Appendix B8

Solano County Water Agency
Memorandum, August 10, 2010,
regarding Reliability Data (Okita)

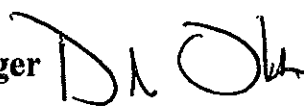# SOLANO COUNTY WATER AGENCY

MEMORANDUM

TO: **City/District Urban Agencies**

FROM: **David B. Okita, General Manager**

DATE: **August 10, 2010**

SUBJECT: **UWMP Reliability Data(Revised for SWP-prior memo is dated 6/10/10 – Solano Project data unchanged)**

Attached are new tables that SCWA will be using in our 2011UWMP for SWP and Solano Project supplies. Note that the SWP Reliability Report is in draft form and could be revised – so my SWP table may change.

DWR guidelines are not out yet, but last time, UWMP's require data for Normal Year, Single Dry Year and Multiple Dry Years. These terms are not defined in the law and are subject to local interpretation. In 2005 we discussed using common assumptions, but not every agency wanted to conform – and there was no requirement to do so. Note that for single dry year, DWR has recommended using the driest of years – like 1977. We disagree with that interpretation and thus use the average of single dry years and the first year or multiple dry years. We also define multiple dry years as three or more consecutive dry years. I think we all understand that the requirements in State law for UWMP are not necessarily the data we would use to analyze our local water supply reliability. The requirements probably originated by a legislative staffer who has little understanding about local water supply planning. Nevertheless, these are the requirements we must live with. The method SCWA plans to use for our UWMP is the same we used in 2005.

Note that the averages may not be what you intuitively would expect. In the big scheme of things, there is really a short history of data to rely upon. This can skew the averages.

State Water Project

For SWP we identify the year type (Normal and Dry) based on the Sacramento Valley Index (SVI). SVI uses terms Above Normal and Below Normal. I combine them to be Normal. I also combine Dry and Critically Dry to be Dry. Wet is Wet. The Draft 2009 SWP Reliability Report is the basis for water supply numbers. This year they did an analysis customized for each contractor –

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accessible on their web page – not in the printed report. The individual contractor data, this year, are based on a model that makes some assumption of carryover supplies. Carryover from prior years is added to the current year supply for annual allocations of Table A. Also DWR has provided data on Article 21 water for NBA contractors. Carryover and Article 21 supplies need to be explained help understand how these supplies may be incorporated in a water supply analysis in Solano County.

There are also other significant changes from the data provided for the 2005 UWMP's. The 2009 model includes South Delta pumping restrictions based on the Biological Opinions for Delta smelt and salmon. Some of these restrictions have been reduced since the publishing of the draft Reliability Report, but the future is uncertain as to how the restriction may change in the future. The 2009 data also includes different climate change impacts for the 2029 scenario that reduce supplies.

The addition of carryover supplies from prior years has a major impact on NBA supplies. Attached is the data for SCWA provided by DWR. In many years carryover makes a large amount of the overall supply. Note that the 2029 scenario assumes no carryover because they assume that demand will increase such that all Table A is used each year – that may or may not be the case for us. To determine carryover amounts, DWR first calculated carryover demand then calculated carryover supply. If there is carryover demand and there is carryover supply then carryover is allocated. Carryover demand is based on our annual schedules that we submit to DWR – they used 2004-2007 data. Our schedules show requests based on 100%, 50% and 30% allocation. For a 100% allocation DWR assumes our carryover demand is 23,700 AF/YR. For a 50% and 30% allocation DWR assumes our carryover demand is 8,400 AF/YR. For carryover supply they assumed that for different levels of final Table A allocation, a percentage of carryover demand is the carryover supply. For allocation less than 45% carryover supply is 30% carryover demand. For allocation between 45%-65% carryover supply is 50% carryover demand. For allocation greater than 65% carryover supply is 100% carryover demand. This is hard to figure out, but I think the logic behind this goes something like this: If the allocation for the year is low, that means that the prior year allocation was also probably low, so that the carryover supply is lower too. The weakness of this approach is that the carryover demand is based on our 2004-2007 schedules. We are currently in a mode where we carryover a relatively large amount of Table A, thus the DWR model assumes a relatively large carryover demand that results in a relatively large carryover supply. A potential problem is that if there is a large carryover supply assumed, this requires Table A deliveries to be depressed because carryover is generated from prior year reduced Table A. The bottom line is that over the 1922-2003 analysis period, the average total SWP deliveries may be OK, but when you analyze a single year or short groups of years, the supply may be skewed due to the carryover assumptions that, for example, may mask a short supply year.

Article 21 water for the NBA is not included in these figures. This is a major omission as this is a big part of our SWP supply. Currently we can get Article 21 whenever the Delta is in excess conditions, but our use of Article 21 water is highly variable and dependent on a number of factors that would be virtually impossible to model. New for the 2009 study, DWR has modeled NBA Article 21 separately from other contractors. They have modeled the availability of Article 21 when the Delta is in excess conditions and assumed that the maximum SCWA Article 21 delivery is 1,000 AF/month. I have the monthly data they used, but it does not reflect reality, so I do not think it is of much use. Our UWMPs will need to qualitatively describe Article 21 water, as well as other supplies we get through the NBA.

Solano Project

For Solano Project we have used allocation numbers from the 2009 update of the reliability study we sent to Solano Project users in 2009 – memo from me dated November 23, 2009. In the 2005 data we used the SVI as our year type designation. For the 2009 study we used Lake Berryessa inflow data to develop our own index. The development of Dry and Normal year designations are somewhat arbitrary. We used the 66th and 35th percentile to make the designations to conform to the SVI designations. There is not much of a change for the Solano Project reliability from the 2005 to the 2009 data.

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

A-2 UWMP.mem

File A-2; S-17; N-16C

Appendix B State Water Project Reliability

DWR Study 2009 data - SCWA Specific

Sacramento Valley Index

Value	Year Type
W	Wet
N	Below Normal
N	Above Normal
D	Dry
D	Critically Dry

Year	Sacramento Valley Index	% Full Table A	% Full Table A for Normal Year (N)	% Full Table A for Single Dry Year (D) *	% Full Table A for Multiple Dry Year (3 or more Dry years)
1922	N	0.37	0.37		
1923	N	0.84	0.84		
1924	D	0.26		0.26	0.26
1925	D	0.39			0.39
1926	D	0.49			0.49
1927	W	0.46			
1928	N	0.86	0.86		
1929	D	0.31		0.31	0.31
1930	D	0.36			0.36
1931	D	0.22			0.22
1932	D	0.35			0.35
1933	D	0.35			0.35
1934	D	0.24			0.24
1935	N	0.43	0.43		
1936	N	0.71	0.71		
1937	N	0.66	0.66		
1938	W	0.77			
1939	D	0.96		0.96	
1940	N	0.60	0.60		
1941	W	0.59			
1942	W	0.83			
1943	W	0.77			
1944	D	0.75		0.75	
1945	N	0.44	0.44		
1946	N	0.74	0.74		
1947	D	0.74		0.74	
1948	N	0.65	0.65		
1949	D	0.58		0.58	
1950	N	0.50	0.50		
1951	N	0.43	0.43		
1952	W	0.86			
1953	W	0.89			
1954	N	0.69	0.69		
1955	D	0.51		0.51	
1956	W	0.48			

1957	N	0.82	0.82		
1958	W	0.58			
1959	N	0.83	0.83		
1960	D	0.52		0.52	
1961	D	0.49			
1962	N	0.70	0.70		
1963	W	0.46			
1964	D	0.81		0.81	
1965	W	0.54			
1966	N	0.83	0.83		
1967	W	0.55			
1968	N	0.83	0.83		
1969	W	0.66			
1970	W	0.58			
1971	W	0.83			
1972	N	0.58	0.58		
1973	N	0.45	0.45		
1974	W	0.78			
1975	W	0.79			
1976	D	0.81		0.81	
1977	D	0.14			
1978	N	0.45	0.45		
1979	N	0.65	0.65		
1980	N	0.60	0.60		
1981	D	0.84		0.84	
1982	W	0.57			
1983	W	0.64			
1984	W	0.53			
1985	D	0.77		0.77	
1986	W	0.67			
1987	D	0.55		0.55	0.55
1988	D	0.24			0.24
1989	D	0.38			0.38
1990	D	0.42			0.42
1991	D	0.20			0.20
1992	D	0.20			0.20
1993	N	0.43	0.43		
1994	D	0.67		0.67	
1995	W	0.54			
1996	W	0.85			
1997	W	0.75			
1998	W	0.91			
1999	W	0.60			
2000	W	0.86			
2001	D	0.37		0.37	
2002	D	0.42			
2003	N	0.79	0.79		
	Average	0.59	0.64	0.63	0.33

*Includes first year of consecutive dry years

Appendix B State Water Project Reliability

DWR Study 2029 data - SCWA Specific

Sacramento Valley Index

Value	Year Type
W	Wet
N	Below Normal
N	Above Normal
D	Dry
D	Critically Dry

Year	Sacramento Valley Index	% Full Table A	% Full Table A for Normal Year (N)	% Full Table A for Single Dry Year (D) *	% Full Table A for Multiple Dry Year (3 or more Dry years)
1922	N	0.64	0.64		
1923	N	0.61	0.61		
1924	D	0.20		0.20	0.20
1925	D	0.42			0.42
1926	D	0.52			0.52
1927	W	0.72			
1928	N	0.64	0.64		
1929	D	0.28		0.28	0.28
1930	D	0.41			0.41
1931	D	0.15			0.15
1932	D	0.39			0.39
1933	D	0.39			0.39
1934	D	0.27			0.27
1935	N	0.57	0.57		
1936	N	0.66	0.66		
1937	N	0.81	0.81		
1938	W	1.00			
1939	D	0.43		0.43	
1940	N	0.63	0.63		
1941	W	0.75			
1942	W	0.64			
1943	W	0.74			
1944	D	0.47		0.47	
1945	N	0.75	0.75		
1946	N	0.59	0.59		
1947	D	0.48		0.48	
1948	N	0.58	0.58		
1949	D	0.56		0.56	
1950	N	0.59	0.59		
1951	N	0.74	0.74		
1952	W	0.82			
1953	W	0.57			
1954	N	0.58	0.58		

Year	Type				
1955	D	0.43		0.43	
1956	W	0.82			
1957	N	0.54	0.54		
1958	W	0.92			
1959	N	0.44	0.44		
1960	D	0.47		0.47	
1961	D	0.46			
1962	N	0.66	0.66		
1963	W	0.58			
1964	D	0.64		0.64	
1965	W	0.67			
1966	N	0.62	0.62		
1967	W	0.81			
1968	N	0.55	0.55		
1969	W	1.00			
1970	W	0.69			
1971	W	0.59			
1972	N	0.57	0.57		
1973	N	0.66	0.66		
1974	W	0.74			
1975	W	0.69			
1976	D	0.62		0.62	
1977	D	0.09			
1978	N	0.78	0.78		
1979	N	0.68	0.68		
1980	N	0.83	0.83		
1981	D	0.57		0.57	
1982	W	0.95			
1983	W	1.00			
1984	W	0.77			
1985	D	0.68		0.68	
1986	W	0.79			
1987	D	0.23		0.23	0.23
1988	D	0.30			0.30
1989	D	0.49			0.49
1990	D	0.19			0.19
1991	D	0.22			0.22
1992	D	0.18			0.18
1993	N	0.66	0.66		
1994	D	0.57		0.57	
1995	W	0.85			
1996	W	0.66			
1997	W	0.81			
1998	W	0.83			
1999	W	0.71			
2000	W	0.65			
2001	D	0.30		0.30	
2002	D	0.67			
2003	N	0.58	0.58		
Average		0.60	0.64	0.46	0.31

*Includes first year of consecutive dry years

		SWP Table A Deliveries for 2009 Study				Probability Curve			
Year	Delivery w/o Article 56 Carryover (taf)	Article 56 Carryover (taf)	Total Table A Delivery (taf)	Percent of Maximum Table A (47.8 taf)		SWP Total Table A Delivery (taf)	Year	Exceedence Frequency (%)	Percent of Maximum Table A (47.8 taf)
1922	17.5	0.0	17.5	37%		45.8	1939	0%	96%
1923	22.9	17.4	40.3	84%		43.4	1998	1%	91%
1924	7.2	5.4	12.6	26%		42.4	1953	2%	89%
1925	18.0	0.7	18.7	39%		41.0	1928	4%	86%
1926	19.7	3.8	23.5	49%		40.9	1952	5%	86%
1927	18.2	3.6	21.8	46%		40.9	2000	6%	86%
1928	22.8	18.1	41.0	86%		40.8	1996	7%	85%
1929	9.9	4.9	14.9	31%		40.3	1923	9%	84%
1930	15.0	2.1	17.0	36%		40.1	1981	10%	84%
1931	7.4	3.0	10.5	22%		39.9	1971	11%	83%
1932	14.8	2.1	16.9	35%		39.7	1942	12%	83%
1933	15.1	1.4	16.5	35%		39.7	1968	14%	83%
1934	8.2	3.0	11.3	24%		39.4	1966	15%	83%
1935	18.3	2.2	20.5	43%		39.4	1959	16%	83%
1936	20.2	13.6	33.8	71%		39.3	1957	17%	82%
1937	21.1	10.3	31.3	66%		38.8	1964	19%	81%
1938	23.7	13.2	36.9	77%		38.7	1976	20%	81%
1939	22.1	23.7	45.8	96%		37.9	2003	21%	79%
1940	21.9	7.0	28.9	60%		37.6	1975	22%	79%
1941	20.8	7.3	28.1	59%		37.2	1974	23%	78%
1942	19.0	20.8	39.7	83%		36.9	1985	25%	77%
1943	18.9	17.9	36.7	77%		36.9	1938	26%	77%
1944	18.5	17.5	36.0	75%		36.7	1943	27%	77%
1945	17.7	3.4	21.1	44%		36.0	1944	28%	75%
1946	17.7	17.7	35.4	74%		35.8	1997	30%	75%
1947	20.9	14.6	35.4	74%		35.4	1947	31%	74%
1948	21.6	9.2	30.8	65%		35.4	1946	32%	74%
1949	22.9	4.7	27.6	58%		33.8	1936	33%	71%
1950	20.8	5.5	26.3	55%		33.5	1962	35%	70%
1951	18.3	2.0	20.3	43%		33.2	1954	36%	69%
1952	22.7	18.3	40.9	86%		31.9	1986	37%	67%
1953	19.8	22.6	42.4	89%		31.8	1994	38%	67%
1954	22.1	11.1	33.2	69%		31.7	1969	40%	66%
1955	19.7	4.8	24.5	51%		31.3	1937	41%	66%
1956	20.8	1.9	22.7	48%		31.0	1979	42%	65%
1957	18.6	20.7	39.3	82%		30.8	1948	43%	65%
1958	23.7	3.9	27.7	58%		30.7	1983	44%	64%
1959	18.9	20.5	39.4	83%		28.9	1940	46%	60%

SWP Table A Deliveries for 2009 Study

Year	Delivery w/o Article 56 Carryover (taf)	Article 56 Carryover (taf)	Total Table A Delivery (taf)	Percent of Maximum Table A (47.8 taf)
1960	21.0	4.0	25.0	52%
1961	19.1	4.5	23.6	49%
1962	21.3	12.2	33.5	70%
1963	17.3	4.6	21.9	46%
1964	21.5	17.3	38.8	81%
1965	17.7	8.1	25.8	54%
1966	21.8	17.7	39.4	83%
1967	18.9	7.6	26.5	55%
1968	20.8	18.9	39.7	83%
1969	23.7	7.9	31.7	66%
1970	18.3	9.5	27.9	58%
1971	21.6	18.3	39.9	83%
1972	22.9	4.7	27.5	58%
1973	16.6	4.9	21.6	45%
1974	20.6	16.6	37.2	78%
1975	17.0	20.6	37.6	79%
1976	21.7	17.0	38.7	81%
1977	2.1	4.7	6.8	14%
1978	21.0	0.5	21.5	45%
1979	18.3	12.7	31.0	65%
1980	21.7	6.7	28.4	60%
1981	19.0	21.1	40.1	84%
1982	23.7	3.5	27.2	57%
1983	23.7	7.0	30.7	64%
1984	18.4	6.9	25.3	53%
1985	18.6	18.3	36.9	77%
1986	20.6	11.3	31.9	67%
1987	14.7	11.6	26.3	55%
1988	8.4	3.0	11.3	24%
1989	16.5	1.6	18.2	38%
1990	8.1	11.9	20.0	42%
1991	8.4	1.4	9.8	20%
1992	7.8	2.0	9.8	20%
1993	18.9	1.9	20.7	43%
1994	18.2	13.6	31.8	67%
1995	21.8	3.9	25.8	54%
1996	19.0	21.8	40.8	85%
1997	20.6	15.2	35.8	75%

Probability Curve

Year	SWP Total Table A Delivery (taf)	Exceedence Frequency (%)	Percent of Maximum Table A (47.8 taf)
1999	28.7	47%	60%
1980	28.4	48%	60%
1941	28.1	49%	59%
1970	27.9	51%	58%
1958	27.7	52%	58%
1949	27.6	53%	58%
1972	27.5	54%	58%
1982	27.2	56%	57%
1967	26.5	57%	55%
1987	26.3	58%	55%
1950	26.3	59%	55%
1965	25.8	60%	54%
1995	25.8	62%	54%
1984	25.3	63%	53%
1960	25.0	64%	52%
1955	24.5	65%	51%
1961	23.6	67%	49%
1926	23.5	68%	49%
1956	22.7	69%	48%
1963	21.9	70%	46%
1927	21.8	72%	46%
1973	21.6	73%	45%
1978	21.5	74%	45%
1945	21.1	75%	44%
1993	20.7	77%	43%
1935	20.5	78%	43%
1951	20.3	79%	43%
2002	20.2	80%	42%
1990	20.0	81%	42%
1925	18.7	83%	39%
1989	18.2	84%	38%
2001	17.6	85%	37%
1922	17.5	86%	37%
1930	17.0	88%	36%
1932	16.9	89%	35%
1933	16.5	90%	35%
1929	14.9	91%	31%
1924	12.6	93%	26%

SWP Table A Deliveries for 2009 Study						Probability Curve		
Year	Delivery w/o Article 56 Carryover (taf)	Article 56 Carryover (taf)	Total Table A Delivery (taf)	Percent of Maximum Table A (47.8 taf)	Year	SWP Total Table A Delivery (taf)	Exceedence Frequency (%)	Percent of Maximum Table A (47.8 taf)
1998	22.9	20.6	43.4	91%	1988	11.3	94%	24%
1999	18.2	10.5	28.7	60%	1934	11.3	95%	24%
2000	23.0	17.9	40.9	86%	1931	10.5	96%	22%
2001	12.7	5.0	17.6	37%	1992	9.8	98%	20%
2002	17.7	2.5	20.2	42%	1991	9.8	99%	20%
2003	23.5	14.4	37.9	79%	1977	6.8	100%	14%
Average	18.5	9.8	28.3	59%		28.3		59%
Maximum	23.7	23.7	45.8	96%		45.8		96%
Minimum	2.1	0.0	6.8	14%		6.8		14%

(handwritten annotations: Average "60", Maximum "97" next to the Percent of Maximum columns)

SWP Table A Deliveries for 2029 Study

Year	Delivery w/o Article 56 Carryover (taf)	Article 56 Carryover (taf)	Total Table A Delivery (taf)	Percent of Maximum Table A (47.8 taf)
1922	30.6	0.0	30.6	64%
1923	29.3	0.0	29.3	61%
1924	9.5	0.0	9.5	20%
1925	19.9	0.0	19.9	42%
1926	24.7	0.0	24.7	52%
1927	34.4	0.0	34.4	72%
1928	30.6	0.0	30.6	64%
1929	13.5	0.0	13.5	28%
1930	19.8	0.0	19.8	41%
1931	7.1	0.0	7.1	15%
1932	18.4	0.0	18.4	39%
1933	18.5	0.0	18.5	39%
1934	12.8	0.0	12.8	27%
1935	27.0	0.0	27.0	57%
1936	31.3	0.0	31.3	66%
1937	38.6	0.0	38.6	81%
1938	47.8	0.0	47.8	100%
1939	20.4	0.0	20.4	43%
1940	30.3	0.0	30.3	63%
1941	35.7	0.0	35.7	75%
1942	30.5	0.0	30.5	64%
1943	35.3	0.0	35.3	74%
1944	22.6	0.0	22.6	47%
1945	35.7	0.0	35.7	75%
1946	28.3	0.0	28.3	59%
1947	22.9	0.0	22.9	48%
1948	27.9	0.0	27.9	58%
1949	26.5	0.0	26.5	56%
1950	28.3	0.0	28.3	59%
1951	35.3	0.0	35.3	74%
1952	39.1	0.0	39.1	82%
1953	27.4	0.0	27.4	57%
1954	27.8	0.0	27.8	58%
1955	20.5	0.0	20.5	43%
1956	39.1	0.0	39.1	82%
1957	25.6	0.0	25.6	54%
1958	44.0	0.0	44.0	92%
1959	21.0	0.0	21.0	44%

Probability Curve

Year	SWP Total Table A Delivery (taf)	Exceedence Frequency (%)	Percent of Maximum Table A (47.8 taf)
1983	47.8	0%	100%
1938	47.8	1%	100%
1969	47.8	2%	100%
1982	45.6	4%	95%
1958	44.0	5%	92%
1995	40.5	6%	85%
1980	39.8	7%	83%
1998	39.4	9%	83%
1956	39.1	10%	82%
1952	39.1	11%	82%
1967	38.9	12%	81%
1997	38.6	14%	81%
1937	38.6	15%	81%
1986	37.6	16%	79%
1978	37.1	17%	78%
1984	36.8	19%	77%
1941	35.7	20%	75%
1945	35.7	21%	75%
1974	35.4	22%	74%
1943	35.3	23%	74%
1951	35.3	25%	74%
1927	34.4	26%	72%
1999	34.1	27%	71%
1975	33.1	28%	69%
1970	32.9	30%	69%
1979	32.4	31%	68%
1985	32.3	32%	68%
1965	32.1	33%	67%
2002	32.0	35%	67%
1962	31.7	36%	66%
1973	31.6	37%	66%
1993	31.5	38%	66%
1996	31.4	40%	66%
1936	31.3	41%	66%
2000	31.1	42%	65%
1964	30.7	43%	64%
1928	30.6	44%	64%
1922	30.6	46%	64%

Solano County WA

SWP Table A Deliveries for 2029 Study

Year	Delivery w/o Article 56 Carryover (taf)	Article 56 Carryover (taf)	Total Table A Delivery (taf)	Percent of Maximum Table A (47.8 taf)
1960	22.4	0.0	22.4	47%
1961	22.0	0.0	22.0	46%
1962	31.7	0.0	31.7	66%
1963	27.6	0.0	27.6	58%
1964	30.7	0.0	30.7	64%
1965	32.1	0.0	32.1	67%
1966	29.6	0.0	29.6	62%
1967	38.9	0.0	38.9	81%
1968	26.5	0.0	26.5	55%
1969	47.8	0.0	47.8	100%
1970	32.9	0.0	32.9	69%
1971	28.0	0.0	28.0	59%
1972	27.5	0.0	27.5	57%
1973	31.6	0.0	31.6	66%
1974	35.4	0.0	35.4	74%
1975	33.1	0.0	33.1	69%
1976	29.7	0.0	29.7	62%
1977	4.5	0.0	4.5	9%
1978	37.1	0.0	37.1	78%
1979	32.4	0.0	32.4	68%
1980	39.8	0.0	39.8	83%
1981	27.4	0.0	27.4	57%
1982	45.6	0.0	45.6	95%
1983	47.8	0.0	47.8	100%
1984	36.8	0.0	36.8	77%
1985	32.3	0.0	32.3	68%
1986	37.6	0.0	37.6	79%
1987	10.8	0.0	10.8	23%
1988	14.1	0.0	14.1	30%
1989	23.4	0.0	23.4	49%
1990	9.3	0.0	9.3	19%
1991	10.4	0.0	10.4	22%
1992	8.4	0.0	8.4	18%
1993	31.5	0.0	31.5	66%
1994	27.4	0.0	27.4	57%
1995	40.5	0.0	40.5	85%
1996	31.4	0.0	31.4	66%
1997	38.6	0.0	38.6	81%

Probability Curve

Year	SWP Total Table A Delivery (taf)	Exceedence Frequency (%)	Percent of Maximum Table A (47.8 taf)
1942	30.5	47%	64%
1940	30.3	48%	63%
1976	29.7	49%	62%
1966	29.6	51%	62%
1923	29.3	52%	61%
1950	28.3	53%	59%
1946	28.3	54%	59%
1971	28.0	56%	59%
1948	27.9	57%	58%
1954	27.8	58%	58%
2003	27.7	59%	58%
1963	27.6	60%	58%
1972	27.5	62%	57%
1981	27.4	63%	57%
1994	27.4	64%	57%
1953	27.4	65%	57%
1935	27.0	67%	57%
1949	26.5	68%	56%
1968	26.5	69%	55%
1957	25.6	70%	54%
1926	24.7	72%	52%
1989	23.4	73%	49%
1947	22.9	74%	48%
1944	22.6	75%	47%
1960	22.4	77%	47%
1961	22.0	78%	46%
1959	21.0	79%	44%
1955	20.5	80%	43%
1939	20.4	81%	43%
1925	19.9	83%	42%
1930	19.8	84%	41%
1933	18.5	85%	39%
1932	18.4	86%	39%
2001	14.5	88%	30%
1988	14.1	89%	30%
1929	13.5	90%	28%
1934	12.8	91%	27%
1987	10.8	93%	23%

SWP Table A Deliveries for 2029 Study

Year	Delivery w/o Article 56 Carryover (taf)	Article 56 Carryover (taf)	Total Table A Delivery (taf)	Percent of Maximum Table A (47.8 taf)
1998	39.4	0.0	39.4	83%
1999	34.1	0.0	34.1	71%
2000	31.1	0.0	31.1	65%
2001	14.5	0.0	14.5	30%
2002	32.0	0.0	32.0	67%
2003	27.7	0.0	27.7	58%
Average	28.4	0.0	28.4	60%
Maximum	47.8	0.0	47.8	100%
Minimum	4.5	0.0	4.5	9%

Probability Curve

Year	SWP Total Table A Delivery (taf)	Exceedence Frequency (%)	Percent of Maximum Table A (47.8 taf)
1991	10.4	94%	22%
1924	9.5	95%	20%
1990	9.3	96%	19%
1992	8.4	98%	18%
1931	7.1	99%	15%
1977	4.5	100%	9%
Average	28.4		60%
Maximum	47.8		100%
Minimum	4.5		9%

Appendix C Solano Project Reliability

Ultimate level of development-of Lake Berryessa watershed @ 30,000 AF/yr - 2009 Study

Lake Berryessa Index

Value	Year Type
W	Wet
N	Below Normal
N	Above Normal
D	Dry
D	Critically Dry

Year	Index Value	% Full Alloc	% Full Alloc for Normal Year (N)	% Full Alloc for Single Dry Year (D) *	% Full Alloc for Multiple Dry Years (3 or more Dry years)
1906	W	100%			
1907	W	100%			
1908	D	100%		100%	
1909	W	100%			
1910	N	100%	100%		
1911	W	100%			
1912	D	100%		100%	
1913	D	100%			
1914	W	100%			
1915	W	100%			
1916	W	100%			
1917	N	100%	100%		
1918	D	100%		100%	
1919	N	100%	100%		
1920	D	100%		100%	
1921	N	100%	100%		
1922	N	100%	100%		
1923	N	100%	100%		
1924	D	95%		95%	
1925	N	95%	95%		
1926	N	95%	95%		
1927	W	95%			
1928	N	100%	100%		
1929	D	95%		95%	
1930	N	95%	95%		
1931	D	100%		100%	100%
1932	D	100%			100%
1933	D	45%			45%
1934	D	45%			45%
1935	N	100%	100%		
1936	N	100%	100%		
1937	N	100%	100%		
1938	W	100%			
1939	D	95%		95%	

1940	W	100%			
1941	W	100%			
1942	W	100%			
1943	N	100%	100%		
1944	D	100%		100%	
1945	N	100%	100%		
1946	N	100%	100%		
1947	D	100%		100%	100%
1948	D	95%			95%
1949	D	95%			95%
1950	D	95%			95%
1951	N	95%	95%		
1952	W	100%			
1953	N	100%	100%		
1954	N	100%	100%		
1955	D	95%		95%	
1956	W	100%			
1957	D	100%		100%	
1958	W	100%			
1959	D	100%		100%	
1960	N	100%	100%		
1961	D	100%		100%	
1962	N	100%	100%		
1963	W	100%			
1964	D	100%		100%	
1965	W	100%			
1966	N	100%	100%		
1967	W	100%			
1968	N	100%	100%		
1969	W	100%			
1970	W	100%			
1971	N	100%	100%		
1972	D	100%		100%	
1973	W	100%			
1974	W	100%			
1975	N	100%	100%		
1976	D	100%		100%	
1977	D	100%			
1978	W	100%			
1979	N	100%	100%		
1980	W	100%			
1981	D	100%		100%	
1982	W	100%			
1983	W	100%			
1984	N	100%	100%		
1985	D	100%		100%	
1986	W	100%			
1987	D	100%		100%	100%
1988	D	100%			100%
1989	D	100%			100%
1990	D	95%			95%
1991	N	95%	95%		

Year					
1992	D	90%		90%	
1993	W	95%			
1994	D	95%		95%	
1995	W	100%			
1996	W	100%			
1997	W	100%			
1998	W	100%			
1999	N	100%	100%		
2000	N	100%	100%		
2001	D	100%		100%	
2002	N	100%	100%		
2003	N	100%	100%		
2003	W	100%			
2004	N	100%	100%		
2005	N	100%	100%		
2006	W	100%			
2007		100%			
	Average	98%	99%	98%	89%

*Includes first year of consecutive dry years ·