	0%	15,400
1943	7,863	-	3,206	1,609	1,022	500	-	-	-	1,200	-	0%	15,400
1944	7,863	-	3,206	1,504	1,127	500	-	-	-	1,200	-	0%	15,400
1945	7,863	-	3,206	1,224	1,407	500	-	-	-	1,200	-	0%	15,400
1946	7,863	-	3,206	1,050	1,581	500	-	-	-	1,200	-	0%	15,400
1947	7,863	-	3,206	847	1,650	500	134	-	-	1,200	-	0%	15,400
1948	7,863	-	3,161	656	1,650	608	262	-	-	1,200	-	0%	15,400
1949	6,290	-	877	550	1,650	4,150	122	561	-	1,200	-	0%	15,400
1950	5,032	-	1,961	527	1,650	4,150	35	845	-	1,200	-	0%	15,400
1951	4,026	-	-	500	1,650	4,150	-	2,300	-	1,200	1,574	10%	15,400
1951.1	3,221	-	1,841	616	1,650	4,150	-	2,300	-	1,200	422	3%	15,400
1952	7,087	-	2,234	1,227	1,650	2,002	-	-	-	1,200	-	0%	15,400
1953	7,863	-	3,206	1,120	1,511	500	-	-	-	1,200	-	0%	15,400
1954	7,863	-	3,206	914	1,650	567	-	-	-	1,200	-	0%	15,400
1955	7,863	-	3,206	851	1,414	866	-	-	-	1,200	-	0%	15,400
1956	7,735	-	3,206	882	1,650	727	-	-	-	1,200	-	0%	15,400
1957	6,942	-	3,206	831	1,650	1,502	70	-	-	1,200	-	0%	15,400
1958	7,402	-	3,206	1,417	1,650	525	-	-	-	1,200	-	0%	15,400
1959	7,863	-	3,206	1,341	1,290	500	-	-	-	1,200	-	0%	15,400
1960	7,863	-	3,206	917	1,548	666	-	-	-	1,200	-	0%	15,400
1961	7,839	-	2,337	682	1,650	1,692	-	-	-	1,200	-	0%	15,400
1962	7,853	-	2,099	1,018	1,650	1,580	-	-	-	1,200	-	0%	15,400
1963	7,863	-	3,206	957	1,650	500	24	-	-	1,200	-	0%	15,400
1964	7,863	-	3,206	747	1,650	734	-	-	-	1,200	-	0%	15,400
1965	7,638	-	3,206	729	1,650	977	-	-	-	1,200	-	0%	15,400
1966	7,797	-	3,206	1,059	1,638	500	-	-	-	1,200	-	0%	15,400
1967	7,863	-	3,206	1,316	1,315	500	-	-	-	1,200	-	0%	15,400
1968	7,863	-	3,206	1,095	1,536	500	-	-	-	1,200	-	0%	15,400
1969	7,863	-	3,206	1,746	885	500	-	-	-	1,200	-	0%	15,400
1970	7,863	-	3,206	1,456	1,175	500	-	-	-	1,200	-	0%	15,400
1971	7,863	-	3,206	1,153	1,478	500	-	-	-	1,200	-	0%	15,400
1972	7,863	-	3,206	863	1,650	561	57	-	-	1,200	-	0%	15,400
1973	7,863	-	3,206	1,167	1,464	500	-	-	-	1,200	-	0%	15,400
1974	7,863	-	3,206	1,205	1,426	500	-	-	-	1,200	-	0%	15,400
1975	7,863	-	3,206	1,162	1,469	500	-	-	-	1,200	-	0%	15,400
1976	7,863	-	3,206	935	1,650	546	-	-	-	1,200	-	0%	15,400
1977	7,863	-	3,206	699	315	2,024	93	-	-	1,200	-	0%	15,400
1978	7,863	-	3,206	1,472	1,159	500	-	-	-	1,200	-	0%	15,400
1979	7,863	-	3,206	1,591	1,040	500	-	-	-	1,200	-	0%	15,400
1980	7,863	-	3,206	1,608	1,023	500	-	-	-	1,200	-	0%	15,400
1981	7,863	-	3,206	1,565	1,066	500	-	-	-	1,200	-	0%	15,400
1982	7,863	-	3,206	1,408	1,223	500	-	-	-	1,200	-	0%	15,400
1983	7,519	-	3,206	2,375	600	500	-	-	-	1,200	-	0%	15,400
1984	7,863	-	3,206	1,724	907	500	-	-	-	1,200	-	0%	15,400
1985	7,863	-	3,206	1,271	1,360	500	-	-	-	1,200	-	0%	15,400
1986	7,863	-	3,206	1,123	1,508	500	-	-	-	1,200	-	0%	15,400
1987	7,863	-	3,206	741	864	1,001	525	-	-	1,200	-	0%	15,400
1988	7,863	-	3,206	1,278	978	504	372	-	-	1,200	-	0%	15,400
1989	7,493	-	3,206	1,061	1,650	645	145	-	-	1,200	-	0%	15,400
1990	6,306	-	925	511	642	4,150	71	1,595	-	1,200	-	0%	15,400
1991	6,291	-	1,321	826	929	4,150	-	683	-	1,200	-	0%	15,400
1992	7,561	-	3,206	1,280	797	1,356	-	-	-	1,200	-	0%	15,400
1993	7,608	-	3,206	2,286	600	500	-	-	-	1,200	-	0%	15,400
Avg	7,578	-	2,992	1,118	1,328	1,021	29	108	-	1,200	26	0%	15,400
Max	7,863	-	3,206	2,375	1,650	4,150	525	2,300	-	1,200	1,574	10.2%	15,400
Min	3,221	-	-	500	315	500	-	-	-	1,200	-	0%	15,400
Total					102,264	78,650	2,213	8,284	-				
Unit Cost (\$/AF)					\$ 390	\$ 450	\$ 390	\$ 1,000	\$ 1,450				
Total Cost					\$ 39,882,960	\$ 35,392,365	\$ 862,875	\$ 8,284,180	\$ -				\$ 84,422,380

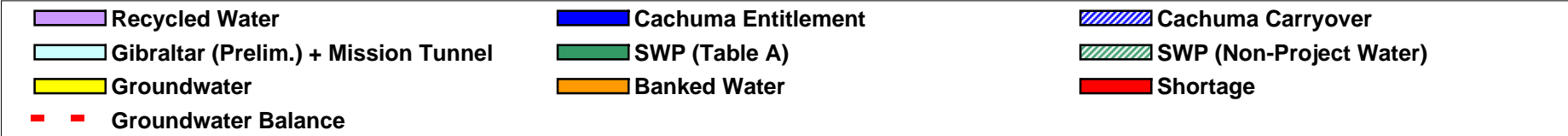
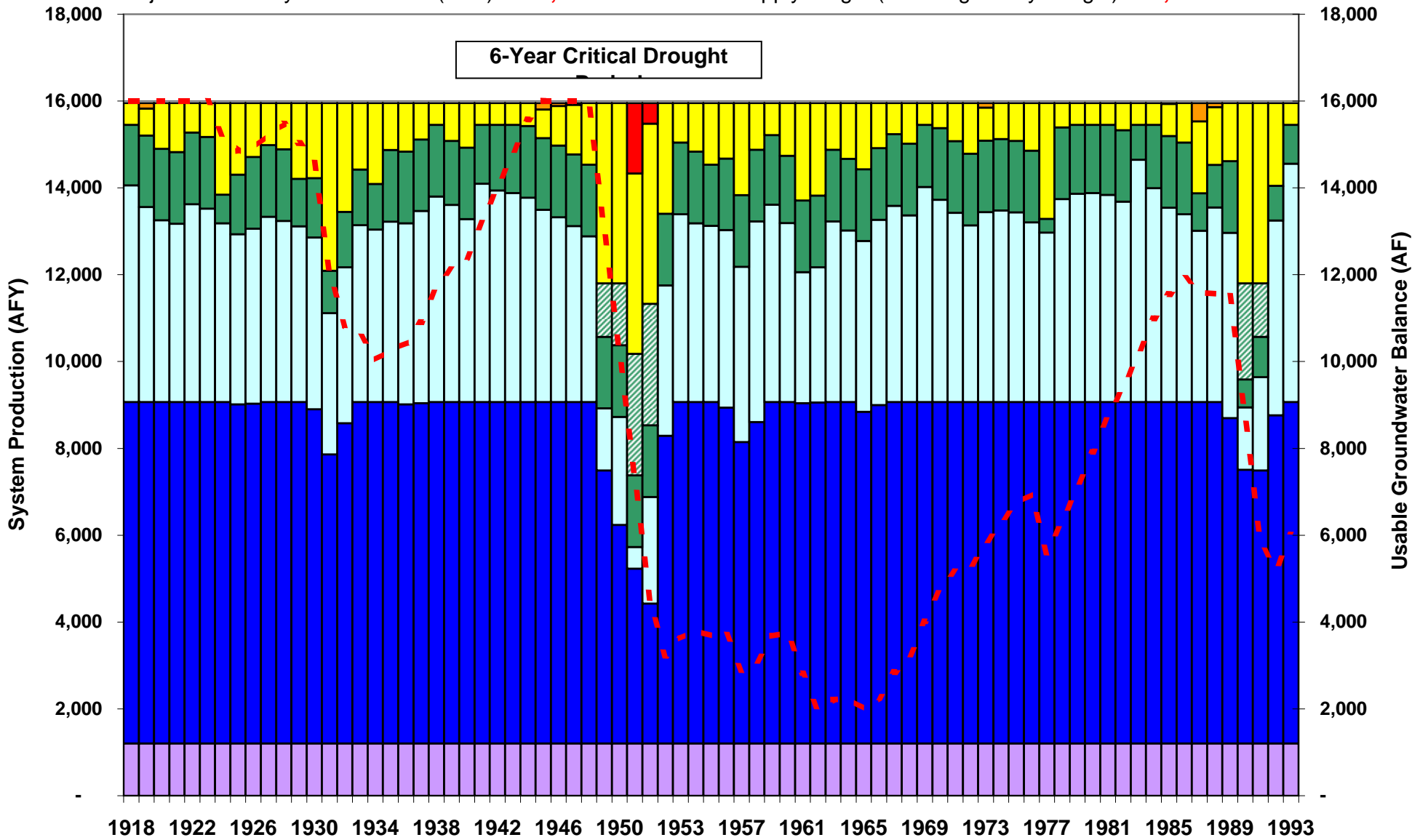
Water Supply Performance Over 77-Year Model Period

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1/5/11

Projected 2030 System Demand (AFY): **14,500**

Water Supply Target (including Safety Margin): **15,950**



2011 LTWSP Update Planning Worksheet

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Projected 2030 Demand: 14,500 AFY

Print Date: 1/5/11

6-Year Critical Drought

Water Supply Target with Safety Margin: 15,950 AFY

- 10% = Safety Margin
- 10% = Acceptable Shortage
- 14,500 = Projected 2030 System Demand (AFY)
- 1,450 = Safety Margin (AFY)
- 15,950 = Water Supply Target (AFY)
- 600 = SWP Table A Minimum (Exchange) (AFY)
- 50% = SWP Maximum Delivery % of Table A Amount
- 2,800 = SWP Non-Project Purchases - Annual Limit (AFY)
- 500 = Groundwater Minimum Pumping (AFY)
- 1,300 = Groundwater Mid-level Pumping (AFY)
- 4,150 = Groundwater Maximum Pumping (AFY)
- 16,000 = Groundwater Useable Storage (AF)
- 1,300 = Groundwater Annual Recharge (AFY)

- 1,200 = Recycled Water Connected Demand (AFY)
- 5,000 = Banked water maximum storage (AF)
- 50% = Banked Water Discount on Entry
- 1,000 = Banked Water Annual Withdrawal Limit
- 0 = Desalination capacity assumed (AFY)

Output:	10% = Maximum % Shortage
	- = Total Cachuma Carryover Used
	1,026 = Total Banked Water Used
	11,711 = Total SWP Non-Project Water Used
	1,987 = Minimum Groundwater Balance
\$ 104,410,000	= Total Non-Base Load Marginal Cost

Water Year

	Cachuma Entitlement	Cachuma Carryover	Gibraltar (Prelim.)	Mission Tunnel	SWP (Table A)	Groundwater	Banked Water	SWP (Non-Project Water)	Desal	Recycled Water	Shortage	Shortage (%)	Total
1918	7,863	-	3,206	1,786	1,395	500	-	-	-	1,200	-	0%	15,950
1919	7,863	-	3,206	1,285	1,650	619	128	-	-	1,200	-	0%	15,950
1920	7,863	-	3,206	980	1,650	1,051	-	-	-	1,200	-	0%	15,950
1921	7,863	-	3,206	903	1,650	1,128	-	-	-	1,200	-	0%	15,950
1922	7,863	-	3,206	1,351	1,650	680	-	-	-	1,200	-	0%	15,950
1923	7,863	-	3,206	1,249	1,650	782	-	-	-	1,200	-	0%	15,950
1924	7,863	-	3,206	914	1,650	2,107	-	-	-	1,200	-	0%	15,950
1925	7,811	-	3,206	714	1,372	1,647	-	-	-	1,200	-	0%	15,950
1926	7,827	-	3,206	826	1,650	1,241	-	-	-	1,200	-	0%	15,950
1927	7,863	-	3,206	1,063	1,650	968	-	-	-	1,200	-	0%	15,950
1928	7,863	-	3,206	968	1,650	1,063	-	-	-	1,200	-	0%	15,950
1929	7,863	-	3,206	845	1,093	1,743	-	-	-	1,200	-	0%	15,950
1930	7,700	-	3,206	750	1,366	1,728	-	-	-	1,200	-	0%	15,950
1931	6,658	-	2,595	660	976	3,861	-	-	-	1,200	-	0%	15,950
1932	7,374	-	2,606	990	1,272	2,508	-	-	-	1,200	-	0%	15,950
1933	7,863	-	3,206	871	1,278	1,532	-	-	-	1,200	-	0%	15,950
1934	7,863	-	3,206	767	1,052	1,862	-	-	-	1,200	-	0%	15,950
1935	7,863	-	3,206	948	1,650	1,083	-	-	-	1,200	-	0%	15,950
1936	7,812	-	3,206	964	1,650	1,118	-	-	-	1,200	-	0%	15,950
1937	7,840	-	3,206	1,217	1,650	837	-	-	-	1,200	-	0%	15,950
1938	7,863	-	3,206	1,530	1,650	501	-	-	-	1,200	-	0%	15,950
1939	7,863	-	3,206	1,334	1,476	871	-	-	-	1,200	-	0%	15,950
1940	7,863	-	3,206	1,006	1,650	1,025	-	-	-	1,200	-	0%	15,950
1941	7,863	-	3,206	1,825	1,356	500	-	-	-	1,200	-	0%	15,950
1942	7,863	-	3,206	1,670	1,511	500	-	-	-	1,200	-	0%	15,950
1943	7,863	-	3,206	1,609	1,572	500	-	-	-	1,200	-	0%	15,950
1944	7,863	-	3,206	1,504	1,650	527	-	-	-	1,200	-	0%	15,950
1945	7,863	-	3,206	1,224	1,650	660	147	-	-	1,200	-	0%	15,950
1946	7,863	-	3,206	1,050	1,650	912	70	-	-	1,200	-	0%	15,950
1947	7,863	-	3,206	847	1,650	1,145	39	-	-	1,200	-	0%	15,950
1948	7,863	-	3,161	656	1,650	1,420	-	-	-	1,200	-	0%	15,950
1949	6,290	-	877	550	1,650	4,150	-	1,233	-	1,200	-	0%	15,950
1950	5,032	-	1,961	527	1,650	4,150	-	1,429	-	1,200	-	0%	15,950
1951	4,026	-	-	500	1,650	4,150	-	2,800	-	1,200	1,624	10%	15,950
1951.1	3,221	-	1,841	616	1,650	4,150	-	2,800	-	1,200	472	3%	15,950
1952	7,087	-	2,234	1,227	1,650	2,552	-	-	-	1,200	-	0%	15,950
1953	7,863	-	3,206	1,120	1,650	911	-	-	-	1,200	-	0%	15,950
1954	7,863	-	3,206	914	1,650	1,117	-	-	-	1,200	-	0%	15,950
1955	7,863	-	3,206	851	1,414	1,416	-	-	-	1,200	-	0%	15,950
1956	7,735	-	3,206	882	1,650	1,277	-	-	-	1,200	-	0%	15,950
1957	6,942	-	3,206	831	1,650	2,121	-	-	-	1,200	-	0%	15,950
1958	7,402	-	3,206	1,417	1,650	1,075	-	-	-	1,200	-	0%	15,950
1959	7,863	-	3,206	1,341	1,604	736	-	-	-	1,200	-	0%	15,950
1960	7,863	-	3,206	917	1,548	1,216	-	-	-	1,200	-	0%	15,950
1961	7,839	-	2,337	682	1,650	2,242	-	-	-	1,200	-	0%	15,950
1962	7,853	-	2,099	1,018	1,650	2,130	-	-	-	1,200	-	0%	15,950
1963	7,863	-	3,206	957	1,650	1,074	-	-	-	1,200	-	0%	15,950
1964	7,863	-	3,206	747	1,650	1,284	-	-	-	1,200	-	0%	15,950
1965	7,638	-	3,206	729	1,650	1,527	-	-	-	1,200	-	0%	15,950
1966	7,797	-	3,206	1,059	1,650	1,038	-	-	-	1,200	-	0%	15,950
1967	7,863	-	3,206	1,316	1,650	715	-	-	-	1,200	-	0%	15,950
1968	7,863	-	3,206	1,095	1,650	936	-	-	-	1,200	-	0%	15,950
1969	7,863	-	3,206	1,746	1,435	500	-	-	-	1,200	-	0%	15,950
1970	7,863	-	3,206	1,456	1,650	575	-	-	-	1,200	-	0%	15,950
1971	7,863	-	3,206	1,153	1,650	878	-	-	-	1,200	-	0%	15,950
1972	7,863	-	3,206	863	1,650	1,168	-	-	-	1,200	-	0%	15,950
1973	7,863	-	3,206	1,167	1,650	757	108	-	-	1,200	-	0%	15,950
1974	7,863	-	3,206	1,205	1,650	826	-	-	-	1,200	-	0%	15,950
1975	7,863	-	3,206	1,162	1,650	869	-	-	-	1,200	-	0%	15,950
1976	7,863	-	3,206	935	1,650	1,096	-	-	-	1,200	-	0%	15,950
1977	7,863	-	3,206	699	315	2,667	-	-	-	1,200	-	0%	15,950
1978	7,863	-	3,206	1,472	1,650	559	-	-	-	1,200	-	0%	15,950
1979	7,863	-	3,206	1,591	1,590	500	-	-	-	1,200	-	0%	15,950
1980	7,863	-	3,206	1,608	1,573	500	-	-	-	1,200	-	0%	15,950
1981	7,863	-	3,206	1,565	1,616	500	-	-	-	1,200	-	0%	15,950
1982	7,863	-	3,206	1,408	1,650	623	-	-	-	1,200	-	0%	15,950
1983	7,863	-	3,206	2,375	806	500	-	-	-	1,200	-	0%	15,950
1984	7,863	-	3,206	1,724	1,457	500	-	-	-	1,200	-	0%	15,950
1985	7,863	-	3,206	1,271	1,650	743	17	-	-	1,200	-	0%	15,950
1986	7,863	-	3,206	1,123	1,650	908	-	-	-	1,200	-	0%	15,950
1987	7,863	-	3,206	741	864	1,654	422	-	-	1,200	-	0%	15,950
1988	7,863	-	3,206	1,278	978	1,329	97	-	-	1,200	-	0%	15,950
1989	7,493	-	3,206	1,061	1,650	1,340	-	-	-	1,200	-	0%	15,950
1990	6,306	-	925	511	642	4,150	-	2,216	-	1,200	-	0%	15,950
1991	6,291	-	1,321	826	929	4,150	-	1,233	-	1,200	-	0%	15,950
1992	7,561	-	3,206	1,280	797	1,906	-	-	-	1,200	-	0%	15,950
1993	7,863	-	3,206	2,286	895	500	-	-	-	1,200	-	0%	15,950
Avg	7,586	-	2,992	1,118	1,481	1,380	13	152	1,100	1,200	27	0%	15,950
Max	7,863	-	3,206	2,375	1,650	4,150	422	2,800	-	1,200	1,624	10.2%	15,950
Min	3,221	-	-	500	315	500	-	-	-	1,200	-	0%	15,950
Total					114,042	106,282	1,026	11,711	-				
Unit Cost (\$/AF)					\$ 390	\$ 450	\$ 390	\$ 1,000	\$ 1,450				
Total Cost					\$ 44,476,380	\$ 47,826,990	\$ 400,140	\$ 11,711,180	\$ -				\$ 104,414,690