CHAPTER VII. WATER SUPPLY IMPACTS OF PREFERRED ALTERNATIVE

This chapter presents the analysis of the preferred alternative's water supply impacts compared to those of the D-1485 base case. No inference should be made from this analysis regarding distribution of water supply impacts to specific water users. The SWRCB has not determined who will share in that responsibility, or how the impacts will be allocated. In this analysis, the SWP and the CVP are used as surrogates in order to determine the overall water supply impacts of the preferred alternative. The allocation process will be the subject of a water rights proceeding which will commence following adoption of the plan.

The water supply impacts of the preferred alternative are evaluated with the DWR's Planning Simulation Model, DWRSIM, by comparing the modeled results from the D-1485 base case study with the results from the preferred alternative study[1]. The D-1485 base case is described on page VII-5. The modeled impacts represent the overall impacts of replacing one set of objectives with another. Complete characterization of the water supply impacts requires consideration of three components: total export reductions, Sacramento River Basin storage changes, and San Joaquin River Basin water supply impacts. Table VII-1 provides a summary of water supply impacts for the preferred alternative relative to the base case. Export levels and reservoir storage are also discussed in Chapter VIII as a component of the environmental impact analysis.

A. MODELING ASSUMPTIONS (DWR 1994, 1995a)

This section discusses the major assumptions and operations criteria used in the model. A description of these and additional DWRSIM assumptions has been prepared by the DWR (DWR 1995a).

Hydrology. DWRSIM operates on a monthly time basis and uses the historical 71-year hydrologic sequence of flows from water years 1922 through 1992, with 1995 level hydrology and upstream depletions based on land use projections from DWR Bulletin 160-93.

Water Year Classification. Unless specified otherwise, the 60-20-20 San Joaquin Valley water year hydrologic classification system applies to all San Joaquin River flow requirements, and the 40-30-30 Sacramento Valley water year hydrologic classification system applies to all other objectives. These hydrologic classification systems are described in Chapter II.

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[1] Modeled conditions under the base case and preferred alternative are obtained from preliminary DWRSIM operation studies conducted by the DWR to assess the impacts of the draft plan of December 15, 1994 (Studies 1995c6b-MONTERY-412 and 1995c6b-SWRCB-409.MONT, respectively)

TABLE VII-1
Water Supply Impacts of the Preferred Alternative
Relative to the D-1485 Base Case
(TAF per year)

COMPONENT	Critically Dry Period Average (May 1928 - Oct 1934)	71-Year Average (1922 - 1992)
Annual exports (CVP, SWP, Contra Costa, North Bay)	-816	-229
Adjustment for upstream reservoir storage used	-32	NA
Adjustment for additional flows in excess of New Melones releases needed to meet San Joaquin River requirements	-139	-71
Average annual carryover storage in Sacramento River Basin	NA	17
Average annual carryover storage in New Melones Reservoir	NA	-666

Export Demand. Table VII-2 shows the 1995 level CVP export demand used in DWRSIM. Maximum SWP contractor demand in DWRSIM varies in response to local wetness indices, as shown in Table VII-3. In wetter years, San Joaquin Valley agricultural contractors receive reduced deliveries based on a wetness index developed from annual Kern River inflows to Lake Isabella. Similarly, the Metropolitan Water District (MWD) of Southern California receives reduced deliveries based on a 10-station southern California 2-year average precipitation index. Total SWP demand ranges from 2.619 MAF in wet years to 3.574 MAF in dry years, and total combined CVP and SWP demand ranges from 5.914 MAF to 6.869 MAF, respectively. Figure VII-1, on page VII-7, shows the frequency of maximum combined CVP and SWP demand used in DWRSIM over the historical 71-year hydrologic period.

CVP and SWP Sharing Formula. CVP and SWP sharing of responsibility for the coordinated operation of the two projects is maintained per the COA. Storage withdrawals for in-basin use are split 75 percent CVP and 25 percent SWP, and surplus flows are split 55 percent CVP and 45 percent SWP. The preferred alternative includes exports restrictions based on percent of Delta inflow diverted. Sharing of responsibility for these new standards is not specified under the present COA. An arbitrary sharing ratio of 50 percent CVP and 50 percent SWP is used whenever these export restrictions are controlling.

SWP Monterey Agreement. The Monterey Agreement between the State Water Contractors and the DWR is a set of principles which address various SWP administrative and operational issues, including amending SWP contracts to provide that all future allocations of project water from existing project facilities be based on entitlements, irrespective of type of use. The principles do not affect the annual SWP export amount, but will determine how that total amount is allocated among the SWP contractors and how contractors may manage that water once it is allocated to them.

SWP and CVP Pumping. The SWP Banks Pumping Plant's average monthly capacity with four new pumps is 6,680 cfs (or 8,500 cfs in some winter months) in accordance with the USCOE permit criteria. The CVP Tracy Pumping Plant's capacity is 4,600 cfs. However, constraints along the Delta-Mendota Canal and at the relift pumps to O'Neill Forebay restrict export capacity to 4,200 cfs during many months.

DWRSIM includes wheeling of CVP water through SWP facilities to San Luis Reservoir. When there is unused pumping capacity available at the Banks Pumping Plant, the study allows CVP wheeling as needed to meet only Cross Valley Canal demands.

San Joaquin River Flow Requirements. DWRSIM makes releases from New Melones Reservoir to meet flow requirements on the San Joaquin River. If there is insufficient water in New Melones to meet all of the requirements, the model obtains additional water from unspecified sources.

TABLE VII-2 1995 Level CVP Demand	
CVP UNIT	**TAF/year**
Contra Costa Canal	145
Delta-Mendota Canal and Exchange	1,496
CVP San Luis Unit	1,447
San Felipe Unit	135
Cross Valley Canal	72
TOTAL CVP DELTA DEMAND	**3,295**

TABLE VII-3 1995 Level SWP Demand				
MAXIMUM SWP DELIVERY	**DRY YEARS**	**AVERAGE YEARS**	**ABOVE AVERAGE YEARS**	**WET YEARS**
Kern River Flow (TAF)	<1,000	<1,000	1,000-1,400	>1,400
Maximum SWP Agriculture Delivery (TAF)	1,220	1,220	1,100	915
Southern California Precipitation (inches/yr)	<15	15-17.9	18-20.9	≥21
Maximum MWD Delivery (TAF)	1,450	1,200	900	800
Maximum Other SWP M&I Delivery (TAF)	840	840	840	840
Fixed Losses & Recreation (TAF)	64	64	64	64
TOTAL SWP DELTA DEMAND (TAF)	**3,574**			**2,619**

San Joaquin River Water Quality Objectives at Vernalis. After flow requirements on the San Joaquin River are met, DWRSIM obtains additional water releases from New Melones Reservoir, up to a maximum amount of 70 TAF per year, when necessary to meet water quality objectives at Vernalis.

Base Case. The base case for this analysis is D-1485 conditions, modified to account for upstream requirements on the Sacramento River imposed by the NMFS to protect winter-run chinook salmon. This base case was selected, even though the NMFS biological opinion has been in effect since 1992, because (1) the principal biological decline occurred under D-1485 regulatory conditions; (2) the objectives in the plan are intended to provide reasonable protection to all aquatic resources, including endangered species; (3) the preferred alternative, when compared with this base, shows the maximum reduction in exports of water from the Delta[2]; and (4) this base represents the SWRCB's currently implemented regulatory requirements that impact Bay-Delta water supplies. The following conditions define the base case for DWRSIM studies:

i) Delta conditions must satisfy D-1485 requirements.

ii) End-of-water-year (September 30) carryover storage in Shasta Reservoir must be maintained at 1.9 MAF in all but some critical years to provide suitable temperature conditions in the upper Sacramento River during the winter-run chinook salmon spawning and incubation period.

iii) New Trinity River minimum fish flows below Lewiston Dam are maintained per the May 1991 agreement between the USBR and the USFWS.

iv) Sacramento River minimum fish flows below Keswick Dam are maintained per the agreement between the USBR and the DFG, revised in October 1981.

v) Feather River fish flows are maintained per the August 26, 1983 agreement between the DWR and the DFG.

vi) Lower American River minimum fish and recreation flows are based on the available storage in Folsom Lake per USBR operation criteria.

vii) Stanislaus River minimum fish flows below New Melones vary based on storage levels, in accordance with Water Right Decision 1422 (D-1422) and the interim agreement of June 1987 between the USBR and the DFG.

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[2] Actions under the federal ESA have impacted water supplies to a similar extent as the preferred alternative. If the preferred alternative were compared with the more recent actions by other agencies, the comparison would show no measurable impact on water supplies.

B. TOTAL EXPORTS

For the water supply impact analysis in this section, total exports include SWP Banks Pumping Plant exports, CVP Tracy Pumping Plant exports, Contra Costa Canal exports, North Bay Aqueduct exports, and the City of Vallejo's diversions. Figure VII-2 shows average annual exports under the base case and the preferred alternative by water year type, with 71-year (1922-1992) and critically dry period (May 1928-October 1934) averages. Under the preferred alternative, average annual exports for individual water year types range from a wet-year average of 6.47 MAF to a critical-year average of 4.21 MAF. The 71-year average annual exports under the preferred alternative is 5.89 MAF, while the critically dry period average is 4.33 MAF.

Figure VII-3 shows the average annual change in exports from the base case. Under the preferred alternative, exports are increased by 110 TAF in wet years, and are decreased by 37 TAF in above normal years, 232 TAF in below normal years, 477 TAF in dry years, and 668 TAF in critical years. In wet years, individual annual impacts on exports range from an increase of 723 TAF to a reduction of 572 TAF; in above normal years, from an increase of 162 TAF to a reduction of 284 TAF; in below normal years, from an increase of 96 TAF to a reduction of 715 TAF; in dry years, from reductions of 218 TAF to 1,131 TAF; and in critical years, from reductions of 92 TAF to 988 TAF. Over the 71-year hydrologic period, the average annual export reduction is 229 TAF. For the critically dry period, annual exports are reduced by an average of 816 TAF under the preferred alternative. The maximum impact occurs in 1930, a dry year, when annual exports under the preferred alternative are reduced by 1.13 MAF from the base case.

Figure VII-4 shows the frequencies of exports over the 71-year hydrologic period under the base case and the preferred alternative. In 63 percent of years, annual exports under the preferred alternative would be at or above the 71-year average of 5.89 MAF. The minimum export in any one year is 3.21 MAF in 1977, while the maximum is 7.46 MAF in 1982.

C. SACRAMENTO RIVER BASIN STORAGE

To determine the effect of the preferred alternative on reservoir storage in the Sacramento River Basin, end-of-September carryover storage under the preferred alternative was compared to that of the base case. Reservoirs included in this analysis are the CVP's Clair Engle, Whiskeytown, Shasta, and Folsom reservoirs, and the SWP's Oroville Reservoir. The total storage capacity of these reservoirs is 11.7 MAF.

Under the preferred alternative, the 71-year average carryover storage in CVP reservoirs increased by 80 TAF from the base case; while that of the SWP's Oroville Reservoir decreased by 63 TAF. Combined, the 71-year average carryover storage in the Sacramento River Basin increased by 17 TAF under the preferred alternative.

FIGURE VII-1
FREQUENCY OF MAXIMUM SWP & CVP DEMAND
USED IN DWRSIM STUDIES OVER 71-YEAR HYDROLOGY

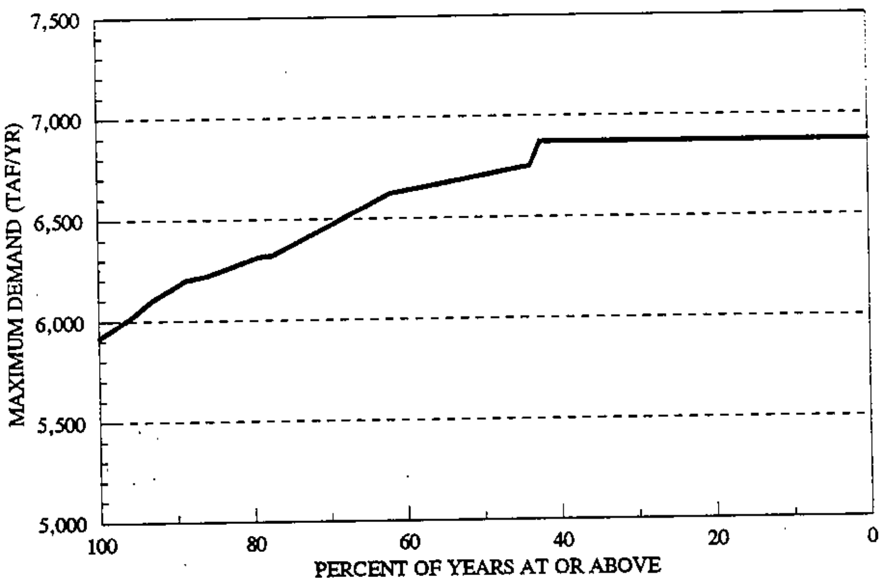
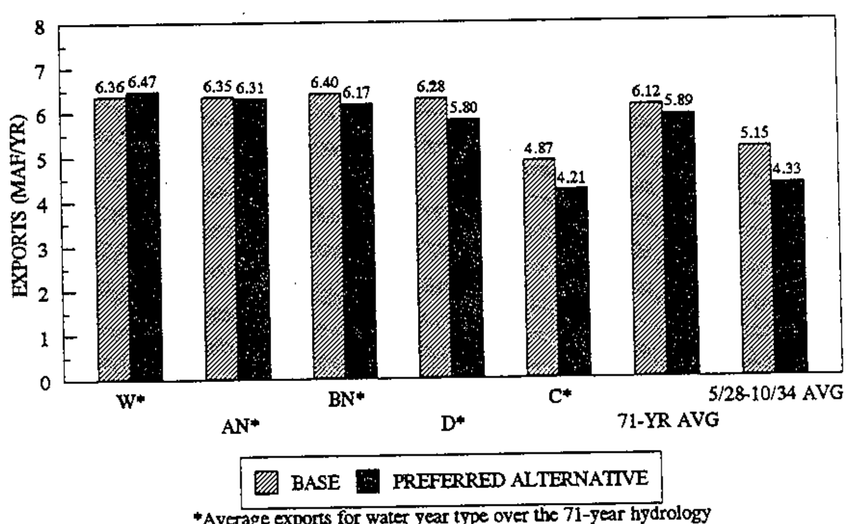
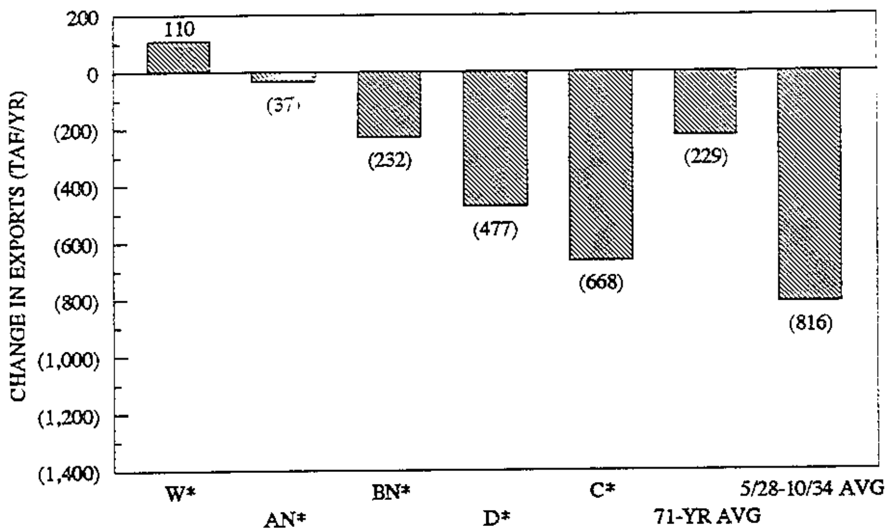


FIGURE VII-2
COMPARISON OF AVERAGE ANNUAL EXPORTS
BETWEEN BASE CASE AND PREFERRED ALTERNATIVE



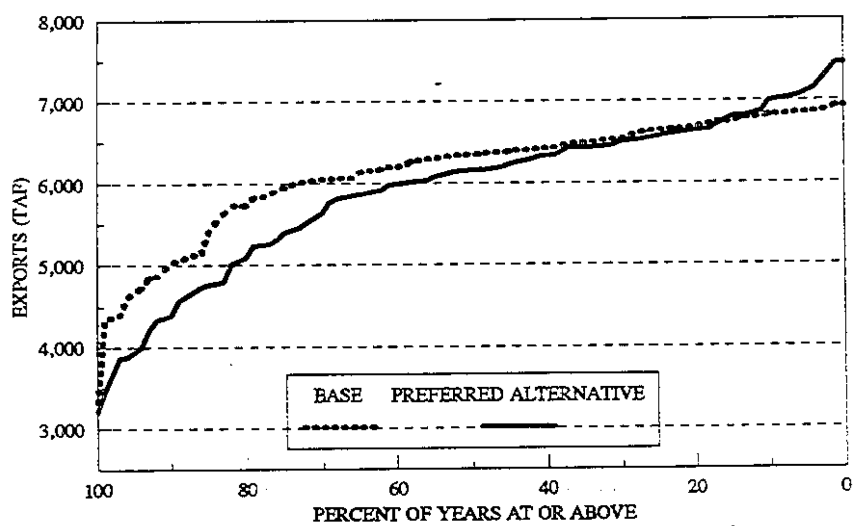
*Average exports for water year type over the 71-year hydrology
Exports include Banks, Tracy, Contra Costa and North Bay/Vallejo diversions.

FIGURE VII-3
AVERAGE ANNUAL CHANGE IN EXPORTS
UNDER PREFERRED ALTERNATIVE FROM BASE CASE



*Average change in exports for water year type over the 71-year hydrology
Exports include Banks, Tracy, Contra Costa and North Bay/Vallejo diversions.

FIGURE VII-4
FREQUENCY OF ANNUAL EXPORTS
OVER 71-YEAR HYDROLOGY



Exports include Banks, Tracy, Contra Costa and North Bay/Vallejo diversions

Figure VII-5 shows the average carryover storage in Sacramento River Basin reservoirs. For the 71-year hydrology, average carryover storage under the preferred alternative is increased by 174 TAF in wet years and is decreased by 2 TAF, 26 TAF, 30 TAF, and 146 TAF in above normal, below normal, dry, and critical water years, respectively, from the base case. Figure VII-6 shows the frequency of upstream carryover storage volume over the 71-year hydrology under the base case and the preferred alternative. In 51 percent of years, carryover storage under the preferred alternative would be at or above the 71-year average of 7.23 MAF per year. Under the preferred alternative, the minimum carryover storage in any one year is 2.44 MAF in 1922, while the maximum is 10.5 MAF in 1983.

For the critically dry period, the impact on storage for upstream reservoirs in the Sacramento River Basin and New Melones Reservoir in the San Joaquin River Basin is characterized as the net change in upstream storage between the preferred alternative and the base case. The change in storage for each case is derived by subtracting storage at the end of October 1934 from storage at the beginning of May 1928, dividing by 6.5 for an annual average, and subtracting losses due to evaporation. The changes in upstream storage are 1,208 TAF under the base case, and 1,240 TAF under the preferred alternative. Therefore, under the preferred alternative, there is a net reservoir storage decrease of 32 TAF from the base case.

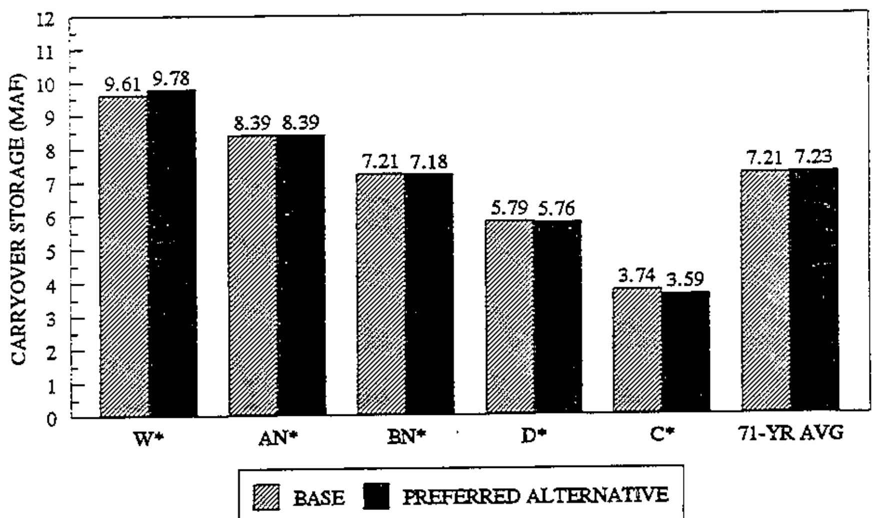
D. SAN JOAQUIN RIVER BASIN

DWRSIM does not model the San Joaquin River Basin in the same detail as the Sacramento River Basin. Reservoirs on the Merced and Tuolumne rivers are not modeled; instead, a base flow on the San Joaquin River upstream of the Stanislaus River is assumed. Consequently, the water supply impacts of the preferred alternative are less certain in the San Joaquin River Basin.

The model analysis of salinity objectives on the San Joaquin River at Vernalis assumes that salinity will be controlled by releases from New Melones Reservoir exclusively, and that releases from New Melones for this purpose would be limited to no more than 70 TAF annually. The first assumption is based on requirements in D-1422, which sets the water right terms for the operation of New Melones. D-1422 requires New Melones releases for salinity control at Vernalis. The second assumption is not based on any legal limits. D-1422 does not limit the amount of reservoir water that should be allocated for salinity control. However, the assumption of a cap is reasonable because salinity control over the long term is unlikely to be achieved exclusively through releases of high quality water from upstream reservoirs. Additional measures, including control of saline discharges and discharge of saline water to a salt sink, must also be considered. The SWRCB will consider the issue of salinity control at Vernalis during the water right phase of the proceedings.

There are two limiting cases for characterizing the water supply impact of new flow objectives at Vernalis on the San Joaquin River Basin. The first limiting case assumes that the water necessary to achieve the objectives is obtained by reducing storage in San Joaquin Valley reservoirs. The second limiting case assumes that the water is obtained by reducing

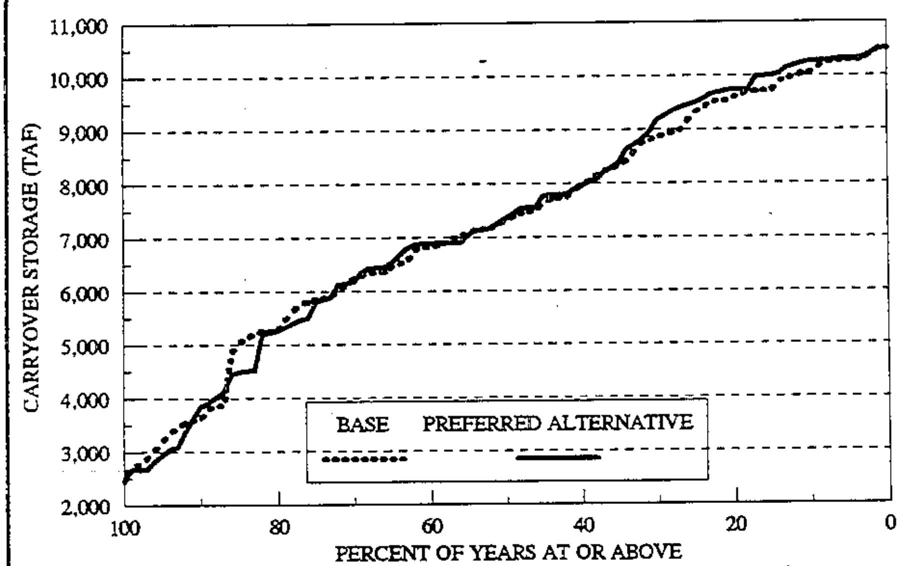
FIGURE VII-5
AVERAGE END-OF-SEPTEMBER CARRYOVER STORAGE IN SACRAMENTO RIVER BASIN RESERVOIRS



Includes Clair Engle, Whiskeytown, Shasta, Oroville and Folsom Reservoirs

*Average carryover storage for water year type over 71-year hydrology

FIGURE VII-6
FREQUENCY OF CARRYOVER STORAGE IN SACRAMENTO RIVER BASIN OVER 71-YEAR HYDROLOGY



Includes Clair Engle, Whiskeytown, Shasta, Oroville and Folsom Reservoirs deliveries to customers in the basin, with reservoir storage unchanged from the base case. In actuality, water users are likely to meet the requirements through a combination of these two measures.

For modeling purposes, the DWR was requested to model the first limiting case by assuming that all water in the San Joaquin River Basin necessary to meet the requirements of the plan be released from New Melones Reservoir, and that any flow requirements in excess of New Melones capacity be identified as "additional flows in excess of New Melones releases" required on the San Joaquin River. The purpose of this request was to use New Melones as a surrogate for total possible storage reductions on the San Joaquin River. The output from this study can also be used to analyze the second limiting case by comparing the additional flow required on the San Joaquin River at Vernalis between the base case and the preferred alternative. The results of these analyses are discussed below.

1. New Melones Reservoir Carryover Storage

New Melones Reservoir has a storage capacity of 2.4 MAF. DWRSIM results indicate that, under the preferred alternative, in 20 years, water in excess of New Melones releases is required to meet the Vernalis flow requirements. The average annual additional flows in excess of New Melones releases required is 71 TAF over the 71-year hydrology, and 139 TAF during the critically dry period.

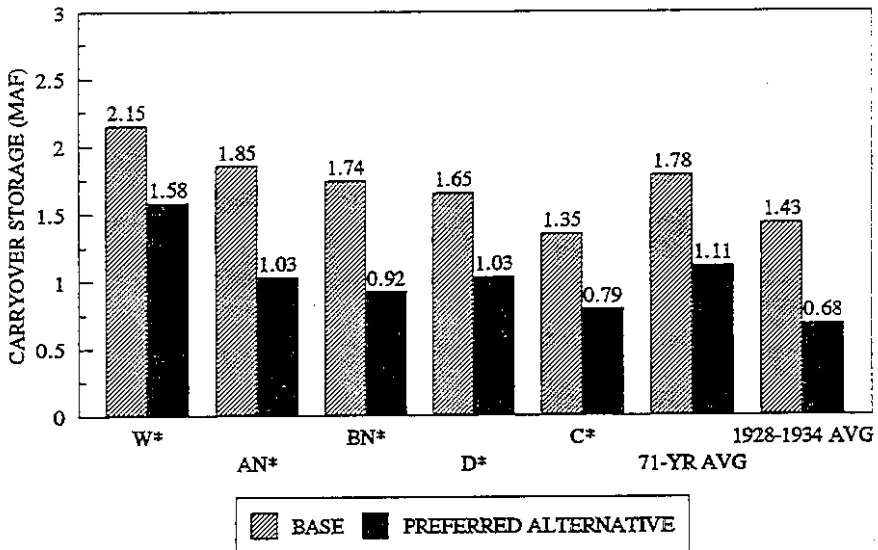
Figure VII-7 shows the average end-of-September carryover storage in New Melones. For the 71-year hydrology, average carryover storage under the preferred alternative is reduced by 562 TAF, 822 TAF, 828 TAF, 618 TAF, and 558 TAF in wet, above normal, below normal, dry, and critical years, respectively. The average annual storage reduction over the 71-year period is 666 TAF, and the reduction during the 1928-1934 period is 755 TAF.

Figure VII-8 shows frequencies of carryover storage volume in New Melones over the 71-year hydrology under the base case and the preferred alternative. In 45 percent of years, carryover storage under the preferred alternative would be at or above the 71-year average of 1.11 MAF. The minimum carryover storage under the proposed objectives is 300 TAF in 1934, while the maximum is 2.27 MAF which occurs in 1969, 1982, and 1983.

2. San Joaquin River Flow

The preferred alternative specifies minimum flow requirements on the San Joaquin River at Vernalis from February through June, and in October. As shown in Figure VII-9, over the 71-year hydrology, the preferred alternative requires, on average, additional flows from the base case of 3.4 TAF in February, 19.9 TAF in March, 90.7 TAF in April, 91.1 TAF in May, 19.8 TAF in June, and 16.3 TAF in October. Incidentally, the additional flows in February through June also provide water for meeting the San Joaquin River salinity objectives in these months. Thus, the balance of the 70 TAF required from New Melones for salinity control is shifted to later in the year. As result, Figure VII-9 shows additional

FIGURE VII-7
AVERAGE END-OF-SEPTEMBER CARRYOVER STORAGE
IN NEW MELONES RESERVOIR



*Average carryover storage for water year type over 71-year hydrology

FIGURE VII-8
FREQUENCY OF CARRYOVER STORAGE
IN NEW MELONES OVER 71-YEAR HYDROLOGY

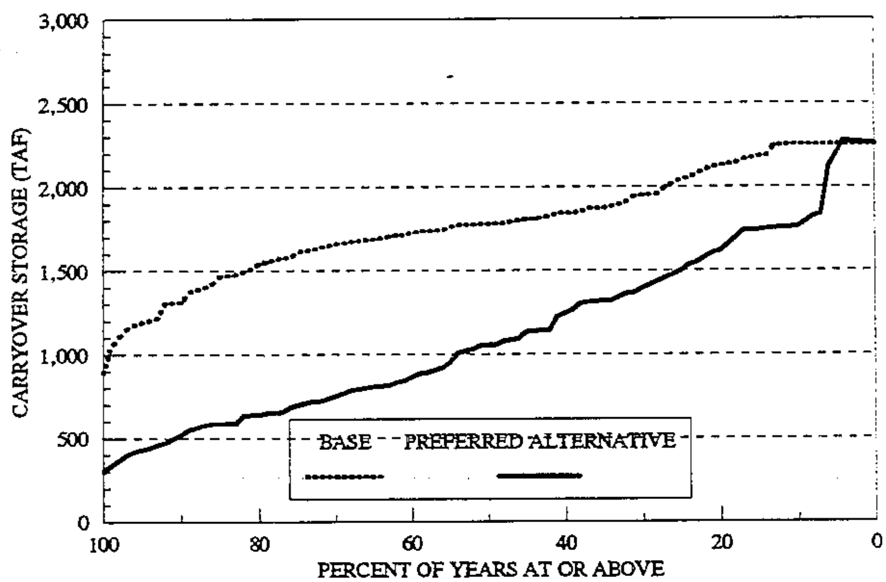


FIGURE VII-9
AVERAGE MONTHLY ADDITIONAL SAN JOAQUIN RIVER FLOW UNDER PREFERRED ALTERNATIVE FROM BASE CASE

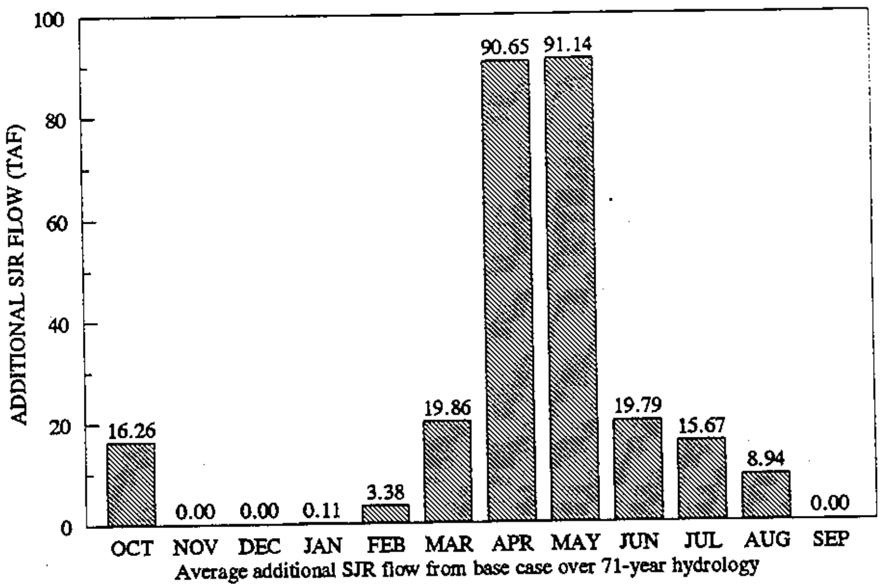
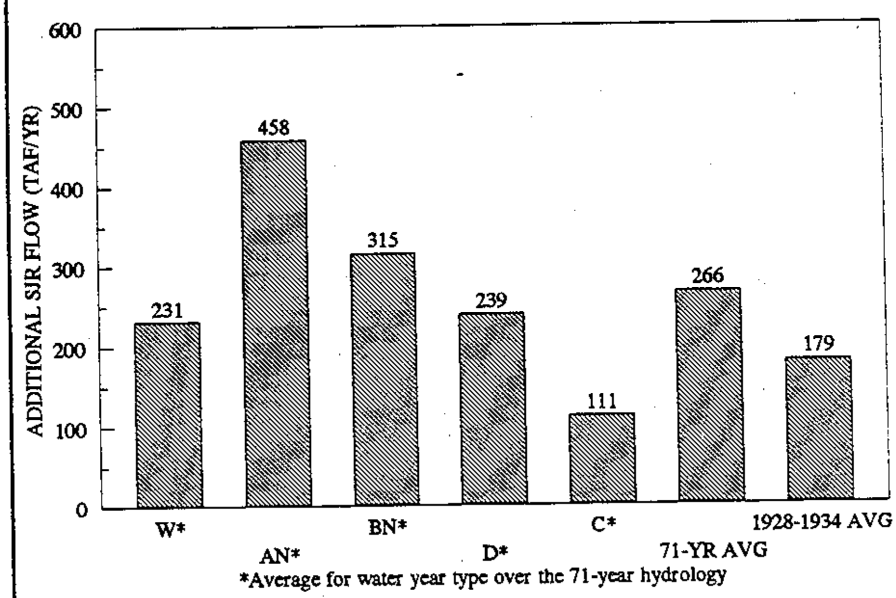


FIGURE VII-10
AVERAGE ANNUAL ADDITIONAL SAN JOAQUIN RIVER FLOW UNDER PREFERRED ALTERNATIVE FROM BASE CASE



San Joaquin River flows of 15.7 TAF and 8.9 TAF in July and August, respectively, for the purpose of salinity control.

Figure VII-10 shows that the average annual increase in San Joaquin River flow from the base case varies by water year type: 231 TAF in wet years; 458 TAF in above normal years; 315 TAF in below normal years; 239 TAF in dry years; and 111 TAF in critical years. In wet years, the additional San Joaquin River flows required under the preferred alternative range from 4 TAF to 607 TAF; in above normal years, from 117 TAF to 883 TAF; in below normal years, from 230 TAF to 508 TAF; in dry years, from 122 TAF to 400 TAF; and in critical years, from 44 TAF to 168 TAF. Over the 71-year hydrology, the average annual additional flow from the base case needed to meet San Joaquin River minimum flow requirements is 266 TAF, with the maximum of 883 TAF occurring in 1963, an above normal water year. During the 1928-1934 period, the average annual additional flow from the base case needed is 179 TAF.

E. DELIVERIES

The SWP has long-term water service contracts with 30 agencies west and south of the Delta for total combined annual entitlements (expected annual delivery) of 4.2 MAF (DWR 1991). The SWP delivers entitlement and entitlement-related (carryover and surplus) water to these customers south of San Luis Reservoir. CVP deliveries to water customers west and south of the Delta are made through the Contra Costa Canal, the San Felipe Project, the Delta-Mendota Canal, the Dos Amigos Unit, and the Cross Valley Canal.

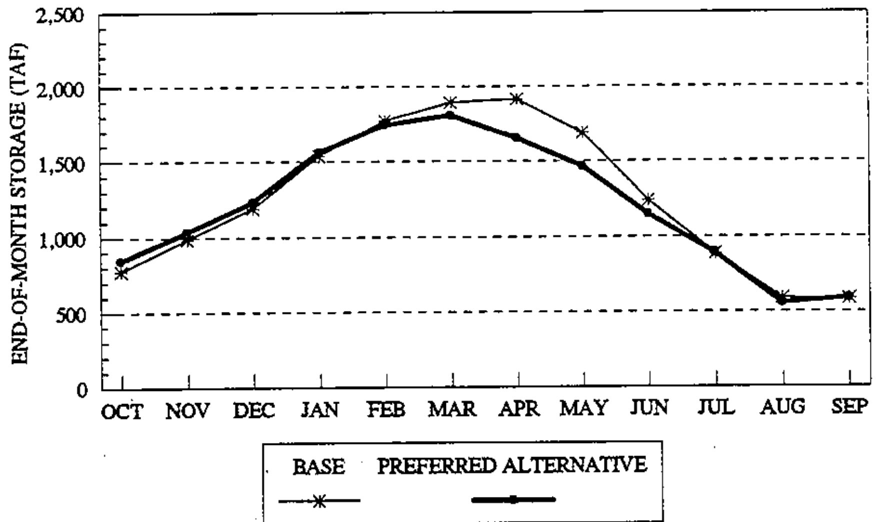
As discussed in section B of this chapter, under the preferred alternative, average annual total exports are reduced by 229 TAF from base case conditions over the 71-year hydrology, and by 816 TAF during the critically dry period. The effects of reduced total exports on deliveries to specific water customers are uncertain at this time. Discussion of these effects would be speculative because allocation of responsibility for meeting the new standards will be determined through either a future agreement between the DWR and the USBR for coordinated operation of the SWP and the CVP, or in the upcoming water right proceedings.

F. SAN LUIS RESERVOIR STORAGE

The USBR and the DWR jointly operate the 2 MAF-capacity San Luis Reservoir. San Luis provides offstream storage for surplus water pumped from the Delta through the California Aqueduct and the Delta-Mendota Canal during periods of high runoff in the winter and spring for delivery to SWP and CVP customers during the peak summer demand season. In order to maximize deliveries, San Luis Reservoir must be filled in the spring.

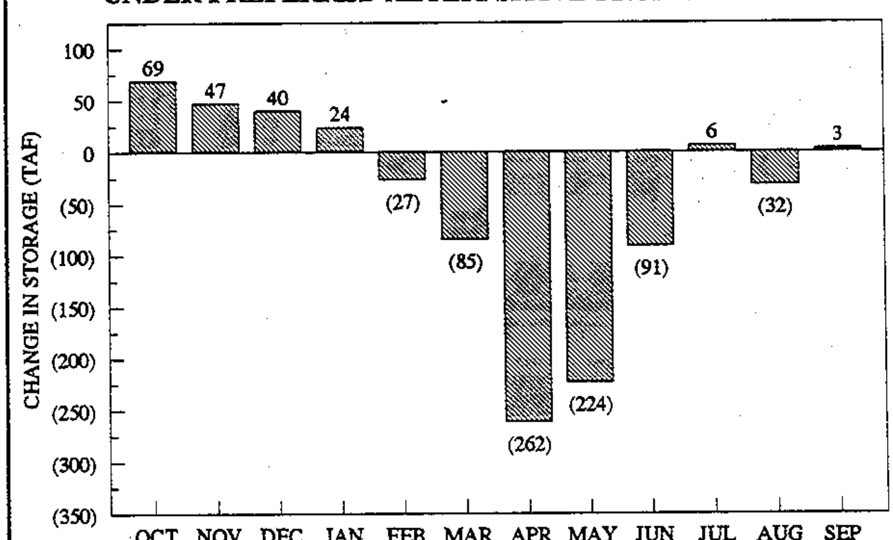
Figures VII-11 and VII-12 compare average end-of-month storage in San Luis under the base case and the preferred alternative. Greatest impacts are seen in March, April, May, and June with average storage reductions of 85 TAF, 262 TAF, 224 TAF, and 91 TAF, respectively. Under the base conditions, monthly average storage peaks at the end of April

FIGURE VII-11
AVERAGE END-OF-MONTH STORAGE IN SAN LUIS RESERVOIR



Average end-of-month storage over 71-year hydrology
Includes SWP and CVP storages in San Luis

FIGURE VII-12
AVERAGE CHANGE IN END-OF-MONTH SAN LUIS STORAGE UNDER PREFERRED ALTERNATIVE FROM BASE CASE



Average change in end-of-month storage over 71-year hydrology
Includes SWP and CVP storages in San Luis

at 1.9 MAF over the 71-year hydrology. Under the preferred alternative, the 71-year average end-of-month storage peaks in March at 1.8 MAF.

Figure VII-13 shows frequencies of end-of-March storage in San Luis. On average over the 71-year period, San Luis is filled at the end of March in 61 percent of years under base case conditions, and 59 percent of years under the preferred alternative. Figure VII-14, on page VII-16, shows frequencies of end-of-April storage in San Luis. Under the base case, San Luis is filled at the end of April in 69 percent of years, and in 18 percent of years under the preferred alternative.

Figure VII-15 shows how the preferred alternative affects the filling of San Luis Reservoir on a monthly basis. As discussed previously, under the preferred alternative, San Luis is filled earlier (in March instead of April) and less often (42 years under the preferred alternative compared to 49 years under the base case). Figure VII-16 shows the preferred alternative's impact, by water year type, on capability to fill San Luis. Under the base case, San Luis storage reaches 2 MAF in all 19 wet years (100 percent), in 10 of 14 above normal years (71 percent), in 7 of 12 below normal years (58 percent), in 9 of 11 dry years (82 percent), and in 4 of 15 critical years (27 percent). Under the preferred alternative, San Luis is filled in 100 percent of wet years, 64 percent of above normal years, 58 percent of below normal years, 55 percent of dry years and 7 percent of critical years.

G. CAPACITY FOR WATER TRANSFERS

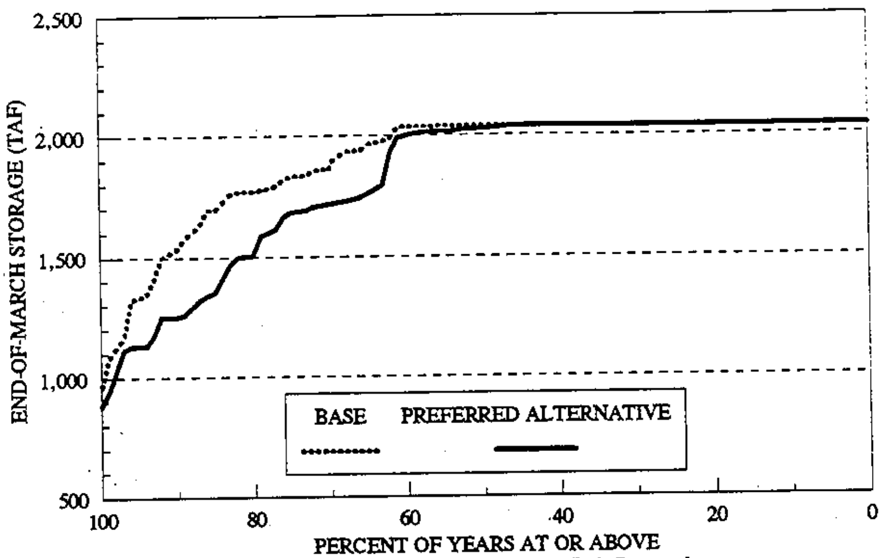
The SWRCB supports the use of water transfers to meet future water needs. Transfers can reduce the water supply impacts in export areas identified earlier in this chapter. The SWRCB recognizes that the adoption of more restrictive standards for the protection of fish and wildlife will reduce the capacity for water transfers. This issue will be reviewed in the upcoming water right proceedings and, to the maximum extent possible, provisions will be made for transfer capacity through the Delta.

For this analysis, the period of July through October is assumed to be the most likely period for water transfers to occur. This assumption is based on historical operations and the standards in the plan which are more restrictive of exports during the February through June period. If water is available for purchase, the transfer capacity during the July through October period is principally dependent on two factors: unused pumping capacity at the Banks and Tracy pumping plants and the standards in the plan.

Two steps are used to calculate the capacity for water transfers available in July through October under the preferred alternative: (1) determine the net available pumping capacity by subtracting the pumping used at Banks and Tracy in these months (from DWRSIM study 1995c6b-SWRCB-109.MONT) from their respective pumping capacity; and (2) adjust, as necessary, the combined unused pumping capacity at Banks and Tracy to avoid exceeding the export restriction of 65 percent of Delta inflow. (More water could be transferred if the parties are willing to provide supplemental Delta inflow to avoid exceeding the 65 percent

FIGURE VII-13

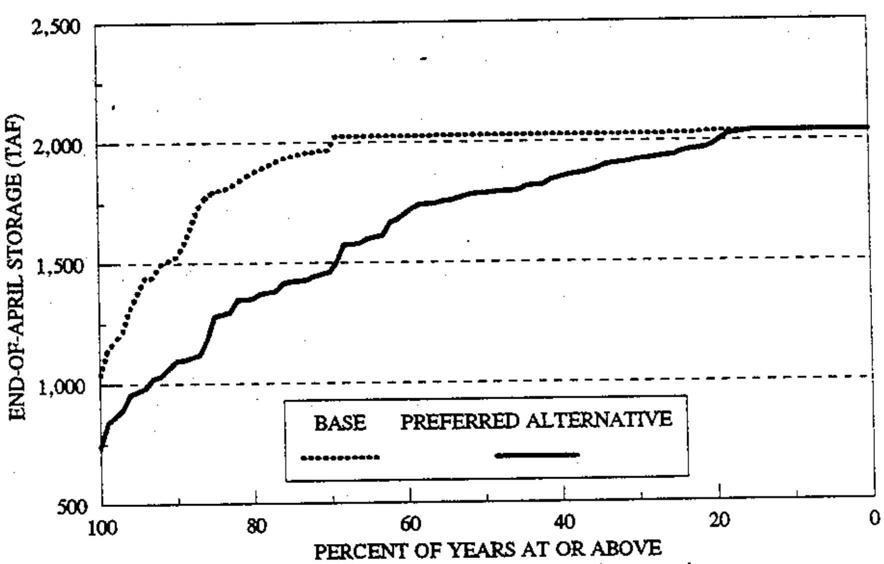
FREQUENCY OF END-OF-MARCH SAN LUIS STORAGE OVER 71-YEAR HYDROLOGY



Includes CVP and SWP storages in San Luis Reservoir

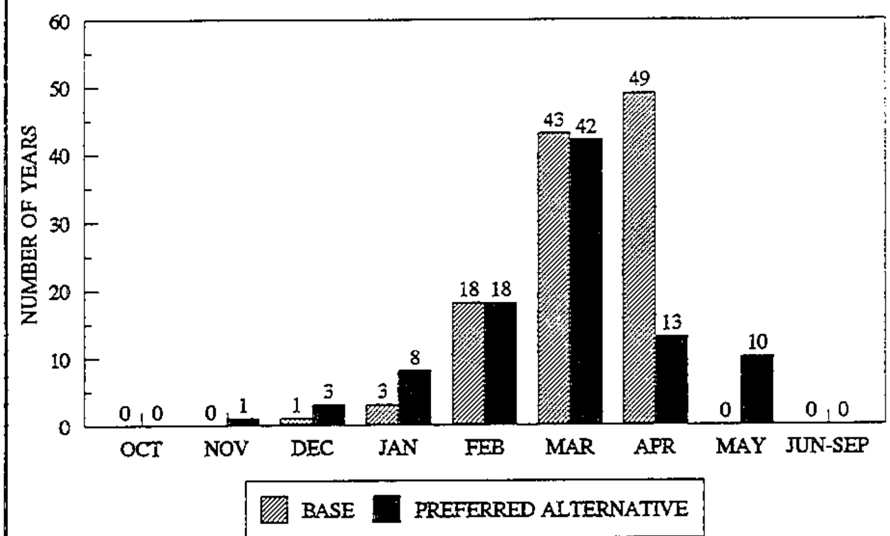
FIGURE VII-14

FREQUENCY OF END-OF-APRIL SAN LUIS STORAGE OVER 71-YEAR HYDROLOGY



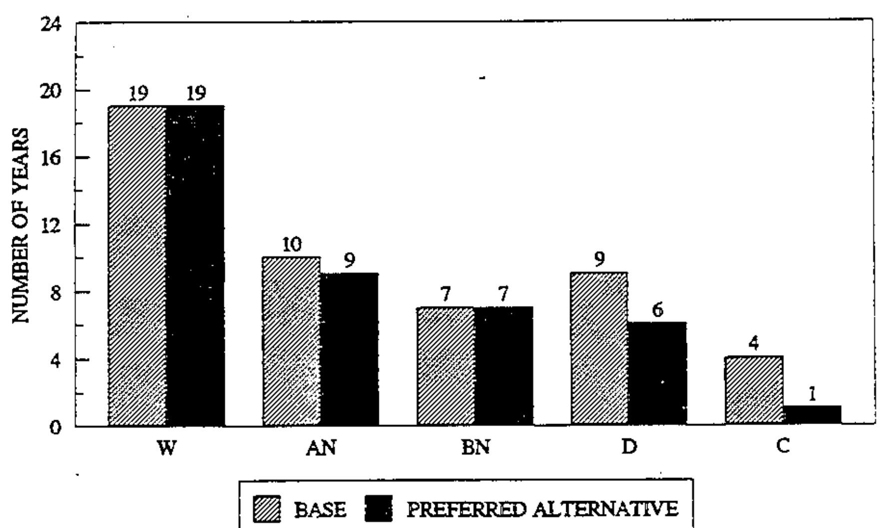
Includes CVP and SWP storages in San Luis Reservoir

FIGURE VII-15
NUMBER OF YEARS IN WHICH SAN LUIS RESERVOIR IS FILLED AT END OF MONTH



Number of years over 71-year hydrology in which end-of-month CVP & SWP storage in San Luis Reservoir reaches 2 MAF

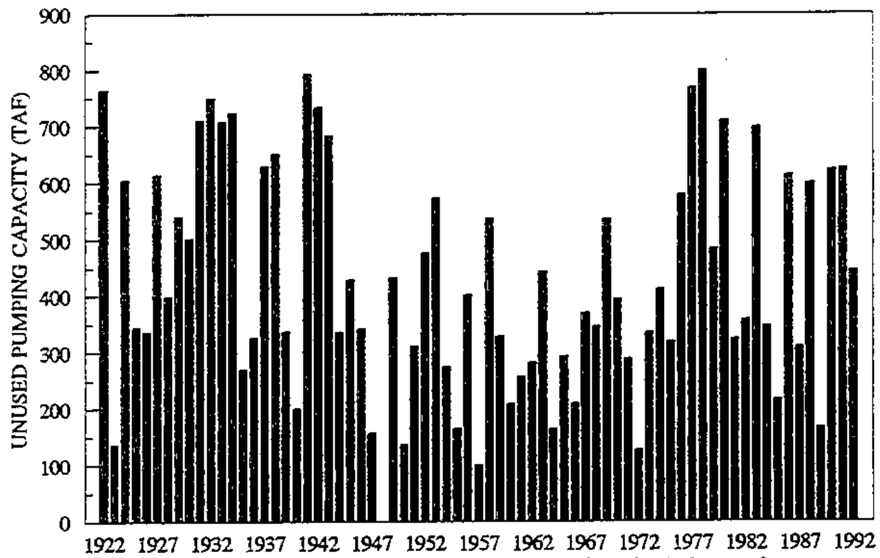
FIGURE VII-16
NUMBER OF YEARS OVER 71-YEAR HYDROLOGY IN WHICH SAN LUIS RESERVOIR IS FILLED



Number of years over 71-year hydrology in which monthly CVP & SWP storage in San Luis Reservoir reaches 2 MAF at least once inflow export restriction.) This analysis focuses on water transfer potentials as represented by available pumping capacity and does not include other possible operational restrictions such as storage capacity south of the Delta. A summary of additional assumptions and data relevant to this analysis has been prepared by the DWR (DWR 1995b).

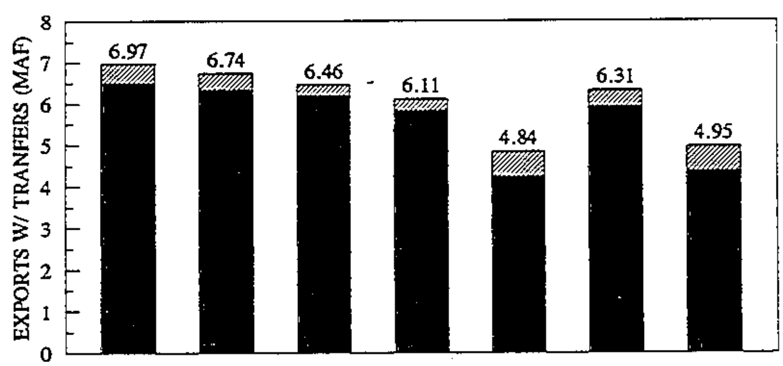
Figures VII-17 and VII-18 show the results of the water transfer analysis described above. Figure VII-7 shows the calculated unused pumping capacity at Banks and Tracy available for water transfers during July through October over the 71-year hydrology. Figure VII-18 shows the average annual total exports under the preferred alternative, as discussed in section B of this chapter, with the additional water transfers. Unused pumping capacity allows 500 TAF, 432 TAF, 288 TAF, 312 TAF, and 629 TAF of water transfers during wet, above normal, below normal, dry, and critical years, respectively. The average annual exports with water transfers are 7.0 MAF in wet years, 6.7 MAF in above normal years, 6.5 MAF in below normal years, 6.1 MAF in dry years, and 4.8 MAF in critical years. Over the 71-year hydrology, the average annual exports with water transfers are 6.3 MAF. During the critically dry period, 5.0 MAF of water exports and transfers are available annually.

FIGURE VII-17
UNUSED PUMPING CAPACITY AT BANKS AND TRACY IN JULY-OCTOBER UNDER PREFERRED ALTERNATIVE



Unused pumping capacity does not imply that water is available for transfer.

FIGURE VII-18
AVERAGE ANNUAL EXPORTS WITH WATER TRANSFERS UNDER PREFERRED ALTERNATIVE



	W*	AN*	BN*	D*	C*	71-YR AVG	5/28-10/34 AVG
EXPORTS	6.47	6.31	6.17	5.80	4.21	5.89	4.33
WATER TRANSFERS	0.50	0.43	0.29	0.31	0.63	0.43	0.62

*Average values for water year type over 71-year hydrology.
Assumes that water is available for transfer in June-October.

Literature Cited in Chapter VII

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