

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Division of Operations and Maintenance

STATE WATER PROJECT ANNUAL REPORT OF OPERATIONS 1979



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FOREWORD

This is the sixth in a series of annual reports summarizing the water and power operation of the California State Water Project.¹

Since January 1965, a "State Water Project, Report of Operations" has been published monthly. These reports are limited to tabulations of daily and monthly data on reservoirs, pumping and generation plant operation, plus data on water quality and water deliveries. The monthly report will continue to provide daily and monthly information to State Water Service Contractors, public agencies, and others.

This annual report summarizes Project facilities in operation during 1979, operational constraints and outages, and significant operations and maintenance events within the five field divisions. Operational data are shown in the form of summaries for the year. Where relevant for comparison, the current and past years' data are shown in charts and tables. Revisions to the data published in the monthly "State Water Project, Report of Operations" are included.

The history, planning, and description of the State Water Project Facilities are detailed in "California State Water Project, Bulletin No. 200, Volumes I-VI," published by the Department of Water Resources.

¹ Annual publications of the Department of Water Resources on the State Water Project activities include: (1) State Water Project, Annual Report of Operations, 1979; (2) The California State Water Project - Current Activities and Future Management Plans (1979), Bulletin 132-80.

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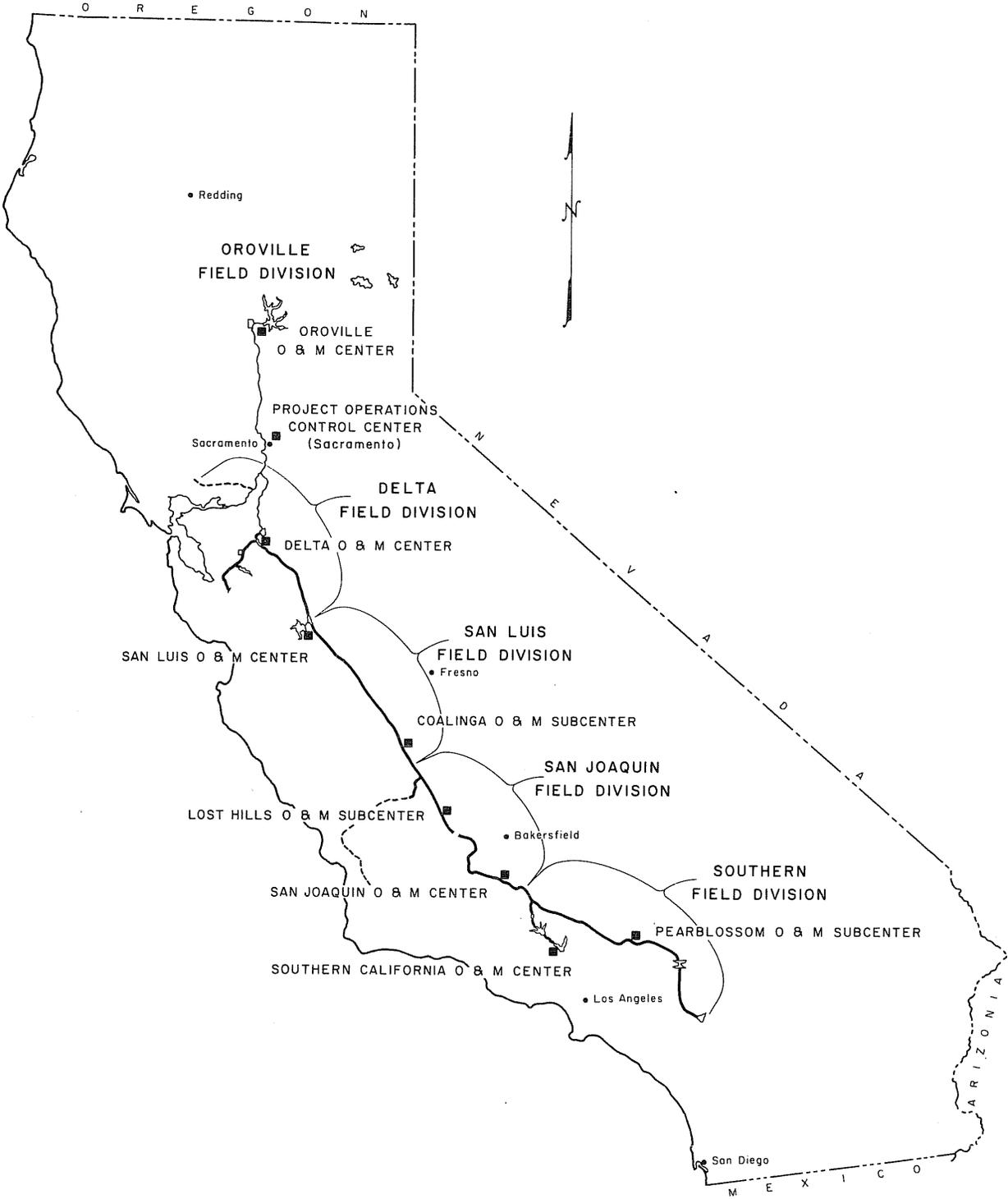
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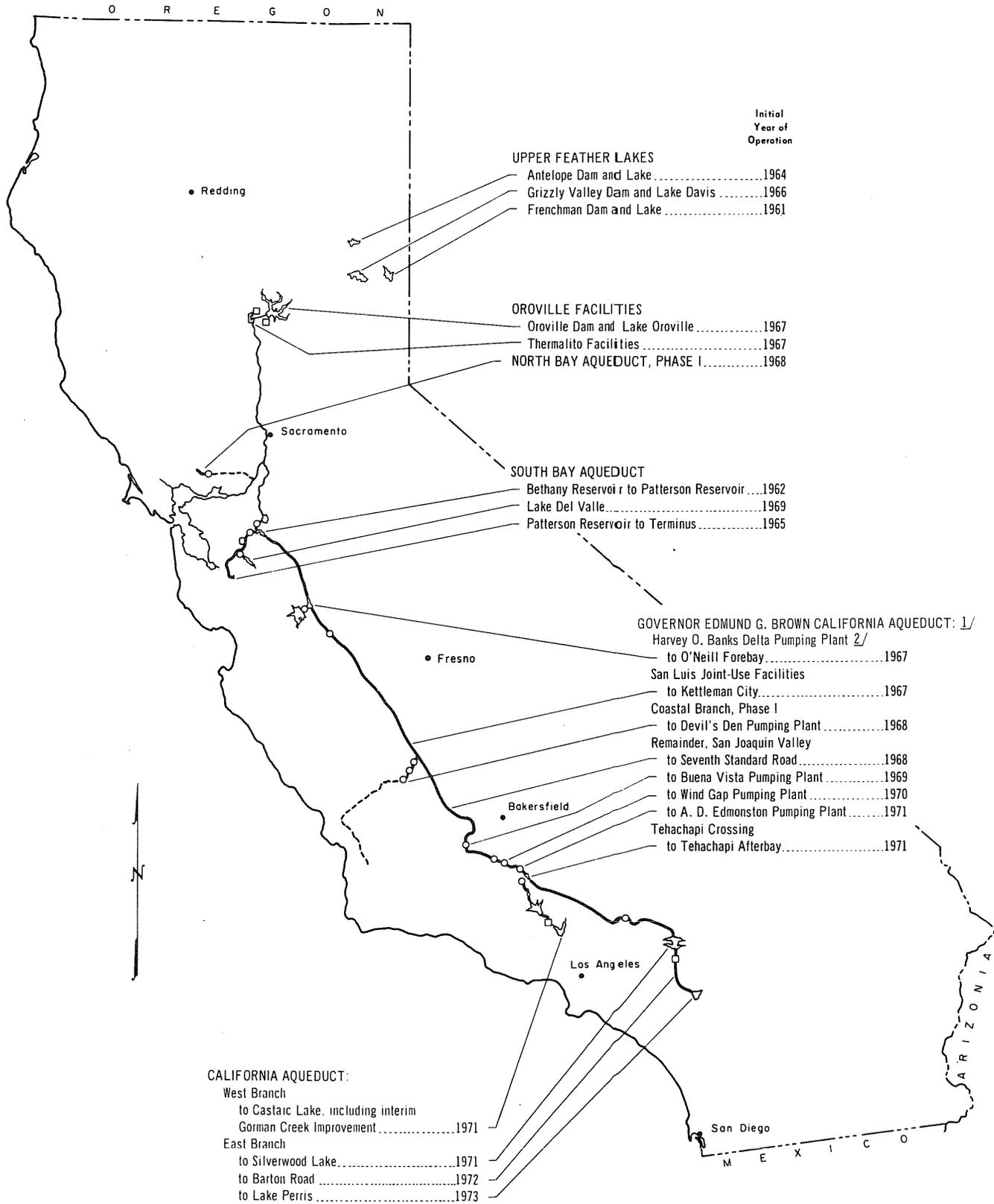
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FIELD DIVISION BOUNDARIES



PROJECT FACILITIES



1/ This title became effective on Nov. 19, 1982.

2/ This title became effective on June 3, 1981.

HIGHLIGHTS OF 1979 OPERATION

Water Quality Standards

From 1976 through 1978, the State Water Project (SWP) was governed successively by at least seven different sets of water quality standards for the Sacramento-San Joaquin Delta. This was due mostly to the pronounced changes in hydrologic conditions leading into and out of California's record drought of 1977 and led, finally, to the adoption by the State Water Resources Control Board (SWRCB) in August 1978 of Water Right Decision 1485 (D-1485), setting water quality standards for the Delta and Suisun Marsh. As described in more detail under Sacramento-San Joaquin Delta Operations, all Delta water quality standards were essentially met in 1979, the first full year in which the D-1485 requirements were in effect.

Water Conditions ¹

In contrast to the high values recorded in the previous water year, statewide precipitation during the 1978-79 water year was about 90 percent of average,² compared to 155 percent of average for the corresponding 1977-78 period. Precipitation varied widely compared to average amounts.³ Hydrographic areas throughout the State which best represent these variations are:

¹ Taken from Bulletin 120-79, "Water Conditions in California", Report No. 4, May 1, 1979.

² Averages are based on the period, 1931 - 1975 (45 years).

³ Comparisons are based on April 1 snow data which are major indexes of precipitation and historically reflect near maximum seasonal accumulation which is representative of the entire water year.

- o North Coastal - 65% of average
- o San Joaquin Valley - 95% of average
- o South Coastal - 135% of average

Statewide snowpack accumulation reached maximum values during the first week of April. Water content measurements in Central Valley watersheds were below normal from the American River Basin northward. San Joaquin Valley basins were about 115 percent of average.

Runoff for the 1978-79 water year essentially followed a pattern similar to that of precipitation and snowpack. All streams north of the American River produced below average flows, while San Joaquin Valley tributaries produced average or slightly above average flows. Statewide runoff for the water year was 79 percent of average.

Based on the State Water Resources Control Board's criteria in its Decision 1485, the 1978-79 water year was classified as a "dry" year. The final determination of year classification is made in May, based on forecasts of the Sacramento Valley unimpaired runoff for the current water year for the sum of the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River at Smartville; American River, total inflow to Folsom Reservoir. The forecasted (and actual, in parentheses) combined runoff for these basins was 12,220,000 (12,409,000) acre-feet for the water year, 72 (73) percent of average for the four basins.

In the Feather River Basin, the primary source of supply for the State Water Project, 1978-79 water year precipitation¹ was 70 percent of average, maximum snowpack water content² was 103 percent of average, and unimpaired runoff¹ was 60 percent of average.

Reservoir Storage

At the beginning of 1979, storage in SWP reservoirs was well above average, due to the wet conditions and resultant high inflows in 1978. Despite the below average runoff in 1979, storage remained above average at the close of the water year because of excellent carryover storage and reduced water demands in Southern California. Local water supplies in Southern California were well above normal as a result of wet conditions in the spring of 1979. Overall, total combined storage in the Project's seven major reservoirs decreased 417,564 ac-ft (eight percent) during 1979. These seven reservoirs are Lake Oroville, Lake Del Valle, San Luis Reservoir, Silverwood Lake, Lake Perris, Pyramid Lake, and Castaic Lake.

Lake Oroville reached a minimum storage of 2,640,537 ac-ft on January 5 and a maximum storage of 3,519,435 ac-ft on June 3. Total inflow to the reservoir in 1979 was 3,067,870 ac-ft. Additional information is given in Project Operations, Oroville Field Division.

State Water Project storage in San Luis Reservoir ranged from 1,064,435 ac-ft, 100 percent of the Project's share of the

¹ Through April 30, 1979.

² From snow survey calculation sheets, using selected snow courses and sensors.

capacity, down to 654,632 ac-ft, 62 percent of SWP's share of the capacity, on August 28. Joint filling of the reservoir was completed in mid-April, at the beginning of the irrigation season.

In 1979, the SWP's southern reservoirs were either full or nearly so by April or May, and were at their lowest point in the fall months, with the exception of Pyramid Lake. Maximum and minimum storage values for the southern reservoirs in 1979 were:

	<u>Maximum</u> (ac-ft)	<u>Date</u>	<u>Minimum</u> (ac-ft)	<u>Date</u>
West Branch				
Castaic Lake	320,356	4/23	256,142	9/6
Pyramid Lake	170,160	10/2	155,964	5/24
East Branch				
Silverwood Lake	72,551	5/24	59,279	10/10
Lake Perris	125,972	5/6	72,050	11/14

Two ground water recharge demonstration programs initiated in 1978 were continued in 1979. During 1978, 23,684 ac-ft of SWP water had been received by the Mojave Water Agency for storage in the Mojave Ground Water Basin. In 1979, 4,000 ac-ft of this water were withdrawn as a delivery from the basin for the agency's use, in lieu of its receiving SWP water then from the Aqueduct. In the second program, 4,029 ac-ft of SWP water were stored during 1979 by the San Bernardino Valley Municipal Water District (SBVMWD). This supplemented the 9,246 ac-ft that had been received by SBVMWD in 1978 for ground water storage. Thus, total water stored at the end of 1979 amounted to 13,275 ac-ft. Under the conservation project, up to 50,000 ac-ft of SWP water may be stored by SBVMWD for later withdrawal, in lieu of surface deliveries.

Water Deliveries

Project water supplies in 1979 were sufficient to meet all water service contractor requests for SWP water deliveries.

Although runoff in the Sacramento Valley was somewhat below average, storage in SWP reservoirs was above average as a result of a large carryover storage from the previous wet year.

Water deliveries from SWP facilities in 1979 totaled 2,392,281 ac-ft, excluding deliveries to satisfy prior water rights and federal customers. This total was an increase of 48 percent over the water deliveries made during 1978, and was the highest of record since the SWP began operations in 1962.

Besides State water service contractors' entitlement water and local water, the 1979 deliveries included the following other types of water:

- Water delivered under wet weather contract provisions.
- Repayment water for preconsolidation water used during construction.
- Water from ground water recharge.
- Surplus water.
- Recreation and mitigation water.

Also, as a carryover from the 1977 drought conditions, the 1979 water delivery total included:

- Makeup water.
- Emergency relief water.
- MWD drought relief exchange water.

Federal water delivered to federal customers from the SWP totaled 1,291,134 ac-ft for the year, 29 percent higher than deliveries made in 1978. This amount excludes 579 ac-ft of recreation and mitigation water but includes 46,733 ac-ft of Central Valley Project (CVP) water wheeled for the USBR to the Cross Valley Canal in compliance with the three-party (the United States, the State, and nine water agencies) long-term contracts. Also included are 58,300 ac-ft of CVP water wheeled under special agreements applicable to 1979 only: 53,300 ac-ft were wheeled through SWP facilities between the Delta and O'Neill Forebay and then through the State's capacity share of the joint-use facilities to the Westlands Water District, and 5,000 ac-ft of Pixley Irrigation District's CVP water were wheeled to Lakeside Irrigation District.

Water delivered from SWP facilities to satisfy prior water rights within the Oroville Field Division totaled 865,786¹ ac-ft, 10 percent higher than the previous year. In addition, 80,902 ac-ft of natural flow were released through the Project's southern reservoirs. This was 42 percent of the releases in 1978, when local inflows had been high due to record rainfall in the first three months of that year.

A summary of water deliveries for SWP facilities by years to individual agencies is shown on Page I-2.

¹ This amount is from the upper Feather River lakes (Frenchman Lake, 347 ac-ft, and Lake Davis, 1,136 ac-ft), Palermo Canal (6,540 ac-ft), and Thermalito Afterbay deliveries (857,763 ac-ft).

Project Energy Generation and Use

Energy generation from the SWP's five power plants during 1979 grossed slightly over 2.4 billion kilowatthours (see chart titled "Project Gross Power Generation", Page VI-1). The 1979 generation at the Oroville-Thermalito Complex and the SWP's other power recovery plants (San Luis, Castaic, and Devil Canyon) was about 83 percent of that generated in 1978. This was about 87 percent of the average generated by the plants during the five-year period 1974-78. Monthly generation totals for each plant are shown in Section VI.

The SWP's use of energy in 1979 was about 3.67 billion kilowatthours. This was 82 percent of the amount used in 1978, when extra reservoir filling took place following the two years of drought. SWP energy uses by field divisions and sources of energy are shown on the chart titled "Project Power Operations", Page VI-2. Summaries, by month, of Project power use and supply are in Section VI.

PROJECT STATUS IN 1979

Project Facilities

The State Water Project conserves water for distribution to much of California's population and to irrigated agriculture. It also provides flood control, water quality control, electrical power generation, new recreational opportunities, and enhancement of sport fisheries and wildlife habitat.

The first SWP facilities to become operational were Frenchman Dam and Lake in the Upper Feather River Division and the South Bay Aqueduct in the San Francisco Bay Area in 1962. By 1973,

construction of the initial facilities of the SWP was complete. This provided for operation of the entire SWP from Plumas County in the north to Riverside County in the south.

SWP facilities in operation during 1979 included: 22 reservoirs with a gross capacity of 6,797,171 ac-ft; 5 power plants with a total output capacity of 1,556 megawatts;¹ 16 pumping plants housing 109 units with a total motor rating of 2,487 megawatts;² and 537 miles of aqueduct.

During 1979, water was delivered from SWP facilities to:

- o 23 State long-term water service contractors.
- o 5 short-term contractors.
- o 10 local agencies receiving water to satisfy prior water rights.

In addition, SWP facilities were used to deliver federal water to:

- o 5 USBR customers along the San Luis Division joint-use facilities.
- o 9 agencies via the Cross Valley Canal.

Outages and Operating Limitations

Major outages and operating limitations of SWP facilities during 1979 follow:

- o During June 13-22, 1979, the Department of Water Resources (DWR) experienced a second strike by employees in the Division of Operations and Maintenance. The first strike occurred in May

¹ This amount includes 202 megawatts of federal power generation output at San Luis Pumping-Generating Plant.

² Includes 261 megawatts of federal pumping capacity at San Luis Pumping-Generating Plant and Dos Amigos Pumping Plant.

1972. The 1979 strike was called by the State Employees Trade Council, an affiliate of the AFL/CIO, and at its maximum involved 437 DWR employees including plant operators, dispatchers, electricians, mechanics, and civil maintenance workers. The strikers shut down SWP plants and facilities before they walked out, leaving the Project briefly inoperative in most areas. The North and South Bay Aqueducts and the Harvey O. Banks Delta Pumping Plant remained in uninterrupted service. Management and supervisory staff immediately took over and, by June 14, had returned essential facilities back on line with very little loss in water deliveries to the water service contractors.

- o Effective March 1, 1979, the operating level of Thermalito Afterbay was limited to elevation 128 (25,831 ac-ft of storage), 8.5 feet below the maximum design level of 136.5 feet (57,042 ac-ft). Temporary encroachments were allowed up to elevation 131 (35,556 ac-ft). The limitation was at the recommendation of the Special Consulting Board for the Oroville Earthquake Study, pending completion of additional foundation testing of the Thermalito Afterbay dikes.
- o Harvey O. Banks Delta Pumping Plant Unit No. 1 was out of service for six and one-half months between October 3, 1978, and April 13, 1979, in order to install a new stainless steel impeller. Unit No. 2 was also out of service for the same purpose, for the three-months from April 17 to July 17.
- o On June 6 and June 11, Pacific Gas and Electric Co. (PGandE) requested the SWP to reduce pumping load during critical power

periods due to hot weather. On June 6, Project load was reduced by 218 megawatts for two hours, and on June 11 by 176 MW for about six hours. Also on June 11, two generators at San Luis Pumping-Generating Plant added 92 MW for about two hours, and generation at Devil Canyon Powerplant was increased by 76 MW for about three hours.

- o At the A. D. Edmonston Pumping Plant, Unit No. 1, taken out of service on July 10, 1978 for excessive downthrust on the unit's bearings, remained out of service during all of 1979. Repairs to the unit were delayed because of the size of the job and the difficulty in obtaining parts from the pump's manufacturer. Unit No. 7, also with bearing problems, was taken out of service on December 8, 1978, and, following repairs, was available for pumping on February 27, 1979, after an 81-day outage. Unit No. No. 6, taken out of service on October 21 for stator re-wedging and annual maintenance, remained out of service at the end of the year.
- o Oso Pumping Plant Unit No. 1, taken out of service on December 14, 1978, for replacement of pump rotating wearing rings, remained out of service during all of 1979. Unit No. 5, which was taken out of service on March 27, 1978, to repair a stator winding coil, was finally returned to service on September 14, 1979, nearly 18 months later. Unit No. 8 was available for emergency use only from November 18, 1978 through all of 1979, due to leakage from a discharge line coupling.

o The Gorman Creek improvement channel was out of service for the six-week period October 1 to November 14, 1979, in order to install the Peace Valley Pipeline crossing. The channel was also out of service for a week in late January and two weeks in early June for lining repairs.

SACRAMENTO-SAN JOAQUIN DELTA OPERATIONS

All Delta water quality standards established by SWRCB's Decision 1485 were essentially met in 1979, the first full year in which the D-1485 requirements were in effect. A minor overage of May-June SWP Delta exports is described on Page 13. Under the year-type classification procedure of D-1485, 1979 was a "dry" year. However, above-normal carryover reservoir storage combined with sufficient early-season runoff to produce an ample supply of good quality water in the Sacramento-San Joaquin Delta during the year, enabling the SWP to meet all delivery requests for Project water.

Even those standards which would apply to a wet year were met in most instances. For example, a Delta outflow index exceeding 12,000 cubic feet per second (cfs) was maintained for 92 consecutive days (January 10 - April 11) without the need for any extra releases from upstream reservoirs for this specific purpose. Figure A, Page 15, "Water Quality Conditions at Selected Delta Stations and Other Pertinent Data, 1979", shows plots of some of the controlling Delta water quality standards and corresponding recorded daily values.

Coordinated operations between the CVP and SWP took place from April 20 through May 7, and from June 3 through October 4.

During these periods, the USBR and DWR mutually agreed that "balanced water conditions"¹ existed and that flows in the Delta were to be controlled by releases from the upstream reservoirs of the two agencies. The determination for apportioning each agency's share of responsibility for reservoir releases is based on the draft agreement "Supplemental Agreement Between the United States of America and the State of California for Coordinated Operation of the Central Valley Project and the State Water Project", dated May 13, 1971. Each year, both agencies have agreed to operate as if this coordination agreement had been executed, except for agreed-upon specific modifications. On February 7, 1979, DWR and USBR signed the annual letter of agreement for the 1979 coordinated operation of the CVP and SWP. This was the first such letter in which both agencies agreed to operate to meet all conditions specified in SWRCB Decision 1485. Figure B, Page 16, shows CVP-SWP coordinated Delta operations for the year.

Table 1, Page 17, tabulates, by months, the routing of water released to the Sacramento, Feather, and American Rivers from CVP-SWP upstream reservoirs. The water flowing to the ocean, represented by the Delta outflow index, provides a fresh water barrier to the more saline water of Suisun Bay, and thus maintains required levels of Delta water quality. During the periods of

¹ "Balanced water conditions" occur when it is agreed by USBR and DWR that the releases of water from upstream CVP and SWP reservoirs, plus other inflows, approximately equal the water supply needed to meet Sacramento Valley in-basin use, including water quality objectives and exports.

"balanced water conditions", any water in excess of that needed for in-basin use (including Delta consumptive use and the Delta outflow index) was available for export from the Delta in accordance with the terms of the coordination agreement.

In 1979, SWP Delta exports were moderate at the start of the year, with a steady increase through June, a steeper rise in July and August, followed by a decline in September and October. Exports increased again in November and December. December had the highest monthly average rate of export for the year, almost twice as high as December 1978. This relatively high export rate was the result of unusually high late-year demands combined with closure of the CVP Delta-Mendota Canal during November and December 1979 for maintenance and the export of additional water from the Delta by the SWP for the USBR's customers in exchange for CVP water stored in San Luis Reservoir.

To protect the striped bass fishery in the Sacramento River during the critical spawning period, SWRCB's Decision 1485 called for limited exports of 3,000 cfs average daily flow per plant at both the USBR Tracy Pumping Plant and DWR Banks Pumping Plant during May and June, plus a limit of 4,600 cfs average daily flow for the Banks Pumping Plant for July. These limits were exceeded slightly in May by 6 ac-ft and in June by 48 ac-ft at Banks Pumping Plant. Total exports for the year from the Delta by SWP facilities were about 2.6 million ac-ft, which included 313,901 ac-ft of CVP water pumped for the USBR.

Operation of the SWP in 1979 reduced the Delta outflow index (i.e., Delta exports exceeded the augmentation of Delta inflows by upstream reservoir releases) every month except July.

The months with the highest reductions in Delta outflow were April, May, and December. Despite these reductions, the Delta outflow index remained above the level required by Decision 1485 throughout the year. Table 2 on Page 18 provides a tabulation of the daily computed Delta outflow index, reflecting flows in the Sacramento River at "I" St. Bridge and in the San Joaquin River at Vernalis, plus a small amount of Yolo Bypass flow at Fremont Weir on February 24 and 25.

In late September 1979, the residual rock at the Werner Cut barrier was removed, returning the channel to its pre-barrier condition. The barrier was constructed in 1977 as part of the drought mitigation program. In early October 1979, installation of a rock barrier at the head of Old River was completed to enhance the fall salmon spawning run in the San Joaquin River in areas upstream of Stockton. The barrier effectively increased flows in the river and also raised dissolved oxygen levels in the water. If low San Joaquin River flows indicate it is needed, the barrier is installed in the fall to coincide with the salmon migration, and removed in early winter when river flows increase. In 1978, an alternative method was used to increase dissolved oxygen levels in the lower San Joaquin River, one involving minimizing Delta exports instead of installing the barrier.

For further information and data on 1979 Delta operations, see DWR Bulletin 132-80, "The California State Water Project, Appendix E, Water Operations in the Sacramento-San Joaquin Delta During 1979".

FIGURE A
 WATER QUALITY CONDITIONS
 AT SELECTED DELTA STATIONS
 & OTHER PERTINENT DATA
 1979

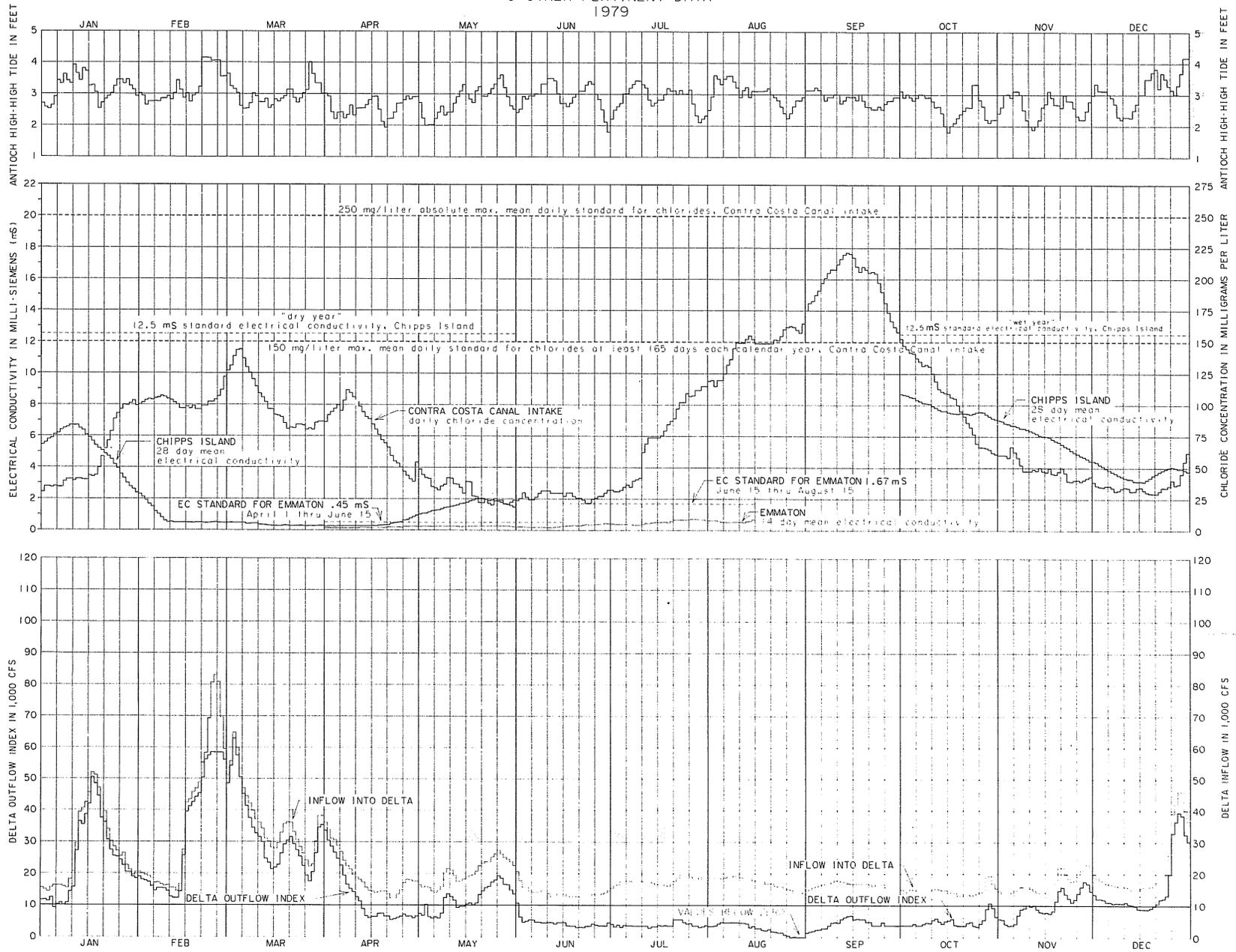


FIGURE B
1979 CVP - SWP COORDINATED OPERATION

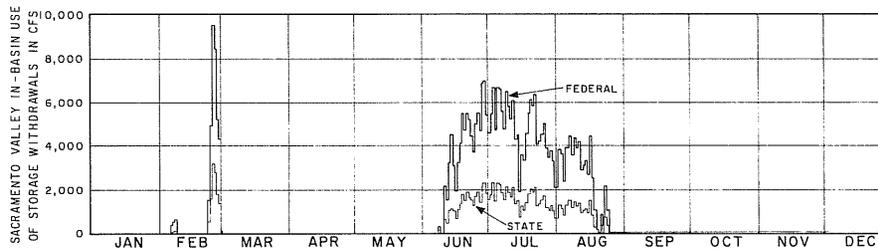
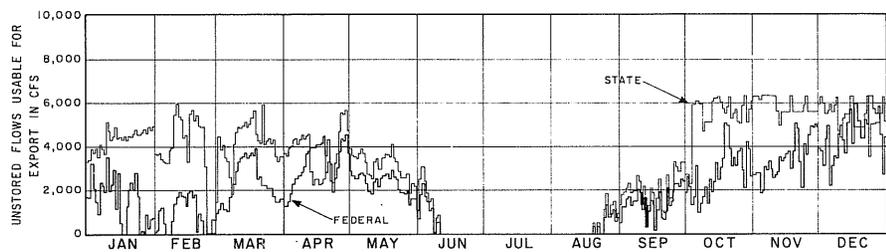
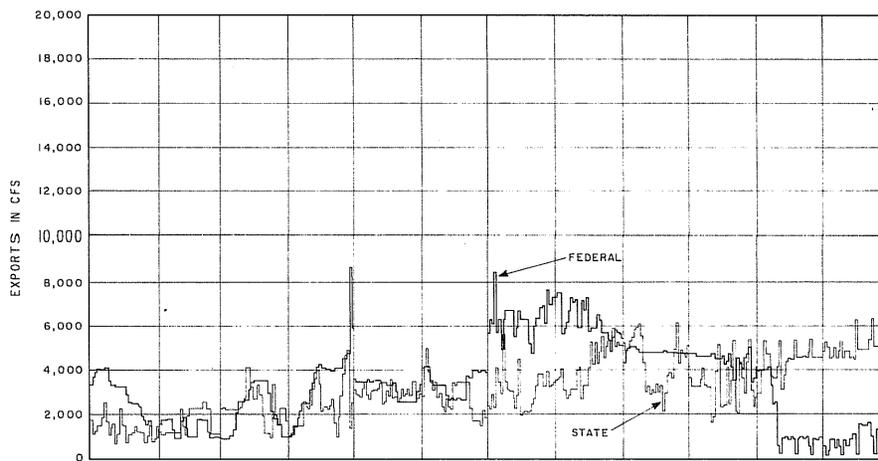
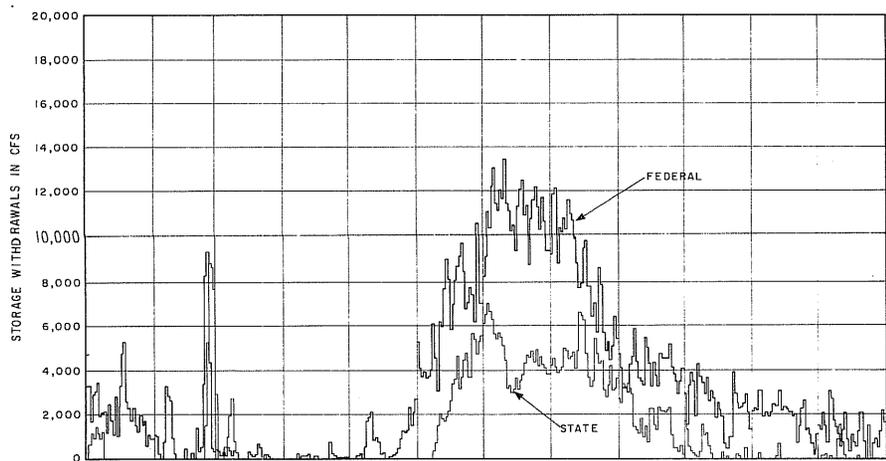
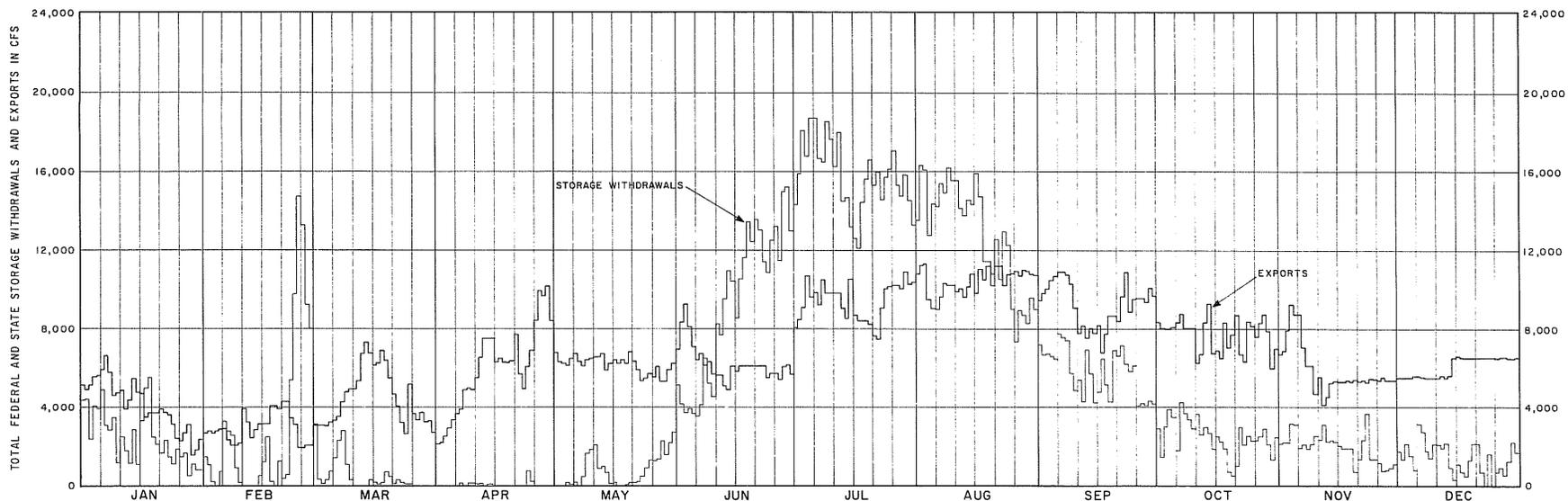


TABLE 1
SACRAMENTO BASIN AND SACRAMENTO-SAN JOAQUIN DELTA
OPERATION FOR 1979

(thousands of acre-feet except as noted)

MONTH	UPSTREAM RESERVOIR RELEASE			SACRAMENTO RIVER IN-BASIN USE ^{2/} (4)	DELTA INFLOW			DELTA CONSUMPTIVE USE ^{4/} (8)	DELTA USES		DELTA EXPORTS		
	KESWICK ^{1/} (1)	OROVILLE ^{1/} (2)	NIMBUS ^{1/} (3)		SACRAMENTO RIVER AT ^{3/} SACRAMENTO (5)	SAN JOAQUIN RIVER AT ^{3/} VERNALIS (6)	TOTAL DELTA INFLOW (7)		DELTA OUTFLOW INDEX		TOTAL EXPORTS (11)	EXPORTED BY STATE-DWR (12)	EXPORTED BY FEDERAL-USBR (13)
									THOUSANDS OF ACRE-FEET (9)	AVERAGE CFS (10)			
JANUARY	376	164	193	653	1,385	327	1,711	-56	1,515	24,640	251	81	170
FEBRUARY	214	224	232	1,062	1,732	398	2,130	-37	2,003	36,074	161	90	71
MARCH	215	290	207	1,028	1,741	540	2,281	-10	2,024	32,929	270	143	126
APRIL	362	100	164	324	951	207	1,158	63	747	12,559	352	145	207
MAY	447	136	400	117	1,091	143	1,244	121	747	12,151	378	182	196
JUNE	583	170	198	-252	700	126	826	191	264	4,440	368	165	203
JULY	848	264	158	-268	1,003	74	1,077	268	235	3,822	576	187	389
AUGUST	657	252	158	-98	968	75	1,044	252	155	2,520	640	259	381
SEPTEMBER	360	136	181	199	876	87	963	174	238	4,002	549	265	283
OCTOBER	281	113	130	221	745	147	892	118	299	4,862	473	203	270
NOVEMBER	257	104	143	366	870	112	983	55	579	9,733	350	258	91
DECEMBER	308	155	133	595	1,191	127	1,318	2	949	15,429	365	314	52
TOTAL	4,908	2,108	2,297	3,947	13,253	2,363	15,627	1,141	9,755	163,151	4,733	2,292	2,439

- 1/ Releases to river
- 2/ Positive values show accretions; negative values show depletions.
- 3/ Column 5 and 6 are based on daily 6 a.m. readings. Columns 1, 2, 3, 12 and 13 are based on measured total daily flow.
- 4/ From Consumptive Use Table dated April 9, 1979.

TABLE 2
DELTA OUTFLOW INDEX WITH BYPASS - 1979

(Values in cfs-days except where noted)

DATE	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1	11 099	19 063	48 920	33 374	8 366	10 712	4 104	3 281	1 124	3 344	5 664	13 104
2	11 962	18 135	54 403	31 296	7 903	6 228	3 393	3 120	1 896	3 535	5 294	11 850
3	11 502	17 964	63 076	28 458	10 135	4 806	3 951	3 615	1 743	3 622	3 911	11 916
4	12 698	17 467	59 959	26 950	6 614	5 010	3 237	4 192	2 147	3 622	3 256	11 596
5	9 356	16 189	50 689	24 682	6 098	5 169	3 720	4 635	2 151	4 024	3 513	10 803
6	10 184	14 811	45 229	22 519	6 200	5 196	3 568	4 604	2 158	3 791	4 136	10 421
7	10 848	15 366	41 505	19 374	6 030	4 698	3 606	4 645	2 561	3 571	6 693	10 114
8	10 565	15 484	37 700	16 916	7 597	4 663	3 613	4 664	3 696	4 175	8 325	10 365
9	11 179	15 245	34 340	15 300	12 555	4 667	3 677	4 702	4 602	4 399	8 844	10 396
10	14 530	14 787	32 887	14 311	13 491	4 575	3 671	4 632	4 719	4 195	9 941	10 287
11	15 841	12 923	31 513	12 508	12 475	4 608	3 623	4 132	4 587	6 123	9 551	10 782
12	27 421	12 497	30 002	11 121	11 675	4 620	3 616	4 501	5 420	6 840	9 727	10 081
13	36 635	12 609	24 791	8 935	9 135	4 038	3 077	4 165	6 186	5 025	8 887	9 880
14	35 662	14 672	23 590	6 827	9 422	4 756	3 285	3 083	6 482	3 966	7 849	9 258
15	38 867	25 971	21 575	6 130	9 727	4 717	3 173	3 200	6 571	4 984	7 274	8 509
16	42 077	39 821	22 011	6 426	10 292	4 584	3 617	2 646	5 578	5 039	7 253	8 282
17	50 050	41 266	22 930	6 583	10 803	3 700	3 491	2 631	5 588	5 472	7 018	8 555
18	48 708	42 849	26 410	7 289	11 091	3 430	3 629	2 085	5 551	3 878	7 918	8 271
19	44 627	44 461	29 349	7 195	11 993	3 280	3 370	2 072	5 314	3 204	11 315	8 996
20	37 709	45 488	30 751	6 479	13 378	2 982	3 712	2 211	4 699	3 332	15 549	9 552
21	36 218	50 666	31 331	6 520	14 657	3 124	5 585	1 604	4 874	3 437	15 280	10 172
22	30 714	58 512	29 269	5 443	15 494	3 025	5 571	1 609	3 649	4 252	13 179	11 472
23	27 785	69 420	27 428	5 804	16 084	3 533	5 676	1 155	3 569	4 733	11 888	11 945
24	25 758	85 158	25 760	6 126	17 503	3 684	4 588	1 142	3 231	3 334	10 898	12 761
25	25 329	86 344	22 306	6 641	17 936	4 241	4 043	494	4 373	2 997	11 718	19 549
26	24 483	80 937	19 605	7 116	19 221	3 882	4 143	93	3 480	5 252	13 295	32 699
27	22 744	69 769	17 756	6 846	18 345	3 509	3 652	105	3 160	5 053	15 503	36 153
28	20 769	59 843	20 787	6 725	16 892	3 669	3 656	-463	3 732	8 701	17 139	39 253
29	20 820		26 762	6 070	16 880	3 641	3 127	-382	3 583	10 417	16 430	38 564
30	19 025		34 875	6 794	14 983	4 454	3 475	-302	3 630	8 990	14 749	32 786
31	18 672		35 184		13 719		3 847	254		6 302		29 918
TOTAL	763 837	1 010 067	1 022 093	376 758	376 694	133 201	118 496	78 125	120 054	150 709	291 998	478 290
AVE.	24 640	36 074	32 971	12 559	12 151	4 440	3 822	2 520	4 002	4 862	9 733	15 429
MAX.	50 050	83 044	63 076	33 374	19 221	10 712	5 676	4 702	6 571	10 417	17 139	39 253
MIN.	9 356	12 497	17 756	5 443	6 030	2 982	3 077	-463	1 124	2 997	3 256	8 271
TOTAL IN AF.	1 515 071	2 003 468	2 027 321	747 299	747 173	264 204	235 037	154 961	238 127	298 931	579 178	948 688

ANNUAL--	Total Delta Outflow Index;	4,920,322 cfs days	Delta Outflow Index:	Average	13,480 cfs days
		9,759,458 acre-feet		Maximum	83,044 cfs days
				Minimum	-463 cfs days

PROJECT OPERATIONS

SWP water delivered in 1979 totaled 2,364,829 ac-ft, a 50 percent increase over Project water delivered in 1978. In addition, local water delivered from SWP facilities totaled 27,452 ac-ft, down 23 percent from the amount delivered in 1978. Project and local water delivered to each of the field divisions during 1979 and as compared to 1978 deliveries were:

<u>Field Division</u>	1979 Deliveries Amount (in ac-ft)	Percent Change from 1978 Deliveries
Oroville	10,306	-24
Delta	163,331	15
San Luis	708	88
San Joaquin	1,619,096	112
Southern	<u>598,840</u>	<u>-6</u>
Total	2,392,281	54

A tabulation of 1979 water deliveries by type follows:

<u>Type</u>	Amount (in ac-ft)
Entitlement	1,401,292
Surplus	648,389
Makeup and Wet Weather	258,604
Exchange	30,000
Emergency Relief	20,050
Repayment	5,095
Ground Water Demonstration	4,000
Recreation	<u>1,399</u>
Subtotal	2,364,829
Local Supply (non-Project water)	<u>27,452</u>
Total	2,392,281

A table showing water deliveries by year for individual agencies is presented on Page I-2; however, not shown are natural flow releases through the Project's southern reservoirs and prior water right entitlement releases at the upper Feather River lakes, which releases are summarized on Page 6.

Following is a tabulation of 1979 regulated deliveries of local water supplies:

<u>Agency</u>	<u>Amount (in ac-ft)</u>
Last Chance Creek W.D.	8,492
Thermalito I.D.	1,183
Napa Co. F.C. & W.C.D.	6,561
Alameda Co. W.D.	7,132
Alameda Co. F.C. 7 W.C.D., Zone 7	4,084
	<u>27,452</u>

Federal water deliveries to federal customers from the USBR share of the joint-use facilities totaled 1,186,101 ac-ft, up 23 percent over the 1978 delivery amount. In addition, 105,033 ac-ft of CVP water was wheeled by the State for the USBR, over 12 times the amount wheeled in 1978. See Page 6 for a breakdown of the wheeled amounts.

Oroville Field Division

Upper Feather River Reservoirs

Of the three upper Feather River reservoirs, only Antelope Lake filled and spilled in 1979. Spill took place during a three-week period in late May and early June. Antelope Lake has spilled every year except 1977 since its original filling in 1965. The following table shows the 1979 range of storages of the three upper Feather River reservoirs:

Upper Feather River Reservoir Storage

<u>Reservoir</u>	<u>Maximum in ac-ft)</u>	<u>Date</u>	<u>% of Capacity</u>	<u>Minimum (in ac-ft)</u>	<u>Date</u>	<u>% of Capacity</u>
Antelope Lake	22,760	5/24- 5/27	101	14,913	1/10	66
Frenchman Lake	23,148	5/13- 5/14	42	13,095	11/22- 11/23	24
Lake Davis	67,186	5/18	80	46,758	12/18	55

Monthly operation tables for the upper Feather River lakes are on Page V-1.

Lake Oroville

A summary of Lake Oroville operations data is given in the following tables. More detailed information on operations can be found in Section V.

Lake Oroville Operations Summary

<u>Parameter</u>	<u>Amount</u>	<u>Date</u>
Storage		
Maximum	3,519,435 ac-ft	June 3
Minimum	2,640,537 ac-ft	Jan. 5
Daily Inflow		
Maximum	37,803 ac-ft	Feb. 14
Oroville Complex Total Release to Feather River		
Maximum	15,500 cfs	Feb. 24, 25
Surface Water Temperature		
Maximum	80°F	July 18

The computed inflow to Lake Oroville during 1979 was 3,067,870 ac-ft. Included in this computed inflow amount are releases from Ponderosa Dam (172,352 ac-ft) and Lake Wilenor (3,770 ac-ft).

Water Deliveries

Diversions and releases from the Oroville-Thermalito complex during 1979 are shown in the following table. Other Project deliveries in the Oroville Field Division are shown on Page I-2.

Oroville-Thermalito Complex Diversions and Releases (in ac-ft)

Diversions:	
Palermo Canal	6,540
Thermalito Irrigation District	1,183
County of Butte	302
Thermalito Afterbay deliveries	
Sutter-Butte Canal	501,277
PGandE Lateral	4,031
Richvale Canal	94,910
Western Canal	257,545
Releases: Thermalito Afterbay river outlet, Fish Hatchery, and Fish Barrier Dam	<u>2,127,315</u>
Total	2,993,103

Figure C, Page 23, presents a graph of the 1979 inflow, releases, and diversions for the Oroville-Thermalito complex. The inflow used for the graph is the computed inflow to Lake Oroville.

Hyatt-Thermalito Powerplants

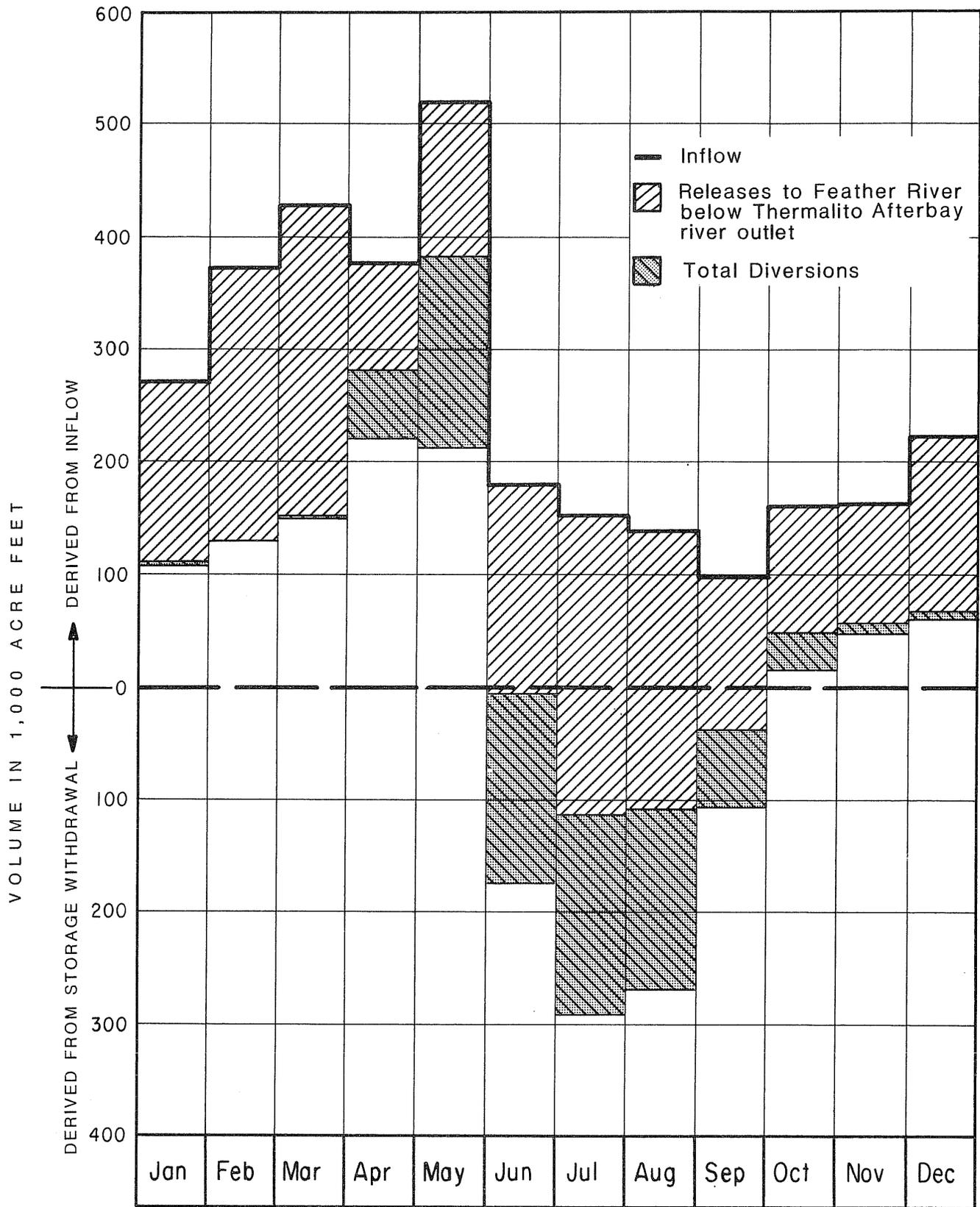
Gross generation at the Oroville-Thermalito Complex during the year totaled 1,713,920 megawatthours. Energy consumed for power plant use and pumpback requirements there totaled 115,970 megawatthours. A graph showing the Edward Hyatt and Thermalito Powerplants monthly gross generation is presented on Page VI-3. Tables of monthly power operations are tabulated in Section VI.

Annual Inspection

The annual inspection and critique for the Oroville Field Division were conducted during May 7-11 by representatives of the Field Division, O&M Headquarters, and the California Water Commission.

Figure C

OROVILLE-THERMALITO COMPLEX OPERATIONS IN 1979 INFLOW, RELEASES, & DIVERSIONS



1979

Activities, Outages, and Limitations

Other activities, events, outages, and limitations affecting or influencing operations of the Oroville Field Division in 1979 were:

- o Effective March 1, the operating level of Thermalito Afterbay was limited to elevation 128 feet (25,381 ac-ft storage), 8.5 feet below the maximum design level of 136.5 feet (57,042 ac-ft). Temporary encroachments were allowed up to elevation 131 (35,556 ac-ft). The limitation was at the recommendation of the Special Consulting Board for the Oroville Earthquake Study, pending completion of additional foundation testing of the Thermalito Afterbay dikes.
- o Edward Hyatt Powerplant Unit No. 1 was limited to a maximum load of 100 megawatts (reduced from 135 MW) since November 14, 1978, due to excessive downthrust on the unit's bearings. Annual maintenance was performed on the unit March 20-April 12.
- o Hyatt Unit No. 2 was taken out of service on August 30 for a complete stator rewind and for annual maintenance and was returned to service on November 20.
- o Hyatt Unit No. 3 was forced out of service on December 19 due to thrust bearing problems. It was returned to service on December 27 with a temporary load limitation of 115 MW. Annual maintenance was performed on the unit February 6-26.

- o Hyatt Unit No. 4 suffered a stator winding short on March 24. The unit had to have a complete stator rewind and was returned to service on July 13. Annual maintenance was also performed during this time period.

- o During the year, annual maintenance was performed on Hyatt Unit No. 5 (January 3-30), Hyatt Unit No. 6 (February 27-March 12), and Thermalito Unit No. 4 (May 4-17). Other units of the Hyatt and Thermalito powerplants were out of service for minor repairs or maintenance during the year, with the various outage periods ranging from less than one day to a week. Also, one-half of stator coil was replaced in Unit 6 (June 30-July 20).

Delta Field Division

Water Deliveries

Comparisons of the 1979 water deliveries to the three areas the Division serves and their percent differences from 1978 deliveries are shown in the following table. Annual water deliveries to each contractor are presented on Page I-2.

Delta Field Division Water Deliveries

<u>Area</u>	<u>Water Deliveries (in ac-ft)</u>	<u>Difference from 1978 (in percent)</u>
California Aqueduct	7,277	83
North Bay Aqueduct	6,561	9
South Bay Aqueduct	149,493	15

Harvey O. Banks Delta Pumping Plant

Pumping at the Banks Pumping Plant for the year totaled 2,606,998 ac-ft, the greatest yearly total since operation began in 1967, and 18 percent over that pumped during 1978, the previous high year.

Of the 1979 total pumping at the Banks Pumping Plant, 313,901 ac-ft were pumped for the USBR. All water pumped for the USBR was conveyed through the California Aqueduct to O'Neill Forebay. 105,033 ac-ft of CVP water were wheeled by the State beyond O'Neill Forebay, including 104,218 ac-ft that were pumped at Banks Pumping Plant during 1979. The remainder of the 1979 pumping for the USBR at Banks Pumping Plant consisted of 193,590 ac-ft of D-1485 replacement water and 16,093 ac-ft of O'Neill Pumping-Generating Plant outage water.

In complying with the SWRCB D-1485 limitation on Delta diversions, described on Page 13, the USBR forgoes up to 193,590 ac-ft of its May-June diversion capacity at its Tracy Pumping Plant. This forgone capacity is then replaced by pumping CVP water at Banks Pumping Plant to the extent needed. In 1979, 165,715 ac-ft of this D-1485 replacement water were pumped at Banks Pumping Plant during July-August, the ordinary time that SWP pumping capacity is available for this purpose, and 27,875 ac-ft were pumped during April-June when Banks Pumping Plant capacity was available in that year.

During the last half of October 1979, the USBR's O'Neill Pumping-Generating Plant Unit 4 experienced a forced outage. DWR assisted the USBR by pumping 16,093 ac-ft of CVP water at Banks

Pumping Plant during that outage period, helping the USBR to build its active storage in San Luis Reservoir in preparation for the scheduled November 10, 1979-January 31, 1980 outage of its Delta-Mendota Canal.

South Bay Aqueduct

Pumping at the South Bay Pumping Plant totaled 141,747 ac-ft for the year, a 37 percent increase over the 1978 amount.

Except for a five-day period in late February, pumping into Lake Del Valle was limited to the period from April 2 until May 8. Maximum storage in the reservoir was 40,042 ac-ft, about 52 percent of storage capacity, during May 10-13. The annual drawdown of the reservoir began on August 17 and continued until November 10. Minimum storage was 24,153 ac-ft, during December 18-20.

A monthly reservoir operation table for Lake Del Valle is shown in Section V.

Annual Inspection

The annual inspection and critique for the Delta Field Division were conducted during June 11-15 by representatives of the Field Division, O&M Headquarters, and the California Water Commission.

Activities, Outages, and Limitations

Other activities, events, outages, and limitations affecting or influencing operations of the Delta Field Division in 1979 were:

- o Banks Pumping Plant Unit No. 1 was out of service starting October 3, 1978, for a six and one-half month period ending April 13, 1979, in order to install a new stainless steel

impeller. Unit No. 2 was also out of service for the same purpose for the three-month period April 17-July 17.

- o Banks Unit No. 1 was out of service nearly a month, from July 4 to August 1, for repair of an oil leak.
- o Banks Unit No. 4, originally taken out of service for annual maintenance on October 12, required extensive impeller repairs before being returned to service on December 14.
- o An electrical storm on October 13 and 14 interrupted power to both the Banks and South Bay Pumping Plants. Water deliveries to South Bay Aqueduct customers had to be curtailed. Although the main power transformer for the John E. Skinner Delta Fish Protective Facility was damaged by lightning, the Facility was able to resume operations after the installation of a portable transformer.
- o Other units of both Banks and South Bay Pumping Plants were out of service for minor repairs or maintenance during the year, with the various outage periods ranging from less than one day to a week.

San Luis Field Division

Water Deliveries

Federal water deliveries from the joint-use facilities during the year totaled 1,239,980 ac-ft, or 36 percent more than the 1978 total. Of this amount, 58 ac-ft of water were delivered to the

Department of Parks and Recreation from San Luis Reservoir and O'Neill Forebay; 371 ac-ft was mitigation water delivered from O'Neill Forebay to the Department of Fish and Game; and 150 ac-ft was recreation water delivered to the Mendota Waterfowl Habitat Area. An additional 708 ac-ft of State water was delivered to the Departments of Parks and Recreation and Fish and Game. The federal total also includes the previously noted amounts of CVP water wheeled through SWP facilities.

Mitigation Water

The SWP's share of mitigation water for 1979 totaled 4,151 ac-ft. Most of this water was conveyed to the California Department of Fish and Game, Grasslands Water District, and William Affonso through the Delta-Mendota Canal. The Department of Fish and Game took about ten percent of the 4,151 ac-ft from O'Neill Forebay. In 1980 the SWP paid back a total of 1,015,225 kWh of electrical energy for pumping the SWP share of the 1979 mitigation water at the USBR's Tracy and O'Neill Pumping Plants.

San Luis Reservoir

San Luis Reservoir storage reached its maximum of the year, 2,029,615 ac-ft during April 14-15, only about 9,000 ac-ft below the maximum storage level. The minimum storage for the year, 1,060,402 ac-ft, was reached on August 28, after the summer drawdown. Of the total volume of stored water released from the reservoir during the four and one-half months of drawdown, 409,803 ac-ft, or 42 percent, was SWP water. A graph showing the fluctuations of San Luis Reservoir for 1979 is presented on Page V-11.

The 1979 pumping at San Luis Pumping-Generating Plant totaled 574,262 ac-ft, only 28 percent of the record amount pumped in 1978. Water released from San Luis Reservoir to O'Neill Forebay for generation totaled 1,066,798 ac-ft, nearly two and one-quarter times the 1978 amount. Monthly operation tables for San Luis Reservoir and O'Neill Forebay are presented in Section V.

Annual Inspection

The annual inspection and critique for the San Luis Field Division were conducted during September 17-21 by representatives of the Field Division, O&M Headquarters, and the California Water Commission.

Activities, Outages, and Limitations

Other activities, events, outages, and limitations affecting or influencing operations of the San Luis Field Division in 1979 were:

- o San Luis Pumping-Generating Plant Units Nos. 1 and 2 and No. 1 Penstock were taken out of service on March 2 for annual maintenance, which was completed in mid-April. The units could not be returned to service until May 17, however, because the headworks crane was out of service until then, preventing stoplog removal.
- o San Luis Units No. 7 and 8 were both out of service for a month-long period of annual maintenance, November 9 - December 7.

- o At Dos Amigos Pumping Plant, Unit No. 3 was taken out of service on January 19 for annual maintenance, which was completed on March 1, but the unit was not returned to service until April 13 because of other necessary repairs. During the year, annual maintenance was also performed on Unit No. 6 (March 5-30), and on Unit No. 1 (September 28 - November 14). Unit No. 4 was out for repairs during the 10-day period November 26 - December 5.
- o Other San Luis and Dos Amigos units were out of service for minor repairs or maintenance during the year, with the various outage periods ranging from less than one day to a week.
- o On March 26-29, a USBR dam safety inspection team inspected the San Luis and O'Neill Dams. The inspection was part of the USBR program to make safety evaluations of all their dams.

San Joaquin Field Division

Water Deliveries

Of the 1,619,096 ac-ft total SWP water delivered to State water service contractors in the San Joaquin Field Division during 1979, about 44 percent was entitlement water, 39 percent was surplus water, and the remaining percentage divided among makeup, emergency relief, and repayment water. The largest delivery (1,290,293 ac-ft) was to the Kern County Water Agency. This represented 80 percent of the total water delivered within the Division.

As previously noted, in addition to the SWP deliveries, a total of 51,733 ac-ft of federal CVP water was wheeled through SWP facilities: 46,733 ac-ft to the Kern County Water Agency's Cross Valley Canal and, under a special 1979 agreement, 5,000 ac-ft of Pixley Irrigation District's CVP water to Lakeside Irrigation District, as part of a water exchange program between the two agencies.

Preconsolidation repayment water delivered to Belridge Oil Company in 1979 totaled 5,095 ac-ft, about twice the amount delivered in 1978. At the end of 1979, the preconsolidation repayment account to be delivered before 1985 was as follows:

Preconsolidation Repayment Water
(in ac-ft)

<u>Contract Holder</u>	<u>Total Contract Amount</u>	<u>1978 Balance</u>	<u>1979 Deliveries</u>	<u>Remaining Balance</u>
J. G. Boswell Co.	131,600	84,895	0	84,895
Belridge Oil Co.	108,000	57,977	5,095	52,882

A table showing water deliveries by year and totals to date for individual agencies is presented on Page I-2.

Annual Inspection

The annual inspection and critique for the San Joaquin Field Division were conducted during October 15-19 by representatives of the Field Division, O&M Headquarters, and the California Water Commission.

Activities, Outages, and Limitations

Other activities, events, outages, and limitations affecting or influencing operations of the San Joaquin Field Division in 1979 were:

Coastal Branch. The following activities, events, outages, and limitations affected the Coastal Branch:

- o Las Perillas Pumping Plant Unit No. 4 was out of service for the six-month period October 10, 1978 to April 12, 1979, for repairs to the impeller, shaft, and bearings. Annual maintenance was performed on Las Perillas Units Nos. 1, 2, and 3 during the months of September and October, with outage periods ranging up to a maximum of fourteen days per unit. Unit No. 6 was out for a 40-day period ending December 14 for the repair of a sluice gate seal.

- o Badger Hill Pumping Plant Units Nos. 1, 2, and 3 had annual maintenance performed in September, October, and November, with outage periods of 5, 18, and 44 days, respectively. Unit No. 4 was out for repairs for a 35-day period ending December 5, and Unit 6 was out of service during the second week of December for the replacement of a suction drain valve. Both Badger Hill and Las Perillas Plants had intermittent problems with tumbleweeds during the year.

California Aqueduct. The following activities, events, outages, and limitations affected the California Aqueduct:

- o Buena Vista Pumping Plant Units Nos. 7, 8, 9, and 10 were out of service from February 26 to March 14 while annual maintenance was being performed on their power transformer. Other units having annual maintenance during the year were: Unit No. 5 (April 22 - July 3), Unit No. 6 (July 5 - August 7), and Unit No. 7 (August 12 - December 28).

- o At Wheeler Ridge Pumping Plant, three units were out of service for annual maintenance during the year: Unit No. 3 (September 11, 1978 - January 30, 1979), Unit No. 4 (April 20 - July 13), and Unit No. 1 (August 16 - December 12). Other units out of service for various repairs were: Unit No. 6 (November 14, 1978 - February 28, 1979), Unit No. 5 (February 13 - March 30), and Unit No. 9 (March 5 - 16).

- o At Wind Gap Pumping Plant, Unit No. 1 was out of service from September 20, 1978 to March 2, 1979 for valve repairs. Unit No. 7 was out of service from November 11, 1978 to February 9, 1979 for valve repairs. Unit No. 8 was out of service from January 30 to March 9 for valve repair. Unit No. 4 was out from February 20 to March 9 for discharge line repairs, as was Unit No. 2 from April 4 to June 1. Unit No. 3 was out for the three-week period June 6 - 27 for slip-ring and contact cleaning. Units Nos. 8 and 9 were out from June 13 to July 24 due to hydraulic system problems. Unit No. 1 was out for a second time for valve repair from July 2 to August 4. Unit No. 9 was taken out of service for repairs on December 10, and it remained out of service at the end

of the year. Unit No. 7 was taken out of service for annual maintenance on August 20 and it also remained out of service at the end of the year.

- o A. D. Edmonston Pumping Plant Unit No. 1, taken out of service on July 10, 1978 for excessive downthrust on the unit's bearings, remained out of service during all of 1979. Repairs to the unit were delayed due to the size of the job and the difficulty in obtaining parts from the pump's manufacturer. Unit No. 7, also with bearing problems, was taken out of service on December 8, 1978, and following repairs was available for pumping on February 17, 1979, after an 81-day outage. Unit No. 6, taken out of service on October 21 for stator re-wedging and annual maintenance, remained out of service at the end of the year.
- o Other outages at Edmonston of more than a week included the following: Unit No. 2, April 2 - 20 for repairs, May 8 - 18 for modifications, July 20 - August 9 for repairs; Unit No. 3, April 2 - 10 for modifications, August 1 - 13 for repairs; Unit No. 4, October 5 - December 11 for repairs; Unit No. 5, June 13 - 26 for voltage regulator calibration, August 1 - 13 for repairs; and Unit No. 7, April 2 - 13 for repairs.
- o Other units in the San Joaquin Field Division's six pumping plants were out of service for minor repairs or maintenance during the year, with the various outage periods ranging from less than one day to a week.

- o During the latter part of January, the Division had to undertake a special cleanup operation to remove tumbleweeds from the Aqueduct.

Southern Field Division

Water Deliveries

Water deliveries from the SWP to State water service contractors in the Southern Field Division totaled 594,338 ac-ft, about 94 percent of the amount delivered the previous year. Not included in this total is SWP water applied in the ground water demonstration areas and recreation water.

As part of the continuation of two ground water recharge demonstration programs started in 1978 in Southern California, 4,029 ac-ft of SWP conservation water were delivered in 1979 to the San Bernardino Valley Municipal Water District for ground water storage. In the other program, 4,000 ac-ft of water were withdrawn from the Mojave Ground Water Basin by the Mojave Water Agency in 1979, in lieu of receiving SWP water conveyed by surface facilities.

All of the 502 ac-ft of recreation water delivered in 1979 went to the California Department of Parks and Recreation, at Silverwood Lake and Lake Perris recreation areas.

A table showing water deliveries by year with totals to date for individual agencies is presented on Page I-2.

Reservoir Storage

At the start of the year, total combined reservoir storage in the Southern Field Division's five reservoirs (Pyramid Lake,

Elderberry Forebay, Castaic Lake, Silverwood Lake, and Lake Perris) was at a record high level, 649,995 ac-ft, or 91 percent of the combined capacity. Combined storage at the end of the year was nearly as high, 632,139 ac-ft, or 88 percent of the combined capacity. During the year, the maximum storage in Lake Perris reached a new record high level of 125,972 ac-ft on May 6, surpassing the mark established in 1978 by about 5,800 ac-ft.

A table of reservoir storages for Southern Field Division reservoirs follows, and summaries of operations for those reservoirs are in Section V.

Reservoir Storages
(in ac-ft)

Reservoir (maximum operating storage)	<u>Beginning</u> <u>12/31/78</u>	<u>Ending</u> <u>12/31/79</u>	<u>Date</u>	<u>Maximum</u>	<u>Date</u>	<u>Minimum</u>
Pyramid Lake (169,901)	160,834	164,093	10/2	170,160	5/24	155,964
Elderberry Forebay (28,230)	17,262	27,139	5/24	32,757	10/3	14,741
Castaic Lake (319,247)	294,154	283,890	4/23	320,356	9/6	256,142
Silverwood Lake (73,032)	71,263	69,369	2/1	72,073	10/10	52,279
Lake Perris (126,841)	106,482	87,648	5/6	125,972	11/14	72,050

Annual Inspection

The annual inspection and critique for the Southern Field Division were conducted during November 12-16 by representatives of the Field Division, O&M Headquarters, and the California Water Commission.

Activities, Outages, and Limitations

Other activities, events, outages, and limitations affecting or influencing operations of the Southern Field Division in 1979 were: West Branch. The following activities, events, outages, and limitations affected the West Branch:

- o Oso Pumping Plant Unit No. 1, which was taken out of service on December 14, 1978 for replacement of pump rotating wearing rings, remained out of service during all of 1979. Unit No. 5, which was taken out of service on March 27, 1978 to repair a stator winding coil, was finally returned to service on September 14, 1979, nearly 18 months later. Unit No. 8 was available for only emergency use from November 18, 1978 through all of 1979, due to leakage from a discharge line coupling.
- o The Gorman Creek improvement channel was out of service for the six-week period October 1 - November 14, in order to install the Peace Valley Pipeline crossing. The channel was also out of service for a week in late January and two weeks in early June, both times for repairs to the lining. Between December 3 and December 7, releases to the Lower Quail Canal were stopped for the Peace Valley Pipeline contractor to restore riprap in the channel at the Interstate 5 highway bridge.

o At Castaic Powerplant, Units Nos. 4 and 6 were out of service for repairs during the two-week period ending January 11. The entire plant was out of service for a four-day period in early October while repairs were made to the Elderberry Forebay outlet works.

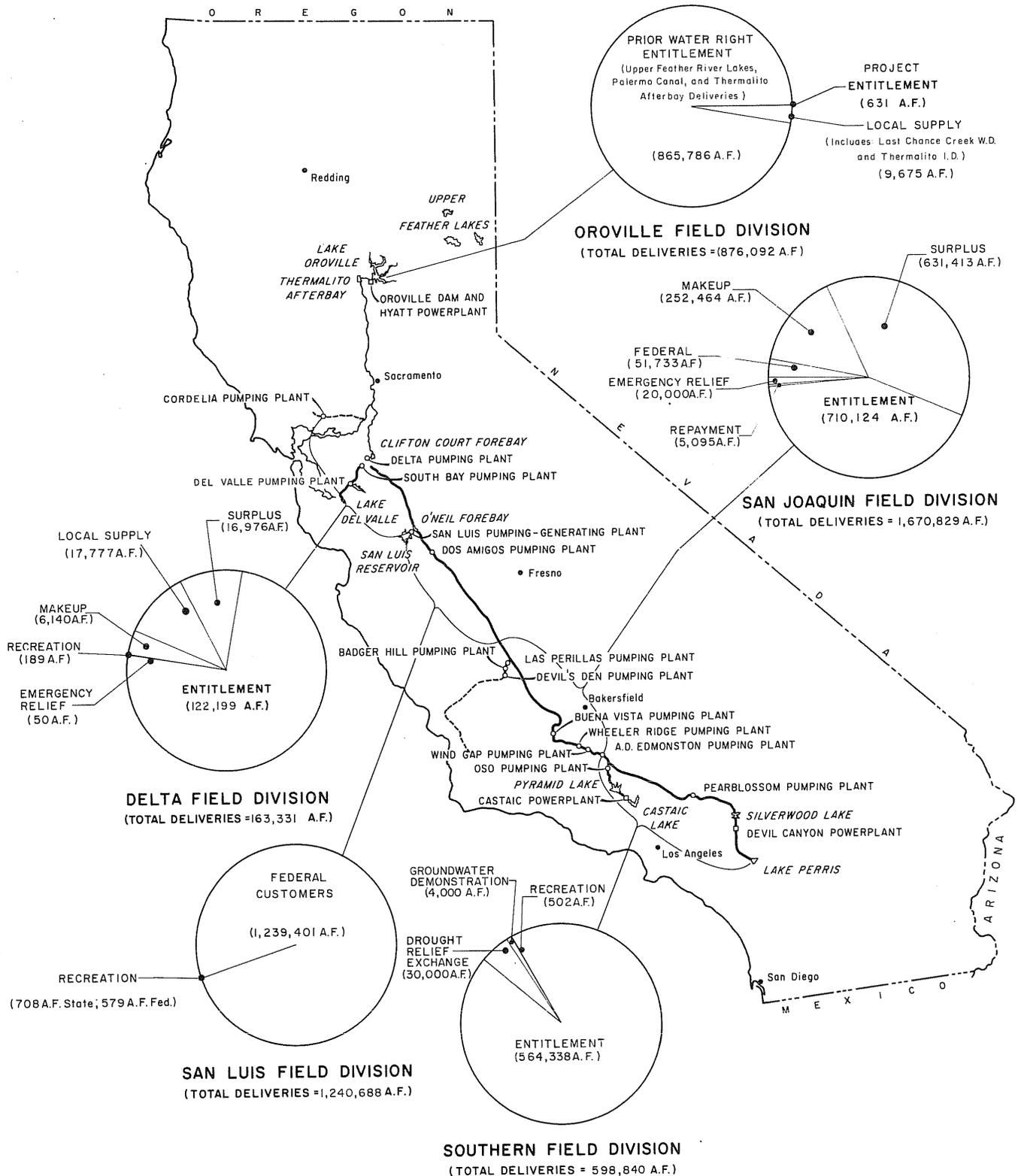
East Branch. The following activities, events, outages, and limitations affected the East Branch:

- o At Pearblossom Pumping Plant, several units were out of service during the year for annual maintenance, as follows: Unit No. 1, May 16 - June 29; Unit No. 2, July 10 - 19 and August 13 - September 14; Unit No. 3, September 17 - October 17; Unit No. 4, October 16 - November 1. Unit No. 4 was also out of service from December 17, 1978 to May 10, 1979 to repair a stator winding coil. Units Nos. 5 and 6 were out of service from January 8 to April 3, both for discharge valve work. Unit No. 6 was also out for repairs from July 19 to August 2, after which it was only available for emergency use, due to vibration problems. The pumping plant was subject to many problems due to tumbleweeds during the year.
- o At Devil Canyon Powerplant, Unit No. 2 was out of service from January 15 to February 2 for repairs. The entire plant was out of service for the five-day period May 7 - 11 while repairs were made to the hydraulic oil system piping of the San Bernardino Tunnel.

- o Other units in the Southern Field Division's pumping plants and powerplants were out of service for minor repairs or maintenance during the year, with the various outage periods ranging from less than one day to a week.

PROJECT
DELIVERIES

PROJECT WATER DELIVERIES 1979



WATER DELIVERIES 1962-1979
(IN ACRE-FEET)

AGENCY	1962-1974	1975	1976	1977 ^{6/}	1978	1979	TOTAL
OROVILLE FIELD DIVISION							
Last Chance Creek W.D. ^{1/}	153,431	18,602	11,437	6,372	11,512	8,492	209,846
Plumas Co. F.C. & W.C.D.	1,966	405	382	303	278	329	3,663
Palermo Canal*	52,773	8,635	10,431	8,049	7,992	6,540	94,420
County of Butte	558	253	527	706	579	302	2,925
Thermalito I.D. ^{1/}	393	413	234	418	1,121	1,183	3,762
Thermalito Afterbay*	5,365,446	837,160	922,677	552,470	779,901	857,763	9,315,417
DELTA FIELD DIVISION							
Napa Co. F.C. & W.C.D. ^{1/}	22,349	6,840	7,122	8,226	6,034	6,561	57,132
Alameda Co. W.D. ^{1/}	183,730	8,725	26,643	20,644	14,963	18,006	465,166
Alameda Co. F.C. & W.C.D., Zone 7 ^{1/}	95,186	16,320	20,983	12,940	18,781	23,409	187,493
Pleasanton Township W.D.	674	0	0	0	0	0	674
Santa Clara Valley W.D.	671,220	106,470	112,705	76,220	97,727	107,989	1,172,331
Marin W.D. ^{1/}	0	0	0	4,594	0	0	4,594
San Francisco W.D. ^{7/}	0	0	0	3,372	973	0	4,345
Skylonda M.W.D. ^{1/}	0	0	0	10	0	0	10
Oak Flat W.D.	38,558	7,152	7,952	3,370	3,912	6,847	67,791
Mustang W.D.	4,256	0	0	0	0	0 ^{12/}	4,256
Tracy Golf & Country Club	11	0	0	0	0	330 ^{12/}	341
East Bay Regional Park District (Lake Del Valle)	0	0	141	112	116	89	458
Orestimba Creek (Spec. Rec. Rel.)	0	0	0	0	0	100	100
SAN LUIS FIELD DIVISION							
Dept. of Parks & Recreation (State's share)	40	19	23	61	54	72	269
Dept. of Fish & Game (State's share)	0	0	72	298	323	636	1,329
Federal Customers (includes fed. rec. water plus joint facilities)	4,393,682	1,361,573	1,317,137	323,638 ^{2/}	910,860	1,239,980	9,566,870
SAN JOAQUIN FIELD DIVISION							
Tulare Lake Basin W.S.D.	650,079	214,706	112,717	44,522	9,533	212,963	1,244,520
Empire West Side I.D.	28,114	6,448	6,457	2,355	454	1,739	45,567
County of Kings	9,100	1,600	1,600	1,530	2,070	2,000	17,900
Hacienda W.D.	38,702	7,517	7,620	3,836	2,520	9,500	69,695
Kern Co. W.A.	2,475,891	821,640	881,400 ^{3/}	432,837 ^{9/}	675,970	1,290,293	6,578,031
Dudley Ridge W.D.	283,668	81,110	72,343 ^{3/}	28,918 ^{9/}	59,333	77,089	602,461
Devil's Den W.D.	82,836	18,195	17,427	11,911	11,362	19,138	160,869
J. G. Boswell Co. ^{8/}	39,513	0	6,712	0	480	0	46,705
Belridge Oil Co. (formerly Buena Vista W.S.D.) ^{8/}	41,276	6,797	0	0	1,950	5,095	55,118
Green Valley W.D.	1,741	2,217	0	0	1,299	1,279	6,536
Federal USBR (U. S. Fish & Wildlife Service)	0	11,700	0	0	0	0	11,700
Federal USBR (Cross Valley Canal)	0	0	88,300	31,060	8,387	51,733	179,480
Wheeler Ridge W.S.D.	0	0	0	0	91	0	91
SOUTHERN FIELD DIVISION							
Antelope Valley-East Kern W.A.	1,332	8,068	27,782	33,354	44,137	60,493 ^{13/}	175,166
Metropolitan W.D. of So. Cal.	509,536	526,958	618,541 ^{4/}	189,755	550,161	507,074 ^{13/}	2,902,025
Littlerock Creek I.D.	1,175	876	589	111	208	133	3,092
Mojave W.A.	69	0	0	80	584 ^{10/}	4,000 ^{11/}	4,733
Desert W.A.	19,000	11,000	12,000	0	15,300	15,000	72,300
Coachella Valley W.D.	12,200	7,000	7,600	0	10,084	10,063	46,947
Crestline-Lake Arrowhead W.A.	1,552	825	1,002	1,109	1,209	1,260	6,957
San Geronio Pass W.A.	0	0	0	0	0	0	0
San Gabriel Valley M.W.D.	612	5,450	6,071	8,996	7,771	290	29,190
San Bernardino Valley M.W.D.	50,306	13,865	12,273	24,833 ^{5/}	4,055	18	105,350
Parks & Recreation (Federal, State & County)	44	70	613	937 ^{2/}	674	502	2,840
Piru Creek Fish Enhancement	1,362	1,553	0	0	0	0	2,915
Castaic Lake W.A.	0	0	0	0	0	7	7

* Prior water right entitlement.

^{1/}Includes regulated delivery of local supply.

^{2/}Includes 245 acre-feet for State Department of Fish and Game and 49 acre-feet to State Department of Parks and Recreation.

^{3/}Of this amount, 10,500 acre-feet was acquired by exchange agreement with Metropolitan W.D.S.C.

^{4/}Does not include amount shown in footnote 3.

^{5/}Includes: Reach 24, 111 acre-feet; Reach 28J, 469 acre-feet; and Reach 30, 357 acre-feet.

^{6/}Includes Exchange and 1976 Carryover Water.

^{7/}Exchange water only.

^{8/}Repayment of preconsolidation water.

^{9/}Includes 200 acre-feet of local supply from Kaweah River.

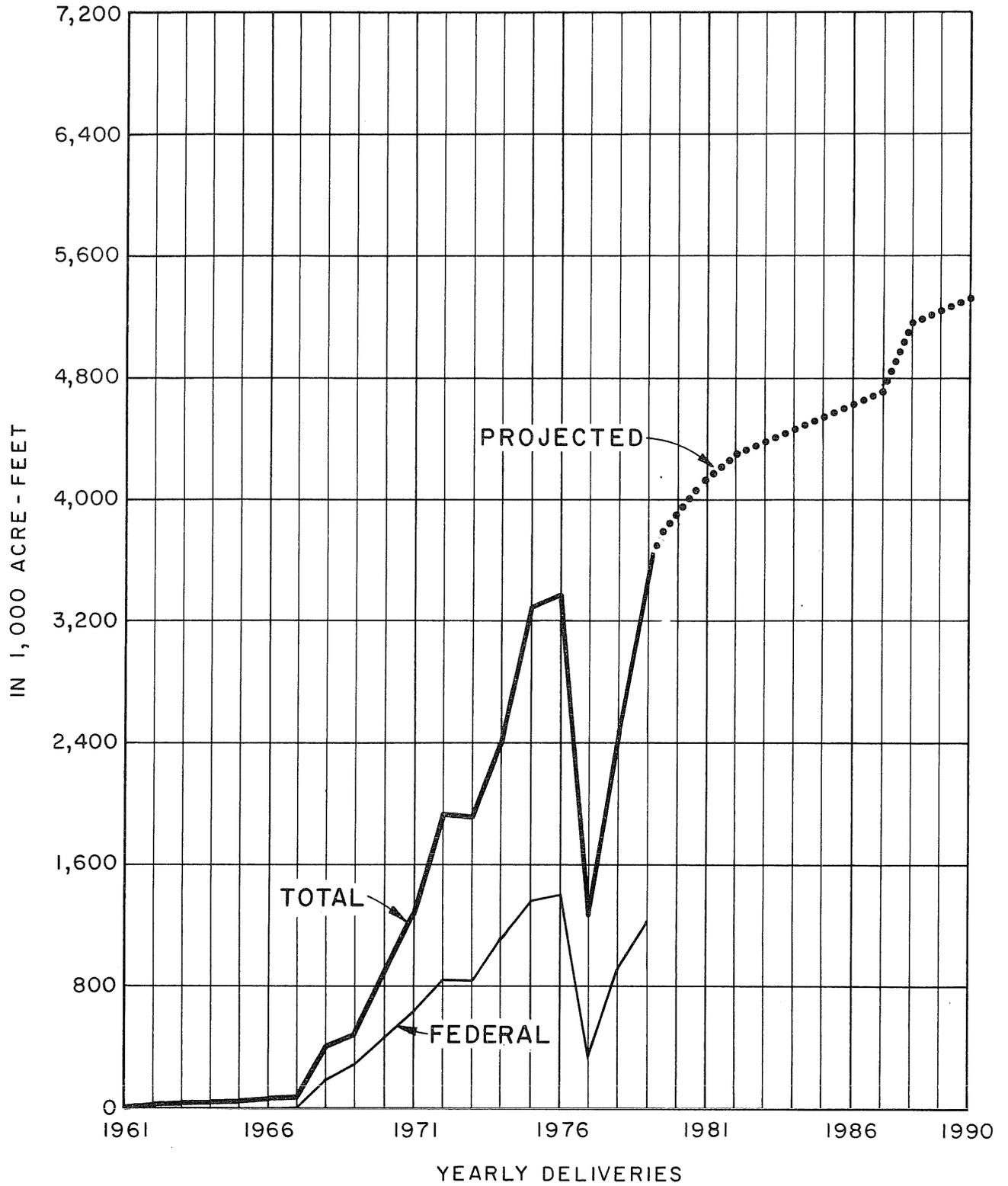
^{10/}Water borrowed during construction.

^{11/}Pumped from ground water basin by the agency for its use.

^{12/}Includes 50 acre-feet acquired in 1977 for emergency relief purposes and later sold when drought ended.

^{13/}Includes 30,000 acre-feet conveyed to Metropolitan for storage in local ground water basins.

PROJECT WATER DELIVERIES - YEARLY TOTALS



Excludes Thermalito Afterbay and includes Federal deliveries

SUMMARY OF
CALIFORNIA AQUEDUCT
OPERATION

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

1979

(Amounts in acre-feet)

DESCRIPTION	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
<u>DELTA FIELD DIVISION</u>						
North Bay Aqueduct						
Pumped at Cordelia Pumping Plant	480	297	385	464	509	681
Storage Change	-3	0	-3	6	9	6
Operational Losses (-), Gains (+)	0	0	0	0	+18	0
Delivered to Contracting Agency	483	297	389	458	518	675
California Aqueduct						
Pumped at Delta Pumping Plant	80,750	90,335	143,431	156,941	184,471	178,563
South Bay Diversions (So. Bay P.P.)	9,068	8,435	9,464	14,572	13,524	15,178
Storage Change	-194	-105	256	142	-57	-38
Operational Losses (-), Gains (+)	-2,322	-2,156	-2,037	-2,809	2,557	-2,436
Delivered to Contracting Agencies	133	6	49	1,213	1,404	1,305
Outflow at Check 12	69,421	79,843	131,625	138,205	172,157	159,682
South Bay Aqueduct						
Pumped at South Bay P.P.	9,068	8,435	9,464	14,572	13,524	15,178
Inflow from Lake Del Valle	0	0	0	0	0	876
Outflow at Del Valle P.P.	0	960	0	3,996	1,051	0
Operational Losses (-), Gains (+)	-10	-10	-10	-10	-10	-10
Delivered to Contracting Agencies:						
Project Water	7,793	5,943	7,497	9,586	11,246	15,189
Del Valle Inflow Exchanged and Released from Aqueduct	1,265	1,522	1,957	539	217	48
Del Valle Inflow Released from Aqueduct	0	0	0	0	0	0
Storage Change	0	0	0	0	0	0
Del Valle Stored Exchange and Released from Aqueduct	0	0	0	441	1,000	807
Lake Del Valle Operation:						
End-of-Month Storage	25,948	32,730	34,618	38,973	39,900	38,612
Storage Change	1,225	6,782	1,888	4,355	927	-1,288
<u>SAN LUIS FIELD DIVISION</u>						
O'Neill Forebay Operation						
End-of-Month Storage	40,053	46,258	51,823	53,435	41,248	43,516
Storage Change	-12,253	6,205	5,565	1,612	-12,187	2,268
Inflow, California Aqueduct	69,421	79,843	131,625	138,205	172,157	159,682
Inflow, O'Neill P-G Plant	153,789	47,150	60,077	68,679	3,946	5,164
Inflow, San Luis P-G Plant	87	363	107	5,336	112,852	366,725
Delivered to Federal Customers	622	381	994	1,964	2,983	4,556
Outflow, O'Neill P-G Plant	0	3,320	4,114	1,184	24,182	64,965
Outflow, San Luis P-G Plant	98,358	88	20	14,921	0	0
Operational Losses (-), Gains (+)	3,723	369	6,937	3,108	-3,323	-14,215
Outflow, Dos Amigos P.P.	140,293	117,731	188,053	195,647	270,654	445,567
San Luis Reservoir Operation						
End-of-Month Storage	2,019,203	2,021,741	2,021,741	2,027,707	1,912,336	1,544,768
Storage Change	93,151	2,538	0	5,966	-115,371	-367,568
Inflow, San Luis P-G Plant	98,358	88	20	14,921	0	0
Operational Losses (-), Gains (+)	-5,120	2,813	87	-3,619	-2,519	-843
Outflow, San Luis P-G Plant	87	363	108	5,336	112,852	366,725
California Aqueduct (Pools 14 thru 21)						
Inflow, Dos Amigos P.P. (State)	79,119	86,304	111,986	117,422	166,615	267,090
Inflow, Dos Amigos P.P. (Federal)	61,174	31,427	76,067	78,225	104,039	178,447
Inflow, Floodwater into Aqueduct	36	412	0	0	0	0
Inflow, Well Water Pumped into Aqueduct	0	0	0	0	0	0

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

1979

(Amounts in acre-feet)

JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	DESCRIPTION
							<u>DELTA FIELD DIVISION</u>
							North Bay Aqueduct
718	713	706	579	407	622	6,562	Pumped at Cordelia Pumping Plant
-3	-1	6	0	9	11	37	Storage Change
0	0	0	0	18	0	36	Operational Losses (-), Gains (+)
721	714	700	579	416	611	6,561	Delivered to Contracting Agencies
							California Aqueduct
282,446	346,492	277,654	223,877	281,780	360,258	2,606,998	Pumped at Delta Pumping Plant
16,302	15,027	9,773	8,821	10,393	11,190	141,747	South Bay Diversions (So. Bay P.P.)
-18	149	-153	-348	381	-56	-41	Storage Change
-3,021	881	6,828	6,637	1,167	121	3,410	Operational Losses (-), Gains (+)
1,377	841	262	291	132	264	7,277	Delivered to Contracting Agencies
261,764	331,356	274,600	221,750	272,041	348,981	2,461,425	Outflow at Check 12
							South Bay Aqueduct
16,302	15,027	9,773	8,821	10,393	11,190	141,747	Pumped at South Bay P.P.
23	833	4,836	5,330	1,886 ^{1/}	0	13,784	Inflow from Lake Del Valle
0	0	0	0	0	0	6,007	Outflow at Del Valle P.P.
-10	-10	-10	-10	-10	-10	-120	Operational Losses (-), Gains (+)
15,057	14,804	14,053	14,141	12,171	10,708	138,188	Delivered to Contracting Agencies:
66	0	20	0	98	472	6,204	Project Water
0	0	0	0	0	0	0	Del Valle Inflow Exchanged and
0	0	0	0	0	0	0	Released from Aqueduct
1,192	1,046	526	0	0	0	5,012	Del Valle Inflow Released from
38,198	36,823	31,587	26,057	24,202	24,606	--	Aqueduct
-414	-1,375	-5,236	-5,530	-1,855	404	-117	Storage Change
							San Luis Reservoir Operation
1,243,690	1,068,880	1,212,743	1,369,824	1,453,962	1,375,381	9,271,976	End-of-month Storage
-301,078	-174,810	143,863	157,081	84,138	-78,581	-550,671	Storage Change
0	10,197	159,703	174,417	99,139	17,419	574,262	Inflow, San Luis P-G Plant
518	-4,245	-15,755	-17,336	-10,217	-1,899	-58,135	Operational Losses (-), Gains (+)
301,596	180,762	85	0	4,784	94,101	1,066,798	Outflow, San Luis P-G Plant
							California Aqueduct (Pools 14 thru 21)
349,583	322,085	199,626	156,270	156,024	200,684	2,212,800	Inflow, Dos Amigos P.P. (State)
200,828	178,741	46,221	31,209	66,555	184,661	1,237,624	Inflow, Dos Amigos P.P. (Federal)
0	0	0	0	0	0	448	Inflow, Floodwater into Aqueduct
0	0	0	0	0	0	0	Inflow, Well Water Pumped into Aqueduct

^{1/} Includes Floodwater Inflow.

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

1979

(Amounts in acre-feet)

DESCRIPTION	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
<u>SAN LUIS FIELD DIVISION (Cont.)</u>						
California Aqueduct Pools 14 thru 21 (Cont.)						
Storage Change	133	394	-19	-183	-703	2,125
Delivered to Federal Customers	60,434 ^{1/2}	33,560	75,616	76,599	103,999	177,518
Operational Losses (-), Gains (+)	-1,568	4,248	-1,015	-3,603	-85	9,676
Outflow, Check 21 (State)	78,194	88,437	111,441	115,628	167,273	270,287
Outflow, Check 21 (Federal)	0	0	0	0	0	5,313
<u>SAN JOAQUIN FIELD DIVISION</u>						
California Aqueduct, Check 21 to Buena Vista Pumping Plant						
Inflow, Check 21 (State)	66,156	81,552	106,492	111,133	156,198	243,802
Inflow, Check 21 (Federal)	12,038	6,885	4,949	4,495	11,075	31,798
Inflow, Kern River Intertie (State)	0	0	0	0	0	0
Delivered to State Contracting Agencies	28,684	42,674	66,960	56,089	79,212	160,527
Delivered for Repayment of Preconsolidation Water	0	398	388	440	480	457
Delivered to Federal Customers (Cross Valley Canal)	0	0	0	0	0	5,313
Pixley I.D.	0	0	0	0	0	0
Coastal Br. Diversion (Las Per. P.P.)	5,893	4,342	6,241	13,018	18,994	24,816
Storage Change	676	-117	168	-656	-340	616
Operational Losses (-), Gains (+)	3,494	346	585	1,529	-2,137	-5,225
Outflow, Buena Vista P.P.	46,435	41,486	38,269	48,266	66,790	78,646
California Aqueduct, Buena Vista P.P. to Wheeler Ridge P.P.						
Inflow, Buena Vista P.P.	46,435	41,486	38,269	48,266	66,790	78,646
Delivered to Contracting Agencies	3,216	7,030	10,164	9,168	16,269	30,427
Storage Change	-20	-204	13	97	117	-296
Operational Losses (-), Gains (+)	667	-1,470	-1,865	-923	-51	55
Outflow, Wheeler Ridge P.P.	43,906	33,190	26,227	38,078	50,353	48,570
California Aqueduct, Wheeler Ridge P.P. to Wind Gap P.P.						
Inflow, Wheeler Ridge P.P.	43,906	33,190	26,227	38,078	50,353	48,570
Delivered to Contracting Agencies	362	605	978	3,307	5,016	6,434
Storage Change	-4	-58	57	-4	-63	4
Operational Losses (-), Gains (+)	-23	407	2,541	-201	412	169
Outflow, Wind Gap P.P.	43,525	33,050	27,733	34,574	45,812	42,301
California Aqueduct, Wind Gap P.P. to A. D. Edmonston P.P.						
Inflow, Wind Gap P.P.	43,525	33,050	25,733	34,574	45,812	42,301
Delivered to Contracting Agencies	496	459	459	981	1,120	3,572
Storage Change	119	-139	-19	-22	-9	124
Operational Losses (-), Gains (+)	-431	393	426	44	-884	-302
Outflow, A. D. Edmonston P.P.	42,479	33,123	25,719	33,659	43,817	38,303
Coastal Branch, California Aqueduct						
Inflow, Las Perillas P.P.	5,893	4,342	6,241	13,018	18,994	24,816
Delivered to Contracting Agencies	5,598	4,119	6,000	11,948	6,869	22,659
Storage Change	1	0	-5	4	-42	19
Operational Losses (-), Gains (+)	-294	-223	-246	-1,066	-2,167	-2,138

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

1979

(Amounts in acre-feet)

JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	DESCRIPTION
							<u>SAN LUIS FIELD DIVISION</u> (cont.)
							California Aqueduct (Pools 14 thru 21) (Cont.)
-917	-62	1,384	-2,954	1,014	498	710	Storage Change
196,469	162,597	37,320	31,489	66,476	189,554	1,211,631	Delivered to Federal Customers
9,823	13,650	2,846	7,119	1,422	14,273	56,786	Operational Losses (-), Gains (+)
355,902	333,848	200,614	163,139	155,793	208,036	2,248,592	Outflow, Check 21 (State)
8,780	18,093	9,375	2,924	718	1,530	46,733	Outflow, Check 21 (Federal)
							<u>SAN JOAQUIN FIELD DIVISION</u>
							California Aqueduct, Check 21 to Buena Vista Pumping Plant
325,412	321,920	174,601	123,545	111,958	172,737	1,995,506	Inflow, Check 21 (State)
39,270	30,021	35,388	42,518	44,553	36,829	299,819	Inflow, Check 21 (Federal)
0	0	0	0	0	-14	-14	Inflow, Kern River Intertie (State)
216,948	202,791	91,769	94,691	88,695	109,138	1,238,178	Delivered to State Contracting Agencies
486	501	465	494	502	484	5,095	Delivered for Repayment of Preconsolidation Water
8,780	18,093	9,375	2,924	718	1,530	46,733	Delivered to Federal Customers (Cross Valley Canal)
0	4,193	807	0	0	0	5,000	Pixley I.D.
27,807	24,578	7,803	3,457	5,222	7,621	149,792	Coastal Br. Diversion (Las Per. P.P.)
135	-539	1,020	-726	5	111	353	Storage Change
-2,718	-99	-1,144	-1,807	1,785	-1,856	-7,247	Operational Losses (-), Gains (+)
107,808	102,225	97,606	63,416	63,154	88,812	842,913	Outflow, Buena Vista P.P.
							California Aqueduct, Buena Vista P.P. to Wheeler Ridge P.P.
107,808	102,225	97,606	63,416	63,154	88,812	842,913	Inflow, Buena Vista P.P.
35,084	33,759	8,352	4,659	3,317	7,756	169,201	Delivered to Contracting Agencies
434	-58	183	-245	42	-114	-51	Storage Change
803	2,016	1,942	859	577	1,845	4,455	Operational Losses (-), Gains (+)
73,093	70,540	91,013	59,861	60,372	83,015	678,218	Outflow, Wheeler Ridge P.P.
							California Aqueduct, Wheeler Ridge P.P. to Wind Gap P.P.
73,093	70,540	91,013	59,861	60,372	83,015	678,218	Inflow, Wheeler Ridge P.P.
7,480	6,851	4,620	2,996	3,672	4,507	46,828	Delivered to Contracting Agencies
-25	86	-17	2	-12	30	-4	Storage Change
-1,471	-434	4	1,079	98	-668	-87	Operational Losses (-), Gains (+)
64,167	63,169	86,414	57,942	56,810	77,810	631,307	Outflow, Wind Gap P.P.
							California Aqueduct, Wind Gap P.P. to A. D. Edmonston P.P.
64,167	63,169	86,414	57,942	56,810	77,810	631,307	Inflow, Wind Gap P.P.
5,481	5,645	700	467	686	818	20,884	Delivered to Contracting Agencies
-123	-18	286	-248	55	79	85	Storage Change
-368	-319	-1,468	-645	-290	-319	-4,163	Operational Losses (-), Gains (+)
58,441	57,223	83,960	57,078	55,779	76,594	606,175	Outflow, A. D. Edmonston P.P.
							Coastal Branch, California Aqueduct
27,807	24,578	7,803	3,457	5,222	7,621	149,792	Inflow, Las Perillas P.P.
25,722	22,883	7,010	3,237	5,287	7,564	138,896	Delivered to Contracting Agencies
15	-27	23	-1	5	-18	-26	Storage Change
-2,070	-1,722	-770	-221	70	-75	-10,922	Operational Losses (-), Gains (+)

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

1979

(Amounts in acre-feet)

DESCRIPTION	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
SOUTHERN FIELD DIVISION						
California Aqueduct, A. D. Edmonston P.P. to Junction of West Branch						
Inflow, A. D. Edmonston P.P.	42,479	33,123	25,719	33,659	43,817	38,303
Storage Change	1	-1	-2	-2	5	1
Operational Losses (-), Gains (+)	-5	-5	-8	-18	-16	-18
Outflow, West Branch	13,603	17,793	12,971	8,805	8,272	1,237
Outflow, East Branch	28,870	15,326	12,742	24,838	35,524	37,047
California Aqueduct, Junction of West Branch to Pearblossom P.P.						
Inflow	28,870	15,326	12,742	24,838	35,524	37,047
Delivered to Contracting Agencies	363	358	773	4,541	8,311	9,617
Storage Change	88	-32	175	-193	-120	-84
Operational Losses (-), Gains (+)	-375	-373	-594	-1,329	-1,218	-1,317
Outflow, Pearblossom P.P.	28,044	14,627	11,200	19,161	26,115	26,197
California Aqueduct, Pearblossom P.P. to Silverwood Lake						
Inflow, Pearblossom P.P.	28,044	14,627	11,200	19,161	26,115	26,197
Deliveries (Exchange of natural inflow)	769	621	778	715	860	827
Storage Change	147	-10	-48	19	-93	12
Operational Losses (-), Gains (+)	-883	-140	373	-570	-866	-1,230
Outflow to Silverwood Lake	26,245	13,876	10,843	17,857	24,482	24,128
Silverwood Lake Operation						
End-of-Month Storage	71,873	71,036	69,585	71,026	70,195	63,860
Storage Change	610	-837	-1,451	1,441	-831	-6,335
Inflow, Project	26,245	13,876	10,843	17,857	24,482	24,128
Inflow, Natural	3,640	4,451	9,268	4,526	2,180	880
Delivered to Contracting Agencies	94	88	86	70	76	123
Outflow, Natural Inflow Released	2,234	3,215	7,851	5,775	834	712
Outflow, Project Water at San Bernardino Tunnel	29,678	17,060	13,096	15,377	27,104	31,046
Operational Losses (-), Gains (+)	2,731	1,199	-529	280	521	538
California Aqueduct, Silverwood Lake to Lake Perris						
Inflow, San Bernardino Tunnel	29,678	17,060	13,096	15,377	27,104	31,046
Delivered to Contracting Agencies	14,919	10,665	12,945	12,093	18,830	29,700
Storage Change	0	0	0	-1	0	2
Operational Losses (-), Gains (+)	1	1	1	-2	-2	-2
Outflow to Lake Perris	14,760	6,393	152	3,283	8,272	1,342
Lake Perris Operation						
End-of-Month Storage	118,357	124,078	123,874	124,487	124,146	104,916
Storage Change	11,857	5,721	-204	613	-314	-19,227
Inflow	14,760	6,396	152	3,283	8,272	1,342
Delivered to Contracting Agencies	3,206	658	313	1,409	7,768	20,004
Operational Losses (-), Gains (+)	321	-17	-43	-1,261	-845	-565
Outflow	0	0	0	0	0	0
West Branch California Aqueduct Tehachapi Afterbay to Oso P.P.						
Inflow	13,603	17,793	12,971	8,805	8,272	1,237
Storage Change	2	-3	-6	-7	15	4
Delivered to Contracting Agencies	-16	-16	-25	-55	-51	-54
Operational Losses (-), Gains (+)	-16	-16	-25	-55	-51	-54
Outflow, Oso Pumping Plant	13,585	17,780	12,952	8,757	8,206	1,179

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

1979

(Amounts in acre-feet)

JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	DESCRIPTION
SOUTHERN FIELD DIVISION							
California Aqueduct, A. D. Edmonston P.P. to Junction of West Branch							
58,441	57,223	83,960	57,078	55,779	76,594	606,175	Inflow, A. D. Edmonston P.P.
-5	-1	0	-10	7	-3	-1	Storage Change
-20	-21	-13	-20	-17	-15	-176	Operational Losses (-), Gains (+)
6,213	9,355	30,754	1,487	16,867	25,352	152,709	Outflow, West Branch
52,213	47,848	53,184	55,581	38,888	51,230	453,291	Outflow, East Branch
California Aqueduct, Junction of West Branch to Pearblossom P.P.							
52,213	47,848	53,184	55,581	38,888	51,230	453,291	Inflow
11,570	10,646	8,221	4,462	946	818	60,626	Delivered to Contracting Agencies
-33	18	-108	452	37	175	375	Storage Change
-1,495	-1,549	-937	-1,499	-1,267	-1,101	-13,054	Operational Losses (-), Gains (+)
39,181	35,635	44,134	49,168	36,638	49,136	379,236	Outflow, Pearblossom P.P.
California Aqueduct, Pearblossom P.P. to Silverwood Lake							
39,181	35,635	44,134	49,168	36,638	49,136	379,236	Inflow, Pearblossom P.P.
411	131	67	215	105	254	5,753	Deliveries (Exchange of natural inflow)
-50	-10	214	-93	96	195	379	Storage Change
-2,331	-1,864	-1,933	-1,281	-976	-999	-12,700	Operational Losses (-), Gains (+)
36,489	33,650	41,920	47,765	35,461	47,688	360,404	Outflow to Silverwood Lake
Silverwood Lake Operation							
65,609	65,192	62,437	68,679	69,669	69,369	--	End-of-Month Storage
1,749	-417	-2,755	6,242	990	-300	-1,894	Storage Change
36,489	33,650	41,920	47,765	35,461	47,688	360,404	Inflow, Project
318	95	28	390	145	188	26,109	Inflow, Natural
153	145	142	110	96	94	1,277	Delivered to Contracting Agencies
23	161	17	99	18	19	20,813	Outflow, Natural Inflow Released
37,020	35,679	45,271	42,841	35,111	48,871	378,154	Outflow, Project Water at San Bernardino Tunnel
2,138	1,678	727	1,137	609	808	11,837	Operational Losses (-), Gains (+)
California Aqueduct, Silverwood Lake to Lake Perris							
37,020	35,679	45,271	42,841	35,111	48,871	378,154	Inflow, San Bernardino Tunnel
36,187	35,404	37,075	34,609	25,454	28,641	296,522	Delivered to Contracting Agencies
-1	-3	9	-5	5	-1	5	Storage Change
-3	-3	-3	-1	-1	-1	-15	Operational Losses (-), Gains (+)
831	275	8,184	8,236	9,651	20,230	81,612	Outflow to Lake Perris
Lake Perris Operation							
90,027	78,165	75,271	73,260	75,687	87,648	--	End-of-Month Storage
-14,892	-11,862	-2,894	-2,011	2,427	11,961	-18,834	Storage Change
831	275	8,184	8,236	9,651	20,230	81,612	Inflow
14,180	10,996	10,930	10,140	6,933	8,202	94,739	Delivered to Contracting Agencies
-1,543	-1,141	-148	-107	-291	-67	-5,707	Operational Losses (-), Gains (+)
0	0	0	0	0	0	0	Outflow
West Branch California Aqueduct Tehachapi Afterbay to Oso P.P.							
6,213	9,355	30,754	1,487	16,867	25,352	152,709	Inflow
-15	-4	28	-29	20	-10	-5	Storage Change
-62	-64	-39	-62	-52	-46	-542	Delivered to Contracting Agencies
6,166	9,295	30,687	1,454	16,795	25,316	152,172	Operational Losses (-), Gains (+)
							Outflow, Oso Pumping Plant

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

1979

(Amounts in acre-feet)

DESCRIPTION	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
<u>SOUTHERN FIELD DIVISION (Cont.)</u>						
West Branch California Aqueduct Oso P.P. to Pyramid Lake						
Inflow, Oso P.P.	13,585	17,780	12,952	8,757	8,206	1,179
Storage Change	151	-1,022,	-1,057	1,715	-2,191	849
Delivered to Contracting Agencies	0	0	0	0	0	0
Operational Losses (-), Gains (+)	77	-95	-409	-357	-490	-176
Outflow to Pyramid Lake	13,511	18,707	13,600	6,685	9,907	154
Pyramid Lake Operation						
End-of-Month Storage	165,244	165,536	166,490	168,203	159,902	168,241
Storage Change	4,410	292	954	1,713	-8,301	8,339
Inflow, Project	13,511	18,707	13,600	6,685	9,907	154
Inflow, Natural (from local runoff)	3,478	6,563	12,076	9,770	3,956	1,672
Inflow, Pumpback from Elderberry Forebay	1,136	23	1,385	2,262	69,378	68,671
Operational Losses (-), Gains (+)	381	-461	-709	-1,791	-6,798	-4,434
Outflow, Angeles Tunnel	12,099	17,380	16,595	7,326	80,158	54,448
Outflow, Natural Inflow Released to Piru Creek	1,997	7,160	8,803	7,887	4,586	3,276
Elderberry Forebay Operation						
End-of-Month Storage	19,881	24,085	24,339	23,454	30,430	20,230
Storage Change	2,619	4,204	254	-885	6,976	-10,200
Inflow, Project thru Castaic P-G Plant	12,099	17,380	16,595	7,326	80,158	54,448
Inflow, Natural	3,799	3,521	5,282	2,667	950	289
Operational Losses (-), Gains (+)	-2,190	-1,201	-4,815	-911	4,349	3,848
Outflow, Pumpback to Pyramid Lake	1,136	23	1,385	2,262	69,378	68,671
Outflow, Project Water Released to Castaic Lake	6,154	11,952	10,141	5,038	8,153	0
Outflow, Natural Inflow Released to Castaic Lake	3,799	3,521	5,282	2,667	950	114
Castaic Lake Operation						
End-of-Month Storage	292,806	306,648	318,848	318,870	318,427	297,974
Storage Change	-1,348	13,842	12,200	22	-443	-20,453
Inflow, Project	6,154	11,952	10,141	5,038	8,153	0
Inflow, Natural	2,414	3,439	4,273	3,334	1,492	432
Inflow, Natural Release from Elderberry Forebay	3,799	3,521	5,282	2,667	950	114
Delivered to Contracting Agencies	14,904	5,778	5,858	6,283	8,068	19,388
Operational Losses (-), Gains (+)	2,640	921	2,524	-1,047	-559	-793
Outflow, Castaic Afterbay	1,451	213	4,163	3,687	2,411	818
Castaic Lagoon Operation						
Inflow	1,451	213	4,163	3,687	2,411	818
Change in Storage	-11	49	-10	-6	-16	-119
Operational Losses (-), Gains (+)	0	0	0	-83	-91	-124
Outflow, Subsurface	185	164	184	179	184	179
Outflow, Surface	1,277	--	3,989	3,431	2,152	634

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

1979

(Amounts in acre-feet)

JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	DESCRIPTION
<u>SOUTHERN FIELD DIVISION (Cont.)</u>							
West Branch California Aqueduct Oso P.P. to Pyramid Lake							
6,166	9,295	30,687	1,454	16,795	25,316	152,172	Inflow, Oso P.P.
76	-92	185	921	-1,600	1,662	-403	Storage Change
0	0	0	0	0	0	0	Delivered to Contracting Agencies
-298	-368	-709	-163	-110	-102	-3,200	Operational Losses (-), Gains (+)
5,792	9,019	29,793	370	18,285	23,552	149,375	Outflow to Pyramid Lake
Pyramid Lake Operation							
164,056	164,422	167,985	165,511	165,371	164,093	--	End-of-Month Storage
-4,185	366	3,563	-2,474	-140	-1,278	3,259	Storage Change
5,792	9,019	29,793	370	18,285	23,552	149,375	Inflow, Project
886	641	550	674	835	1,249	42,350	Inflow, Natural (from local runoff)
15,725	20,456	40,405	23,365	13,772	263	256,841	Inflow, Pumpback from Elderberry Forebay
-1,574	-1,795	-3,461	-1,485	-1,503	-1,267	-24,897	Operational Losses (-), Gains (+)
22,496	25,994	62,764	24,883	31,046	24,511	379,700	Outflow, Angeles Tunnel
2,518	1,961	960	515	483	564	40,710	Outflow, Natural Inflow Released to Piru Creek
Elderberry Forebay Operation							
24,638	24,767	23,288	18,626	24,339	27,139	--	End-of-Month Storage
4,408	129	-1,479	-4,662	5,713	2,800	9,877	Storage Change
22,496	25,994	62,764	24,883	31,046	24,511	379,700	Inflow, Project thru Castaic P-G Plant
38	31	39	43	76	119	16,854	Inflow, Natural
583	696	1,113	517	-153	163	1,999	Operational Losses (-), Gains (+)
15,725	20,456	40,405	23,365	13,772	263	256,841	Outflow, Pumpback to Pyramid Lake
2,771	6,105	24,951	6,697	11,408	21,611	114,981	Outflow, Project Water Released to Castaic Lake
213	31	39	43	76	119	16,854	Outflow, Natural Inflow Released to Castaic Lake
Castaic Lake Operation							
279,175	260,621	269,726	266,658	269,867	283,890	--	End-of-Month Storage
-18,799	-18,554	9,105	-3,068	3,209	14,023	-10,264	Storage Change
2,771	6,105	24,951	6,697	11,408	21,611	114,981	Inflow, Project
167	89	70	100	170	323	16,304	Inflow, Natural
213	31	39	43	76	119	16,854	Inflow, Natural Release from Elderberry Forebay
20,683	23,822	16,522	9,095	7,755	7,435	145,591	Delivered to Contracting Agencies
-907	-772	746	-628	-525	-422	1,178	Operational Losses (-), Gains (+)
360	185	179	185	165	173	13,990	Outflow, Castaic Afterbay
Castaic Lagoon Operation							
360	185	179	255 ^{2/}	165	173	14,060 ^{2/}	Inflow
-150	-85	-83	11	-46	-15	-481	Change in Storage
-124	-116	-127	-113	-75	-62	-915	Operational Losses (-), Gains (+)
184	154	135	131	136	126	1,941	Outflow, Subsurface
202	0	0	0	0	0	11,685	Outflow, Surface

^{1/} Includes ungedaged amount of natural inflow of 9 ac-ft.

^{2/} 70 ac-ft added to original October value (185) as backflow from Foothill Feeder, noted on hand typed operations record from West Branch.

PUMPING
PLANTS

PROJECT PUMPING PLANTS

1979

(Amounts in acre-feet)

PUMPING PLANTS	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
Hyatt	941	8,368	2,070	969	0	2,675	300	0	14,012	8,553	13,728	25,390	77,006
Thermalito	2,004	9,343	1,837	1,247	0	4,447	0	0	17,486	8,495	12,591	28,310	85,760
Cordelia	480	297	386	464	509	681	718	713	706	579	407	622	6,562
Delta:													
State	80,750	90,335	143,431	144,614	182,352	165,134	186,840	258,748	265,525	203,346	258,457	313,565	2,293,097
Federal	0	0	0	12,327	2,119	13,429	95,606	87,744	12,129	20,531	23,323	46,693	313,901
South Bay	9,068	8,435	9,464	14,572	13,524	15,178	16,302	15,027	9,773	8,821	10,393	11,190	141,747
Del Valle	0	960	0	3,996	1,051	0	0	0	0	0	0	0	6,007
1/San Luis:													
State	29	88	20	10,140	0	0	0	7,200	67,907	51,090	58,455	17,419	212,348
Federal	98,329	0	0	4,781	0	0	0	2,997	91,796	123,327	40,684	0	361,914
2/O'Neill: (USBR)													
Federal	153,789	47,150	60,077	68,679	3,946	5,164	16,339	31,998	137,376	148,173	49,592	0	722,283
State	0	0	0	0	0	0	0	0	0	0	0	0	0
1/Dos Amigos:													
State	79,119	86,304	111,986	117,422	166,615	267,090	349,583	322,085	199,626	156,270	156,024	200,684	2,212,808
Federal	61,174	31,427	76,067	78,225	104,039	178,477	200,828	178,741	46,221	31,209	66,555	184,661	1,237,624
Las Perillas	5,893	4,342	6,241	13,018	18,994	24,816	27,807	24,578	7,803	3,457	5,222	7,621	149,792
Badger Hill	5,928	4,303	6,228	13,100	19,066	24,758	27,625	24,424	7,860	3,444	5,092	7,526	149,354
Buena Vista	46,435	41,486	38,269	48,266	66,790	78,646	107,808	102,225	97,606	63,416	63,154	88,812	842,913
Wheeler Ridge	43,906	33,190	26,227	38,078	50,353	48,570	73,093	70,540	91,013	59,861	60,372	83,015	678,218
Wind Gap	43,525	33,050	25,733	34,574	45,812	42,301	64,167	63,169	86,414	57,942	56,810	77,810	631,307
A. D. Edmonston	42,479	33,123	25,719	33,659	43,817	38,303	58,441	57,223	83,960	57,078	55,779	76,594	606,175
Oso	13,585	17,780	12,952	8,757	8,206	1,179	6,166	9,295	30,687	1,454	16,795	25,316	152,172
Castaic	1,136	23	1,385	2,262	69,378	68,671	15,725	20,456	40,405	23,365	13,772	263	256,841
Pearblossom	28,044	14,627	11,200	19,161	26,115	26,197	39,181	35,635	44,134	49,168	36,638	49,136	379,236

1/ Joint State-Federal Facility

2/ O'Neill Pumping Plant is a Federal USBR facility

JOINT SAN LUIS FACILITIES

**MONTHLY OPERATIONS SUMMARY
STATE-FEDERAL JOINT SAN LUIS FACILITIES**

1979

Amounts in acre-feet unless noted.

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Check 12	State	69,421	79,843	131,625	125,878	170,038	146,253	166,158	243,612	262,471	201,219	248,718	302,288	2,147,524
	Federal	0	0	0	12,327	2,119	13,429	95,606	87,744	12,129	20,531	23,323	46,693	313,901
	Total	69,421	79,843	131,625	138,205	172,157	159,682	261,764	331,356	274,600	221,750	272,041	348,981	2,461,425
O'Neill Pumping and Generating Plant Amount Pumped	State	0	0	0	0	0	0	0	0	0	0	0	0	0
	Federal	153,789	47,150	60,077	68,679	3,946	5,164	16,339	31,998	137,376	148,173	49,592	0	722,283
	Total	153,789	47,150	60,077	68,679	3,946	5,164	16,339	31,998	137,376	148,173	49,492	0	722,283
Released for Generation	Federal	0	3,320	4,114	1,184	24,182	64,965	9,903	3,358	0	0	4,351	22,863	138,230
O'Neill Forebay End-of-Month Storage	State	14,059	8,075	31,614	31,636	33,213	28,241	17,140	22,716	14,810	3,378	35,518	22,648	XXXX
	Federal	25,994	38,183	20,209	21,799	8,035	15,275	27,862	27,451	33,763	41,911	5,910	22,745	XXXX
	Total	40,053	46,258	51,823	53,435	41,248	43,516	45,002	50,167	48,573	45,289	41,428	45,393	XXXX
San Luis Reservoir End-of-Month Storage	State	1,054,309	1,055,581	1,055,542	1,063,692	1,062,307	938,146	759,269	662,942	722,099	763,654	816,490	913,889	XXXX
	Federal	964,894	966,160	966,199	964,015	850,029	606,622	484,421	405,938	490,644	637,472	637,472	461,492	XXXX
	Total	2,019,203	2,021,741	2,021,741	2,027,707	1,912,336	1,544,768	1,243,690	1,068,880	1,212,743	1,369,824	1,453,962	1,375,381	XXXX
San Luis Pumping and Generating Plant Amount Pumped	State	29	88	20	10,140	0	0	0	7,200	67,907	51,090	58,455	17,419	212,348
	Federal	98,329	0	0	4,781	0	0	0	2,997	91,796	123,327	40,684	0	361,914
	Total	98,358	88	20	14,921	0	0	0	10,197	159,703	174,417	99,139	17,419	574,262
Released for Generation	State	87	363	107	0	0	123,697	179,162	101,192	85	0	0	0	404,693
	Federal	0	0	0	5,336	112,852	243,028	122,434	79,570	0	0	4,784	94,101	662,105
	Total	87	363	107	5,336	112,852	366,725	301,596	180,762	85	0	4,784	94,101	1,066,798
Dos Amigos Pumping Plant Amount Pumped	State	79,119	86,304	111,986	117,422	166,615	267,090	349,583	322,085	199,626	156,270	156,024	200,684	2,212,808
	Federal	61,174	31,427	76,067	78,225	104,039	178,477	200,828	178,741	46,221	31,209	66,555	184,661	1,237,624
	Total	140,293	117,731	188,053	195,647	270,654	445,567	550,411	500,826	245,847	187,479	222,579	385,345	3,450,432

T-11

OPERATION
OF
RESERVOIRS

**UPPER FEATHER AREA LAKES
MONTHLY OPERATION**

1979

Month	Lake Storage			Outflow						Inflow	
	Water Surface Elevation in feet	Storage	Storage Change	Regulated		Release		Spill	Estimated Evaporation and Seepage	Total Outflow	Computed or Estimated
				Streamflow Maint.	Water Supply Contract	Water Right Entitlement	Total Regulated Release				
	1	2	3	4	5	6	7	8	9	10	11

ANTELOPE LAKE

Capacity 22,566 ac-ft

Jan	4992.91	15,008	-110	962	0	0	962	0	51	1,013	903
Feb	4993.27	15,273	265	555	0	0	555	0	59	614	879
Mar	4995.21	16,748	1,475	615	0	0	615	0	91	706	2,181
Apr	4998.72	19,627	2,879	594	0	0	594	0	163	757	3,636
May	5002.15	22,704	3,077	615	0	0	615	157	293	1,065	4,142
June	5001.44	22,048	-656	595	0	0	595	24	536	1,155	499
July	5000.26	20,983	-1,065	615	0	0	615	0	640	1,255	190
Aug	4999.07	19,929	-1,054	591	0	0	591	0	598	1,189	135
Sept	4997.98	18,997	-932	554	0	0	554	0	437	991	59
Oct	4997.40	18,512	-485	615	0	0	615	0	264	879	394
Nov	4996.94	18,133	-379	595	0	0	595	0	132	727	348
Dec	4996.79	18,010	-123	615	0	0	615	0	90	705	582
Tot	--	--	2,892	7,521	0	0	7,521	181	3,354	11,056	13,948

FRENCHMAN LAKE

Capacity 55,477 ac-ft

Jan	5557.74	19,536	446	123	0	0	123	0	58	181	627
Feb	5558.49	20,166	630	122	0	0	122	0	59	181	811
Mar	5560.25	21,693	1,527	126	0	165	291	0	106	397	1,924
Apr	5561.27	22,608	915	50	0	182	232	0	269	501	1,416
May	5558.94	20,550	-2,058	60	2791	0	2851	0	389	3240	1182
June	5555.10	17,416	-3,134	0	2,711	0	2,711	0	466	3,177	43
July	5551.77	14,962	-2,454	0	2,045	0	2,045	0	519	2,465	110
Aug	5550.22	13,903	-1,059	62	629	0	691	0	460	1,151	92
Sept	5549.26	13,275	-628	42	316	0	358	0	345	703	75
Oct	5549.09	13,165	-110	117	0	0	117	0	119	316	206
Nov	5549.01	13,114	-51	110	0	0	110	0	102	212	161
Dec	5549.46	13,404	290	106	0	0	106	0	70	176	466
Tot	--	--	-5,686	918	8492	347	9757	0	3,042	12799	7113

LAKE DAVIS

Capacity 84,371 ac-ft

Jan	5767.60	57,394	1,488	254	6	0	260	0	227	487	1,975
Feb	5768.14	59,169	1,775	230	6	0	236	0	230	466	2,241
Mar	5768.69	61,010	1,841	575	3	0	578	0	401	979	2,820
Apr	5769.94	65,312	4,302	851	1	0	852	0	690	1,542	5,844
May	5770.28	66,511	1,199	726	27	182	935	0	1,526	2,461	3,660
June	5769.52	63,883	-2,628	589	71	238	898	0	2,030	2,928	300
July	5768.05	58,871	-5,012	2,807	67	246	3,120	0	2,300	5,420	408
Aug	5765.21	49,915	-8,956	6,833	65	184	7,082	0	2,156	9,238	282
Sept	5764.43	47,602	-2,313	733	43	179	955	0	1,420	2,375	62
Oct	5764.34	47,339	-263	239	29	107	375	0	903	1,278	1,015
Nov	5764.25	47,077	-262	259	5	0	264	0	465	729	467
Dec	5764.76	48,573	1,496	252	6	0	258	0	320	578	2,074
Tot	--	--	-7,333	14,333	329	1,136	15,813	0	12,668	28,481	21,148

LAKE OROVILLE
MONTHLY OPERATION
1979

Amounts in acre-feet unless noted

Capacity 3,537,577 acre-feet

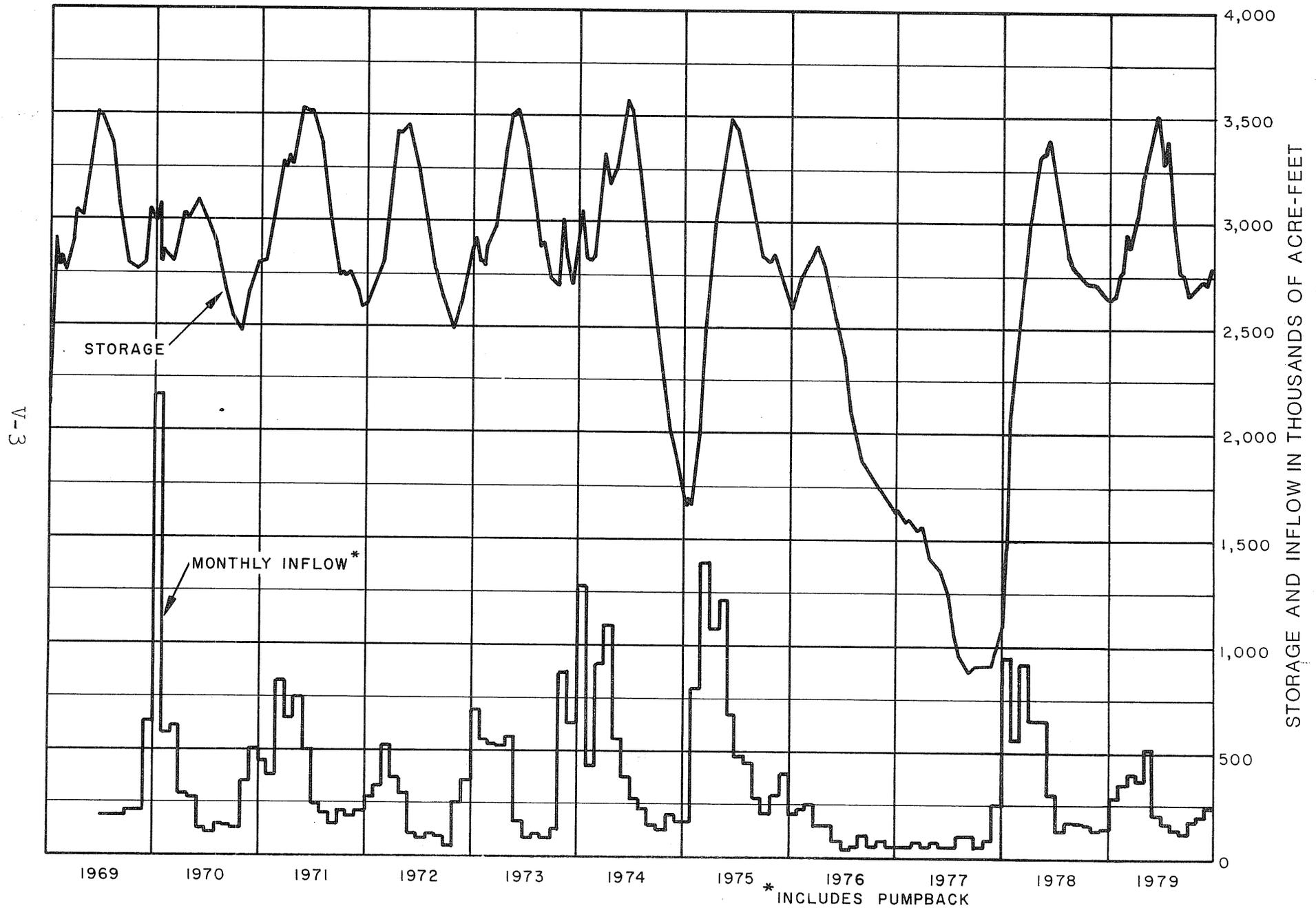
MONTH	YEAR	WATER SURFACE ELEVATION IN FEET	STORAGE	STORAGE CHANGE	OUTFLOW					TOTAL INFLOW		
					POWER	PALERMO CANAL	SPILLWAY LEAKAGE	EVAPORATION	SPILL	TOTAL OUTFLOW	PUMPBACK	INFLOW*
JAN	1979	847.25	2,771,631	118,603	151,906	128	159	1,026	0	153,219	941	270,881
	1978	785.31	2,030,415	910,498	45,897	76	0	546	0	46,519	11,035	945,982
FEB	1979	856.83	2,901,014	129,383	249,383	19	206	1,243	0	250,521	8,368	371,536
	1978	828.10	2,525,098	494,683	64,511	74	16	1,062	0	64,663	8,560	550,786
MAR	1979	868.17	3,059,593	158,579	262,422	0	278	2,415	0	265,115	2,070	421,624
	1978	852.47	2,841,617	316,519	608,980	78	228	2,430	0	611,716	522	927,713
APR	1979	884.22	3,294,401	234,808	138,676	13	534	3,908	0	143,131	969	376,970
	1978	875.71	3,168,365	326,748	336,137	128	286	3,116	0	339,667	21,674	644,741
MAY	1979	897.75	3,502,144	207,743	302,479	464	1,273	7,314	0	311,530	0	519,273
	1978	887.54	3,344,538	176,173	373,311	604	486	7,422	0	381,823	7,388	550,608
JUN	1979	886.48	3,328,471	-173,673	304,226	1,183	1,335	10,700	37,079 ^{1/}	354,523	2,675	178,175
	1978	886.63	3,330,742	-13,796	300,296	1,156	587	9,145	0	311,243	3,312	294,076
JUL	1979	866.64	3,037,849	-290,622	428,750	1,210	480	10,871	0	441,311	300	150,389
	1978	865.51	3,021,859	-308,883	417,860	1,259	452	11,116	0	430,687	0	121,804
AUG	1979	847.07	2,769,240	-268,609	395,508	1,278	175	9,240	0	406,201	0	137,591
	1978	849.02	2,795,226	-226,633	391,981	1,494	224	10,315	0	404,014	44	177,337
SEP	1979	839.67	2,672,165	-97,075	200,345	1,146	75	8,364	0	209,930	14,012	98,843
	1978	845.18	2,744,217	-51,009	214,583	1,346	214	7,184	0	223,327	0	172,318
OCT	1979	841.88	2,700,906	28,741	134,430	730	175	4,202	0	139,537	8,553	159,725
	1978	845.40	2,727,885	-16,332	162,608	1,166	192	6,129	0	170,095	0	153,763
NOV	1979	850.42	2,747,121	46,215	125,550	199	182	2,095	0	128,026	13,728	160,513
	1978	842.37	2,707,306	-20,579	149,902	490	179	2,283	0	152,854	9,080	123,195
DEC	1979	850.42	2,813,985	66,864	178,744	170	262	1,699	0	180,875	25,390	222,349
	1978	838.19	2,653,028	-54,278	198,481	121	131	1,104	0	199,837	18,818	126,741
TOTAL	1979	--	--	160,957	2,872,089	6,540	5,134	63,077	37,079 ^{1/}	2,983,919	77,006	3,067,870
	1978			1,533,113	3,263,547	7,992	2,995	61,852	0	3,336,445	80,433	4,789,064

*Computed inflow excluding pumpback.

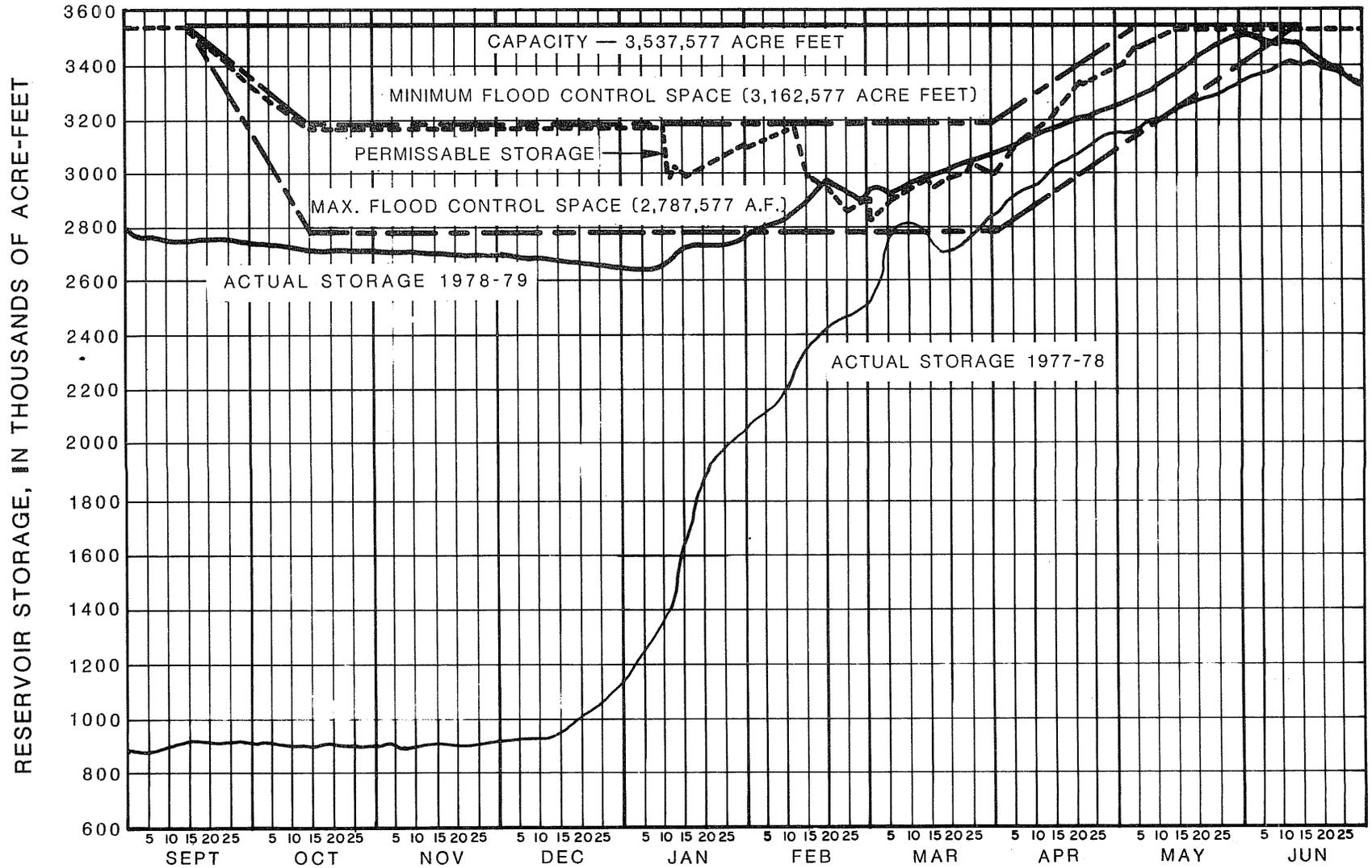
^{1/} Emergency procedures in effect during employee work stoppage allowed the use of spillway gates for release to meet downstream requirements.

LAKE OROVILLE OPERATION

CAPACITY - 3,537,577 A.F.



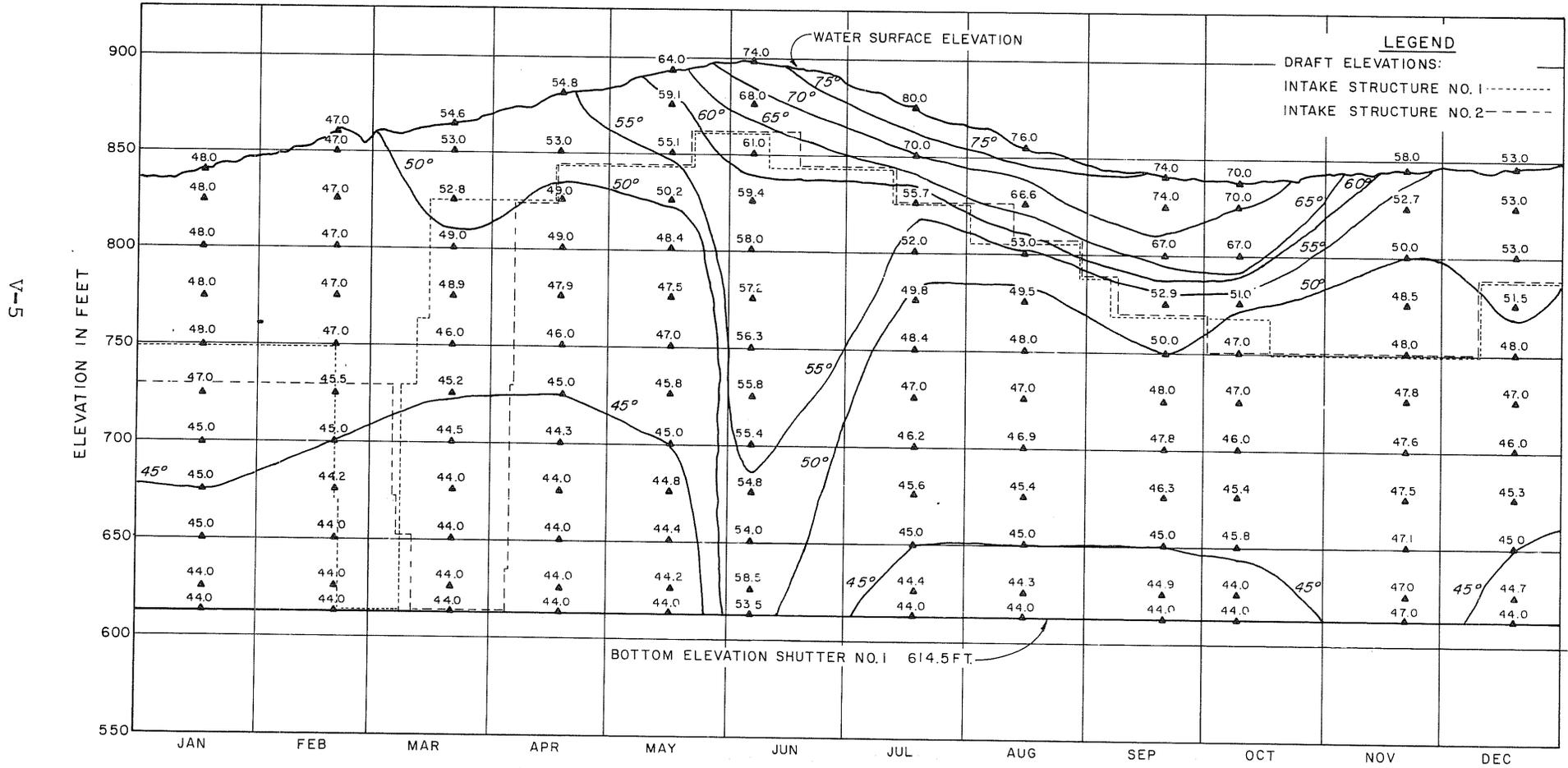
OPERATION OF LAKE OROVILLE FOR FLOOD CONTROL 1978-1979



7-Δ

LAKE OROVILLE ISOTHERMS - 1979

(IN DEGREES FAHRENHEIT)



**OROVILLE-THERMALITO COMPLEX
MONTHLY STORAGE**

1979
(Elevation in feet, storage in acre-feet)

MONTH	YEAR	THERMALITO DIVERSION DAM POOL		THERMALITO FOREBAY		THERMALITO AFTERBAY	
		ELEVATION	STORAGE	ELEVATION	STORAGE	ELEVATION	STORAGE
JANUARY	1979	223.51	12,875	223.36	10,752	128.12	26,191
	1978	223.44	12,853	223.60	10,898	127.33	23,863
FEBRUARY	1979	224.36	13,146	224.12	11,219	129.83	31,589
	1978	224.06	13,050	223.76	10,997	127.01	22,948
MARCH	1979	222.64	12,601	223.00	10,534	127.50	24,353
	1978	223.60	12,904	224.14	11,231	134.15	47,313
APRIL	1979	223.50	12,872	223.50	10,838	124.57	16,518
	1978	223.41	12,843	223.82	11,033	131.81	38,431
MAY	1979	224.90	13,320	224.56	11,492	127.70	24,939
	1978	223.50	12,872	223.74	10,984	130.51	33,867
JUNE	1979	223.90	12,999	223.54	10,862	125.24	18,188
	1978	223.99	13,028	223.18	10,643	133.87	46,207
JULY	1979	224.43	13,169	224.20	11,268	125.54	18,960
	1978	223.92	13,006	222.54	10,257	130.16	32,684
AUGUST	1979	223.50	12,872	223.64	10,923	127.87	25,413
	1978	223.00	12,714	223.09	10,588	134.01	46,758
SEPTEMBER	1979	224.25	13,111	224.16	11,243	125.17	18,010
	1978	223.62	12,910	223.56	10,874	129.32	29,928
OCTOBER	1979	223.99	13,028	223.90	11,083	124.76	16,984
	1978	223.81	12,970	223.60	10,898	124.99	17,559
NOVEMBER	1979	220.00	11,785	220.02	8,787	125.78	19,588
	1978	223.84	12,980	223.86	11,058	125.89	19,878
DECEMBER	1979	223.92	13,006	224.12	11,219	125.24	18,188
	1978	222.59	12,900	223.44	10,801	128.05	25,982

**CLIFTON COURT FOREBAY
MONTHLY OPERATION**

(In acre-feet, except elevation, which is in feet)

MONTH	YEAR	WATER SURFACE ELEVATION	END OF MONTH STORAGE	STORAGE CHANGE	INFLOW
JANUARY	1979	2.54	23,746	1,946	82,366
	1978	0.11	18,499	-368	365,011
FEBRUARY	1979	3.36	25,522	1,776	92,111
	1978	0.80	19,987	1,488	344,798
MARCH	1979	2.25	23,119	-2,403	141,028
	1978	2.85	24,418	4,431	112,084
APRIL	1979	0.23	18,758	-4,361	154,881
	1978	2.50	23,660	-758	34,172
MAY	1979	-0.72	16,714	-2,044	190,462
	1978	0.88	20,159	-3,501	62,541
JUNE	1979	0.55	19,448	2,734	188,406
	1978	0.20	18,693	-1,466	207,780
JULY	1979	-0.20	17,833	-1,615	287,451
	1978	-1.51	15,016	-3,677	215,871
AUGUST	1979	-1.36	15,339	-2,494	351,280
	1978	0.21	18,716	3,700	257,869
SEPTEMBER	1979	-0.21	17,811	2,472	285,283
	1978	1.36	21,195	2,479	217,610
OCTOBER	1979	0.57	19,491	1,680	227,292
	1978	1.75	22,038	843	129,394
NOVEMBER	1979	-0.01	18,242	-1,249	333,357
	1978	1.93	22,428	390	135,546
DECEMBER	1979	0.98	20,375	2,133	361,391
	1978	1.64	21,800	-628	171,204
TOTAL	1979	--	--	-1,425	2,695,308
	1978	--	--	2,933	2,253,880

LAKE DEL VALLE MONTHLY OPERATION

1979

(Amounts in acre-feet unless noted)

MONTH	WATER SURFACE ELEVATION (feet)	STORAGE	STORAGE CHANGE	INFLOW		OUTFLOW					PRECIPITATION (inches)
				NATURAL	SOUTH BAY AQUEDUCT	SOUTH BAY AQUEDUCT	RECREATION 1/	ARROYO VALLE	TOTAL	EVAPORATION (feet)	
JANUARY	680.32	25,948	2,430	1,265	0	0	1	0	1	0.10	0
FEBRUARY	692.20	32,730	13,452	5,822	960	0	0	0	0	0.11	3.20
MARCH	695.18	34,618	1,888	1,968	0	0	0	0	0	0.12	1.96
APRIL	701.66	38,973	4,355	539	3,996	0	0	0	0	0.40	0.79
MAY	702.98	39,900	927	217	1,051	0	16	0	16	0.70	0.25
JUNE	701.14	38,612	-1,288	48	0	876	0	0	876	0.92	0
JULY	700.54	38,198	-414	66	0	23	0	0	23	0.87	0.09
AUGUST	698.52	36,823	-1,375	-122	0	833	16	0	849	0.77	0
SEPTEMBER	690.34	31,587	5,236	20	0	4,836	10	0	4,846	0.79	0
OCTOBER	680.53	26,057	5,530	-32	0	5,330	0	0	5,330	0.34	1.79
NOVEMBER	676.82	24,202	-1,855	98	0	1,886	0	0	1,886	0.15	1.41
DECEMBER	677.65	24,606	404	472	0	0	0	0	0	0.16	2.23
TOTAL	--	--	--	10,361	6,007	13,784	43	0	13,827	5.43	11.72

1/ To East Bay Regional Park District.

**O'NEILL FOREBAY
MONTHLY OPERATION**

1979

(In acre-feet unless noted)

MONTH	YEAR	RESERVOIR STORAGE			INFLOW			OUTFLOW				GAIN (+) LOSS (-)
		WATER SURFACE ELEVATION IN FEET	STORAGE	MONTHLY STORAGE CHANGE	O'NEILL P-G PLANT PUMPING	SAN LUIS P-G PLANT GENERATION	CALIFORNIA AQUEDUCT CHECK 12	O'NEILL P-G PLANT GENERATION	SAN LUIS P-G PLANT PUMPING	DOS AMIGOS PUMPING	DELIVERIES	
JANUARY	1979	218.79	40,053	-12,253	153,789	87	69,421	0	98,358	140,293	621	3,722
	1978	222.40	49,450	-5,197	237,521	0	367,000	0	579,360	55,809	21	-25,472
FEBRUARY	1979	221.19	46,258	6,205	47,150	363	79,843	3,320	88	117,731	379	367
	1978	220.80	45,289	-4,161	221,691	0	343,142	0	539,387	63,509	22	-33,924
MARCH	1979	223.29	51,823	5,565	60,077	107	131,625	4,114	20	188,053	989	6,932
	1978	222.46	49,609	4,320	247,112	0	102,227	0	289,492	89,017	210	-33,700
APRIL	1979	223.89	53,435	1,612	68,679	5,336	138,205	1,184	14,921	195,647	1,958	3,102
	1978	221.04	45,863	-3,746	158,556	42	28,756	0	144,776	47,334	74	-1,084
MAY	1979	219.26	41,248	-12,187	3,946	112,852	172,157	24,182	0	270,654	2,950	-3,356
	1978	218.50	39,324	-6,538	72,682	1,381	42,684	0	10,085	113,222	2,660	-2,681
JUNE	1979	220.14	43,516	2,268	5,164	366,725	159,682	64,965	0	445,567	4,531	-14,240
	1978	219.38	41,557	2,233	142,891	31,566	181,832	0	7,480	345,276	3,319	-2,019
JULY	1979	220.71	45,002	1,486	16,339	301,596	261,764	9,903	0	550,411	5,467	-12,432
	1978	219.42	46,660	103	30,257	233,238	188,513	9,619	0	438,920	4,503	-1,137
AUGUST	1979	222.67	50,167	5,165	31,998	180,762	331,356	3,358	10,197	500,826	6,492	-18,078
	1978	223.04	51,151	9,491	15,770	210,691	226,052	22,175	6,191	413,521	4,978	-3,843
SEPTEMBER	1979	222.07	48,573	-1,594	137,376	85	274,600	0	159,703	245,847	2,780	-5,325
	1978	223.36	52,011	860	116,466	1,756	196,565	0	196,793	131,920	1,870	-16,656
OCTOBER	1979	220.82	45,289	-3,284	148,173	0	221,750	0	174,417	187,479	1,691	-9,620
	1978	220.84	45,341	-6,670	79,649	87	121,373	10,923	42,071	160,000	897	-6,112
NOVEMBER	1979	219.33	41,428	-3,861	49,592	4,784	272,041	4,351	99,139	222,579	393	-3,816
	1978	221.42	46,862	1,521	172,065	58	125,835	0	120,325	189,711	73	-13,672
DECEMBER	1979	220.86	45,393	3,965	0	94,101	348,981	22,863	17,419	385,345	663	-12,827
	1978	223.47	52,306	5,444	201,009	0	155,390	0	82,538	269,328	348	-1,259
TOTAL	1979	--	--	-6,913	722,283	1,066,798	2,461,425	138,230	574,262	3,450,432	28,914	-61,849
	1978	--	--	-2,341	1,695,664	478,819	2,079,369	42,717	2,018,498	2,317,567	18,975	-141,559

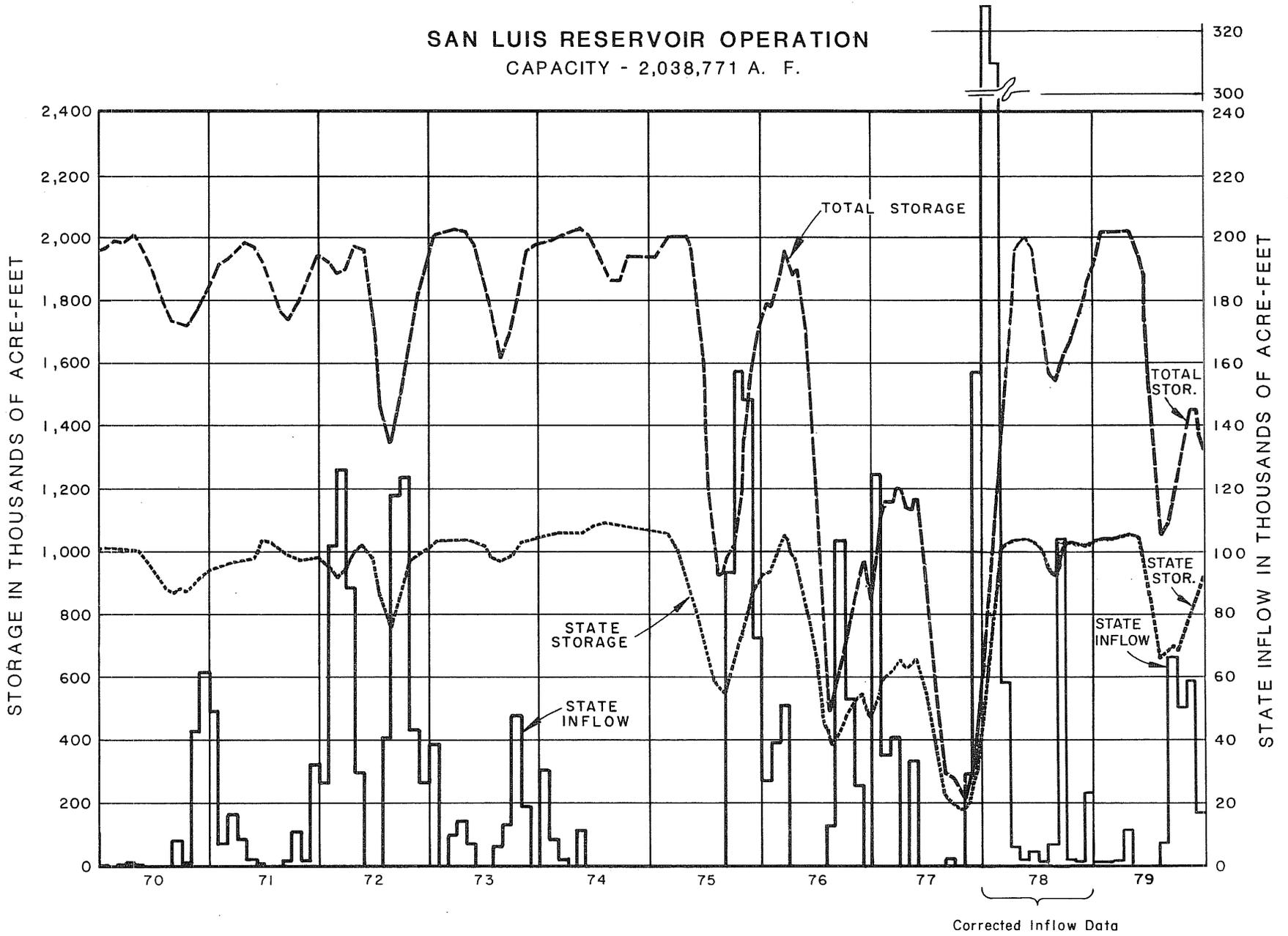
**SAN LUIS RESERVOIR
MONTHLY OPERATION**

(In acre-feet unless noted)

MONTH	YEAR	RESERVOIR STORAGE			INFLOW	OUTFLOW			GAIN (+) LOSS (-)	EVAPORATION	PRECIPITATION IN INCHES
		WATER SURFACE ELEVATION IN FEET	STORAGE	MONTHLY STORAGE CHANGE	SAN LUIS P-G PLANT PUMPING	SAN LUIS P-G PLANT GENERATION	PACHECO TUNNEL (FUTURE FACILITY)				
JANUARY	1979	542.32	2,019,203	93,151	98,358	87			-5,120	1,081	2.55
	1978	463.44	1,108,497	545,288	579,360	0			-34,072	978	3.91
FEBRUARY	1979	542.52	2,021,741	2,538	88	363			2,813	1,549	2.71
	1978	509.49	1,617,913	509,416	539,387	0			-29,971	1,551	4.20
MARCH	1979	542.52	2,021,741	0	20	107			87	3,271	2.13
	1978	531.17	1,879,432	261,519	289,492	0			-27,973	3,132	4.48
APRIL	1979	542.99	2,027,707	5,966	14,921	5,336			-3,619	6,469	7.94
	1978	542.06	2,015,903	136,471	144,776	42			-8,263	4,365	1.42
MAY	1979	533.82	1,912,336	-115,371	0	112,852			-2,519	10,247	0.04
	1978	542.26	2,018,441	2,538	10,085	1,381			-6,166	10,432	0
JUNE	1979	503.22	1,544,768	-367,568	0	366,725			-843	13,464	0
	1978	539.84	1,987,818	-30,623	7,480	31,566			-6,537	12,373	0.09
JULY	1979	476.25	1,243,690	-301,078	0	301,596			518	11,758	0.05
	1978	520.74	1,751,944	-235,874	0	233,238			-2,636	13,553	0
AUGUST	1979	459.59	1,068,880	174,810	10,197	180,762			-4,245	10,669	0
	1978	502.96	1,541,758	-210,186	6,191	210,691			-5,686	13,194	0
SEPTEMBER	1979	473.36	1,212,743	143,863	159,703	85			-15,755	8,505	0
	1978	517.99	1,718,852	177,094	196,793	1,756			-17,943	7,704	0.25
OCTOBER	1979	487.79	1,369,824	157,081	174,417	0			-17,336	5,236	0.93
	1978	520.78	1,752,427	33,575	42,071	87			-8,409	6,153	0
NOVEMBER	1979	495.29	1,453,962	84,138	99,139	4,784			-10,217	1,855	0.87
	1978	528.98	1,852,392	99,965	120,325	58			-20,302	2,007	2.13
DECEMBER	1979	488.29	1,375,381	-75,581	17,419	94,101			-1,899	1,142	1.16
	1978	534.92	1,926,052	73,660	82,538	0			-8,878	1,285	0.39
TOTAL	1979			-201,051	574,262	1,066,798			-58,135	75,246	18.38
	1978			-1,362,843	2,018,498	478,819			-176,836	76,727	16.87

SAN LUIS RESERVOIR OPERATION

CAPACITY - 2,038,771 A. F.



**PYRAMID LAKE
MONTHLY OPERATION**

1979

Amounts in acre-feet unless noted

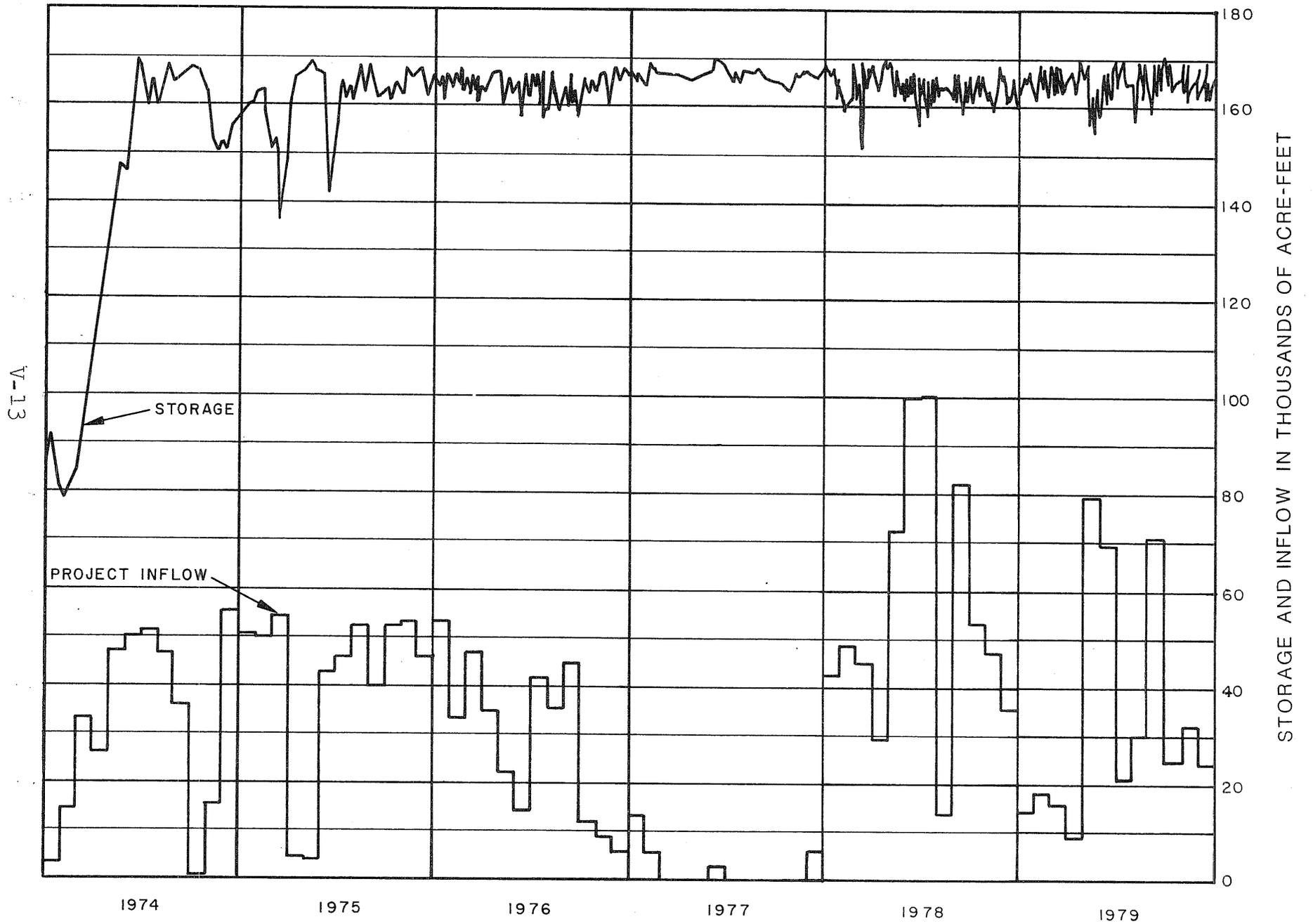
MONTH	WATER SURFACE ELEVATION	TOTAL STORAGE 1/	STORAGE CHANGE	INFLOW			OUTFLOW			COMPUTED LOSSES (-) GAINS (+)		
				NATURAL	PROJECT		ANGELES TUNNEL	TO PIRU CREEK				
					GORMAN CREEK	PUMPBACK 2/		NATURAL INFLOW RELEASE 3/	PROJECT WATER FOR FISH ENHANCEMENT			
JAN	2,574.36	(813) 165,244	4,410	3,478	13,511	1,136	12,099	1,997				381
FEB	2,574.59	(216) 165,536	292	6,563	18,707	23	17,380	7,160				-461
MAR	2,575.34	166,490	954	12,076	13,600	1,385	16,595	8,803				-709
APR	2,576.68	(5,372) 168,203	1,713	9,770	6,685	2,262	7,326	7,887				-1,791
MAY	2,570.10	(4,742) 159,902	-8,301	3,956	9,907	69,378	80,158	4,586				-6,798
JUN	2,576.71	(3,138) 168,241	8,339	1,672	154	68,671	54,448	3,276				-4,434
JUL	2,573.42	(1,506) 164,056	-4,185	886	5,792	15,725	22,496	2,518				-1,574
AUG	2,573.71	(186) 164,422	366	641	9,019	20,456	25,994	1,961				-1,795
SEP	2,576.51	(-224) 167,985	3,563	550	29,793	40,405	62,764	960				-3,461
OCT	2,574.57	(-65) 165,511	-2,474	674	370	23,365	24,883	515				-1,485
NOV	2,574.46	(287) 165,371	-140	835	18,285	13,772	31,046	483				-1,503
DEC	2,573.45	(972) 164,093	-1,278	1,249	23,552	263	24,511	564				-1,267
TOTAL			3,259	42,350	149,375	256,841	379,700	40,710				-24,897

1/ Natural inflow storage shares shown in brackets

2/ Pumpback by Los Angeles Department of Water and Power (LADWP) from Elderberry Forebay thru Castaic Powerplant.

3/ Portion of these amounts used to satisfy fishery enhancement agreement.

PYRAMID LAKE OPERATION
CAPACITY 171,196, ACRE-FEET



**ELDERBERRY FOREBAY
MONTHLY OPERATION**

1979

Amounts in acre-feet unless noted

MONTH	WATER SURFACE ELEVATION IN FEET	TOTAL STORAGE	STORAGE CHANGE	INFLOW		OUTFLOW			COMPUTED LOSSES (-) GAINS (+)
				CASTAIC P.P. GENERATION	NATURAL	TO CASTAIC LAKE		PUMP-BACK TO PYRAMID LAKE. 1/ -	
						NATURAL	PROJECT		
JAN	1,510.2	19,881	2,619	12,099	3,799	3,799	6,154	1,136	-2,190
FEB	1,520.6	24,085	4,204	17,380	3,521	3,521	11,952	23	-1,201
MAR	1,521.2	24,339	254	16,595	5,282	5,282	10,141	1,385	-4,815
APR	1,519.1	23,454	-885	7,326	2,667	2,667	5,038	2,262	-911
MAY	1,534.7	30,430	6,976	80,158	950	950	8,153	69,378	4,349
JUN	1,511.1	(175) 20,230	-10,200	54,448	289	114	0	68,671	3,848
JUL	1,521.9	(0) 24,638	4,408	22,496	38	213	2,771	15,725	583
AUG	1,522.2	(0) 24,767	129	25,994	31	31	6,105	20,456	696
SEP	1,518.7	23,288	-1,479	62,764	39	39	24,951	40,405	1,113
OCT	1,506.9	(0) 18,626	-4,662	24,883	43	43	6,697	23,365	517
NOV	1,521.2	(0) 24,339	5,713	31,046	76	76	11,408	13,772	-153
DEC	1,527.6	27,139	2,800	24,511	119	119	21,611	263	163
TOTAL			9,877	379,700	16,854	16,854	114,981	256,841	1,999

1/ Pumpback by Los Angeles Department of Water and Power (ADWP) thru Castaic Power Plant.

**CASTAIC LAKE
MONTHLY OPERATION**

1979

Amount in acre-feet unless noted

MONTH	WATER SURFACE ELEVATION IN FEET	TOTAL STORAGE <u>1/</u>	STORAGE CHANGE	INFLOW			OUTFLOW		DISPOSITION OF NATURAL INFLOW		COMPUTED LOSSES (-) GAINS (+)
				NATURAL	FROM ELDERBERRY FOREBAY		DELIVERIES	RELEASED TO CASTAIC AFTERBAY	RELEASED FROM CASTAIC AFTERBAY		
					NATURAL	PROJECT			SURFACE	SUB-SURFACE	
JAN	1500.77	(4,205) 292,806	-1,348	2,414	3,799	6,154	14,904	1,451	1,277	185	2,640
FEB	1507.25	(11,001) 306,648	13,842	3,439	3,521	11,952	5,778	213	--	164	921
MAR	1512.82	(16,384) 318,848	12,200	4,274	5,282	10,141	5,858	4,163	3,989	184	2,524
APR	1512.83	(0) 318,870 ^{2/}	22	3,334	2,667	5,038	6,283	3,687	3,431	179	-1,047
MAY	1512.63	(106) 318,427	-443	1,492	950	8,153	8,068	2,411	2,152	184	-559
JUN	1503.21	(-161) 297,974	-20,453	432	114	0	19,388	818	634	179	-793
JUL	1494.21	(-167) 279,175	-18,799	167	213	2,771	20,683	360	202	184	-907
AUG	1484.98	(-201) 260,621	-18,554	89	31	6,105	23,822	185	0	154	-772
SEP	1489.55	(-227) 269,726	9,105	70	39	24,951	16,522	179	0	135	746
OCT	1488.01	(-215) 266,658	-3,068	100	43	6,697	9,095	185	0	131	-628
NOV	1489.62	(-105) 269,867	3,209	170	76	11,408	7,755	165	0	136	-525
DEC	1496.50	(211) 283,890	14,023	323 ^{3/}	119	21,611	7,435	173	0	126	-422
TOTAL			-10,264	16,304	16,854	114,981	145,591	13,990	11,685	1,941	1,178

1/ Natural inflow storage shares shown in brackets.

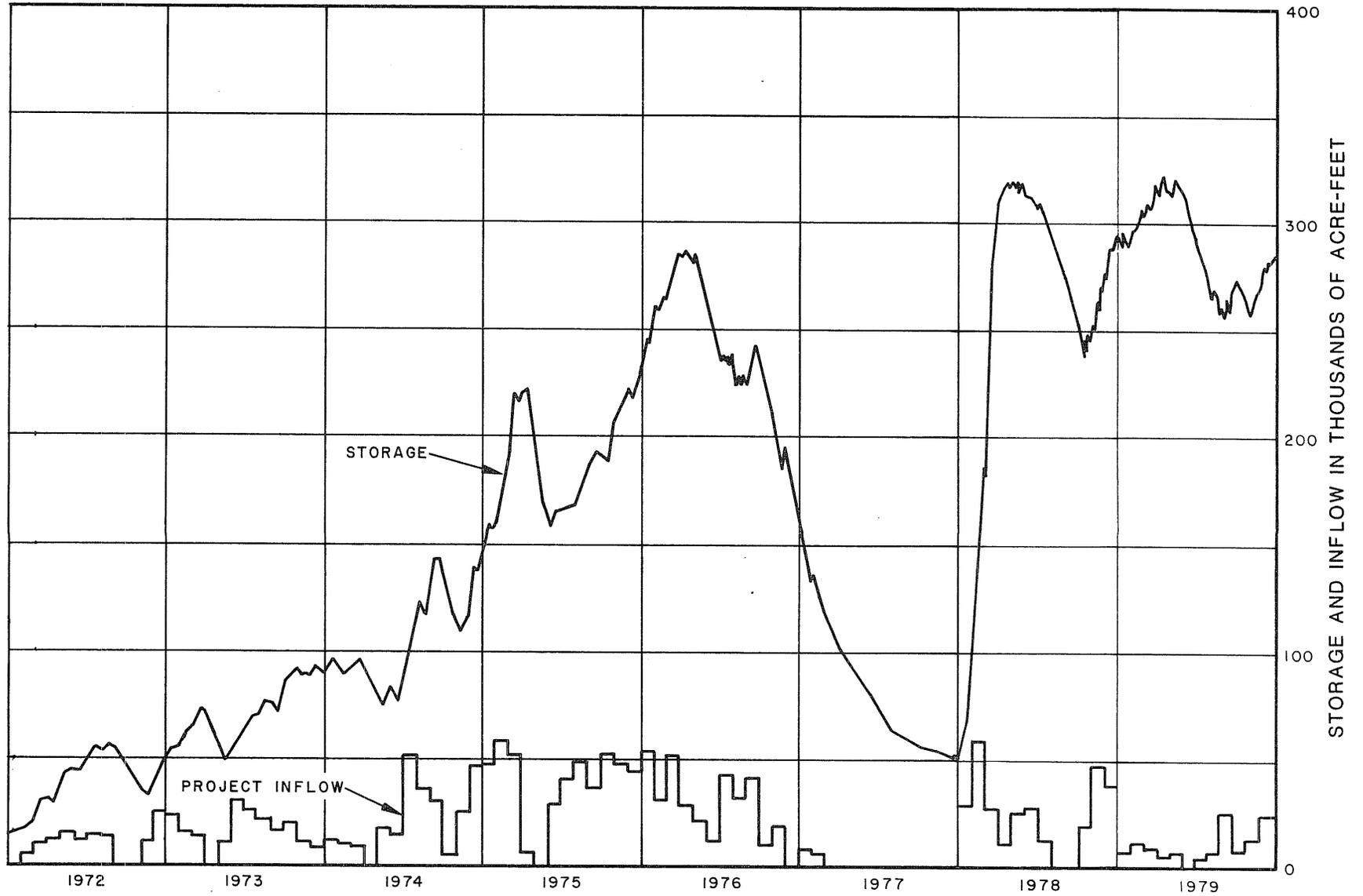
3/ Includes ungaged amount of natural inflow of 9 ac-ft.

2/ 18,775 AF to DWR as per agreement.

V-15

CASTAIC LAKE OPERATION
CAPACITY 323,702 ACRE-FEET

V-16



**SILVERWOOD LAKE
MONTHLY OPERATION**

1979

Amounts in acre-feet unless noted

MONTH	WATER SURFACE ELEVATION IN FEET	STORAGE <u>1/</u>	STORAGE CHANGE	INFLOW		OUTFLOW			COMPUTED LOSSES	TOTAL NATURAL INFLOW RELEASED <u>2/</u>
				NATURAL	PROJECT	SAN BERNARDINO TUNNEL	AT TURNOUT (CLAWA)	NATURAL INFLOW TO MOJAVE RIVER		
JAN	3,351.79	(1,120) 71,873	610	3,640	26,245	29,678	94	2,234	2,731	3,003
FEB	3,350.91	(1,735) 71,036	-837	4,451	13,876	17,060	88	3,215	1,199	3,836
MAR	3,349.34	(2,374) 69,585	-1,451	9,268	10,843	13,096	86	7,851	-529	8,629
APR	3,350.90	(410) 71,026	1,441	4,526	17,857	15,377	70	5,775	280	6,490
MAY	3,350.02	70,195	-831	2,180	24,482	27,104	76	834	521	1,694
JUN	3,343.12	(237) 63,860	-6,335	880	24,128	31,046	123	712	538	1,539
JUL	3,345.06	(121) 65,609	1,749	318	36,489	37,020	153	23	2,138	434
AUG	3,344.60	(69) 65,192	-417	95	33,650	35,679	145	16	1,678	147
SEP	3,341.52	(13) 62,437	-2,755	28	41,920	45,271	142	17	727	84
OCT	3,348.40	(89) 68,679	6,242	390	47,765	42,841	110	99	1,137	314
NOV	3,349.46	(111) 69,669	990	145	35,461	35,111	96	18	609	123
DEC	3,349.14	(26) 69,369	-300	188	47,688	48,871	94	19	808	273
TOTAL			-1,894	26,109	360,404	378,154	1,277	20,813	11,837	26,566

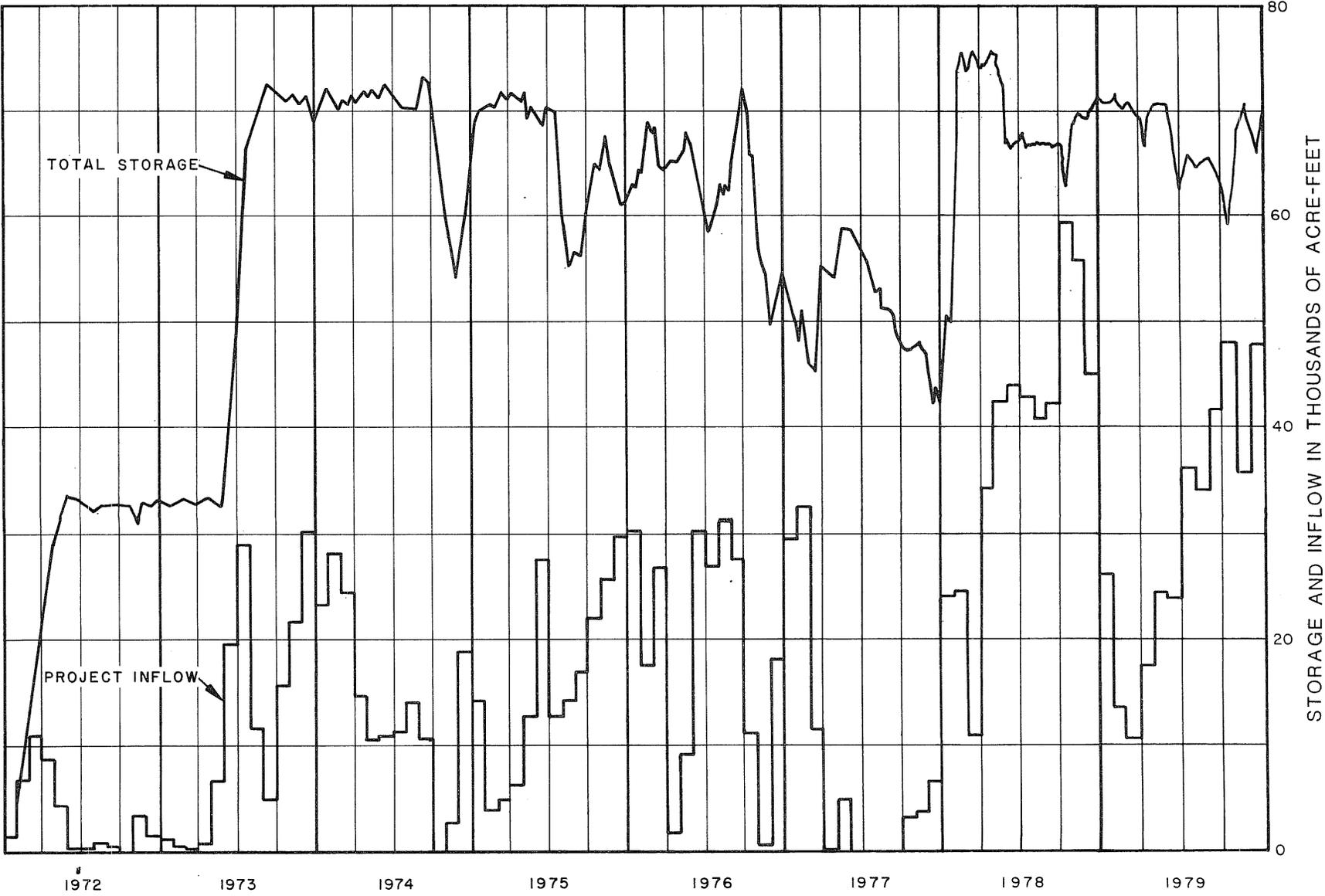
1/ Natural inflow storage shares are shown in brackets.

2/ Total releases made from Mojave Siphon to Las Flores Ranch Co., in exchange for natural inflow stored in lake, and from Silverwood Lake to Mojave River from outlet works for Mojave W.A. The difference between this total column and the natural inflow released to Mojave River equals the Las Flores Ranch exchange.

SILVERWOOD LAKE OPERATION

CAPACITY 74,970 A.F.

V-18



**LAKE PERRIS
MONTHLY OPERATION**

1979

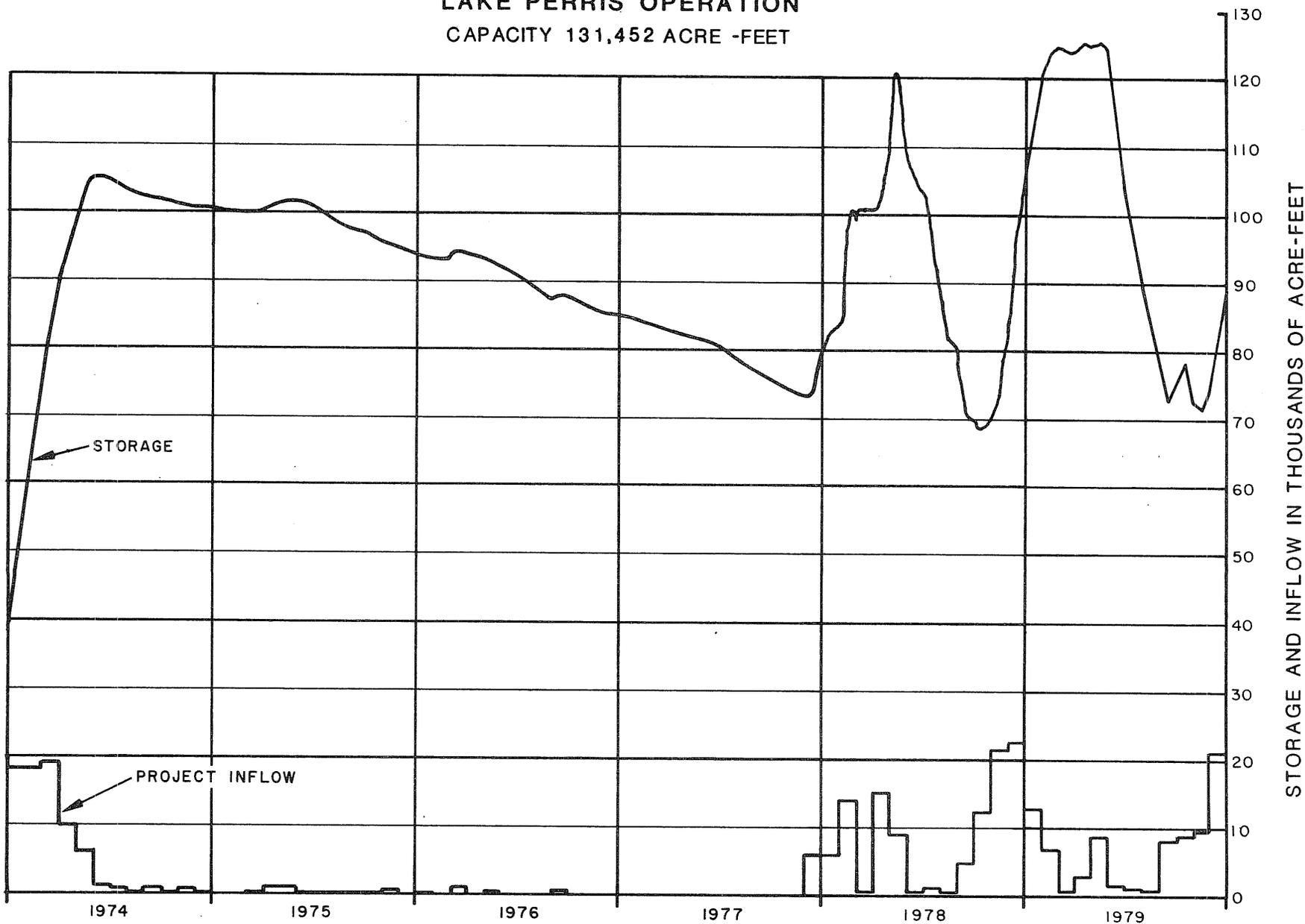
Amounts in acre-feet unless noted

MONTH	WATER SURFACE ELEVATION IN FEET	TOTAL STORAGE	STORAGE CHANGE	INFLOW	OUTFLOW	COMPUTED LOSSES (-) GAINS (+)
JAN	1,584.25	118,357	11,875	14,760	3,206	321
FEB	1,586.79	124,078	5,721	6,396	658	-17
MAR	1,586.70	123,874	-204	152	313	-43
APR	1,586.97	124,487	613	3,283	1,409	-1,261
MAY	1,586.82	124,146	-341	8,272	7,768	-845
JUN	1,578.10	104,919	-19,227	1,342	20,004	-565
JUL	1,570.95	90,027	-14,892	831	14,180	-1,543
AUG	1,564.94	78,165	-11,862	275	10,996	-1,141
SEP	1,563.42	75,271	-2,894	8,184	10,930	-148
OCT	1,562.35	73,260	-2,011	8,236	10,140	-107
NOV	1,563.64	75,687	2,427	9,651	6,933	-291
DEC	1,569.77	87,648	11,961	20,230	8,202	-67
TOTAL			-18,834	81,612	94,739	-5,707

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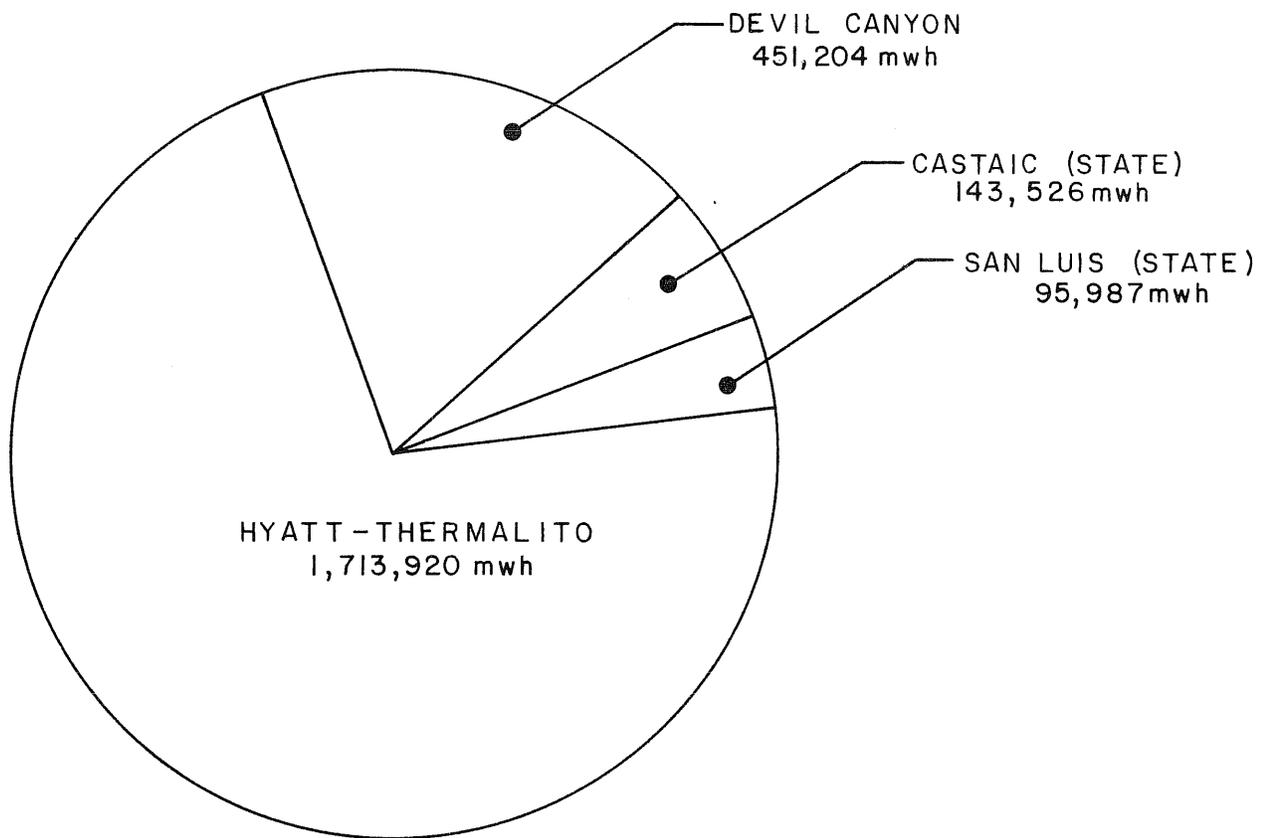
LAKE PERRIS OPERATION
CAPACITY 131,452 ACRE -FEET

V-20



POWER SUPPLY & USE

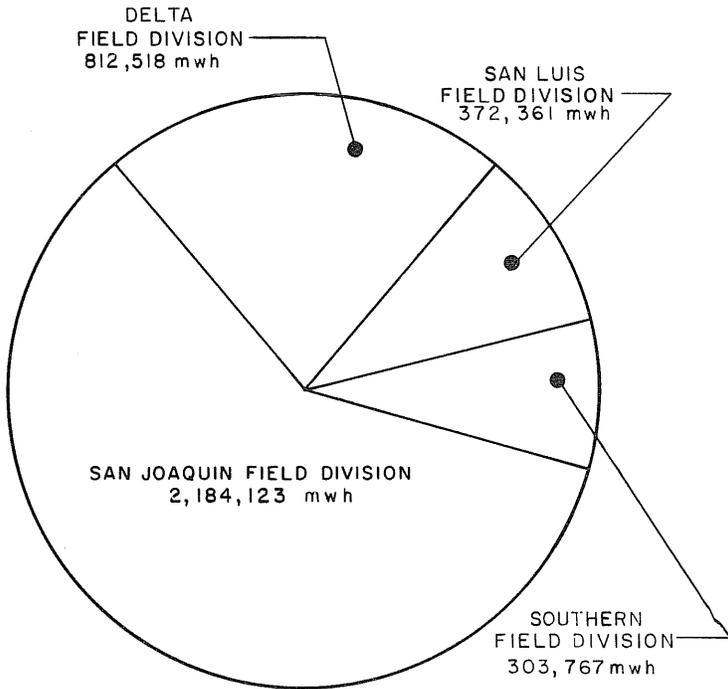
PROJECT GROSS POWER GENERATION 1979



PROJECT POWER OPERATIONS 1/

(STATE ONLY)

1979



ENERGY USED *

PUMPING PLANTS

DELTA FIELD DIVISION

1. CORDELIA
2. DELTA
3. SOUTH BAY
4. DEL VALLE

SAN LUIS FIELD DIVISION

1. SAN LUIS
2. DOS AMIGOS

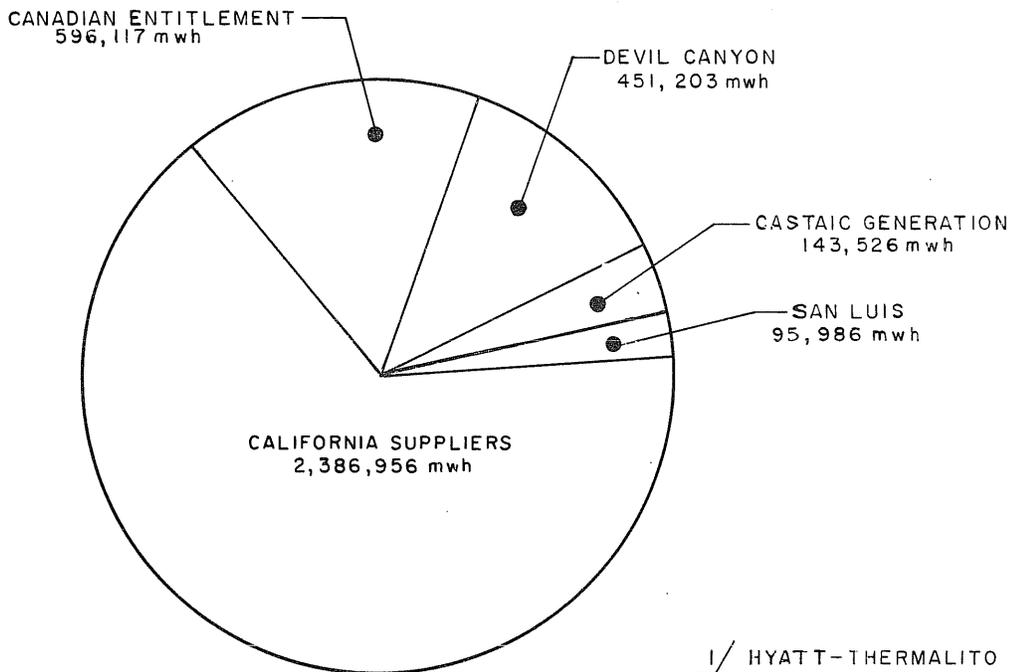
SAN JOAQUIN FIELD DIVISION

1. LAS PERILLAS
2. BADGER HILL
3. BUENA VISTA
4. WHEELER RIDGE
5. WIND GAP
6. A. D. EDMONSTON

SOUTHERN FIELD DIVISION

1. OSO
2. PEARBLOSSOM

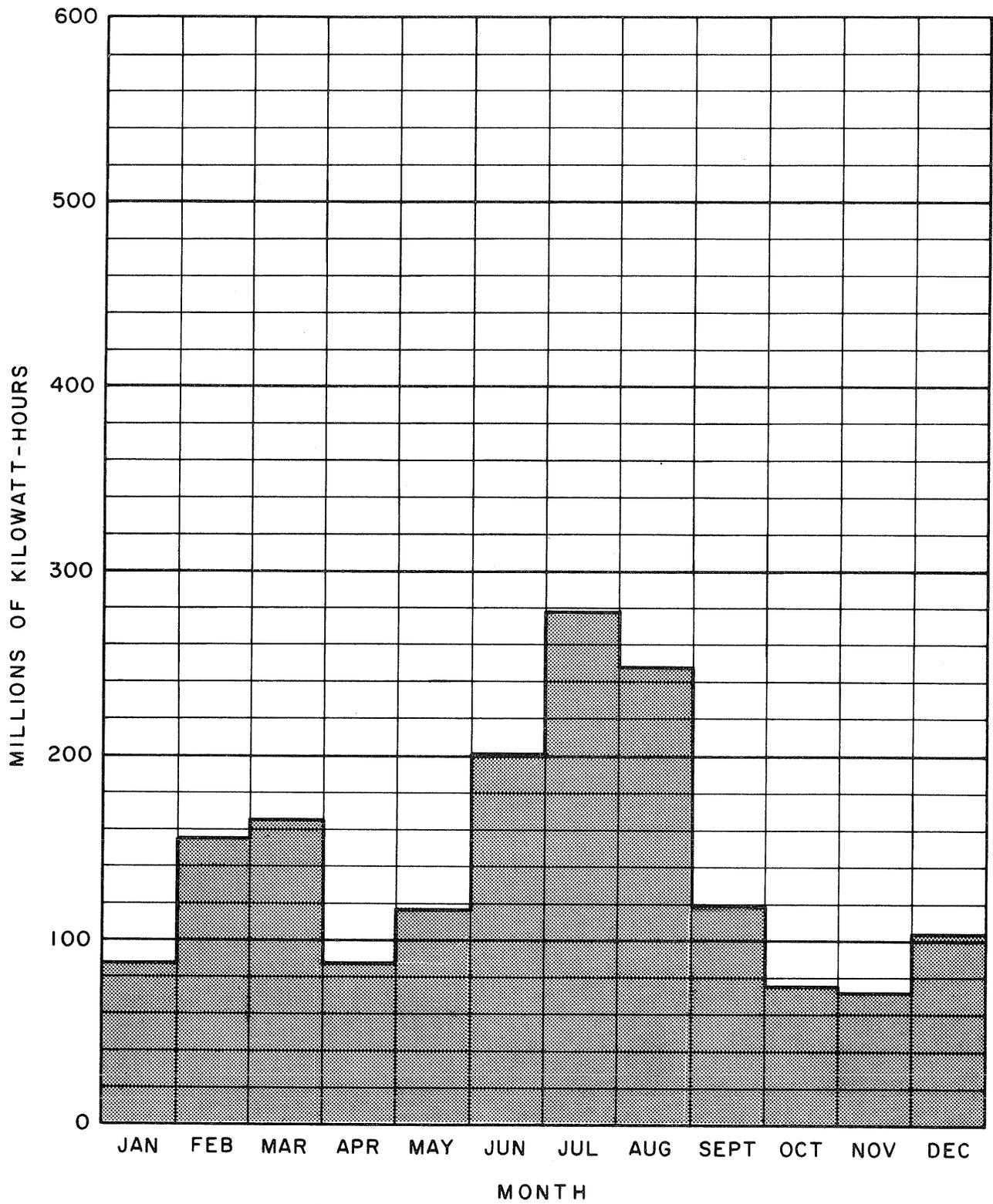
* Not included are Devil Canyon Powerplant station service and states share of power to pump waterfowl mitigation water at Tracy Pumping Plant



ENERGY SOURCES

1/ HYATT-THERMALITO NOT INCLUDED.

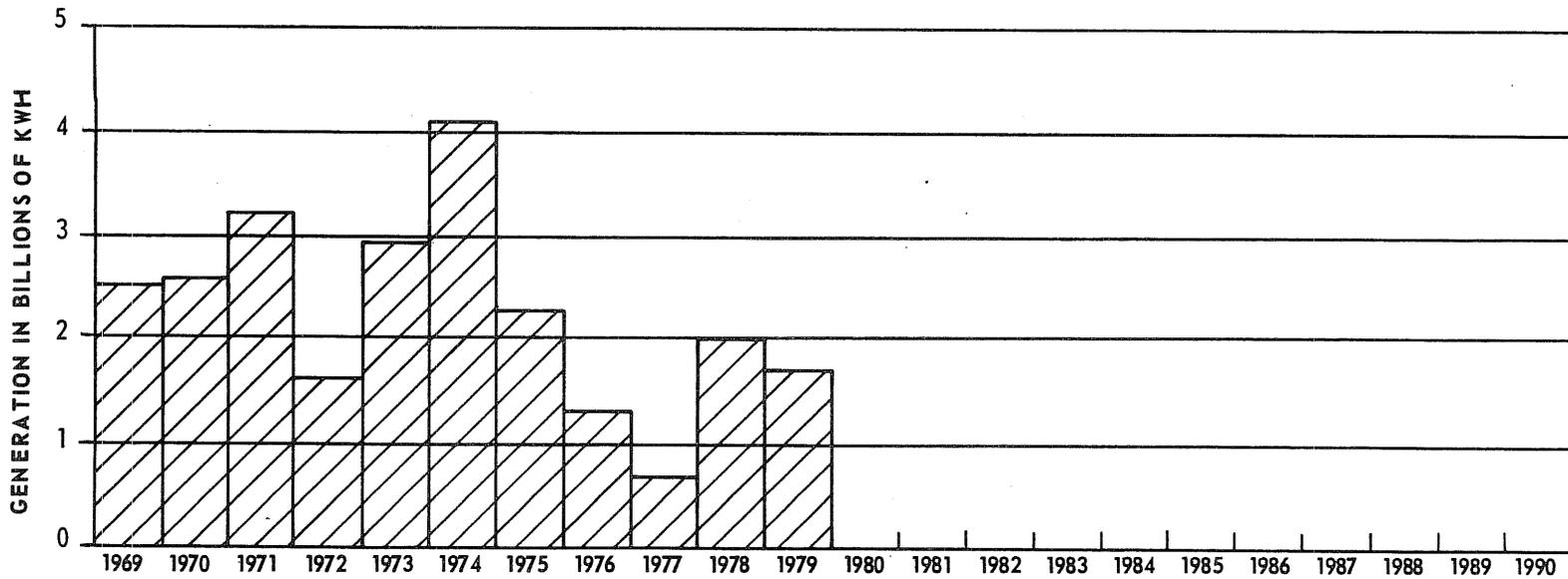
GROSS GENERATION AT HYATT AND THERMALITO POWERPLANTS 1979



OPERATION OF EDWARD HYATT AND THERMALITO POWERPLANTS

1979
ENERGY IN MILLIONS OF KWH

OPERATIONS	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
ENERGY GENERATED BY EDWARD HYATT AND THERMALITO POWER PLANTS													
GROSS GENERATION	87.47	155.65	164.79	84.59	119.13	203.34	279.45	248.02	119.41	77.10	70.65	104.32	1,713.92
POWERPLANT USE AND PUMPBACK REQUIREMENTS	5.22	11.96	4.96	6.36	1.74	4.48	2.35	2.92	17.63	12.23	18.45	27.67	115.97
DELIVERED TO CALIFORNIA POWER POOL COMPANIES	82.25	143.69	159.83	78.23	117.39	198.86	277.10	245.10	101.78	64.87	52.20	76.65	1,597.95



PROJECT POWER SUPPLY

1979

(In megawatt hours)

SOURCE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
San Luis Generation:													
State	22	100	28	0	0	31,923	42,315	21,581	17	0	0	0	95,986
Federal	0	0	0	1,538	32,136	63,880	28,889	16,850	0	0	1,161	22,397	166,851
Total	22	100	28	1,538	32,136	95,803	71,204	38,431	17	0	1,161	22,397	262,837
Castaic:													
State	11,928	18,984	13,728	6,030	6,000	720	5,520	9,000	30,168	0	17,856	23,592	143,526
Devil Canyon	35,390	20,546	15,845	18,707	32,449	37,348	43,991	42,759	54,302	50,578	41,982	57,306	451,203
Bonneville Power Administration	0	0	0	0	0	0	0	0	0	0	0	0	0
Canadian Entitlement	51,769	47,058	52,295	48,221	49,967	48,698	50,201	50,460	48,625	49,895	48,259	50,669	596,117
Suppliers	115,095	93,846	92,420	142,188	182,287	152,275	227,992	258,394	333,429	232,782	243,464	312,784	2,386,956

PROJECT POWER USE

1979

(In megawatt hours)

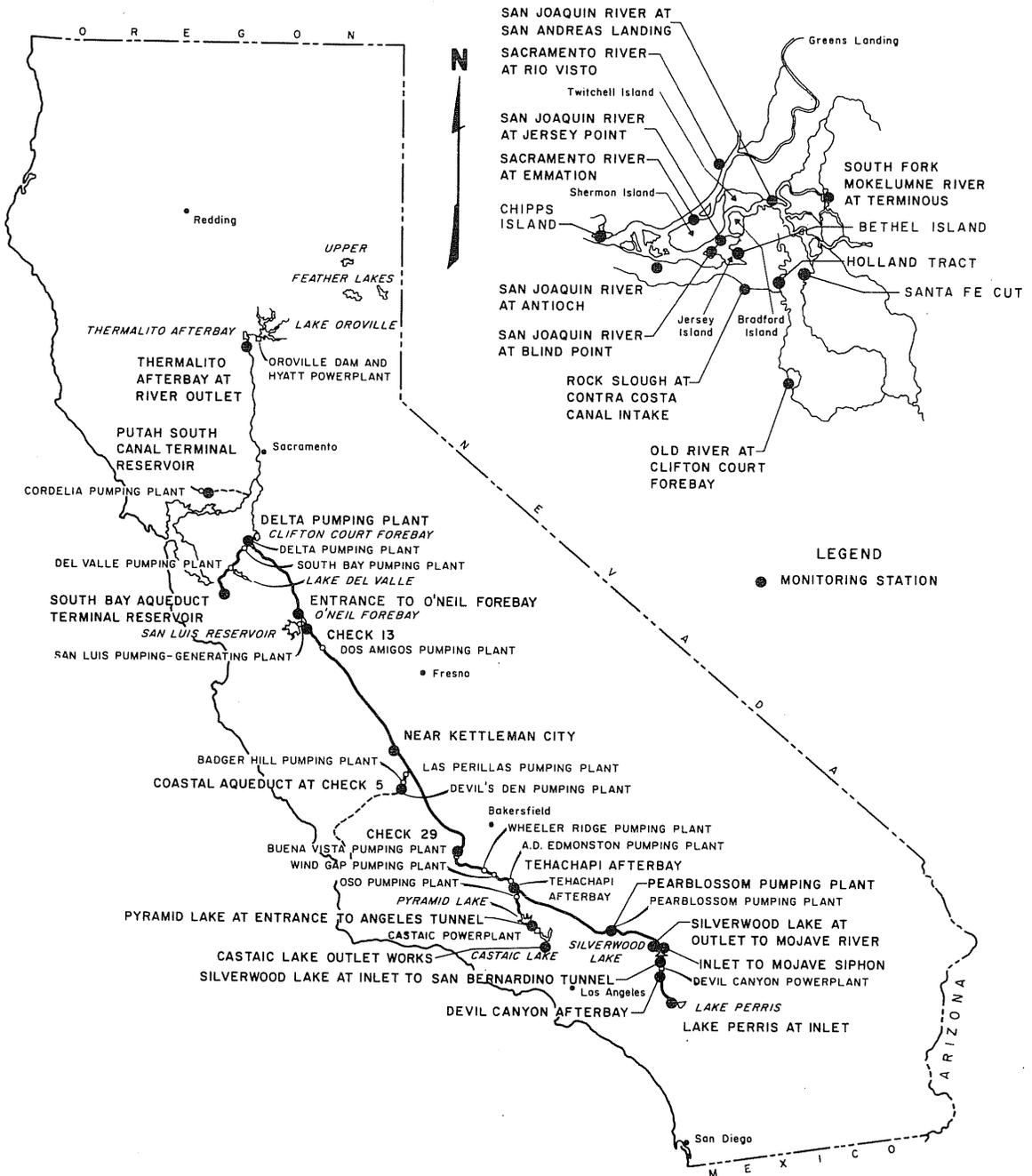
PUMPING PLANTS	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
Cordelia	261	166	211	257	284	375	385	395	384	318	221	338	3,595
Tracy:													
State	0	1,013 ^{1/}	0	0	0	0	0	0	0	0	0	0	1,013
Delta:													
State	25,452	28,121	44,022	44,041	54,002	48,517	54,168	75,833	78,681	59,971	76,973	93,700	683,481
Federal	0	0	0	3,821	657	4,163	29,638	27,201	3,760	6,346	6,997	14,008	96,591
South Bay	7,756	7,045	8,073	12,910	11,986	14,023	15,069	13,702	8,398	7,451	8,748	9,686	124,847
Del Valle	13	92	11	261	82	7	11	8	9	9	80	12	595
San Luis:													
State	16	71	40	5,644	5	3	5	1,951	18,952	15,317	18,223	5,455	65,682
Federal	51,959	24	26	2,686	5	2	5	819	26,098	36,355	12,516	8	130,503
Dos Amigos:													
State	10,149	12,408	15,739	15,549	22,370	37,674	48,710	45,033	28,738	20,353	23,254	26,702	306,679
Federal	8,981	4,261	9,311	10,854	14,235	24,387	29,018	25,738	4,855	5,820	7,960	27,967	173,387
Los Perillas	437	325	451	916	1,332	1,840	2,049	1,823	586	260	399	572	10,990
Badger Hill	1,116	821	1,163	2,539	3,661	4,959	5,516	4,917	1,591	641	1,000	1,495	29,419
Buena Vista	11,571	10,305	9,410	11,804	16,323	19,271	26,235	24,874	23,790	15,581	15,523	21,854	206,541
Wheeler Ridge	12,801	9,890	7,867	10,938	14,293	13,783	20,173	19,722	25,362	16,978	17,058	23,179	192,044
Wind Gap	27,334	21,396	16,622	22,182	28,469	26,810	40,521	40,142	54,697	36,116	35,921	49,341	399,551
A. D. Edmonston	94,091	73,536	56,827	74,473	97,448	85,276	128,491	126,546	186,686	126,402	124,313	171,489	1,345,578
Oso	3,787	5,048	3,672	2,493	2,341	343	1,752	2,678	8,473	427	4,621	7,008	42,643
Pearblossom	19,420	10,296	8,034	13,314	18,103	18,084	26,936	24,567	30,194	33,429	25,227	33,520	261,124
Devil Canyon (Station Service)	0	0	0	0	0	0	0	0	0	0	0	0	0

^{1/} Payback for mitigation water.

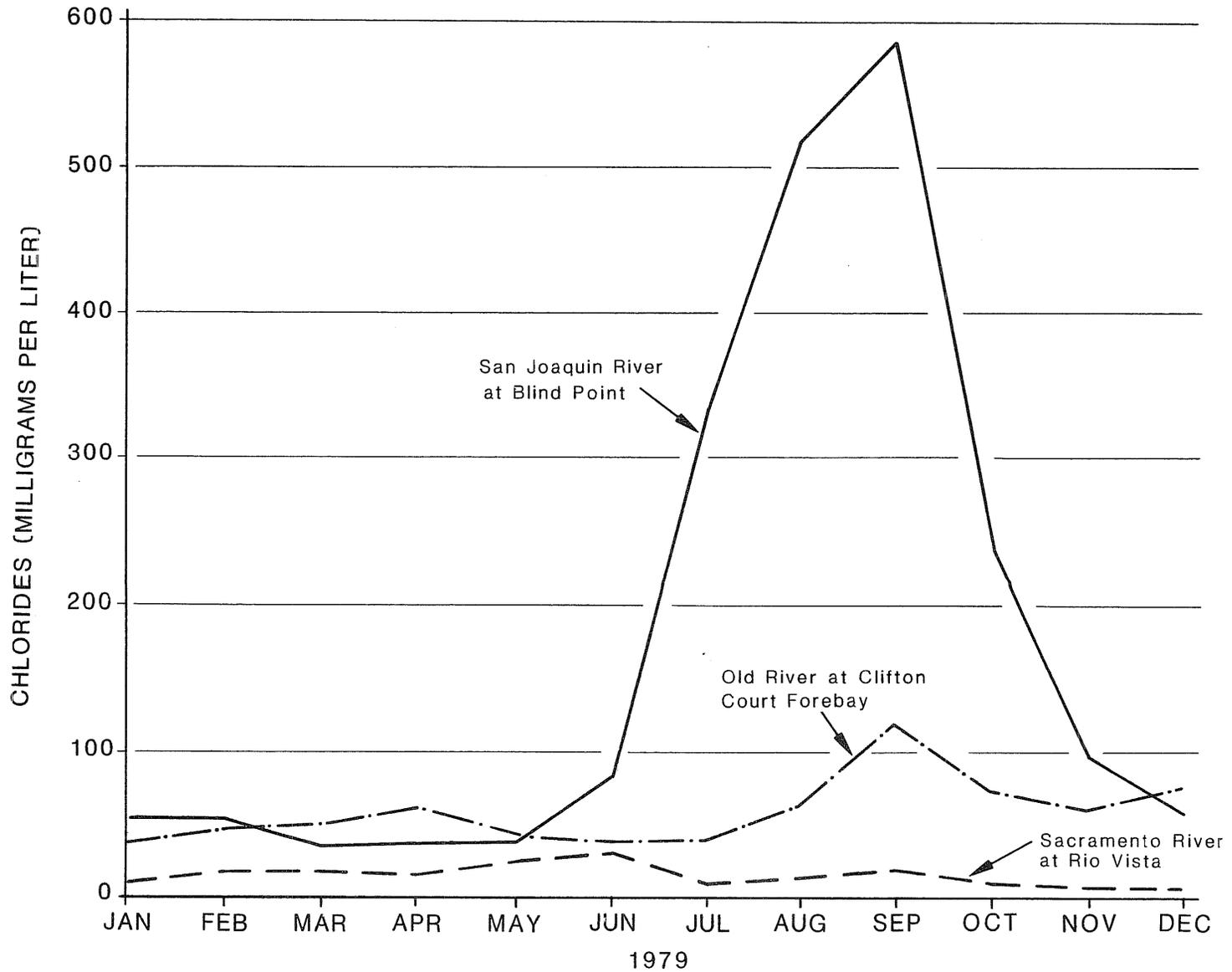
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WATER QUALITY

MAP OF WATER QUALITY MONITORING STATIONS

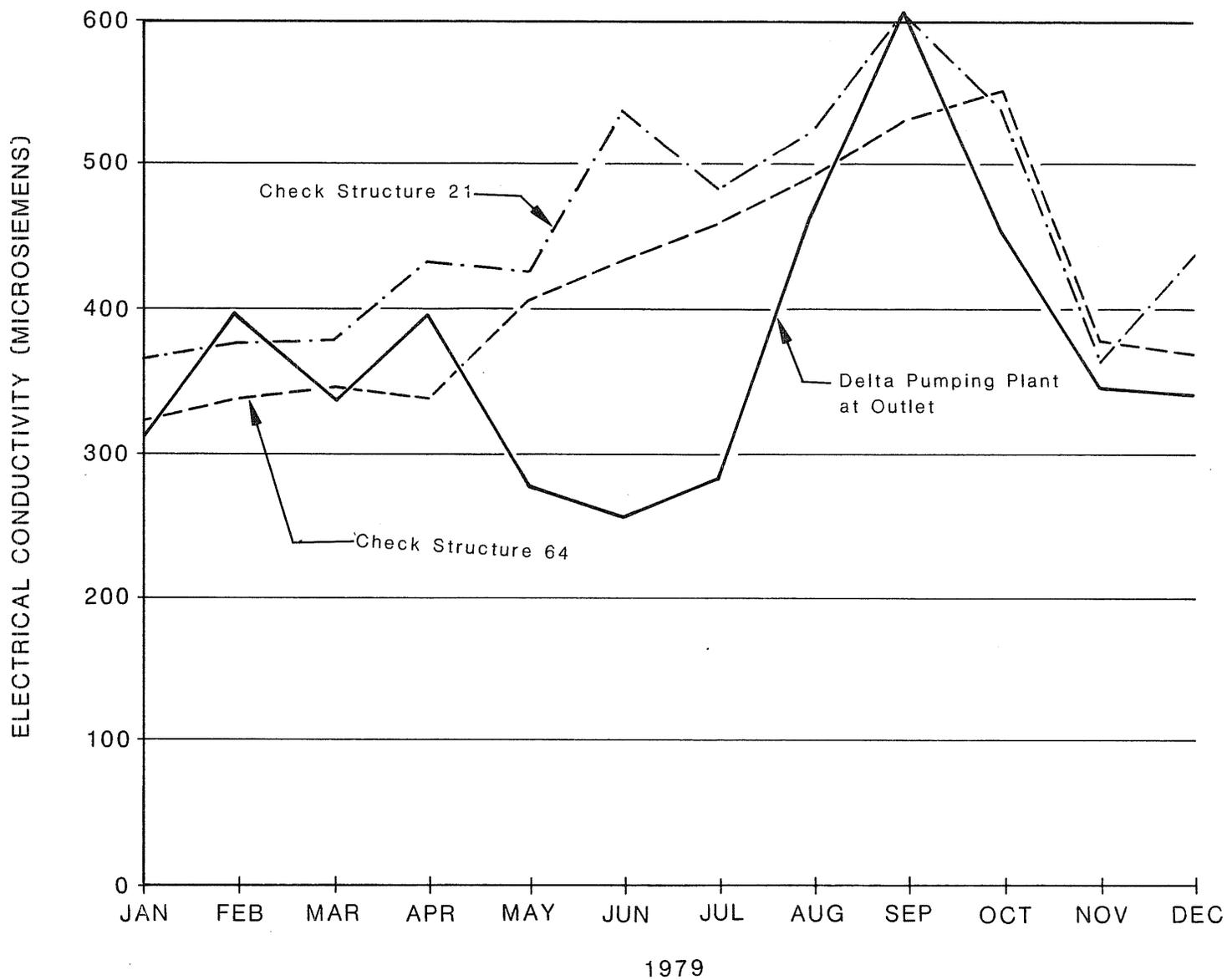


PLOT OF MONTHLY 28 DAY MEAN CHLORIDE LEVELS ^{1/} AT DELTA STATIONS



^{1/} CALCULATED FROM CORRELATIONS USING THE 28-DAY MEAN VALUE OF ELECTRICAL CONDUCTIVITY FOR THE LAST DAY OF EACH MONTH

MONTHLY ELECTRICAL CONDUCTIVITY AT SWP LOCATIONS



WATER QUALITY
1979
THERMALITO AFTERBAY AT FEATHER RIVER
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	50	63	60	51	55		54	56	68	67	42	63	58
TOTAL HARDNESS	a	33	32	39	36	36		32	32	32	32	36	39	35
CHLORIDES	a	1.9	1	2	0	0		0	0	0	2	0	1	1
SULFATES	a	0.6	0	3	2	1		2	2	0	2	0	0	1
SODIUM	a	3.4	3	4	4	4		3	3	3	4	4	4	4
SODIUM (%)	a	19	17	18	19	19		17	17	17	21	19	18	18
ELECT. COND. (micromhos)	a													
ELECT. COND. (micromhos)	b	82	82	92	89	85		80	87	85	85	86	93	87
PH	c	7.1	7.0	7.1	7.0	7.1		7.2	7.2	7.3	7.1	7.4	7.2	7.2
BORON	b	0.1	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0	0.0
FLUORIDE	b													
LEAD	b													
SELENIUM	b													
HEXAVALENT CHROMIUM	b													
ARSENIC	d													
IRON	b													
MANGANESE	b													
MAGNESIUM	b		3	4	4	4		3	3	3	3	4	4	4
COPPER	b													
CALCIUM	b		8	9	8	8		8	8	8	8	8	9	8
ZINC	b													
PHENOL	b													
COLOR (units)	d													
SAMPLING DATE	b	1/17	2/21	3/21	4/18	5/16		7/18	8/15	9/19	10/17	11/21	12/19	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
PUTAH SOUTH CANAL TERMINAL FACILITY
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	159	221	277	227	197	196	175	189	204	206	172	197	202
TOTAL HARDNESS	a	132	164	195	180	163	160	150	156	160	156	156	160	161
CHLORIDES	a	7.3	10	19	11	6	6	6	6	6	6	6	6	8
SULFATES	a	18	27	54	36	22	22	20	18	21	20	20	24	25
SODIUM	a	10	14	28	19	11	10	9	10	10	10	11	11	13
SODIUM (%)	a	14	16	24	19	13	12	12	12	12	12	13	13	14
ELECT. COND. (micromhos)	a													
ELECT. COND. (micromhos)	b	278	362	469	404	344	336	313	335	333	336	329	344	349
PH	c	8.4	8.7	8.6	8.4	8.6	8.1	8.6	8.5	8.5	8.6	9.4	8.6	8.7
BORON	b	0.2	0.2	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2
FLUORIDE	b													
LEAD	b													
SELENIUM	b													
HEXAVALENT CHROMIUM	b													
ARSENIC	d													
IRON	b													
MANGANESE	b													
MAGNESIUM	b		27	28	28	28	28	26	27	28	27	27	28	27
COPPER	b													
CALCIUM	b		21	32	26	19	18	17	18	18	18	18	18	20
ZINC	b													
PHENOL	b													
COLOR (units)	d													
SAMPLING DATE	b	01/16	02/20	03/20	04/17	05/15	06/19	07/17	08/14	09/18	10/16	11/20	12/18	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
CALIFORNIA AQUEDUCT AT DELTA PUMPING PLANT
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	184	231	198	232	166	155	171	271	356	266	202	200	219
TOTAL HARDNESS	a	80	91	83	91	68	64	70	106	136	104	81	80	88
CHLORIDES	a	37	54	42	54	32	29	33	61	89	60	41	41	48
SULFATES	a	28	37	30	37	25	23	27	58	90	56	35	35	40
SODIUM	a	30	41	33	41	27	25	28	47	65	46	34	33	38
SODIUM (%)	a	45	50	47	50	46	46	46	49	51	49	48	47	48
ELECT. COND. (micromhos)	a	315	396	338	397	279	260	288	459	603	450	341	337	372
ELECT. COND. (micromhos)	b	329	367	373	412	265	253	285	469	676	440	377	332	382
PH	c	8.1	7.9	8.2	7.6	7.6	8.1	8.0	8.6	8.2	8.1	7.9	8.4	8.1
BORON	b	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2
FLUORIDE	b	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LEAD	b	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.02	0.01
SELENIUM	b	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00
HEXAVALENT CHROMIUM	b d		0.00							0.00				0.00
ARSENIC	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRON	b	0.02	0.09	0.05	0.04	0.01	0.00	0.01	0.01	0.01	0.00	0.02	0.03	0.02
MANGANESE	b	0.03	0.00	0.04	0.03	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.04	0.02
MAGNESIUM	b	10	9	10	12	9	8	8	11	16	12	10	10	10
COPPER	b	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.04	0.01
CALCIUM	b	18	17	19	21	15	15	13	14	18	15	19	18	17
ZINC	b	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.00	0.02	0.02	0.03	0.02
PHENOL	b d		0.000							0.000				0.000
COLOR (units)	b	35	10	30	0	15	18	8	12	25	12	10	15	16
SAMPLING DATE		1/17	2/21	3/21	4/18	5/16	6/20	7/18	8/15	9/19	10/17	11/21	12/19	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.

b - Laboratory analysis of monthly samples.

c - Field analysis of monthly samples.

d - Sampling performed twice annually.

^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
SOUTH BAY AQUEDUCT TERMINAL RESERVOIR
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS ^a	173	232	198	238	198	187	201	312	398	311	259	262	247
TOTAL HARDNESS ^a	78	97	86	99	73	69	74	117	150	116	97	98	96
CHLORIDES ^a	36	52	43	54	31	28	31	55	75	55	43	44	46
SULFATES ^a	27	38	32	39	27	25	28	54	77	53	41	41	40
SODIUM ^a	22	35	28	36	26	25	27	43	57	43	35	36	34
SODIUM (%) ^a	38	44	41	44	44	44	44	45	45	45	44	44	44
ELECT. COND. (micromhos) ^a	302	401	343	411	285	268	289	457	586	455	377	382	380
ELECT. COND. (micromhos) ^b	319	464	365	434	276	256		482		456	372	340	387
PH ^c	8.18	8.2	8.0	8.1	7.4	8.8	8.0	8.0	8.1	8.5	8.1	8.5	8.4
BORON ^b	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
FLUORIDE ^b	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LEAD ^b	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.01
SELENIUM ^b	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
HEXAVALENT CHROMIUM ^b		0.00							0.00				0.00
ARSENIC ^b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
IRON ^b	0.02	0.02	0.04	0.05	0.03	0.01	0.01	0.01	0.00	0.00	0.01	0.05	0.02
MANGANESE ^b	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.07	0.01	0.01
MAGNESIUM ^b	10	11	10	12	9	8	8	11	18	15	10	10	11
COPPER ^b	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.01
CALCIUM ^b	18	22	19	22	16	15	13	14	26	25	18	18	19
ZINC ^b	0.01	0.01	0.01	0.03	0.04	0.01	0.01	0.01	0.00	0.02	0.02	0.03	0.02
PHENOL ^b		0.001							0.001				0.001
COLOR (units) ^b	35	5	30	0	15	25	8	20	12	10	8	18	16
SAMPLING DATE	01/16	02/20	03/20	04/17	05/15	06/19	07/17	08/14	09/18	10/16	11/20	12/18	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
CALIFORNIA AQUEDUCT ENTRANCE TO O'NEILL FOREBAY
(milligrams per liter except where noted)

CONSTITUENTS 1/		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	168	217	190	228	162	154	162	275	342	247	193	205	212
TOTAL HARDNESS	a	76	88	81	90	69	66	69	104	122	95	79	83	85
CHLORIDES	a	32	48	39	52	31	29	31	62	83	54	39	42	45
SULFATES	a	25	37	30	40	26	23	26	61	87	51	34	38	40
SODIUM	a	27	38	31	41	26	25	26	48	62	43	32	34	36
SODIUM (%)	a	43	48	46	49	45	45	45	50	52	49	47	47	47
ELECT. COND. (micromhos)	a	290	377	329	396	278	264	278	475	592	426	333	353	366
ELECT. COND. (micromhos)	b	305	454	360	465	276	264	281	477	680	457	369	351	395
PH	c	8.4	7.8	8.0	7.9	7.6	7.7	8.4	8.0	8.4	8.6	8.9	8.7	8.4
BORON	b	0.2	0.3	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
FLUORIDE	b	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.03	0.01
SELENIUM	b	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
HEXAVALENT CHROMIUM	b d		0.00							0.00				0.00
ARSENIC	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
IRON	b	0.02	0.03	0.03	0.04	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.01	0.02
MANGANESE	b	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.02	0.02	0.01
MAGNESIUM	b	10	11	9	12	9	8	7	11	16	12	10	10	10
COPPER	b	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.00	0.00	0.01	0.02	0.03	0.01
CALCIUM	b	17	21	18	23	16	15	11	14	17	16	18	19	17
ZINC	b	0.02	0.01	0.02	0.02	0.04	0.01	0.03	0.01	0.00	0.02	0.04	0.04	0.02
PHENOL	b d		0.001							0.000				0.001
COLOR (units)	b	25	8	25	0	25	20	5	12	25	12	8	12	15
SAMPLING DATE		1/17	2/21	3/21	4/18	5/16	6/20	7/18	8/15	9/19	10/17	11/21	12/19	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.

b - Laboratory analysis of monthly samples.

c - Field analysis of monthly samples.

d - Sampling performed twice annually.

1/ Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
CALIFORNIA AQUEDUCT AT CHECK 13
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	199	225	202	249	233	289	252	286	336	259	203	246	248
TOTAL HARDNESS	a	87	96	88	105	93	111	100	110	125	102	83	98	100
CHLORIDES	a	41	49	42	56	56	76	63	75	93	65	44	60	60
SULFATES	a	32	38	33	44	42	58	48	58	73	50	34	46	46
SODIUM	a	34	39	34	45	43	55	47	55	65	49	37	46	46
SODIUM (%)	a	46	47	46	48	50	52	51	52	53	51	49	51	50
ELECT. COND. (micromhos)	a	349	396	354	441	407	508	442	503	593	455	352	430	436
ELECT. COND. (micromhos)	b	381	429	353	495	413	484	492	546	646	456	359	456	459
PH	c	7.3	7.4	7.4	7.5	7.5	7.5	7.4	7.6	7.5	7.6	7.4	7.5	7.5
BORON	b	0.2	0.3	0.3	0.3	0.1	0.1	0.1	0.2	0.1	0.0	0.2	0.2	0.2
FLUORIDE	b	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.04	0.01
SELENIUM	b	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.00	0.02	0.01
HEXAVALENT CHROMIUM	b		0.00							0.00				0.00
ARSENIC	d													
	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRON	b	0.01	0.03	0.04	0.04	0.17			0.11	0.01	0.01	0.04	0.03	0.05
MANGANESE	b	0.01	0.00	0.01	0.02	0.02			0.09	0.05	0.02	0.02	0.02	0.03
MAGNESIUM	b	10	10	9	13	12		12	14	16	12	10	12	12
COPPER	b	0.02	0.02	0.01	0.02	0.01			0.02	0.01	0.01	0.01	0.02	0.02
CALCIUM	b	19	20	18	24	20		20	20	20	17	18	21	20
ZINC	b	0.01	0.01	0.01	0.01	0.02			0.04	0.00	0.00	0.01	0.02	0.01
PHENOL	b		0.001							0.000				0.001
	d													
	b	25	15	25	25	20	12	8	8	8	12	10	10	15
COLOR (units)	b													
SAMPLING DATE		01/17	02/21	03/21	04/18	05/16	06/20	07/18	08/15	09/18	10/17	11/21	12/19	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
CALIFORNIA AQUEDUCT NEAR KETTLEMAN CITY
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	212	219	221	248	256	325	293	321	378	328	215	263	273
TOTAL HARDNESS	a	90	93	93	102	100	129	116	127	150	130	84	103	110
CHLORIDES	a	45	47	47	56	54	73	64	71	87	73	44	56	60
SULFATES	a	33	35	36	45	58	94	77	92	122	96	36	61	65
SODIUM	a	36	38	38	45	43	53	48	52	61	53	36	44	46
SODIUM (%)	a	47	47	47	49	48	47	47	47	47	47	49	48	48
ELECT. COND. (micromhos)	a	369	381	385	435	424	527	479	521	604	531	364	435	455
ELECT. COND. (micromhos)	b	360	394	329	408	361	582	386	565	642	483	318	501	444
PH	c	7.9	7.6	7.6	8.0	8.2	8.2	8.0	8.3	8.2	8.4	8.0	7.8	8.1
BORON	b	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.2
FLUORIDE	b	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.01			0.00	0.03	0.02	0.00	0.02	0.01
SELENIUM	b	0.00	0.01	0.00	0.00	0.00		0.01	0.01	0.00	0.01	0.00	0.01	0.00
HEXAVALENT CHROMIUM	b d		0.00							0.00				0.00
ARSENIC	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRON	b	0.01	0.04	0.05	0.02	0.17			0.01	0.01	0.01	0.01	0.01	0.03
MANGANESE	b	0.01	0.00	0.00	0.00	0.01			0.00	0.00	0.00	0.00	0.00	0.00
MAGNESIUM	b	13	10	8	10	10		10	14	16	13	9	13	11
COPPER	b	0.01	0.02	0.02	0.02	0.03			0.00	0.01	0.01	0.01	0.02	0.02
CALCIUM	b	15	20	17	20	19		18	22	20	17	16	23	19
ZINC	b	0.01	0.01	0.02	0.02	0.03			0.00	0.00	0.01	0.02	0.04	0.02
PHENOL	b d		0.000							0.001				0.001
COLOR (units)	b	20	15	45	0	15	15	8	18	8	12	8	8	14
SAMPLING DATE		01/17	02/21	03/21	04/18	05/15	06/20	07/18	08/15	09/19	10/17	11/21	12/19	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.

b - Laboratory analysis of monthly samples.

c - Field analysis of monthly samples.

d - Sampling performed twice annually.

^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
COASTAL BRANCH AT CHECK 5
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	206	203	216	235	254	300	283	310	334	302	225	260	261
TOTAL HARDNESS	a	89	89	93	100	93	106	101	109	116	107	84	95	99
CHLORIDES	a	43	42	47	51	62	83	75	87	99	84	48	64	65
SULFATES	a	32	31	35	39	43	56	51	59	66	57	36	45	46
SODIUM	a	35	34	37	41	45	55	51	58	64	56	38	46	47
SODIUM (%)	a	46	46	47	49	51	53	52	54	55	53	49	51	51
ELECT. COND. (micromhos)	a	359	354	378	412	422	509	477	528	575	513	366	433	444
ELECT. COND. (micromhos)	b	384	392	338	404	352	576	437	523	634	525	326	480	448
PH	c	7.6	7.1	7.0	7.0	7.1	7.8	8.0	8.1	7.7	8.0	8.2	7.8	7.8
BORON	b	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2
FLUORIDE	b	0.1	0.1	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.0	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.23	0.01	0.02
SELENIUM	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HEXAVALENT CHROMIUM	b													
ARSENIC	d													
IRON	b	0.02	0.05	0.04	0.02	0.01	0.01	0.06	0.01	0.05	0.13	0.02	0.04	0.04
MANGANESE	b	0.00	0.02	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.02	0.00	0.01	0.01
MAGNESIUM	b	9	10	8	10	10	14	12	12	15	13	8	12	11
COPPER	b	0.02	0.01	0.02	0.02	0.03	0.02	0.02	0.01	0.02	0.03	0.02	0.03	0.02
CALCIUM	b	20	20	16	20	19	25	20	21	19	18	17	22	20
ZINC	b	0.02	0.02	0.04	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.03	0.02
PHENOL	b		0.001							0.000				0.001
COLOR (units)	d													
SAMPLING DATE	b	01/16	02/20	03/20	04/17	05/15	06/26	07/17	08/14	09/18	10/16	11/20	12/18	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.

b - Laboratory analysis of monthly samples.

c - Field analysis of monthly samples.

d - Sampling performed twice annually.

^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
CALIFORNIA AQUEDUCT AT CHECK 29
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	206	204	223	239	260	301	291	302	338	318	228	266	265
TOTAL HARDNESS	a	89	88	94	99	97	109	106	110	120	114	87	99	102
CHLORIDES	a	43	42	49	54	63	77	74	78	90	83	52	65	70
SULFATES	a	33	33	37	40	46	59	55	59	71	64	37	48	49
SODIUM	a	35	34	39	43	44	53	51	53	61	57	38	45	46
SODIUM (%)	a	46	46	47	48	50	51	51	51	52	52	48	50	46
ELECT. COND. (micromhos)	a	358	354	389	418	428	503	484	505	569	533	371	439	446
ELECT. COND. (micromhos)	b	354	351	378	378	418	528	445	536	608	524	358	498	448
PH	c	7.5	7.0	7.0	7.0	7.0	7.9	8.4	7.6	8.2	8.5	7.7	7.7	7.9
BORON	b	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.2
FLUORIDE	b	0.0	0.0	0.1	0.0	0.2	0.2	0.1	0.0	0.2	0.1	0.0	0.0	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.07	0.04	0.01
SELENIUM	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HEXAVALENT CHROMIUM	b													
ARSENIC	d b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRON	b	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.06	0.01	0.01	0.02	0.02
MANGANESE	b	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01
MAGNESIUM	b	9	9	8	9	11	13	12	13	14	13	9	12	11
COPPER	b	0.01	0.01	0.01	0.03	0.92	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.02
CALCIUM	b	19	19	18	20	22	23	21	22	20	18	18	23	20
ZINC	b	0.00	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.01
PHENOL	b d		0.009							0.001				0.005
COLOR (units)	b	10	23	20	15	15	18	18	15	6	13	18	13	15
SAMPLING DATE		1/16	2/20	3/20	4/17	5/15	6/26	7/17	8/14	9/18	10/16	11/20	12/18	

- a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
- b - Laboratory analysis of monthly samples.
- c - Field analysis of monthly samples.
- d - Sampling performed twice annually.
- ^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
CALIFORNIA AQUEDUCT AT TEHACHAPI AFTERBAY
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	192	198	215	196	238	273	270	294	315	319	215	228	246
TOTAL HARDNESS	a	87	89	95	89	97	106	106	112	118	119	90	94	100
CHLORIDES	a	42	43	49	43	56	69	68	76	84	86	47	52	56
SULFATES	a	33	34	38	33	46	53	53	58	62	63	42	44	47
SODIUM	a	35	36	40	36	44	52	52	57	62	62	39	42	46
SODIUM (%)	a	46	47	48	47	50	52	51	52	53	53	49	49	50
ELECT. COND. (micromhos)	a	354	364	395	360	419	481	477	518	556	562	380	402	439
ELECT. COND. (micromhos)	b	348	328	435	359	435	484	379	485	579	578	363	472	437
PH	c	7.9	7.2	8.9	9.1		8.5	7.9	8.0	8.0	8.7	8.0	7.4	8.5
BORON	b	0.1	0.2	0.3	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.2
FLUORIDE	b	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.0	0.1	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HEXAVALENT CHROMIUM	b													
ARSENIC	d													
IRON	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MANGANESE	b	0.04	0.05	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02
MAGNESIUM	b	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
COPPER	b	4	8	10	9	12	13	9	12	13	14	10	12	11
CALCIUM	b	0.00	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
ZINC	b	28	17	21	18	21	22	20	20	19	18	17	21	20
PHENOL	b	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00
COLOR (units)	b	8	25	8	13	18	5	15	13	13	13	13	18	14
SAMPLING DATE	b	01/17	02/20	03/21	04/18	05/16	06/29	07/19	08/15	09/19	10/17	11/21	12/20	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
PYRAMID LAKE AT ENTRANCE TO ANGELES TUNNEL
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	306	250	257	282	281	299	257	315	308	336	342	297	294
TOTAL HARDNESS	a	152	134	131	145	142	146	149	139	132	129	158	144	142
CHLORIDES	a	41	43	39	40	38	40	39	45	68	71	55	55	48
SULFATES	a	96	76	79	89	91	103	102	98	76	72	78	86	87
SODIUM	a	44	40	40	39	41	43	43	45	54	58	47	51	45
SODIUM (%)	a	38	39	39	36	38	38	38	41	46	49	39	43	40
ELECT. COND. (micromhos)	a													
ELECT. COND. (micromhos)	b	502	460	459	470	456	495	511	498	523	549	546	525	500
PH	c	7.2	8.5	9.6	8.7	8.7	8.7	8.6	9.4	9.2	8.5		8.0	9.0
BORON	b	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3
FLUORIDE	b	0.4	0.6	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.4
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HEXAVALENT CHROMIUM	b													
ARSENIC	d													
IRON	b	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00
MANGANESE	b	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
MAGNESIUM	b	15	13	13	14	14	15	15	15	15	15	17	15	15
COPPER	b	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CALCIUM	b	36	32	31	35	34	34	35	31	28	27	35	33	33
ZINC	b	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.99	0.01
PHENOL	b													
COLOR (units)	d													
	b	8	8	8	18	8	8	8	8	3	8	4	8	8
SAMPLING DATE		1/18	2/28	3/21	4/17	5/15	6/26	7/17	8/14	9/18	10/16	11/21	12/18	

- a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
CASTAIC LAKE AT OUTLET WORKS
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	367	346	349	382	349	373	354	393	402	397	372	365	371
TOTAL HARDNESS	a		191	190	192	190	186	189	189	203	200	197	199	193
CHLORIDES	a	51	53	49	51	51	51	51	50	55	50	48	48	51
SULFATES	a	121	118	121	118	120	126	131	135	139	138	127	131	127
SODIUM	a	52	47	48	48	48	51	51	51	53	52	50	51	50
SODIUM (%)	a	37	34	35	35	35	37	37	36	36	36	35	35	36
ELECT. COND. (micromhos)	a													
ELECT. COND. (micromhos)	b	613	597	599	595	590	605	599	620	646	634	615	617	611
PH	c	7.5		9.3	8.7	8.6		8.4	8.1	8.5	8.7		8.1	8.7
BORON	b	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
FLUORIDE	b	0.4	0.7	0.5	0.4	0.5	0.5	0.6	0.5	0.5	0.5	0.4	0.4	0.5
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HEXAVALENT CHROMIUM	b d													
ARSENIC	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRON	b	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.00	0.01
MANGANESE	b	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MAGNESIUM	b	16	16	17	17	17	18	18	18	19	19	17	18	18
COPPER	b	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
CALCIUM	b	49	50	48	49	48	45	46	46	50	49	51	50	48
ZINC	b	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.01
PHENOL	b d													
COLOR (units)	b	8	8	8	10	13	8	8	8	3	8	2	8	8
SAMPLING DATE		1/19	2/28	3/20	4/16	5/14	6/18	7/16	8/13	9/17	10/15	11/19	12/17	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
CALIFORNIA AQUEDUCT AT PEARBLOSSOM PUMPING PLANT
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	226	199	229	205	309	273	215	295	320	200	211	311	249
TOTAL HARDNESS	a	84	88	94	78	107	120	91	100	110	98	86	104	97
CHLORIDES	a	45	50	47	39	71	81	54	85	113	89	55	70	67
SULFATES	a	40	40	61	49	67	55	35	37	40	26	26	46	44
SODIUM	a	40	39	44	37	58	69	40	58	78	61	42	54	52
SODIUM (%)	a	50	48	50	50	54	55	48	55	60	56	51	52	52
ELECT. COND. (micromhos)	a													
ELECT. COND. (micromhos)	b	364	380	416	345	496	585	389	492	600	507	379	506	455
PH	c	8.6	8.1	7.8	8.9		8.2	8.3	8.5	8.1	8.6	8.2	8.2	8.4
BORON	b	0.2	0.2	0.3	0.2	0.3	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.2
FLUORIDE	b	0.0	0.1	0.2	0.0	0.2	0.2	0.1	0.2	0.1	0.1	0.0	0.1	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HEXAVALENT CHROMIUM	b d													
ARSENIC	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRON	b	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02
MANGANESE	b	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
MAGNESIUM	b	9	10	10	8	12	14	10	12	14	13	10	12	11
COPPER	b	0.01	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
CALCIUM	b	19	19	21	18	23	25	20	20	21	18	18	22	20
ZINC	b	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.03	0.00	0.00	0.01
PHENOL	b d													
COLOR (units)	b	8	15	10	18	18	4	13	8	13	5	10	18	12
SAMPLING DATE		01/17	02/20	03/21	04/18	05/16	06/28	07/18	08/15	09/19	10/17	11/21	12/20	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
CALIFORNIA AQUEDUCT AT INLET TO MOJAVE SIPHON
1979
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	175	181	186	183	229	243	260	275	297	312	209	207	230
TOTAL HARDNESS	a	82	84	85	84	95	99	104	108	114	118	89	89	96
CHLORIDES	a	36	38	40	39	55	60	66	71	78	83	48	48	55
SULFATES	a	29	30	31	31	41	43	47	50	54	57	37	37	41
SODIUM	a	31	32	33	33	42	45	48	52	56	60	37	37	42
SODIUM (%)	a	45	46	46	46	49	49	50	51	52	52	48	48	49
ELECT. COND. (micromhos)	a	323	334	343	338	407	430	459	485	521	547	374	371	411
ELECT. COND. (micromhos)	b	338	356	402	341	490	519	460	531	546	604	385	497	456
PH	c	8.5	8.3	9.7	9.1		8.5	8.3	8.7	7.9	8.8	8.4	8.5	8.9
BORON	b	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2
FLUORIDE	b	0.0	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.0	0.1	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HEXAVALENT CHROMIUM	b d													
ARSENIC	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRON	b	0.03	0.01	0.01	0.03	0.01	0.02	0.01	0.01	0.03	0.01	0.02	0.02	0.02
MANGANESE	b	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MAGNESIUM	b	10	9	10	8	12	13	11	13	13	15	10	11	11
COPPER	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CALCIUM	b	18	20	20	17	22	24	22	21	18	20	17	23	20
ZINC	b	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00
PHENOL	b d													
COLOR (units)	b	8	15	10	23	18	5	10	8	13	13	10	18	13
SAMPLING DATE		1/17	2/20	3/21	4/18	5/17	6/28	7/18	8/15	9/19	10/17	11/20	12/19	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.

b - Laboratory analysis of monthly samples.

c - Field analysis of monthly samples.

d - Sampling performed twice annually.

^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
SILVERWOOD LAKE AT OUTLET TO MOJAVE RIVER
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	190	175	187	208	206	242	265	263	275	271	310	263	238
TOTAL HARDNESS	a	82	80	80	78	82	88	102	100	97	101	102	94	91
CHLORIDES	a	41	41	38	39	42	54	72	73	85	93	89	70	61
SULFATES	a	33	33	36	36	42	45	58	44	38	37	32	33	38
SODIUM	a	34	33	33	34	36	44	51	52	60	64	63	51	46
SODIUM (%)	a	47	46	46	48	48	51	51	51	56	57	56	53	51
ELECT. COND. (micromhos)	a													
ELECT. COND. (micromhos)	b	340	338	332	332	351	404	462	472	501	515	516	461	420
PH	c	7.8	8.1		9.3	9.3	8.5		8.3	7.6	7.5	8.6	8.0	8.7
BORON	b	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2
FLUORIDE	b	0.0	0.4	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM	b	0.00	0.00	0.00	0.00	0.00			0.00				0.00	0.00
HEXAVALENT CHROMIUM	b d													
ARSENIC	b	0.00	0.00	0.00	0.00	0.00			0.00				0.00	0.00
IRON	b	0.01	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00		0.01	0.01
MANGANESE	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00		0.00	0.00
MAGNESIUM	b	9	8	8	5	9	10	12	12	12	13	14	12	10
COPPER	b	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00		0.00	0.00
CALCIUM	b	18	19	19	23	18	19	21	20	19	19	18	18	19
ZINC	b	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00		0.00	0.00
PHENOL	b d													
COLOR (units)	b	8	8	8	5	13	10	7	13	8	4		13	9
SAMPLING DATE		1/30	2/27	3/21	4/18	5/15	6/28	7/19	8/13	9/17	10/1	11/20	12/30	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.

b - Laboratory analysis of monthly samples.

c - Field analysis of monthly samples.

d - Sampling performed twice annually.

^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
SILVERWOOD LAKE AT INLET TO SAN BERNARDINO TUNNEL
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	177	179	187	204	203	247	246	280	273	313	263	250	235
TOTAL HARDNESS	a	78	80	78	82	82	88	102	100	97	104	105	94	91
CHLORIDES	a	38	41	36	38	42	54	72	72	83	94	97	73	62
SULFATES	a	29	29	33	35	40	45	48	45	38	36	30	34	37
SODIUM	a	32	31	32	32	36	44	51	52	58	63	66	54	46
SODIUM (%)	a	46	45	46	45	48	51	51	52	55	56	57	54	51
ELECT. COND. (micromhos)	a													
ELECT. COND. (micromhos)	b	315	317	319	326	348	407	466	467	498	530	530	480	417
PH	c	7.6	7.9			9.1	8.3		8.3	8.0	7.5	8.5	7.9	8.4
BORON	b	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2
FLUORIDE	b	0.0	0.4	0.2	0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM	b	0.00	0.00	0.00	0.00	0.00			0.00			0.00	0.00	0.00
HEXAVALENT CHROMIUM	b													
ARSENIC	d b	0.00	0.00	0.00	0.00	0.00			0.00			0.00	0.00	0.00
IRON	b	0.01	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
MANGANESE	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MAGNESIUM	b	8	8	8	6	9	10	12	12	18	13	14	12	11
COPPER	b	0.00	0.00	0.01	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.01
CALCIUM	b	18	19	18	23	18	19	21	20	19	20	19	18	19
ZINC	b	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PHENOL	b d													
COLOR (units)	b	8	8	8	5	13	10	8	13	8	4		13	9
SAMPLING DATE		1/30	2/27	3/21	4/18	5/15	6/28	7/19	8/13	9/17	10/01	11/20	12/20	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.

b - Laboratory analysis of monthly samples.

c - Field analysis of monthly samples.

d - Sampling performed twice annually.

^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
DEVIL CANYON AFTERBAY
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS	a	190	208	185	200	208	215	251	280	276	319	320	291	245
TOTAL HARDNESS	a	74	78	80	78	78	92	100	100	97	108	108	92	90
CHLORIDES	a	38	40	38	35	39	53	68	73	85	105	95	74	62
SULFATES	a	31	32	33	34	39	45	47	45	39	37	34	31	37
SODIUM	a	33	32	32	32	36	42	51	52	60	72	66	54	47
SODIUM (%)	a	48	46	46	46	50	49	52	52	56	58	56	55	51
ELECT. COND. (micromhos)	a													
ELECT. COND. (micromhos)	b	332	327	328	313	338	389	456	469	502	578	535	485	421
PH	c	7.7	7.2	8.5	9.0		8.2	8.7	8.0	8.1	8.1	8.4	7.8	8.4
BORON	b	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2
FLUORIDE	b	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1
LEAD	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
HEXAVALENT CHROMIUM	b													
ARSENIC	d b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRON	b	0.03	0.02	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01
MANGANESE	b	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
MAGNESIUM	b	7	8	8	8	8	11	12	12	12	14	14	11	10
COPPER	b	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
CALCIUM	b	18	18	19	18	18	19	20	20	19	20	20	19	19
ZINC	b	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00
PHENOL	b d b													
COLOR (units)	b	15	15	8	15	10	5	8	8	13	8	8	8	10
SAMPLING DATE		01/18	02/20	03/22	04/18	05/17	06/28	07/18	08/16	09/20	10/17	11/20	12/19	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.

b - Laboratory analysis of monthly samples.

c - Field analysis of monthly samples.

d - Sampling performed twice annually.

^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

WATER QUALITY
1979
LAKE PERRIS AT INLET
(milligrams per liter except where noted)

CONSTITUENTS ^{1/}	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
TOTAL DISSOLVED SOLIDS ^a		228	250	281	248	251	253	270	244	264	277	272	259
TOTAL HARDNESS ^a		102	101	104	102	102	102	98	90	90	91	87	96
CHLORIDES ^a		66	62	66	65	63	63	64	66	69	74	76	68
SULFATES ^a		40	41	41	39	41	43	40	41	41	42	42	41
SODIUM ^a		48	48	50	51	52	51	51	52	52	56	57	52
SODIUM (%) ^a		50	50	50	51	51	51	52	55	54	56	58	53
ELECT. COND. (micromhos) ^a													
ELECT. COND. (micromhos) ^b		452	454	452	452	460	460	460	444	446	462	449	462
PH ^c		8.7	8.8	9.1	8.7		8.7	7.8	7.5	7.3	8.4	7.6	8.5
BORON ^b		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
FLUORIDE ^b		0.5	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.2	0.2
LEAD ^b		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SELENIUM ^b		0.00	0.00	0.00	0.00			0.00			0.00	0.00	0.00
HEXAVALENT CHROMIUM ^b													
ARSENIC ^d													
ARSENIC ^b		0.00	0.00	0.00	0.00			0.00			0.00	0.00	0.00
IRON ^b		0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
MANGANESE ^b		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
MAGNESIUM ^b		11	13	12	11	11	11	11	12	12	13	12	12
COPPER ^b		0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CALCIUM ^b		23	19	22	23	23	23	21	16	16	15	15	19
ZINC ^b		0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PHENOL ^b													
PHENOL ^d													
PHENOL ^b													
COLOR (units) ^b		8	8	7	8	8	8	8	8	3		8	7
SAMPLING DATE		02/27	03/20	04/17	05/14	06/27	07/18	08/14	09/18	10/02	11/21	12/21	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

^{1/} Zeros indicate a measurement, blank spaces indicate no measurement

