NOTICE TO
STATE WATER PROJECT CONTRACTORS

NUMBER: 05-08

DATE: MAY 2 5 2005

SUBJECT: SWP Delivery Reliability Data From the Draft 2005 SWP Delivery Reliability Report

FROM: *Gerald E. Johns*

DEPUTY DIRECTOR, DEPARTMENT OF WATER RESOURCES

The Department of Water Resources (DWR) is preparing an update to the State Water Project (SWP) Delivery Reliability Report issued in 2003. Many SWP Contractors have already begun or will soon begin preparation of their 2005 Urban Water Management Plans (UWMP), which must be completed by December 2005. Contractors have indicated they would like to use updated information on the delivery reliability of the SWP as the basis for the SWP supplies included in their UWMP's. However, the 2005 Delivery Reliability Report is not expected to be publicly available, as a draft, until September 2005.

Given this time gap between the immediate need of the Contractors for updated data for use in their UWMP preparation and the availability of an updated Reliability Report, DWR is providing relevant sections from the working draft of the 2005 Delivery Reliability Report. Attachment 1 contains these sections, namely, Chapter 4 and excerpts from Chapter 6 and Appendix B.

The working draft includes seven studies. Studies 1, 2, and 3 are from the 2003 report. Studies 4 and 5 are similar to the studies for the CVP/SWP Operations Criteria and Plan. Studies 6 and 7 are similar to studies 4 and 5 but contain updated assumptions for Contractor demands. The updated assumptions for demand in studies 6 and 7 were developed with representatives of the State Water Contractors as part of the study preparation for the Environmental Impact Report for the Monterey Amendment. Because studies 6 and 7 contain the most current information for assumed demands, DWR recommends the results of these studies for use in the development of the UWMPs.

DWR was also asked to include estimates of SWP delivery reliability with the increased Delta export limit (8500 cfs) proposed in the South Delta Improvement Program (SDIP). The environmental and public review required by CEQA and NEPA has not been completed for the SDIP. It is possible the proposed export operation will be modified in response to this review. The potential delivery increases associated with the proposed project are, therefore, not contained in this notice.

For additional information regarding these results, you may contact Sushil Arora, Chief of the Hydrology and Operations Unit, Bay-Delta Office, at (916) 653-7921 or sushil@water.ca.gov.

Attachment

Attachment 1

Excerpts from Working Draft of 2005 State Water Project Delivery Reliability Report

May 2005

Chapter 4
Model Study Assumptions

The selection of the assumptions and the factors that go into the estimation of future water delivery reliability is very important and must be tailored to the particular water supplier. Assumptions and factors for the State Water Project concern, in particular, Sacramento and San Joaquin river basin precipitation; water rights and uses; SWP storage and conveyance facilities, including diversion facilities in the Delta; SWP service area demand; and the statutes, regulations, and contractual provisions that govern and regulate the SWP, including coordinating operations with the federal Central Valley Project (CVP).

The assumptions for the seven studies in this report differ in three main categories: the projected water use in the source areas, assumed SWP demands, and base model assumptions. These categories are summarized in Table 4-1. Water use in the areas supplying water to the SWP (source areas) is represented at the current level of use (2005) and at a level of use projected to occur in 2025. For this report, the existing water use estimates for the source areas for 2001 and 2020 are assumed to be representative of 2005 and 2025 conditions, respectively.

Table 4-1 Key study assumptions

Study	Use of water in source areas	SWP Table A demand (maf/year)	SWP Article 21 demand (taf/month)	Model version
1	2001 level of development	3.0–4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
2	2020 level of development	3.3–4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
3	2020 level of development	4.1	0–84, Apr–Nov 50–134, Dec–Mar	May 2002 benchmark
4	2001 level of development	3.0–4.1	0–84, Apr–Nov 50–134, Dec–Mar	2004 OCAP
5	2020 level of development	3.3–4.1	0–84, Apr–Nov 50–134, Dec–Mar	2004 OCAP
6	2001 level of development	2.3–3.9	0–84, Apr–Nov 100–184, Dec–Mar	2004 OCAP
7	2020 level of development	3.9–4.1	0–84, Apr–Nov 100–184, Dec–Mar	2004 OCAP

maf = million acre-feet
OCAP = 2004 Long-Term Central Valley Project Operations Criteria and Plan
taf = thousand acre-feet

The SWP contractors' Table A and Article 21 demands from the Delta for the seven studies are shown in Table 4-1. For six of the studies, a range in Table A demands is shown because the demand is assumed to vary each year with the weather in the delivery areas. In study 3, the SWP Table A demand is assumed to be maximized each year, regardless of weather. Article 21 deliveries are available on an unscheduled and interruptible basis and are not counted as part of the Table A amount.

There are two versions of the model that are used for these studies as shown in Table 4-1. The three studies from *The SWP Delivery Reliability Report 2002* (DWR 2003) are based on the May 2002 benchmark study version, and subsequent studies are based on the 2004 Long-Term Central Valley Project Operations Criteria and Plan (OCAP) study version. The key modeling assumption differences between the May 2002 benchmark version and the 2004 OCAP version as used in this report are as follows:

1. Temperature flow below Keswick changed from a fixed time series flow to a dynamic storage dependent flow.
2. Relaxation of flow below Nimbus criteria when Folsom storage drops below 300 thousand acre-feet.
3. Navigation control point flow criteria modified from being dependent on water year type to being dependent on CVP agricultural allocation levels. Criteria were also relaxed for very low allocation years.
4. Clear Creek Tunnel target flows modified to match the latest Trinity EIR analysis.
5. Addition of a minimum pumping level at Banks of 300 cubic feet per second.
6. Addition of a minimum pumping level at Tracy of 600 cubic feet per second.
7. Addition of flow requirements on the Feather River at the mouth for Settlement Contractors.
8. Delivery-carryover relationship was adjusted to reduce delivery targets and increase carryover in critically dry years.
9. Addition of Lake Oroville end-of-September carryover target storage rule.
10. Five-step study setup modified to isolate B2 accounting from "with Project" conditions.
11. Modification of American River demands.
12. Modification of Contra Costa Water District demands.
13. The minimum flow of the Trinity River below Lewiston Dam in studies 4 and 6 ranges from 369 to 453 thousand acre-feet per year depending on water year type. All other studies used in this report assume the Trinity River minimum flow has a higher range from 369 to 815 thousand acre-feet per year. This higher range of Trinity River minimum flows represents the Trinity Environmental Impact Statement Preferred Alternative.
14. Studies 5 and 7 assume implementation of Freeport Regional Water Project including modified East Bay Municipal Utility District operations on the Mokelumne River.
15. Implementation of May 2003 CVPIA 3406 (b)(2) decision and other changes:
    a. Streamlining of actions for simplified analyses of the results.
    b. Anadromous Fish Restoration Program table updates to better represent management of (b)(2) water under the May 2003 (b)(2) decision.
    c. Action triggering modifications to attempt to meet 200 thousand-acre feet target during October through January period.
16. Environmental Water Account changes including:
    a. Streamlining of actions and coordination with (b)(2) actions.
    b. Environmental Water Account (EWA) purchase amount increase to a maximum of 250 thousand acre-feet per year.
    c. Addition of storage debt carryover accounting including debt spill at San Luis.
    d. Addition of EWA asset takeover by SWP and CVP at San Luis when reservoir space utilized by EWA is needed for project operations.
    e. Eliminates the need to pay off end-of-year debt from unidentified sources of water in order to keep the projects whole.

Chapter 6 (excerpt)
Study Results

SWP Water Deliveries under Different Hydrologic Scenarios

The assumed demands and results of the studies estimating SWP water deliveries under current conditions (2005) and 2025 conditions are summarized in tables 6-1 through 6-8.

Average, Maximum, and Minimum

The average, maximum, and minimum Table A demands from the Delta for the seven studies are shown in Table 6-1. Studies 4 and 5 have the same demands as studies 1 and 2, respectively. Study 6 has lower demands than studies 1 and 4. The average demand for study 6 is 80 percent of full Table A compared to 90 percent of full Table A for studies 1 and 4. The primary reason for the lower demand in study 6 is that it includes a new set of annual Table A demands for the Metropolitan Water District of Southern California prepared specifically for 2003 conditions by MWDSC. The average demand for study 7 is 99.4 percent of full Table A and is less than full Table A in only seven wet years based on local Kern River water supply conditions.

Table 6-1 SWP Table A demand from Delta

Study	Full Table A (taf per year)	Average demand		Maximum demand		Minimum demand	
		(taf per year)	(percent of full Table A)	(taf per year)	(percent of full Table A)	(taf per year)	(percent of full Table A)
SWP Delivery Reliability Report (2003):							
1. 2001 Study	4,114	3,712	90%	4,114	100%	3,007	73%
2. 2021A Study	4,133	4,026	97%	4,133	100%	3,343	81%
3. 2021B Study	4,133	4,133	100%	4,133	100%	4,133	100%
OCAP (2004):							
4. OCAP Today	4,114	3,712	90%	4,114	100%	3,007	73%
5. OCAP Future	4,133	4,026	97%	4,133	100%	3,343	81%
Revised-Demand:							
6. Revised-Demand Today	4,112	3,290	80%	3,862	94%	2,321	56%
7. Revised-Demand Future	4,133	4,110	99%	4,133	100%	3,898	94%

Table 6-2 contains the average, maximum, and minimum Table A deliveries from the Delta for the seven studies. Comparing the results for studies 1 and 2 (weather variable demand) shows the average Table A delivery value is projected to increase by only 3 percentage points, from 72 percent to 75 percent over 20 years. This increase is due to the projected increase in Table A demand in 2025. When it is assumed that future demand will not vary with the weather and will be constant at 4.13 maf (study 3), the average Table A delivery value is 76 percent, only 1 percentage point above study 2. These relatively small differences indicate that the SWP Table A demand is very near the full Table A amount. Recall that the demand levels range from 3.0 maf per year to 4.1 maf per year for study 1; from 3.3 maf per year to 4.1 maf per year for study 2; and is constant at 4.1 maf per year for study 3.

4

Table 6-2 SWP Table A delivery from Delta

Study	Full Table A (taf per year)	Average delivery		Maximum delivery		Minimum delivery	
		(taf per year)	(percent of full Table A)	(taf per year)	(percent of full Table A)	(taf per year)	(percent of full Table A)
SWP Delivery Reliability Report (2003):							
1. 2001 Study	4,114	2,962	72%	3,845	93%	804	20%
2. 2021A Study	4,133	3,083	75%	4,128	100%	830	20%
3. 2021B Study	4,133	3,130	76%	4,133	100%	830	20%
OCAP (2004):							
4. OCAP Today	4,114	2,973	72%	3,850	94%	165	4%
5. OCAP Future	4,133	3,156	76%	4,133	100%	187	5%
Revised-Demand:							
6. Revised-Demand Today	4,112	2,818	69%	3,848	94%	159	4%
7. Revised-Demand Future	4,133	3,178	77%	4,133	100%	187	5%

Studies 4 and 5 indicate a slightly higher increase in average delivery in the future, 72 percent to 76 percent of full Table A, respectively (see Table 6-2). This slightly higher increase of 4 percent is due to differences in modeling assumptions as listed in Appendix A. Studies 6 and 7 have the highest increase (8 percent) with an average delivery of 69 percent of full Table A under current conditions (study 6) and 77 percent under future conditions (study 7). The lower delivery of 69 percent under current conditions is due to the lower level of demand assumed for study 6. The slightly higher average delivery of 77 percent for study 7 compared to 76 percent for study 5 is due to the assumed higher demand in study 7.

The more recent studies have a minimum delivery of 4 percent to 5 percent of full Table A compared to 20 percent for the studies in the *SWP Delivery Reliability Report 2002* (DWR 2003). The lower minimum delivery is primarily due to modification of the delivery-carryover storage rule. This modification was developed during the project-simulation effort associated with the application for license renewal with the Federal Energy Regulatory Commission. Compared to the rule used for the *SWP Delivery Reliability Report 2002* studies (studies 1, 2, and 3), the modified rule reduces delivery by about 80 percent whenever carryover storage (sum of the end-of-September storages of Oroville Reservoir and the SWP share of San Luis Reservoir) is projected to be less than about 860 thousand acre-feet (taf). Potential adjustment of 1977 CalSim-II Table A deliveries is discussed in a later section of this chapter.

Average Article 21 demands and average, maximum, and minimum Article 21 deliveries for the seven studies are shown in Table 6-3. All studies have the same Article 21 demand in April through November. Studies 6 and 7 both assume a 200 taf increase in Article 21 demand in December through March compared to the other studies.

Table 6-3 SWP Article 21 demand and delivery from Delta (taf per year except as noted)

Study	Average Article 21 demand			Annual delivery from Delta		
	Dec-Mar	Apr-Nov	Total	Average	Maximum	Minimum
SWP Delivery Reliability Report (2003):						
1. 2001 Study	504	607	1,111	130	510	0
2. 2021A Study	504	607	1,111	80	400	0
3. 2021B Study	504	607	1,111	70	400	0
OCAP (2004):						
4. OCAP Today	504	607	1,111	170	620	0
5. OCAP Future	504	607	1,111	90	500	0
Revised-Demand:						
6. Revised-Demand Today	704	607	1,311	260	1,110	0
7. Revised-Demand Future	704	607	1,311	120	550	0

Delivery numbers rounded to the nearest 10,000 acre-feet.

The average amount of water supply per year under Article 21 decreases from 130 taf in study 1 to 80 taf in study 2. Water pumped from the Delta will go toward meeting Table A demands prior to being made available under Article 21. The 50 taf decrease is a direct result of the assumed increase in Table A demand for study 2. Study 3 reflects this same relationship with an average Article 21 delivery of 70 taf, slightly less than study 2.

Studies 4 and 5 show an increase in Article 21 delivery compared to studies 1 and 2 even though Article 21 demands are the same and studies 4 and 5 have the same Table A demands as studies 1 and 2, respectively. The average delivery for study 4 is 170 taf per year, 40 taf per year more than study 1; study 5 has an average delivery of 90 taf per year, 10 taf per year more than study 2. These increases are primarily due to implementation of a Lake Oroville end-of-September carryover target storage rule in studies 4 and 5 to better simulate actual reservoir operations. The effect of this rule is to lower Lake Oroville storage and increase SWP San Luis Reservoir storage in the fall and winter of some years as compared to studies 1 and 2. As a result, the rule increases the probability that SWP San Luis Reservoir will fill, a condition that must be met before Article 21 water can be delivered.

The average Article 21 delivery for study 6 is 260 taf per year, an increase of 90 taf per year from the study 4 average delivery of 170 taf per year. This increase in delivery is a result of the increase in Article 21 demand of 200 taf per year in studies 6 and 7 and also due to the decrease in Table A demand in study 6 compared to study 4. Study 7 has an average Article 21 delivery of 120 taf per year, 30 taf per year more than study 5, which is the result of increased Article 21 demand.

Drought Years

Table 6-4 includes estimates of water deliveries under an assumed repetition of historical drought periods for the seven studies. The years are identified as dry by the Eight River Index, a good indicator of the relative amount of water supply available to the SWP. The Eight River Index is the sum of the unimpaired

runoff from the four rivers in the Sacramento Basin used to define water conditions in the basin plus the four rivers in the San Joaquin Basin, which correspondingly define water conditions in that basin. The eight rivers are the Sacramento, Feather, Yuba, American, Stanislaus, Tuolumne, Merced, and San Joaquin. Table 6-4 also includes the average deliveries for comparison purposes.

Table 6-4 SWP average and dry year Table A delivery from Delta for seven studies

Study	Full Table A (taf per year)	SWP Table A delivery from Delta (in percent of full Table A)					
		Average 1922-1994	Single dry year 1977	2-year drought 1976-1977	4-year drought 1931-1934	6-year drought 1987-1992	6-year drought 1929-1934
SWP Delivery Reliability Report (2003):							
1. 2001 Study	4,114	72%	20%	48%	37%	41%	40%
2. 2021A Study	4,133	75%	20%	44%	39%	40%	41%
3. 2021B Study	4,133	76%	20%	44%	39%	40%	41%
OCAP (2004):							
4. OCAP Today	4,114	72%	4%	41%	31%	40%	36%
5. OCAP Future	4,133	76%	5%	42%	35%	43%	39%
Revised-Demand:							
6. Revised-Demand Today	4,112	69%	4%	42%	32%	43%	38%
7. Revised-Demand Future	4,133	77%	5%	40%	33%	42%	38%

As shown in Table 6-5, studies 6 and 7 are selected to represent the estimated 2005 and 2025 deliveries, respectively, and to show Table A delivery in 5-year intervals as required by SB 610. The intermediate estimates shown in Table 6-5 for the years 2010, 2015, and 2020 are simply linearly interpolated from the study results for 2005 and 2025.

Table 6-5 SWP average and dry year Table A delivery from Delta in five-year intervals for studies 6 and 7

Year	Full Table A (taf per year)	SWP Table A delivery from Delta (in percent of full Table A)					
		Average 1922-1994	Single dry year 1977	2-year drought 1976-1977	4-year drought 1931-1934	6-year drought 1987-1992	6-year drought 1929-1934
2005	4,112	69%	4%	42%	32%	43%	38%
2010	4,117	71%	4%	41%	32%	42%	38%
2015	4,123	73%	4%	41%	33%	42%	38%
2020	4,128	75%	4%	41%	33%	42%	38%
2025	4,133	77%	5%	40%	33%	42%	38%

Even though the demands are projected to increase from 2005 to 2025 and the resulting amount of reservoir carryover storage is less, the drought deliveries are estimated to remain about the same (see Table 6-5). This result is attributable to the operation rules governing the amount of water that must be retained for carryover storage, the fact that SWP demand between 2005 and 2025 increases relatively slightly, and because less water is made available under Article 21.

Table 6-6 summarizes the estimates of dry year deliveries under Article 21 for the seven studies. Notice the reductions in delivery for studies 2 and 3 compared to study 1 in the years 1930, 1932, 1933, and

7

1976. These reductions are due to the increase in Table A deliveries. Study 5 has similar reductions compared to study 4 for the same reason. As previously mentioned, Article 21 deliveries for studies 4 and 5 tend to be higher than studies 1 and 2, respectively, due to implementation of a Lake Oroville end-of-September carryover target storage rule to better simulate actual reservoir operations. Study 7 does not always show a decrease in Article 21 delivery compared to study 6, illustrating how differences in Table A and Article 21 demands can alter dry period operations. For example, SWP San Luis fills in March 1989 of study 7 thereby allowing an Article 21 delivery of 90 taf, but SWP San Luis does not fill in 1989 in study 6, which has lower demands. Differences in Article 21 delivery between studies are also affected by differences in the transfer of EWA assets to the CVP and SWP at San Luis Reservoir when reservoir space used by EWA is needed for project operations.

Table 6-6 Average and dry year delivery under Article 21 (taf per year)

Study:	1	2	3	4	5	6	7
Year	Study 2001	Study 2021A	Study 2021B	OCAP Today	OCAP Future	Revised-Demand Today	Revised-Demand Future
1929	0	0	0	0	0	0	0
1930	90	30	30	130	70	120	140
1931	0	0	0	0	0	0	0
1932	200	40	40	270	70	240	110
1933	130	10	10	400	400	510	550
1934	0	0	0	210	130	210	240
1976	110	0	0	140	0	190	0
1977	0	0	0	0	0	0	0
1987	0	0	0	400	140	550	180
1988	0	0	0	0	0	0	0
1989	0	0	0	80	70	0	90
1990	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0
1992	0	0	0	30	0	0	100
1922-1994 average	130	80	70	170	90	260	120

Numbers rounded to the nearest 10,000 acre-feet.

Wet Years

Tables 6-7 and 6-8 below summarize the model run results for historical wet years. As with drought years, the Eight River Index is used to identify the wet years.

Table 6-7 SWP average and wet year Table A delivery from Delta

Study	Full Table A (taf per year)	SWP Table A delivery from Delta (in percent of full Table A)					
		Average 1922-1994	Single wet year 1983	2-year wet 1982-1983	4-year wet 1980-1983	6-year wet 1978-1983	10-year wet 1978-1987
SWP Delivery Reliability Report (2003):							
1. 2001 Study	4,114	72%	74%	79%	80%	80%	80%
2. 2021A Study	4,133	75%	82%	89%	86%	87%	84%
3. 2021B Study	4,133	76%	100%	100%	91%	91%	87%
OCAP (2004):							
4. OCAP Today	4,114	72%	73%	79%	80%	80%	80%
5. OCAP Future	4,133	76%	81%	89%	89%	90%	85%
Revised-Demand:							
6. Revised-Demand Today	4,112	69%	61%	66%	70%	75%	72%
7. Revised-Demand Future	4,133	77%	95%	97%	93%	93%	89%

Table 6-8 contains information about Article 21 deliveries for the wet period 1978–1987. The information illustrates a significant decrease in the availability of Article 21 supply between study 1 and studies 2 and 3. This is primarily due to the increase in Table A demand. Studies 5 and 7 have similar decreases in Article 21 delivery compared to studies 4 and 6, respectively.

The generally higher Article 21 deliveries for studies 6 and 7 compared to studies 4 and 5 are attributed to the 200 taf per year increase in Article 21 demand assumed for studies 6 and 7. In addition, the increase in Article 21 deliveries for study 6 compared to the study 4 is partially due to the decrease in Table A demand assumed for study 6.

Table 6-8 Average and wet year delivery under Article 21 (taf per year)

Study:	1	2	3	4	5	6	7
Year	Study 2001	Study 2021A	Study 2021B	OCAP Today	OCAP Future	Revised-Demand Today	Revised-Demand Future
1978	100	100	100	150	150	300	300
1979	140	90	100	260	80	160	140
1980	100	70	80	100	40	140	90
1981	120	0	0	280	50	550	70
1982	390	100	60	450	120	800	170
1983	200	200	160	200	200	400	360
1984	410	380	370	400	400	550	490
1985	0	0	0	0	0	0	0
1986	50	50	60	60	30	120	80
1987	0	0	0	400	140	550	180
1922-1994 average	130	80	70	170	90	260	120

Numbers rounded to the nearest 10,000 acre-feet.

SWP Table A Delivery Probability

The probability that a given level of SWP Table A amount will be delivered from the Delta is shown for the three current-condition studies in Figure 6-1 and for the four future-condition studies in Figure 6-2. The plot lines in the figures are derived from the study results listed in tables B-3 through B-9. Each line is constructed by ranking the 73 annual Table A delivery values of the relevant study from lowest to highest and calculating the percentage of values equal to or greater than the delivery value of interest. For example, for study 7 in Figure 6-2, the value of 3.50 maf is in the middle of the ranking; therefore, it is equaled or exceeded by half of the 73 delivery values. The delivery value of 0.20 maf, the minimum value for study 7, is equaled or exceeded by all of the delivery values.
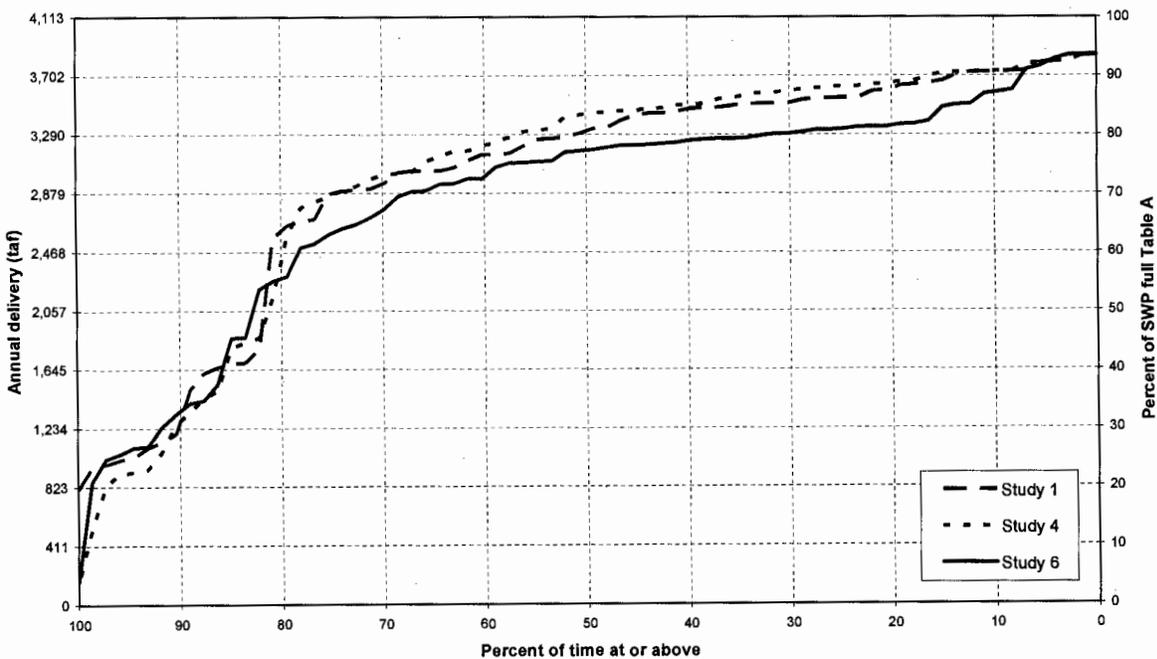
Figure 6-1 SWP Delta Table A delivery probability for year 2005

The curves for studies 1 and 4 in Figure 6-1 are very similar except at the lowest portion of the ranking (delivery values equaled or exceeded by 90 percent of the values). The divergence between 90 and 100 percent is due to modification of the delivery-carryover storage rule. The curve for study 6 is generally lower than the other two studies due to assumed lower demand.

10

The curves for studies 2 and 3 in Figure 6-2 are very similar for the lower portion of the ranking (that is, delivery values equaled or exceeded by 50 percent to 100 percent of the values). These lower values are similar because deliveries are limited by the amount of water available to the SWP for export from the Delta. The curves diverge within the upper range of the delivery values due to differences in assumed demand.
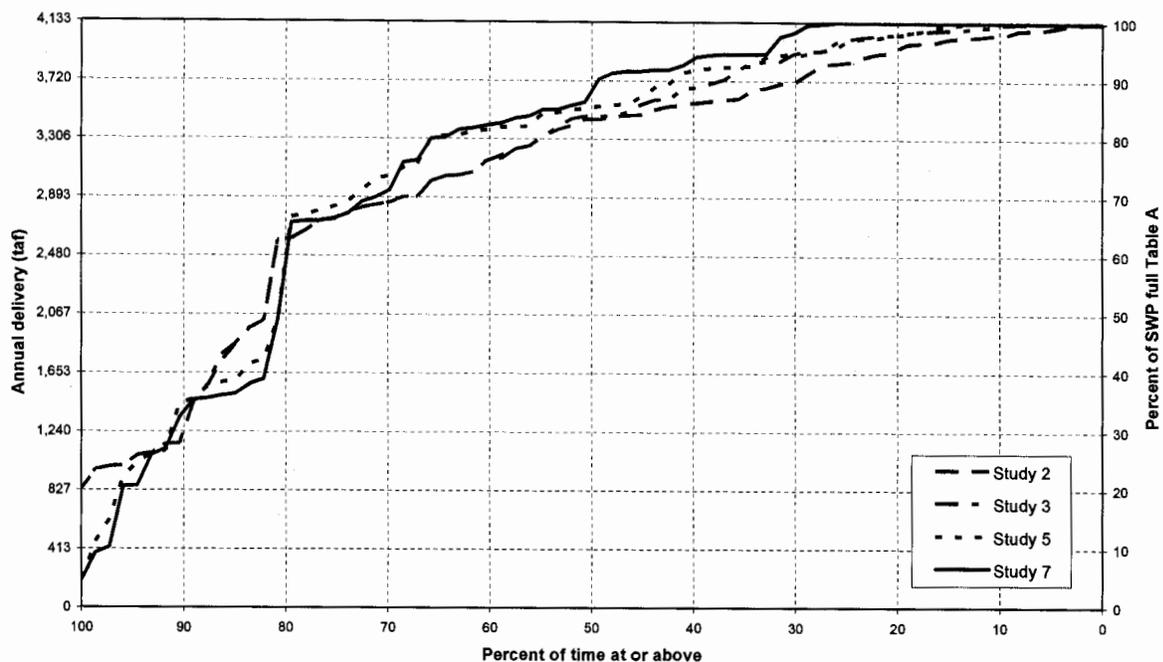
Figure 6-2 SWP Delta Table A delivery probability for year 2025

Study 5 shows higher deliveries than study 2 for delivery values exceeded by up to 80 percent of the values, and mostly lower deliveries for values exceeded by 80 to 100 percent of the values. Because the assumed demands are the same for these two studies, the higher deliveries in study 5 are due to modeling assumption differences other than demand. The curve for study 7 diverges from the study 5 curve for delivery values equaled or exceeded by up to 50 percent of the values. This divergence is attributed to the higher assumed demands in study 7.

A comparison of the upper range of studies 2 and 3 illustrates the effect the projected demand has upon SWP deliveries. The deliveries in study 3 reach 100 percent more frequently than in study 2 (weather variable demand) because the demand for 100 percent of Table A deliveries is assumed for each year of study 3. In study 2, the demand for 100 percent of Table A occurs in significantly fewer years and is rarely met because when 100 percent is assumed to be needed, the water year often cannot provide it. The delivery values for the three current-condition studies never reach 100 percent Table A for the same reason (Figure 6-1).

Study 7 deliveries reach 100 percent 26 percent of the time, the highest percentage for the seven studies. This is primarily a result of the assumed demands (only seven years less than full Table A).

The amount of SWP Table A delivery per year, either in percent of full Table A or in thousand acre-feet, associated with a specific degree of reliability can be estimated from Figures 6-1 and 6-2 for 2005 and 2025 conditions, respectively. The study 6 curve in Figure 6-1 is recommended to be used to represent 2005 conditions, and the study 7 curve in Figure 6-2 is recommended to be used to represent 2025 conditions. By referencing the curve for study 7 in Figure 6-2, the following can be deduced:
- In 75 percent of the years, the annual water delivery of the SWP is estimated to be at or above 2.70 maf per year (65 percent of 4.13 maf).
- In 50 percent of the years, it is estimated to be at or above 3.50 maf per year (85 percent of 4.13 maf).
- In 25 percent of the years, it is at 4.13 maf per year (100 percent).

Figures 6-1 and 6-2 depict the estimated reliability for the total of SWP deliveries. Under conditions when almost all contractors are requesting their maximum Table A, like in study 7, this information can be directly applied to individual long-term water supply contracts for the SWP. For example, if a water agency has a full SWP Table A amount of 400 taf, it can expect to receive at least 260 taf per year (65 percent of 400 taf) 75 percent of the time.

Potential Adjustments to 1977 CalSim-II Table A Deliveries

The CalSim-II model, a planning model, is not the best tool for analyzing SWP performance and operations for a shorter period, like a single year; nevertheless, there is a tendency to compare and contrast shorter-period operations with actual historical operations. Studies 4 through 7, discussed earlier, show that operations criteria changes result in much lower 1977 Table A deliveries. These deliveries are lower than historical as well as what is shown in *SWP Delivery Reliability Report 2002* (DWR 2003). The discussion below presents some adjustments contractors may consider in estimating 1977 Table A deliveries.

In order to understand what led to lower deliveries in 1977, it is prudent to start with 1975, a wet year, followed by 1976 and 1977, two critically dry years (1977 being the driest year on record during the last 80 years of historical hydrology). For the Revised-Demand Today study (study 6), SWP Table A deliveries during 1975, 1976, and 1977 are 3.23 maf, 3.27 maf, and 159 taf, respectively. For the Revised-Demand Future study (study 7) the respective deliveries are 4.13 maf. 3.14 maf, and 187 taf. Pursuant to the long-term water supply contracts as practiced in recent years, many of the contractors would carry over a portion of their allocated Table A deliveries during 1975 and 1976 to succeeding years. In the case of 1977, one can assume that up to 500 taf of 1976 Table A deliveries could be carried over to 1977. In addition, due to the slightly conservative delivery-carryover rule curve used in these studies, the minimum SWP storage in San Luis Reservoir for 1977, which occurs during the June-August period, averages about 190 taf for both studies 6 and 7. The minimum pool for the SWP share of San Luis Reservoir is just over 40 taf. In a year as critically dry as 1977, it is reasonable to assume an additional 150 taf would be made available for deliveries bringing the SWP storage in San Luis Reservoir to minimum pool. After August, the SWP storage in San Luis Reservoir begins to rise. It is reasonable to expect additional deliveries to also be made in the September-December period.

In summary, under the hydrologic conditions similar to a critically dry year like 1977, project deliveries can be expected to range from 4 or 5 to 20 percent of Table A, depending upon such factors as the delivery-carryover risk curve applied by SWP operators and Article 56 (carryover) deliveries.

Additional Analysis of Tables B-3 through B-9

Information on the average deliveries over the entire study period (1922-1994) and specific wet and dry periods is helpful in analyzing the delivery reliability of a specific water system receiving a portion of its water supply from the SWP. The series of data contained in tables B-3 through B-9 are also very helpful in analyzing longer periods of time that contain not only dry periods but wetter periods, which can replenish local water supplies if there is a place to store the supply. Analysis of this information can help determine if a local agency has adequate storage for capturing these supplies or if more storage could be utilized in the local water system.

Cited Reference

[DWR] California Department of Water Resources, Bay-Delta Office. 2003. The State Water Project Delivery Reliability Report 2002. Final.

Table B-3 SWP Water Delivery from Delta for Study 1 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of full Table A - 4.114 maf	Model Article 21 supply
1922	3,407	3,389	82%	175
1923	3,717	3,727	91%	143
1924	3,961	1,014	25%	0
1925	3,940	1,502	36%	0
1926	3,777	2,951	72%	0
1927	3,543	3,504	85%	220
1928	3,897	3,337	81%	155
1929	3,952	1,037	25%	0
1930	3,922	2,697	66%	92
1931	3,971	1,141	28%	0
1932	3,673	1,620	39%	199
1933	3,939	1,663	40%	134
1934	3,981	1,689	41%	0
1935	3,697	3,439	84%	81
1936	3,769	3,638	88%	0
1937	3,451	3,297	80%	87
1938	3,418	3,439	84%	470
1939	3,673	3,475	84%	227
1940	3,713	3,544	86%	102
1941	3,013	3,036	74%	100
1942	3,583	3,599	87%	513
1943	3,632	3,545	86%	447
1944	3,563	3,449	84%	0
1945	3,613	3,479	85%	136
1946	3,710	3,724	91%	3
1947	3,954	2,653	64%	0
1948	3,959	2,681	65%	2
1949	3,864	2,568	62%	2
1950	3,812	2,909	71%	0
1951	3,779	3,794	92%	311
1952	3,078	3,108	76%	103
1953	3,790	3,801	92%	272
1954	3,833	3,803	92%	98
1955	3,761	1,694	41%	0
1956	3,639	3,649	89%	261
1957	3,759	3,331	81%	96
1958	3,481	3,492	85%	441
1959	4,055	3,506	85%	265
1960	4,114	1,795	44%	0
1961	4,114	2,873	70%	0
1962	3,689	3,158	77%	21
1963	3,634	3,630	88%	223
1964	3,907	3,262	79%	5
1965	3,586	3,256	79%	98
1966	3,722	3,731	91%	147
1967	3,439	3,424	83%	497
1968	3,792	3,548	86%	402
1969	3,157	3,151	77%	100
1970	3,714	3,727	91%	406
1971	3,837	3,845	93%	0
1972	4,012	3,057	74%	2
1973	3,611	3,592	87%	261
1974	3,650	3,664	89%	297
1975	3,720	3,737	91%	415
1976	4,014	3,150	77%	110
1977	3,948	804	20%	0
1978	3,126	3,036	74%	100
1979	3,527	3,509	85%	140
1980	3,197	3,208	78%	100
1981	3,834	3,532	86%	124
1982	3,451	3,471	84%	386
1983	3,007	3,036	74%	200
1984	3,692	3,706	90%	408
1985	3,753	3,540	86%	0
1986	3,345	3,023	73%	51
1987	3,905	2,894	70%	0
1988	4,026	968	24%	0
1989	4,097	2,903	71%	0
1990	3,961	1,101	27%	0
1991	3,957	983	24%	0
1992	3,880	1,199	29%	0
1993	3,559	3,505	85%	133
1994	3,739	3,272	80%	9
Average	3,712	2,962	72%	134
Maximum	4,114	3,845	93%	513
Minimum	3,007	804	20%	0

14

Table B-4 SWP Water Delivery from Delta for Study 2 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of full Table A - 4.133 maf	Model Article 21 supply
1922	4,133	4,043	98%	0
1923	4,133	3,670	89%	0
1924	3,980	972	24%	0
1925	4,133	1,445	35%	0
1926	4,133	2,856	69%	113
1927	4,133	4,032	98%	124
1928	4,133	3,255	79%	3
1929	3,971	1,070	26%	0
1930	4,133	2,734	66%	27
1931	4,133	1,086	26%	0
1932	4,116	1,855	45%	39
1933	4,133	1,966	48%	6
1934	4,133	1,564	38%	0
1935	3,907	3,562	86%	59
1936	4,133	3,655	88%	5
1937	4,133	3,189	77%	65
1938	4,133	4,128	100%	192
1939	3,948	3,443	83%	1
1940	4,133	3,856	93%	22
1941	3,481	3,472	84%	0
1942	3,881	3,894	94%	378
1943	4,120	3,591	87%	375
1944	3,711	3,443	83%	2
1945	3,948	3,574	86%	123
1946	3,969	3,772	91%	0
1947	3,973	2,602	63%	0
1948	4,133	2,587	63%	2
1949	3,996	2,656	64%	0
1950	4,133	2,895	70%	0
1951	4,094	3,994	97%	230
1952	3,510	3,538	86%	100
1953	4,063	3,989	97%	236
1954	4,133	3,830	93%	6
1955	3,995	1,735	42%	0
1956	4,133	4,127	100%	129
1957	4,029	3,069	74%	3
1958	3,942	3,910	95%	335
1959	4,133	3,477	84%	167
1960	4,133	2,021	49%	0
1961	4,133	2,815	68%	0
1962	3,933	3,153	76%	2
1963	4,133	4,046	98%	134
1964	4,030	3,050	74%	0
1965	3,966	3,234	78%	3
1966	4,046	3,844	93%	61
1967	4,033	3,979	96%	167
1968	4,128	3,583	87%	398
1969	3,583	3,556	86%	93
1970	4,004	3,929	95%	398
1971	4,133	4,082	99%	0
1972	4,133	2,727	66%	0
1973	4,119	3,699	89%	211
1974	4,090	4,107	99%	147
1975	4,113	4,088	99%	209
1976	4,032	2,789	67%	0
1977	4,133	830	20%	0
1978	3,898	3,706	90%	100
1979	4,133	3,512	85%	89
1980	3,751	3,462	84%	74
1981	4,133	3,400	82%	0
1982	4,009	4,027	97%	101
1983	3,343	3,370	82%	200
1984	4,061	4,079	99%	379
1985	3,905	3,326	80%	0
1986	3,898	3,011	73%	52
1987	3,923	2,837	69%	0
1988	4,045	992	24%	0
1989	4,133	2,895	70%	0
1990	4,133	1,151	28%	0
1991	4,133	999	24%	0
1992	4,133	1,155	28%	0
1993	4,133	4,018	97%	156
1994	4,133	3,042	74%	0
Average	4,026	3,083	75%	78
Maximum	4,133	4,128	100%	398
Minimum	3,343	830	20%	0

15

Table B-5 SWP Water Delivery from Delta for Study 3 (taf)

Year	Model fixed Table A demand	Model Table A delivery	Percent of full Table A - 4.133 maf	Model Article 21 supply
1922	4,133	4,043	98%	0
1923	4,133	3,670	89%	0
1924	4,133	972	24%	0
1925	4,133	1,446	35%	0
1926	4,133	2,856	69%	113
1927	4,133	4,031	98%	124
1928	4,133	3,255	79%	3
1929	4,133	1,070	26%	0
1930	4,133	2,734	66%	27
1931	4,133	1,086	26%	0
1932	4,133	1,855	45%	39
1933	4,133	1,967	48%	6
1934	4,133	1,564	38%	0
1935	4,133	3,729	90%	59
1936	4,133	3,669	89%	0
1937	4,133	3,165	77%	71
1938	4,133	4,129	100%	197
1939	4,133	3,444	83%	1
1940	4,133	3,856	93%	22
1941	4,133	4,084	99%	0
1942	4,133	4,122	100%	75
1943	4,133	3,584	87%	318
1944	4,133	3,465	84%	3
1945	4,133	3,547	86%	123
1946	4,133	3,801	92%	0
1947	4,133	2,597	63%	0
1948	4,133	2,586	63%	2
1949	4,133	2,654	64%	0
1950	4,133	2,893	70%	0
1951	4,133	3,996	97%	222
1952	4,133	4,133	100%	14
1953	4,133	3,931	95%	244
1954	4,133	3,860	93%	33
1955	4,133	1,779	43%	0
1956	4,133	4,126	100%	111
1957	4,133	3,067	74%	3
1958	4,133	4,063	98%	306
1959	4,133	3,467	84%	97
1960	4,133	2,007	49%	0
1961	4,133	2,818	68%	0
1962	4,133	3,153	76%	2
1963	4,133	4,046	98%	134
1964	4,133	3,050	74%	0
1965	4,133	3,233	78%	3
1966	4,133	3,853	93%	56
1967	4,133	4,069	98%	115
1968	4,133	3,584	87%	398
1969	4,133	4,078	99%	13
1970	4,133	3,933	95%	358
1971	4,133	4,082	99%	0
1972	4,133	2,725	66%	0
1973	4,133	3,699	89%	211
1974	4,133	4,133	100%	143
1975	4,133	4,102	99%	211
1976	4,133	2,775	67%	0
1977	4,133	830	20%	0
1978	4,133	3,915	95%	100
1979	4,133	3,493	85%	98
1980	4,133	3,465	84%	75
1981	4,133	3,387	82%	0
1982	4,133	4,133	100%	63
1983	4,133	4,133	100%	160
1984	4,133	4,101	99%	369
1985	4,133	3,322	80%	0
1986	4,133	3,006	73%	62
1987	4,133	2,835	69%	0
1988	4,133	993	24%	0
1989	4,133	2,895	70%	0
1990	4,133	1,151	28%	0
1991	4,133	999	24%	0
1992	4,133	1,155	28%	0
1993	4,133	4,018	97%	156
1994	4,133	3,042	74%	0
Average	4,133	3,130	76%	68
Maximum	4,133	4,133	100%	398
Minimum	4,133	830	20%	0

16

Table B-6 SWP Water Delivery from Delta for Study 4 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of full Table A - 4.114 maf	Model Article 21 supply
1922	3,407	3,412	83%	166
1923	3,717	3,719	90%	37
1924	3,961	922	22%	0
1925	3,940	1,867	45%	0
1926	3,777	3,005	73%	101
1927	3,543	3,542	86%	196
1928	3,897	3,455	84%	144
1929	3,952	1,069	26%	0
1930	3,922	2,859	69%	134
1931	3,971	948	23%	0
1932	3,673	1,346	33%	266
1933	3,939	1,260	31%	398
1934	3,981	1,495	36%	214
1935	3,697	3,698	90%	174
1936	3,769	3,782	92%	51
1937	3,451	3,335	81%	62
1938	3,418	3,426	83%	534
1939	3,673	3,441	84%	268
1940	3,713	3,725	91%	103
1941	3,013	3,028	74%	100
1942	3,583	3,595	87%	621
1943	3,632	3,626	88%	432
1944	3,563	3,581	87%	0
1945	3,613	3,626	88%	123
1946	3,710	3,723	90%	0
1947	3,954	2,982	72%	0
1948	3,959	2,928	71%	0
1949	3,864	2,151	52%	0
1950	3,812	3,273	80%	0
1951	3,779	3,795	92%	260
1952	3,078	3,100	75%	100
1953	3,790	3,806	92%	379
1954	3,833	3,850	94%	131
1955	3,761	1,798	44%	0
1956	3,639	3,659	89%	328
1957	3,759	3,640	88%	131
1958	3,481	3,494	85%	484
1959	4,055	3,506	85%	263
1960	4,114	1,835	45%	0
1961	4,114	2,564	62%	251
1962	3,689	3,310	80%	0
1963	3,634	3,647	89%	170
1964	3,907	3,477	85%	0
1965	3,586	3,315	81%	94
1966	3,722	3,734	91%	262
1967	3,439	3,446	84%	531
1968	3,792	3,579	87%	396
1969	3,157	3,173	77%	100
1970	3,714	3,730	91%	398
1971	3,837	3,845	93%	0
1972	4,012	3,176	77%	0
1973	3,611	3,628	88%	262
1974	3,650	3,665	89%	291
1975	3,720	3,732	91%	497
1976	4,014	3,234	79%	145
1977	3,948	165	4%	0
1978	3,126	3,138	76%	150
1979	3,527	3,538	86%	262
1980	3,197	3,213	78%	100
1981	3,834	3,612	88%	279
1982	3,451	3,466	84%	446
1983	3,007	3,020	73%	200
1984	3,692	2,815	68%	401
1985	3,753	3,606	88%	0
1986	3,345	2,895	70%	57
1987	3,905	2,775	67%	396
1988	4,026	534	13%	0
1989	4,097	3,460	84%	77
1990	3,961	925	22%	0
1991	3,957	834	20%	0
1992	3,880	1,443	35%	29
1993	3,559	3,571	87%	160
1994	3,739	3,500	85%	0
Average	3,712	2,973	72%	166
Maximum	4,114	3,850	94%	621
Minimum	3,007	165	4%	0

Table B-7 SWP Water Delivery from Delta for Study 5 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of full Table A - 4.133 maf	Model Article 21 supply
1922	4,133	4,133	100%	0
1923	4,133	3,935	95%	0
1924	3,980	617	15%	0
1925	4,133	1,717	42%	120
1926	4,133	2,751	67%	147
1927	4,133	4,133	100%	215
1928	4,133	3,388	82%	0
1929	3,971	1,105	27%	0
1930	4,133	2,824	68%	70
1931	4,133	1,087	26%	0
1932	4,116	1,598	39%	72
1933	4,133	1,554	38%	398
1934	4,133	1,585	38%	132
1935	3,907	3,908	95%	134
1936	4,133	3,829	93%	0
1937	4,133	3,388	82%	10
1938	4,133	4,133	100%	226
1939	3,948	3,510	85%	0
1940	4,133	4,133	100%	44
1941	3,481	3,492	84%	0
1942	3,881	3,890	94%	495
1943	4,120	3,822	92%	364
1944	3,711	3,546	86%	0
1945	3,948	3,911	95%	82
1946	3,969	3,674	89%	0
1947	3,973	3,041	74%	0
1948	4,133	3,024	73%	0
1949	3,996	2,023	49%	0
1950	4,133	3,325	80%	0
1951	4,094	4,113	100%	176
1952	3,510	3,525	85%	50
1953	4,063	4,075	99%	298
1954	4,133	4,133	100%	0
1955	3,995	1,468	36%	0
1956	4,133	4,133	100%	281
1957	4,029	3,487	84%	0
1958	3,942	3,953	96%	220
1959	4,133	3,811	92%	210
1960	4,133	1,743	42%	0
1961	4,133	2,799	68%	82
1962	3,933	3,369	82%	0
1963	4,133	4,133	100%	73
1964	4,030	3,102	75%	0
1965	3,966	3,396	82%	0
1966	4,046	4,055	98%	210
1967	4,033	4,044	98%	125
1968	4,128	3,819	92%	379
1969	3,583	3,596	87%	74
1970	4,004	4,017	97%	388
1971	4,133	4,133	100%	0
1972	4,133	2,766	67%	0
1973	4,119	4,029	97%	190
1974	4,090	4,102	99%	0
1975	4,113	4,126	100%	141
1976	4,032	3,315	80%	0
1977	4,133	187	5%	0
1978	3,898	3,907	95%	150
1979	4,133	3,798	92%	83
1980	3,751	3,557	86%	41
1981	4,133	3,777	91%	51
1982	4,009	4,021	97%	118
1983	3,343	3,355	81%	200
1984	4,061	2,859	69%	401
1985	3,905	3,696	89%	0
1986	3,898	2,940	71%	32
1987	3,923	3,332	81%	140
1988	4,045	461	11%	0
1989	4,133	3,538	86%	69
1990	4,133	1,019	25%	0
1991	4,133	926	22%	0
1992	4,133	1,437	35%	0
1993	4,133	4,133	100%	112
1994	4,133	3,130	76%	0
Average	4,026	3,156	76%	93
Maximum	4,133	4,133	100%	495
Minimum	3,343	187	5%	0

18

Table B-8 SWP Water Delivery from Delta for Study 6 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of full Table A - 4.112 maf	Model Article 21 supply
1922	3,750	3,743	91%	104
1923	3,251	3,251	79%	106
1924	3,489	1,244	30%	0
1925	3,353	1,870	45%	0
1926	3,393	2,981	72%	54
1927	3,860	3,845	93%	213
1928	3,458	3,384	82%	134
1929	2,907	1,108	27%	0
1930	3,326	2,855	69%	117
1931	2,933	1,018	25%	0
1932	3,139	1,406	34%	242
1933	3,427	1,330	32%	512
1934	3,470	1,541	37%	206
1935	3,798	3,769	92%	229
1936	3,596	3,573	87%	0
1937	3,492	3,362	82%	80
1938	3,344	3,344	81%	714
1939	3,262	3,262	79%	349
1940	3,239	3,219	78%	154
1941	2,526	2,527	61%	246
1942	3,167	3,167	77%	918
1943	3,104	3,104	75%	623
1944	3,090	3,091	75%	0
1945	3,112	3,101	75%	359
1946	3,215	3,215	78%	249
1947	3,422	3,292	80%	0
1948	3,395	2,942	72%	0
1949	3,313	2,264	55%	0
1950	3,465	3,199	78%	0
1951	3,497	3,497	85%	388
1952	2,585	2,588	63%	275
1953	3,323	3,323	81%	513
1954	3,294	3,294	80%	523
1955	3,228	2,207	54%	0
1956	3,581	3,586	87%	324
1957	3,235	3,235	79%	257
1958	2,980	2,980	72%	1,106
1959	3,547	3,480	85%	366
1960	3,555	1,865	45%	0
1961	3,580	2,659	65%	97
1962	3,690	3,262	79%	0
1963	3,823	3,818	93%	202
1964	3,492	3,323	81%	0
1965	3,059	3,059	74%	177
1966	3,282	3,282	80%	518
1967	2,950	2,946	72%	923
1968	3,324	3,329	81%	552
1969	2,636	2,632	64%	275
1970	3,257	3,257	79%	552
1971	3,341	3,341	81%	0
1972	3,457	3,342	81%	414
1973	3,097	3,092	75%	384
1974	3,184	3,184	77%	854
1975	3,229	3,229	79%	903
1976	3,471	3,265	79%	189
1977	3,421	159	4%	0
1978	3,623	3,603	88%	300
1979	3,512	3,501	85%	160
1980	2,715	2,709	66%	138
1961	3,358	3,358	82%	546
1982	2,890	2,890	70%	801
1983	2,497	2,498	61%	400
1984	3,227	2,766	67%	552
1985	3,214	3,214	78%	0
1986	2,321	2,297	56%	120
1987	2,896	2,896	70%	546
1988	2,967	856	21%	0
1989	3,551	3,174	77%	0
1990	3,628	1,099	27%	0
1991	3,425	1,052	26%	0
1992	3,366	1,426	35%	0
1993	3,862	3,848	94%	159
1994	3,689	3,306	80%	0
Average	3,290	2,818	69%	262
Maximum	3,862	3,848	94%	1,106
Minimum	2,321	159	4%	0

Table B-9 SWP Water Delivery from Delta for Study 7 (taf)

Year	Model variable Table A demand	Model Table A delivery	Percent of full Table A - 4.133 maf	Model Article 21 supply
1922	4,133	4,133	100%	21
1923	4,133	4,133	100%	0
1924	4,133	382	9%	0
1925	4,133	1,491	36%	190
1926	4,133	2,721	66%	279
1927	4,133	4,133	100%	301
1928	4,133	3,379	82%	0
1929	4,133	1,118	27%	0
1930	4,133	2,738	66%	141
1931	4,133	1,072	26%	0
1932	4,133	1,572	38%	112
1933	4,133	1,337	32%	547
1934	4,133	1,471	36%	242
1935	4,133	4,061	98%	218
1936	4,133	3,729	90%	0
1937	4,133	3,369	82%	70
1938	4,133	4,133	100%	200
1939	4,133	3,450	83%	0
1940	4,133	4,116	100%	114
1941	3,898	3,908	95%	0
1942	4,133	4,133	100%	123
1943	4,133	3,787	92%	487
1944	4,133	3,542	86%	0
1945	4,133	3,889	94%	118
1946	4,133	3,828	93%	0
1947	4,133	2,771	67%	0
1948	4,133	2,940	71%	0
1949	4,133	2,025	49%	0
1950	4,133	3,400	82%	0
1951	4,133	4,133	100%	252
1952	3,898	3,912	95%	0
1953	4,133	4,133	100%	296
1954	4,133	4,133	100%	0
1955	4,133	1,505	36%	0
1956	4,133	4,133	100%	352
1957	4,133	3,565	86%	0
1958	4,133	4,133	100%	229
1959	4,133	3,787	92%	107
1960	4,133	1,607	39%	0
1961	4,133	2,712	66%	299
1962	4,133	3,311	80%	1
1963	4,133	4,133	100%	161
1964	4,133	2,889	70%	0
1965	4,133	3,465	84%	47
1966	4,133	4,133	100%	178
1967	4,133	4,133	100%	157
1968	4,133	3,797	92%	465
1969	3,898	3,910	95%	63
1970	4,133	4,122	100%	493
1971	4,133	4,133	100%	0
1972	4,133	2,721	66%	0
1973	4,133	4,032	98%	259
1974	4,133	4,133	100%	69
1975	4,133	4,133	100%	134
1976	4,133	3,137	76%	0
1977	4,133	187	5%	0
1978	3,898	3,902	94%	300
1979	4,133	3,773	91%	144
1980	3,898	3,513	85%	86
1981	4,133	3,797	92%	71
1982	4,133	4,133	100%	171
1983	3,898	3,909	95%	357
1984	4,133	4,133	100%	490
1985	4,133	3,413	83%	0
1986	3,898	2,857	69%	83
1987	4,133	3,307	80%	183
1988	4,133	423	10%	0
1989	4,133	3,513	85%	91
1990	4,133	855	21%	0
1991	4,133	850	21%	0
1992	4,133	1,461	35%	102
1993	4,133	4,133	100%	255
1994	4,133	3,153	76%	0
Average	4,110	3,178	77%	124
Maximum	4,133	4,133	100%	547
Minimum	3,898	187	5%	0