

SOLANO COUNTY WATER AGENCY



MEMORANDUM

TO: Solano Project Water Users

FROM: David B. Okita, General Manager

DATE: November 23, 2009

SUBJECT: Solano Project Reliability Study

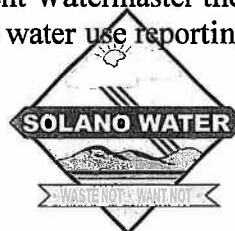
We have updated the Water Availability Analysis for the Solano Project for your use in preparing your Urban Water Management Plans.

There are several changes from the analysis done for the 2005 UWMP's and our last update done in 2006. They are:

1. A new method for determining dry years. The UWMP's require an analysis of dry year water supplies. The State does not provide the analysis of what years are "dry". Thus each water supply must do so. Attached is an analysis of Solano Project water years and a ranking of their dryness based on runoff estimates into Lake Berryessa. We have chosen the 66th percentile as the cutoff between "dry" and "non-dry". As you can see there is no distinct cutoff, so the identification is somewhat arbitrary. Note that the 66th percentile coincides with the Sacramento River Index that is used for State Water Project year type designations. This helps with consistency with both supplies.
2. New data concerning Lake Berryessa evaporation was included based on our recently completed evaporation study. This decreased project yield slightly as evaporation had been underestimated.
3. New Area-Capacity curve. New Lake Berryessa bathymetry provided a more accurate elevation-capacity relationship that modified storage amounts slightly.
4. A few more years of recent runoff data added.

As we did in prior studies, we have included two levels of upstream depletion in the Lake Berryessa Watershed. We currently are much closer to the 15,000 acre feet per year than we are the 30,000 acre feet per year. Through the upstream settlement Watermaster the larger diverters are reporting their depletions, however we do not have 100% water use reporting so the exact

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upstream depletions are not known. We have not seen any noticeable trends in upstream water usage either up or down.

The analysis includes the shortages that are imposed via the Drought Measures Agreement.

These two files will be transmitted to you via e-mail.

The State Water Project is also updating their reliability study. They had some difficulty in modeling the new biological opinions for delta smelt and salmon. The draft studies are completed and they are working on the text to explain the study. They anticipate a draft of the study in early 2010.

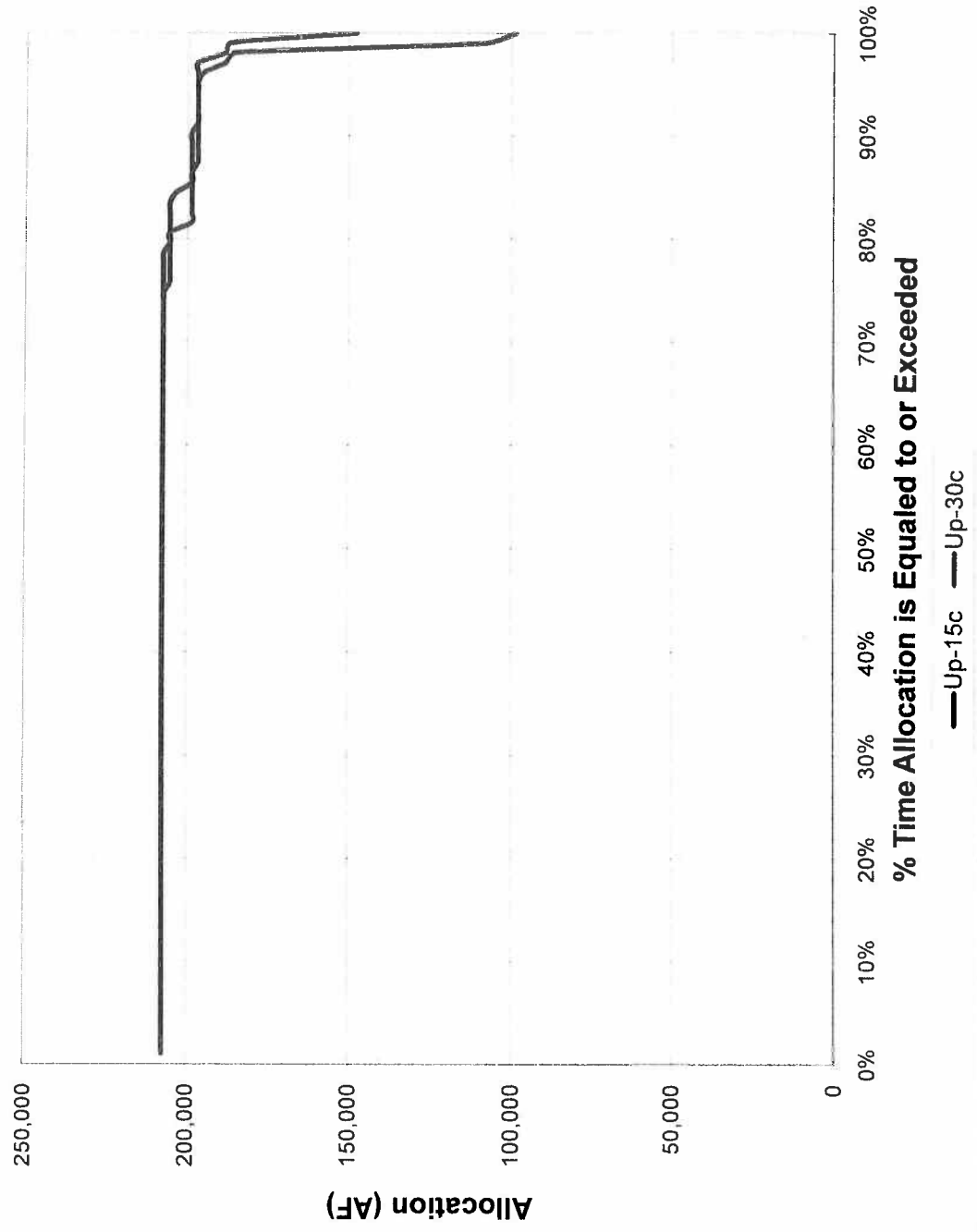
Please note that with the signing of the new water legislation, the requirement for submitting Urban Water Management Plans has been extended to July 1, 2011.

If you have any questions please contact me at 455-1103 or dokita@scwa2.com.

File: S-17

2009 SP RELIABILITY STUDY
11/23/09

**Solano Allocation
Annual Duration Curve
Period: WY 1906-2008**



ALLOCATION CURVE

	% Exc	Up-15c	Up-30c
1	100.0%	147789	98992
2	99.0%	186868	109319
3	98.1%	188460	185146
4	97.1%	196983	188460
5	96.1%	196983	195138
6	95.1%	196983	196983
7	94.2%	196983	196983
8	93.2%	196983	196983
9	92.2%	196983	196983
10	91.3%	196983	196983
11	90.3%	198828	196983
12	89.3%	198828	196983
13	88.3%	198828	196983
14	87.4%	198828	196983
15	86.4%	198828	198828
16	85.4%	198828	198828
17	84.5%	203660	198828
18	83.5%	205505	198828
19	82.5%	205505	198828
20	81.6%	205505	198828
21	80.6%	205505	205505
22	79.6%	205505	205505
23	78.6%	207350	205505
24	77.7%	207350	205505
25	76.7%	207350	205505
26	75.7%	207350	205505
27	74.8%	207350	207350
28	73.8%	207350	207350
29	72.8%	207350	207350
30	71.8%	207350	207350
31	70.9%	207350	207350
32	69.9%	207350	207350
33	68.9%	207350	207350
34	68.0%	207350	207350
35	67.0%	207350	207350
36	66.0%	207350	207350
37	65.0%	207350	207350
38	64.1%	207350	207350
39	63.1%	207350	207350
40	62.1%	207350	207350
41	61.2%	207350	207350
42	60.2%	207350	207350
43	59.2%	207350	207350
44	58.3%	207350	207350
45	57.3%	207350	207350
46	56.3%	207350	207350
47	55.3%	207350	207350
48	54.4%	207350	207350
49	53.4%	207350	207350
50	52.4%	207350	207350
51	51.5%	207350	207350

52	50.5%	207350	207350
53	49.5%	207350	207350
54	48.5%	207350	207350
55	47.6%	207350	207350
56	46.6%	207350	207350
57	45.6%	207350	207350
58	44.7%	207350	207350
59	43.7%	207350	207350
60	42.7%	207350	207350
61	41.7%	207350	207350
62	40.8%	207350	207350
63	39.8%	207350	207350
64	38.8%	207350	207350
65	37.9%	207350	207350
66	36.9%	207350	207350
67	35.9%	207350	207350
68	35.0%	207350	207350
69	34.0%	207350	207350
70	33.0%	207350	207350
71	32.0%	207350	207350
72	31.1%	207350	207350
73	30.1%	207350	207350
74	29.1%	207350	207350
75	28.2%	207350	207350
76	27.2%	207350	207350
77	26.2%	207350	207350
78	25.2%	207350	207350
79	24.3%	207350	207350
80	23.3%	207350	207350
81	22.3%	207350	207350
82	21.4%	207350	207350
83	20.4%	207350	207350
84	19.4%	207350	207350
85	18.4%	207350	207350
86	17.5%	207350	207350
87	16.5%	207350	207350
88	15.5%	207350	207350
89	14.6%	207350	207350
90	13.6%	207350	207350
91	12.6%	207350	207350
92	11.7%	207350	207350
93	10.7%	207350	207350
94	9.7%	207350	207350
95	8.7%	207350	207350
96	7.8%	207350	207350
97	6.8%	207350	207350
98	5.8%	207350	207350
99	4.9%	207350	207350
100	3.9%	207350	207350
101	2.9%	207350	207350
102	1.9%	207350	207350
103	1.0%	207350	207350

09-Study: Current upstream depletion = 15K (including Napa)
 Max Demand = 207350 af/yr with Cutback
 Triggers = 750 & 400 TAF, Delivery in Predictive/Judgment +5 cfs

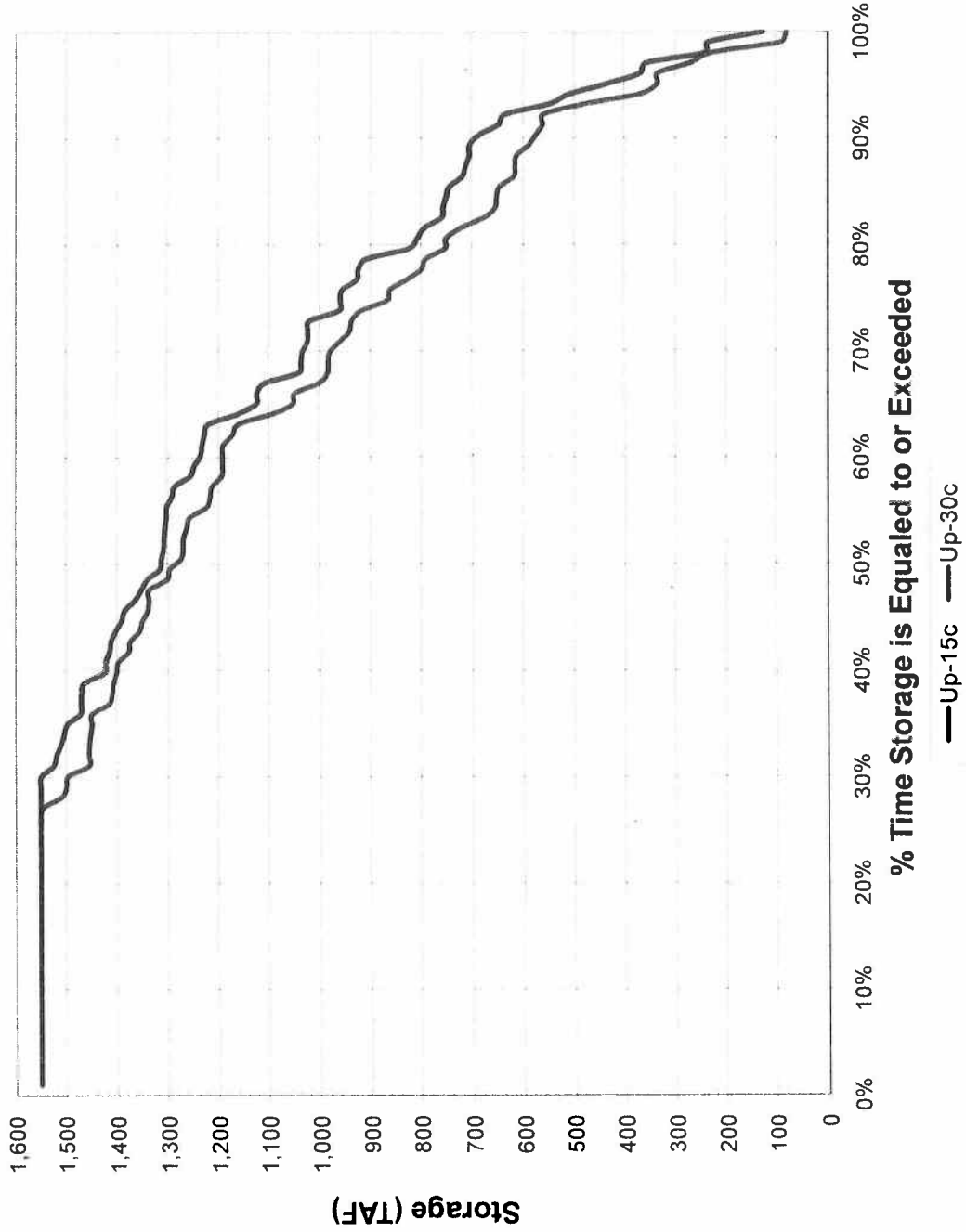
WY	Berryessa Storage on April 1 (TAF)	Solano WY Allocation (AF)	Solano April Cycle Allocation (AF)	% of Full Allocation (%)
1906	1,551	207,350	207,350	100%
1907	1,551	207,350	207,350	100%
1908	1,464	207,350	207,350	100%
1909	1,551	207,350	207,350	100%
1910	1,470	207,350	207,350	100%
1911	1,551	207,350	207,350	100%
1912	1,316	207,350	207,350	100%
1913	1,123	207,350	207,350	100%
1914	1,551	207,350	207,350	100%
1915	1,551	207,350	207,350	100%
1916	1,551	207,350	207,350	100%
1917	1,510	207,350	207,350	100%
1918	1,287	207,350	207,350	100%
1919	1,256	207,350	207,350	100%
1920	963	207,350	207,350	100%
1921	1,123	207,350	207,350	100%
1922	1,025	207,350	207,350	100%
1923	961	207,350	207,350	100%
1924	721	198,828	196,983	95%
1925	707	196,983	196,983	95%
1926	688	196,983	196,983	95%
1927	928	205,505	207,350	100%
1928	957	207,350	207,350	100%
1929	759	198,828	196,983	95%
1930	756	196,983	196,983	95%
1931	509	188,460	186,615	90%
1932	433	203,660	207,350	100%
1933	240	207,350	207,350	100%
1934	127	147,789	127,307	61%
1935	236	186,888	207,350	100%
1936	359	207,350	207,350	100%
1937	371	207,350	207,350	100%
1938	909	207,350	207,350	100%
1939	714	198,828	196,983	95%
1940	1,035	205,505	207,350	100%
1941	1,551	207,350	207,350	100%
1942	1,551	207,350	207,350	100%
1943	1,551	207,350	207,350	100%
1944	1,415	207,350	207,350	100%
1945	1,292	207,350	207,350	100%
1946	1,237	207,350	207,350	100%
1947	1,042	207,350	207,350	100%
1948	793	198,828	196,983	95%
1949	751	196,983	196,983	95%
1950	638	196,983	196,983	95%
1951	744	196,983	196,983	95%
1952	1,038	205,505	207,350	100%
1953	1,161	207,350	207,350	100%
1954	1,107	207,350	207,350	100%
1955	925	207,350	207,350	100%
1956	1,471	207,350	207,350	100%
1957	1,306	207,350	207,350	100%
1958	1,551	207,350	207,350	100%
1959	1,469	207,350	207,350	100%
1960	1,385	207,350	207,350	100%
1961	1,234	207,350	207,350	100%
1962	1,228	207,350	207,350	100%
1963	1,340	207,350	207,350	100%
1964	1,308	207,350	207,350	100%
1965	1,504	207,350	207,350	100%
1966	1,525	207,350	207,350	100%
1967	1,551	207,350	207,350	100%
1968	1,551	207,350	207,350	100%
1969	1,551	207,350	207,350	100%
1970	1,551	207,350	207,350	100%
1971	1,551	207,350	207,350	100%
1972	1,352	207,350	207,350	100%
1973	1,551	207,350	207,350	100%
1974	1,551	207,350	207,350	100%
1975	1,551	207,350	207,350	100%
1976	1,308	207,350	207,350	100%
1977	1,021	207,350	207,350	100%
1978	1,313	207,350	207,350	100%
1979	1,249	207,350	207,350	100%
1980	1,519	207,350	207,350	100%
1981	1,423	207,350	207,350	100%
1982	1,551	207,350	207,350	100%
1983	1,551	207,350	207,350	100%
1984	1,551	207,350	207,350	100%
1985	1,425	207,350	207,350	100%
1986	1,551	207,350	207,350	100%
1987	1,364	207,350	207,350	100%
1988	1,221	207,350	207,350	100%
1989	1,024	207,350	207,350	100%
1990	807	207,350	207,350	100%
1991	707	198,828	196,983	95%
1992	551	196,983	196,983	95%
1993	824	205,505	207,350	100%
1994	650	198,828	196,983	95%
1995	1,302	205,505	207,350	100%
1996	1,550	207,350	207,350	100%
1997	1,551	207,350	207,350	100%
1998	1,551	207,350	207,350	100%
1999	1,551	207,350	207,350	100%
2000	1,551	207,350	207,350	100%
2001	1,412	207,350	207,350	100%
2002	1,403	207,350	207,350	100%
2003	1,498	207,350	207,350	100%
2004	1,551	207,350	207,350	100%
2005	1,551	207,350	207,350	100%
2006	1,551	207,350	207,350	100%
2007	1,391	207,350	207,350	100%
2008	1,303	207,350		
			April cycle allocation yr count	
mean	1,204	205,063	205,041	87 yrs = 100%
max	1,551	207,350	207,350	13 yrs = 95%
min	127	147,789	127,307	1 yrs = 90%
				1 yrs < 90%

09-Study: Current upstream depletion = 30K (Including Napa)
Max Demand = 207350 af/yr with Cutback
Triggers = 750 & 400 TAF, Delivery in Predictive/Judgment +5 cfs

WY	Berryessa Storage on April 1 (TAF)	Solano WY Allocation (AF)	Solano April Cycle Allocation (AF)	% of Full Allocation (%)	
1906	1 551	207,350	207,350	100%	
1907	1 551	207,350	207,350	100%	
1908	1 449	207,350	207,350	100%	
1909	1,551	207,350	207,350	100%	
1910	1,455	207,350	207,350	100%	
1911	1,551	207,350	207,350	100%	
1912	1,301	207,350	207,350	100%	
1913	1,094	207,350	207,350	100%	
1914	1,551	207,350	207,350	100%	
1915	1,551	207,350	207,350	100%	
1916	1,551	207,350	207,350	100%	
1917	1,495	207,350	207,350	100%	
1918	1,257	207,350	207,350	100%	
1919	1,213	207,350	207,350	100%	
1920	918	207,350	207,350	100%	
1921	1,053	207,350	207,350	100%	
1922	942	207,350	207,350	100%	
1923	866	207,350	207,350	100%	
1924	614	198,828	196,983	95%	
1925	590	196,983	196,983	95%	
1926	561	196,983	196,983	95%	
1927	799	196,983	196,983	95%	
1928	828	205,505	207,350	100%	
1929	619	198,828	196,983	95%	
1930	617	196,983	196,983	95%	
1931	370	205,505	207,350	100%	
1932	270	207,350	207,350	100%	
1933	79	109,319	93,828	45%	
1934	91	98,992	92,279	45%	
1935	226	185,146	207,350	100%	
1936	336	207,350	207,350	100%	
1937	335	207,350	207,350	100%	
1938	861	207,350	207,350	100%	
1939	653	198,828	196,983	95%	
1940	962	205,505	207,350	100%	
1941	1,509	207,350	207,350	100%	
1942	1,551	207,350	207,350	100%	
1943	1,551	207,350	207,350	100%	
1944	1,400	207,350	207,350	100%	
1945	1,262	207,350	207,350	100%	
1946	1,193	207,350	207,350	100%	
1947	985	207,350	207,350	100%	
1948	723	198,828	196,983	95%	
1949	678	196,983	196,983	95%	
1950	562	196,983	196,983	95%	
1951	656	196,983	196,983	95%	
1952	938	205,505	207,350	100%	
1953	1,050	207,350	207,350	100%	
1954	983	207,350	207,350	100%	
1955	790	198,828	196,983	95%	
1956	1,337	205,505	207,350	100%	
1957	1,160	207,350	207,350	100%	
1958	1,499	207,350	207,350	100%	
1959	1,454	207,350	207,350	100%	
1960	1,355	207,350	207,350	100%	
1961	1,190	207,350	207,350	100%	
1962	1,171	207,350	207,350	100%	
1963	1,270	207,350	207,350	100%	
1964	1,224	207,350	207,350	100%	
1965	1,407	207,350	207,350	100%	
1966	1,416	207,350	207,350	100%	
1967	1,551	207,350	207,350	100%	
1968	1,545	207,350	207,350	100%	
1969	1,551	207,350	207,350	100%	
1970	1,551	207,350	207,350	100%	
1971	1,551	207,350	207,350	100%	
1972	1,337	207,350	207,350	100%	
1973	1,551	207,350	207,350	100%	
1974	1,551	207,350	207,350	100%	
1975	1,551	207,350	207,350	100%	
1976	1,296	207,350	207,350	100%	
1977	1,001	207,350	207,350	100%	
1978	1,269	207,350	207,350	100%	
1979	1,192	207,350	207,350	100%	
1980	1,449	207,350	207,350	100%	
1981	1,339	207,350	207,350	100%	
1982	1,551	207,350	207,350	100%	
1983	1,551	207,350	207,350	100%	
1984	1,551	207,350	207,350	100%	
1985	1,410	207,350	207,350	100%	
1986	1,551	207,350	207,350	100%	
1987	1,349	207,350	207,350	100%	
1988	1,192	207,350	207,350	100%	
1989	980	207,350	207,350	100%	
1990	750	198,828	196,983	95%	
1991	647	196,983	196,983	95%	
1992	480	188,460	186,615	90%	
1993	752	195,138	196,983	95%	
1994	576	196,983	196,983	95%	
1995	1,217	205,505	207,350	100%	
1996	1,452	207,350	207,350	100%	
1997	1,551	207,350	207,350	100%	
1998	1,551	207,350	207,350	100%	
1999	1,551	207,350	207,350	100%	
2000	1,551	207,350	207,350	100%	
2001	1,398	207,350	207,350	100%	
2002	1,374	207,350	207,350	100%	
2003	1,454	207,350	207,350	100%	
2004	1,551	207,350	207,350	100%	
2005	1,551	207,350	207,350	100%	
2006	1,551	207,350	207,350	100%	
2007	1,376	207,350	207,350	100%	
2008	1,274	207,350	207,350	100%	
mean	1,156	203,319	203,279	83	yrs = 100%
max	1,551	207,350	207,350	16	yrs = 95%
min	79	98,992	92,279	1	yrs = 90%
				2	yrs < 90%

April cycle allocation yr count

**Lake Berryessa
April 1 Storage Duration Curve
Period: WY 1906-2008**



STORAGE DURATION CURVE

	% Exc	Up-15c	Up-30c
1	100.0%	127.45	78.71
2	99.0%	235.69	90.77
3	98.1%	240.23	226.05
4	97.1%	359.20	270.02
5	96.1%	371.37	335.26
6	95.1%	433.04	335.80
7	94.2%	508.52	369.52
8	93.2%	551.50	479.78
9	92.2%	637.74	561.28
10	91.3%	649.99	562.37
11	90.3%	687.77	575.90
12	89.3%	706.69	589.97
13	88.3%	706.71	614.30
14	87.4%	714.20	616.96
15	86.4%	720.82	619.29
16	85.4%	744.47	647.25
17	84.5%	750.50	653.21
18	83.5%	755.92	655.59
19	82.5%	758.74	677.54
20	81.6%	793.24	722.90
21	80.6%	807.28	750.26
22	79.6%	824.49	752.28
23	78.6%	908.82	790.18
24	77.7%	924.68	798.58
25	76.7%	927.66	827.76
26	75.7%	957.05	861.01
27	74.8%	960.80	865.55
28	73.8%	963.06	918.05
29	72.8%	1020.67	937.53
30	71.8%	1023.90	941.52
31	70.9%	1024.64	961.77
32	69.9%	1035.01	980.32
33	68.9%	1037.57	983.32
34	68.0%	1041.89	984.56
35	67.0%	1106.68	1001.36
36	66.0%	1122.88	1049.69
37	65.0%	1123.38	1053.03
38	64.1%	1161.41	1093.60
39	63.1%	1221.36	1159.81
40	62.1%	1228.49	1171.23
41	61.2%	1233.69	1190.15
42	60.2%	1236.63	1191.62
43	59.2%	1248.89	1191.87
44	58.3%	1256.43	1193.03
45	57.3%	1286.51	1212.77
46	56.3%	1291.70	1216.64
47	55.3%	1302.17	1223.65
48	54.4%	1302.94	1256.98
49	53.4%	1305.81	1262.22
50	52.4%	1307.55	1269.17
51	51.5%	1307.75	1269.72

52	50.5%	1312.67	1273.61
53	49.5%	1315.70	1295.96
54	48.5%	1340.36	1300.96
55	47.6%	1351.81	1336.78
56	46.6%	1364.36	1336.89
57	45.6%	1384.74	1339.22
58	44.7%	1391.07	1349.41
59	43.7%	1403.18	1355.37
60	42.7%	1412.49	1373.69
61	41.7%	1415.36	1376.30
62	40.8%	1423.25	1397.58
63	39.8%	1424.73	1400.44
64	38.8%	1463.50	1407.03
65	37.9%	1469.14	1409.78
66	36.9%	1469.63	1416.03
67	35.9%	1471.16	1448.73
68	35.0%	1497.54	1448.80
69	34.0%	1503.63	1451.50
70	33.0%	1510.41	1453.84
71	32.0%	1519.46	1454.37
72	31.1%	1525.43	1454.69
73	30.1%	1549.71	1495.47
74	29.1%	1551.29	1498.70
75	28.2%	1551.29	1508.51
76	27.2%	1551.29	1545.17
77	26.2%	1551.29	1551.29
78	25.2%	1551.29	1551.29
79	24.3%	1551.29	1551.29
80	23.3%	1551.29	1551.29
81	22.3%	1551.29	1551.29
82	21.4%	1551.29	1551.29
83	20.4%	1551.29	1551.29
84	19.4%	1551.29	1551.29
85	18.4%	1551.29	1551.29
86	17.5%	1551.29	1551.29
87	16.5%	1551.29	1551.29
88	15.5%	1551.29	1551.29
89	14.6%	1551.29	1551.29
90	13.6%	1551.29	1551.29
91	12.6%	1551.29	1551.29
92	11.7%	1551.29	1551.29
93	10.7%	1551.29	1551.29
94	9.7%	1551.29	1551.29
95	8.7%	1551.29	1551.29
96	7.8%	1551.29	1551.29
97	6.8%	1551.29	1551.29
98	5.8%	1551.29	1551.29
99	4.9%	1551.29	1551.29
100	3.9%	1551.29	1551.29
101	2.9%	1551.29	1551.29
102	1.9%	1551.29	1551.29
103	1.0%	1551.29	1551.29

