

DELTA WATER QUALITY CONDITIONS



DELTA WATER QUALITY CONDITIONS

COMPLIANCE WITH

WATER QUALITY STANDARDS CONTAINED IN DECISION 1485

DURING CALENDAR YEAR 1982

APRIL 1983

BAY-DELTA PROGRAM

STATE WATER RESOURCES CONTROL BOARD

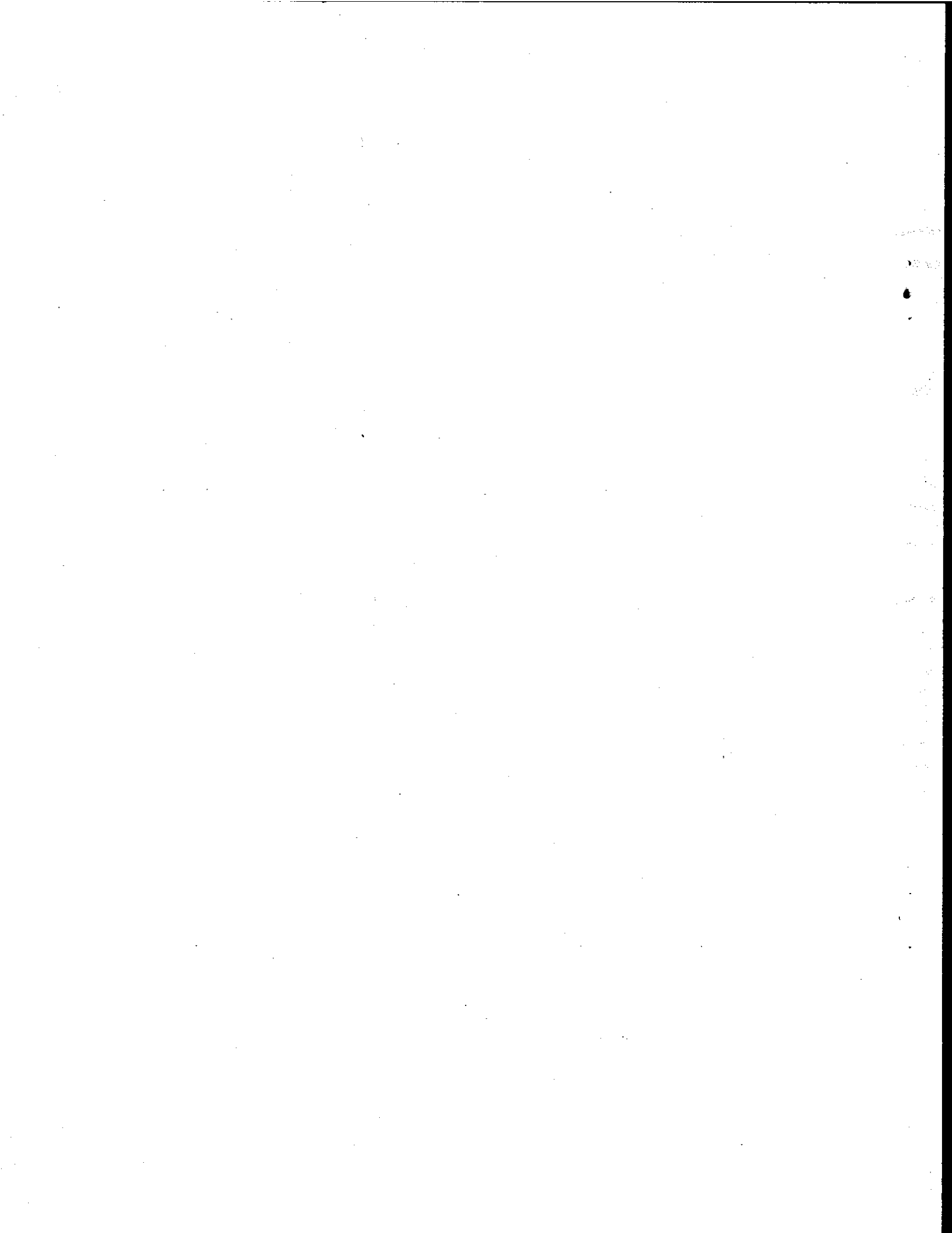


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I. INTRODUCTION

In adopting Decision 1485, the State Water Resources Control Board (State Board) set specific Delta water quality standards as conditions in the water right permits of the Federal Central Valley Project (CVP) and State Water Project (SWP). Decision 1485 also requires the United States Bureau of Reclamation (Bureau) and the Department of Water Resources (Department) to conduct a detailed water quality monitoring program. Reports of Delta water quality data are submitted regularly to the State Board. These reports are reviewed by the State Board to determine the status of compliance^{1/} with the Delta standards and to begin appropriate action in the event actual or potential noncompliance with the standards is observed.

The reports also provide information on Delta water quality conditions. This document is intended to provide the public with a summary of the Delta water quality conditions and the status of compliance with the Decision 1485 Delta standards during 1982.

This report is prepared annually. Comments on its content should be sent to: State Water Resources Control Board, Bay-Delta Program, P.O. Box 100, Sacramento, CA 95801. Persons interested in being included on a mailing list to receive the report should contact the Bay-Delta Program at the above address.

^{1/} Compliance with the Decision 1485 Standards is determined by comparing actual flow and salinity measurements, and CVP/SWP operations against the standards for these parameters contained in Decision 1485.

II. YEAR CLASSIFICATION

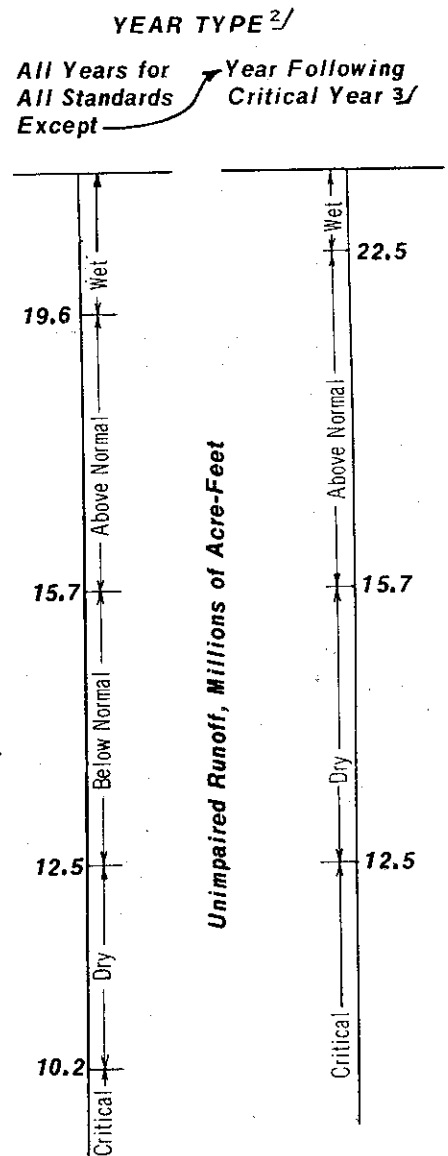
Decision 1485 established a year classification system which is used in the setting of standards. Year types are classified according to forecasts of Sacramento Valley unimpaired runoff. As described in Table 1 (p. 3), the projected annual runoff figures are based on actual runoff to date, plus forecasts of future runoff assuming normal precipitation for the remainder of the water year. Preliminary determinations of water year type are usually made during February, March, and April. The final determination is made in May. These determinations are published each month in the Department's Bulletin 120 series.

During 1982, the classification system was applied on a month-by-month basis

Table 1
YEAR CLASSIFICATION

Year classification shall be determined by the forecast of Sacramento Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year) as published in California Department of Water Resources Bulletin 120 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. Preliminary determinations of year classification shall be made in February, March and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.

YEAR TYPE	RUNOFF, MILLIONS OF ACRE-FEET
Wet ^{1/}	equal to or greater than 19.6 (except equal to or greater than 22.5 in a year following a critical year). ^{3/}
Above Normal ^{1/}	greater than 15.7 and less than 19.6 (except greater than 15.7 and less than 22.5 in a year following a critical year). ^{3/}
Below Normal ^{1/}	equal to or less than 15.7 and greater than 12.5 (except in a year following a critical year). ^{3/}
Dry	equal to or less than 12.5 and greater than 10.2 (except equal to or less than 15.7 and greater than 12.5 in a year following a critical year). ^{3/}
Critical	equal to or less than 10.2 (except equal to or less than 12.5 in a year following a critical year). ^{3/}



^{1/} Any otherwise wet, above normal, or below normal year may be designated a subnormal snowmelt year whenever the forecast of April through July unimpaired runoff reported in the May issue of Bulletin 120 is less than 5.9 million acre-feet.

^{2/} The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available.

^{3/} "Year following critical year" classification does not apply to Agricultural, Municipal and Industrial standards.

III. SUMMARY OF DELTA WATER QUALITY CONDITIONS

During 1982 the combination of heavy precipitation and reduced reservoir capacity caused unusually high Delta outflows to occur virtually throughout the year. The Central Valley experienced precipitation levels averaging approximately 150 percent of normal in water year 81-82. A series of heavy storms occurred from January through April and from October through December leading to periods of high storm runoff. Snowmelt from the abundant Sierra snowpack resulted in heavy spring flows that continued into early summer. As a result, most of the major reservoirs remained encroached into their flood control space until early summer.

In addition, completion of repair work on the San Luis Dam from January through mid October, required that San Luis Reservoir be held at about 50 percent normal capacity. This caused normal CVP and SWP export operations to be curtailed throughout most of the year. Also, in response to a State Board request, the Projects agreed to maintain Delta outflows above an average of 10,000 cubic feet per second during August to help revitalize the ailing Delta striped bass fishery.

The unusually high Delta outflows resulted in excellent water quality conditions throughout 1982. Table 3 on Page 5 shows that all of the applicable water quality standards were easily met by the CVP and SWP during 1982. In fact the Delta was not under balanced conditions during all of 1982. Balanced conditions occur when Delta inflows are equal to flows needed to satisfy Delta consumptive uses, Delta water quality needs, and export demands. Under balanced conditions the project operators have control of Delta outflow. During 1982, the CVP and SWP never controlled Delta outflow.

Conditions at specific locations with applicable Decision 1485 standards are summarized below. Plate 1 shows these locations.

Table 3

Sheet 1 of 2

REPORT ON STATUS OF COMPLIANCE WITH STANDARDS IMPOSED BY DECISION 1485
CALENDAR YEAR 1982

Date: March 1, 1983
Prepared by: Nasser Shahbazi

BENEFICIAL USE PROTECTED AND LOCATION MUNICIPAL AND INDUSTRIAL	STANDARD (YEAR, TYPE, UNIT) PARAMETER	PERIOD	VALUE	SHORT AND LONG TERM SAMPLE VALUES			COMPLI- ANCE?		
				PERIOD	VALUE	TREND/PERIOD			
Contra Costa Canal Intake (Rock Sl.)	Max. Mean Daily Cl ⁻ (Mg/l)	1/1 - 12/31	250	12/1-12/31	87	↑	1/1-12/31	182	Yes
City of Vallejo Intake (Cache Sl.)	"	1/1 - 12/31	250	12/1-12/31	147	↑	1/1-12/31	147	Yes
Clifton Court Forebay Intake (W. Canal)	"	1/1 - 12/31	250	12/1-12/31	19	↑	1/1-12/31	83	Yes
Delta-Mendota Canal (Tracy Pump, Plt.)	"	1/1 - 12/31	250	12/1-12/31	51	↑	1/1-12/31	135	Yes
Antioch Water Works Intake (S.J. Riv.) or Contra Costa Canal Intake	# Days/Cal. Yr. Max. Mean Daily Cl ⁻ ≤ 150 mg/l	EA. YR.	240/365 (66%)	3/1/31				365/365	Yes
AGRICULTURE									
Emmerton (Sacramento River)	Max. 14-Day Running Avg. of Mean Daily EC (mmhos)	4/1 - 8/15	0.45	-	-	-	4/1-08/15	0.24	Yes
Jersey Point (Sacto. River)	"	4/1 - 8/15	0.45	-	-	-	4/1-08/15	0.23	Yes
Terminous (McKelumne River)	"	4/1 - 8/15	0.45	-	-	-	4/1-08/15	0.17	Yes
San Andreas Landing (S.J. River)	"	4/1 - 8/15	0.45	-	-	-	4/1-08/15	0.17	Yes
FISH AND WILDLIFE									
Prisoners Points (S.J. River)	Max. Avg. of Mean Daily EC for Period	4/1 - 5/5	0.550	-	-	-	4/1-05/05	0.19	Yes
Antioch Water Works Intake (S.J. Riv.)	"	4/15 - 5/5	1.52	-	-	-	4/15-05/05	0.16	Yes
Chippis Island (Sacto. River)	Min. Avg. Daily Delta Out- flow index (cfs) for Period	1/1 - 4/14	6700	-	-	-	4/1-4/14	89,411	Yes
		5/6 - 5/31	14000	-	-	-	5/6-5/31	50,136	Yes
		June	14000	-	-	-	June	27,148	Yes
		July	10000	-	-	-	July	15,861	Yes
		January	2500	-	-	-	January	52,494	Yes
		2/1 - 3/15	3000	-	-	-	2/1-3/15	49,589	Yes
		3/16 - 6/30	5000	-	-	-	3/16-6/30	53,003	Yes
		July	5000	-	-	-	July	8,811	Yes
		August	1000	-	-	-	August	8,499	Yes
		9/1 - 12/31	5000	12/1-12/31	23,578	↑	9/1-12/31	23,578	Yes
Chippis Island (O&A Ferry Landing)	Max. 28-day running avg. of Mean Daily EC (mmhos)	Jan. - May	12.5	-	-	-	Jan.-May	0.14	Yes
Chippis Island (Sacto. River)	Min. Monthly avg. of Daily Delta outflow index (cfs)	Oct. - Dec.	12.5	DEC.	0.20	↑	Oct.-Dec	0.34	Yes
State Water Project	Max. Mean monthly diver- sions (cfs)	Jan. - May	6000	-	-	-	Jan.-May	90,139	Yes
		May - June	3000	-	-	-	May-June	2,880	Yes
		July	4600	-	-	-	July	990	Yes
Central Valley Project	# Days closed when daily Outflow Index > 12000 cfs	May - June	3000	-	-	-	May-June	2,984	Yes
Delta Cross Channel Gates		1/1 - 4/15	All	-	-	-	1/1-4/15	106,706	Yes
		4/16-5/31	PER DFG REQUEST	-	-	-	4/16-5/31	0/0	Yes

NOTE: Footnotes on opposite side

values obtained for previous short term period.

By 4/1-5/5 relaxed standard (see Decision 1485)

or the projects impose deficiencies

range at or above minimum level in the flood control
project, CVP storage on American River
than two out of four consecutive days.

Municipal and Industrial Supply

Table 3 (p. 5) shows the applicable chloride standards and locations for protection of municipal and industrial supplies. The 250 mg/l year-round chloride standard is based upon public health considerations, and the 150 mg/l chloride standard provides added protection for salt-sensitive industries in the Antioch area. Mean daily chlorides remained well below the 250 mg/l level throughout 1982 at all locations where the year-round 250 mg/l chloride standard applies. Figures 1, 2 and 3 show graphically mean daily chloride values^{1/} obtained at representative Delta locations during 1982. (Plate I shows these locations).

At the Contra Costa Canal Intake near Rock Slough (Figure 1) mean daily chlorides remained well below the 250 mg/l standard for the entire year. The highest chloride levels occurred during late January and late April. Chlorides were under 100 mg/l throughout the year except for these brief periods.

At the Antioch Water Works Intake (Figure 2) mean daily chlorides remained well below the 150 mg/l standard for all but 3 days in August. For this short period of time alternate supplies were available from the Contra Costa Canal. Contra Costa Canal Intake water quality was well below the 150 mg/l standard during this period. Therefore, total protection at or below the 150 mg/l chloride level for Antioch area industrial users was provided for the entire year. The Decision 1485 wet year standard requires that water of this quality be provided for a minimum of 240 days at either of the intakes (Antioch Water Work Intake or Contra Costa Canal Intake).

At the Delta-Mendota Canal (Figure 3), mean daily chlorides remained well below the standard of 250 mg/l throughout the year. Levels remained below 135 mg/l during January, and below 75 mg/l for the rest of the year.

^{1/} The mean daily chloride values have been converted from mean daily electrical conductivity measurements.

CONTRA COSTA CANAL INTAKE MEAN DAILY CHLORIDES (MG/L)

STANDARD: MAXIMUM OF 250 MG/L ALL YEAR AND
MAXIMUM OF 150 MG/L FOR AT LEAST 240
DAYS OF THE YEAR EITHER HERE OR AT ANTIQCH

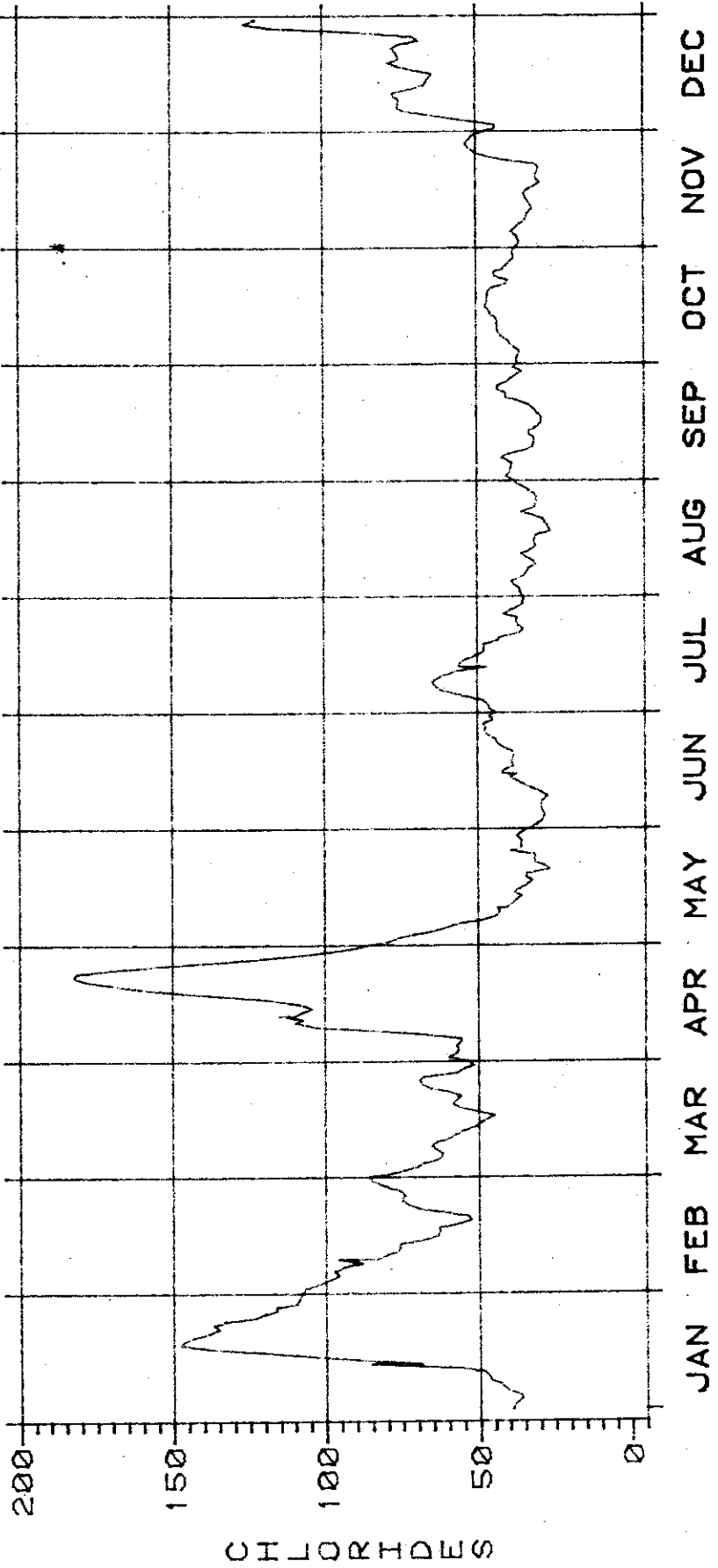


FIGURE 1

1982

SAN JOAQUIN RIVER AT ANTIOCH WATER WORKS INTAKE MEAN DAILY CHLORIDES (MG/L)

STANDARD: MAXIMUM OF 150 MG/L FOR 240 DAYS
AT ANTIOCH OR CONTRA COSTA CANAL

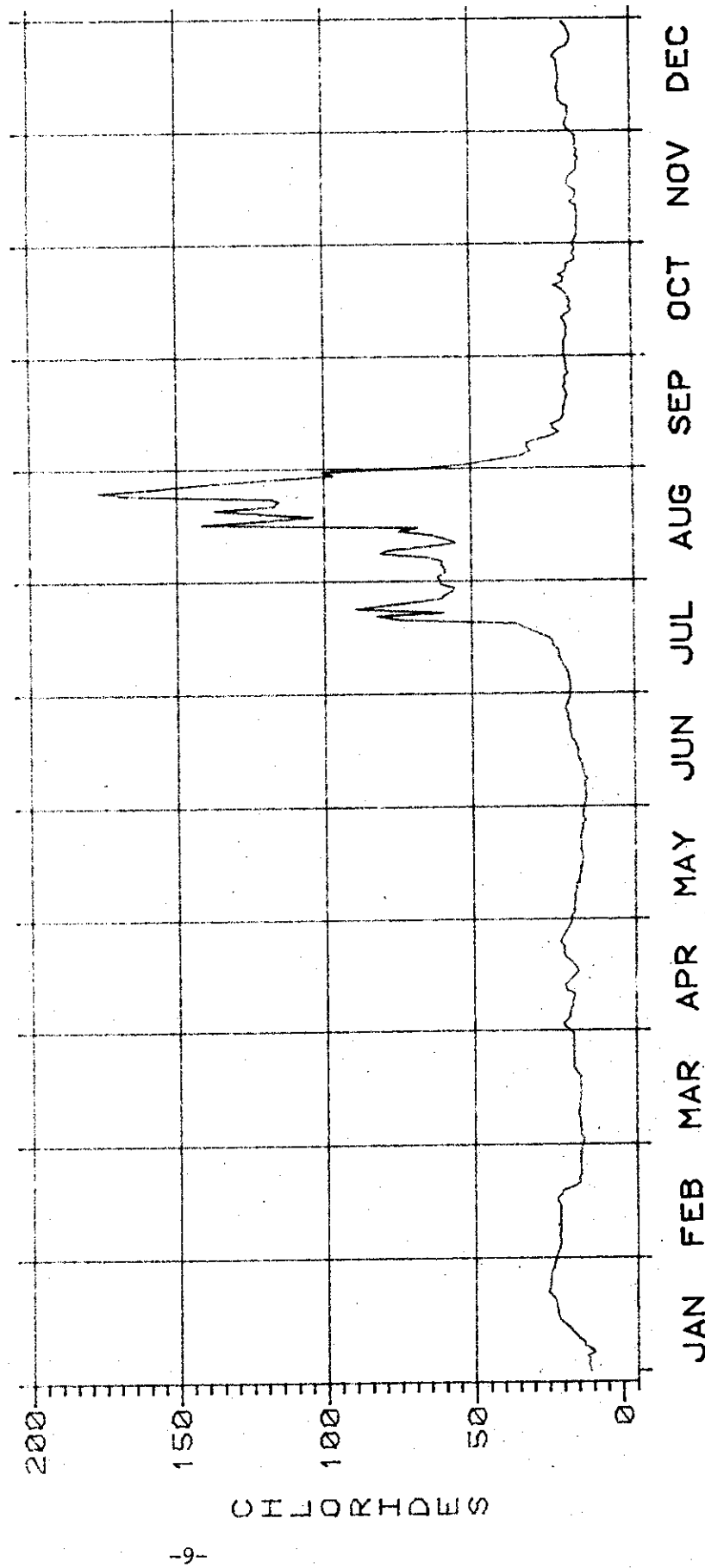


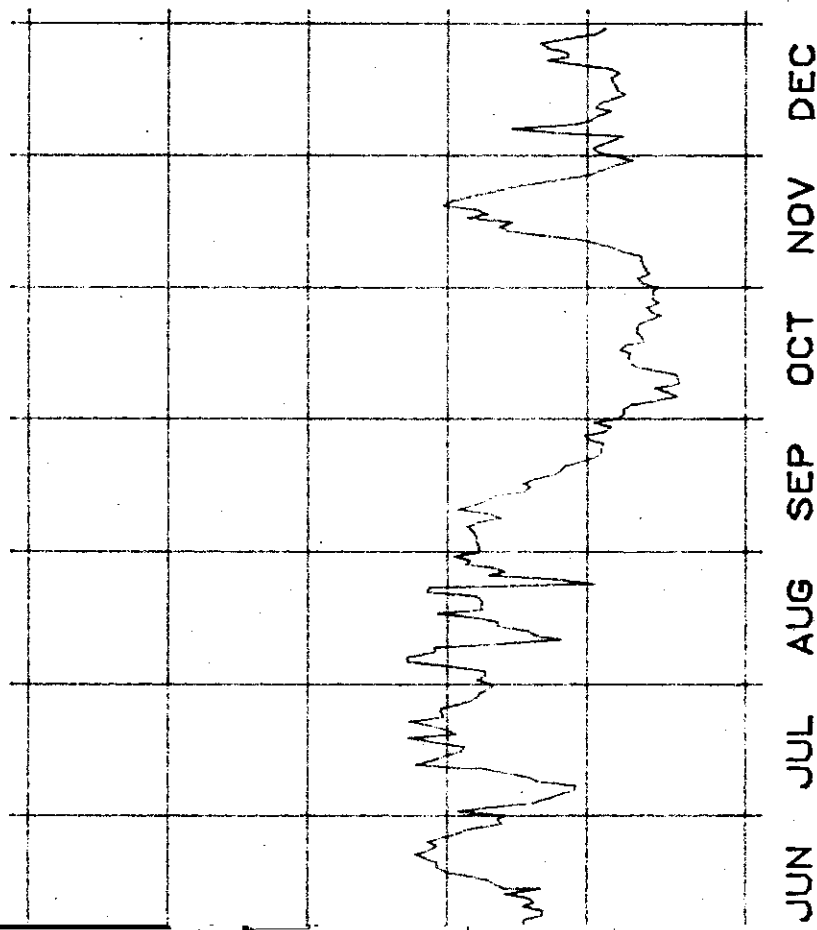
FIGURE 2

1982

FIGURE 3

*NDO TA CANAL
HLORIDES (MG/L)*

M OF 250 MG/L ALL YEAR



1982

Agricultural Supply

Table 3 (p. 5) shows the electrical conductivity (EC) standards set to protect Delta agriculture during the irrigation season (from April 1 through August 15). The 450 micromhos (0.45 millimhos) EC standard (for a maximum 14-day running average) was based upon estimated salinity of applied water required to provide 100% crop yield for corn in Delta sub-irrigated organic soils. In dry years the standards allow for increases from the 450 micromhos level during the latter part of the irrigation season to reflect water quality which would have occurred in the absence of the Central Valley Project and State Water Project. However, in wet years the 450 micromhos standard throughout the irrigation season reflects these "without project conditions".

Figures 4 and 5 show the mean daily electrical conductivity values at the two western Delta locations (San Joaquin River at Jersey Point and Sacramento River at Emmaton) where agriculture is most susceptible to salinity increases due to seawater intrusion (see p. 26 for the plate showing these locations) Figures 6 and 7 represent the 14-day running average values for these two locations. Figures 6 and 7 show that standards at these locations were easily met during 1982.

The existing standard for protection of southern Delta agriculture is in Decision 1422 as a condition of the Bureau's water right permit for operation of New Melones Reservoir. This standard specifies a maximum mean monthly Total Dissolved Solids (TDS) value of 500 mg/l at Vernalis on the San Joaquin River. Figure 8 shows that mean monthly TDS remained well below the standard of 500 mg/l during 1982.

**SAN JOAQUIN RIVER AT JERSEY POINT
MEAN DAILY ELECTRICAL CONDUCTIVITY (MICROMHOS)**

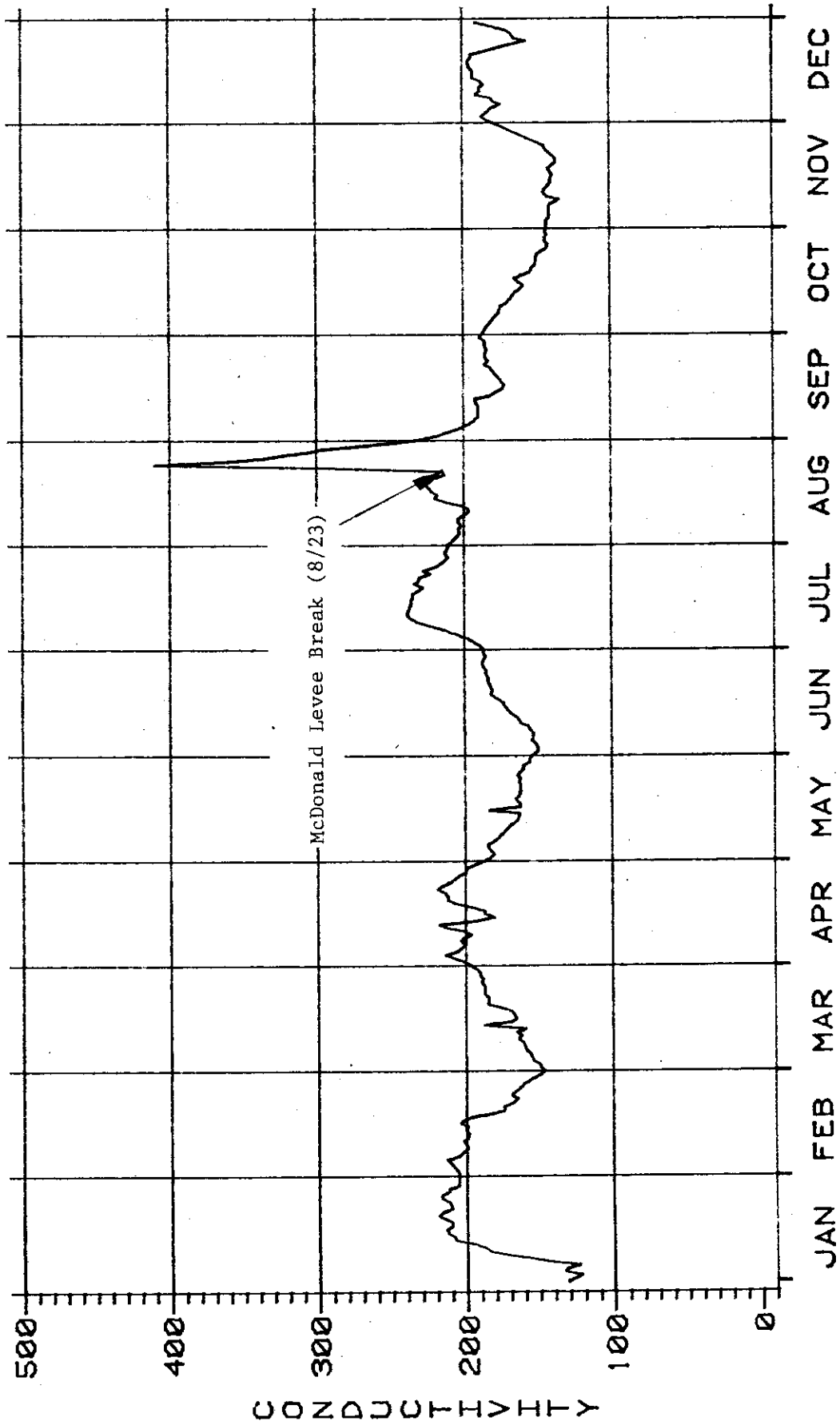


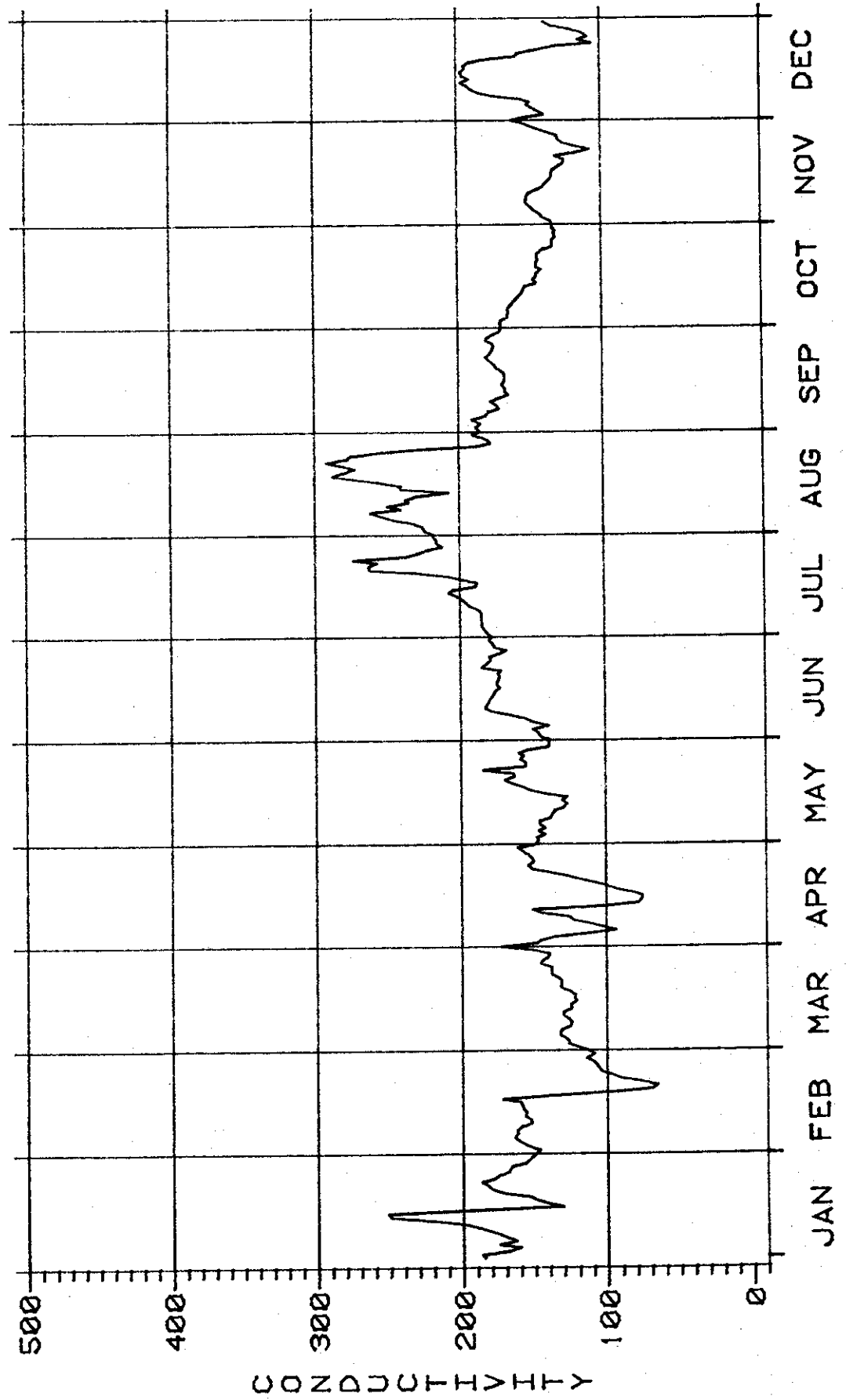
FIGURE 4

1982

CONDUCTIVITY

FIGURE 5

SACRAMENTO RIVER AT EMMATON
MEAN DAILY ELECTRICAL CONDUCTIVITY (MICROMHOS)



1982

*TWIN RIVER AT JERSEY POINT
DAY RUNNING AVERAGE OF
AN DAILY EC (MICROMHOS)*

1UM OF 450 MICROMHOS FROM APRIL 1 TO AUGUST 15

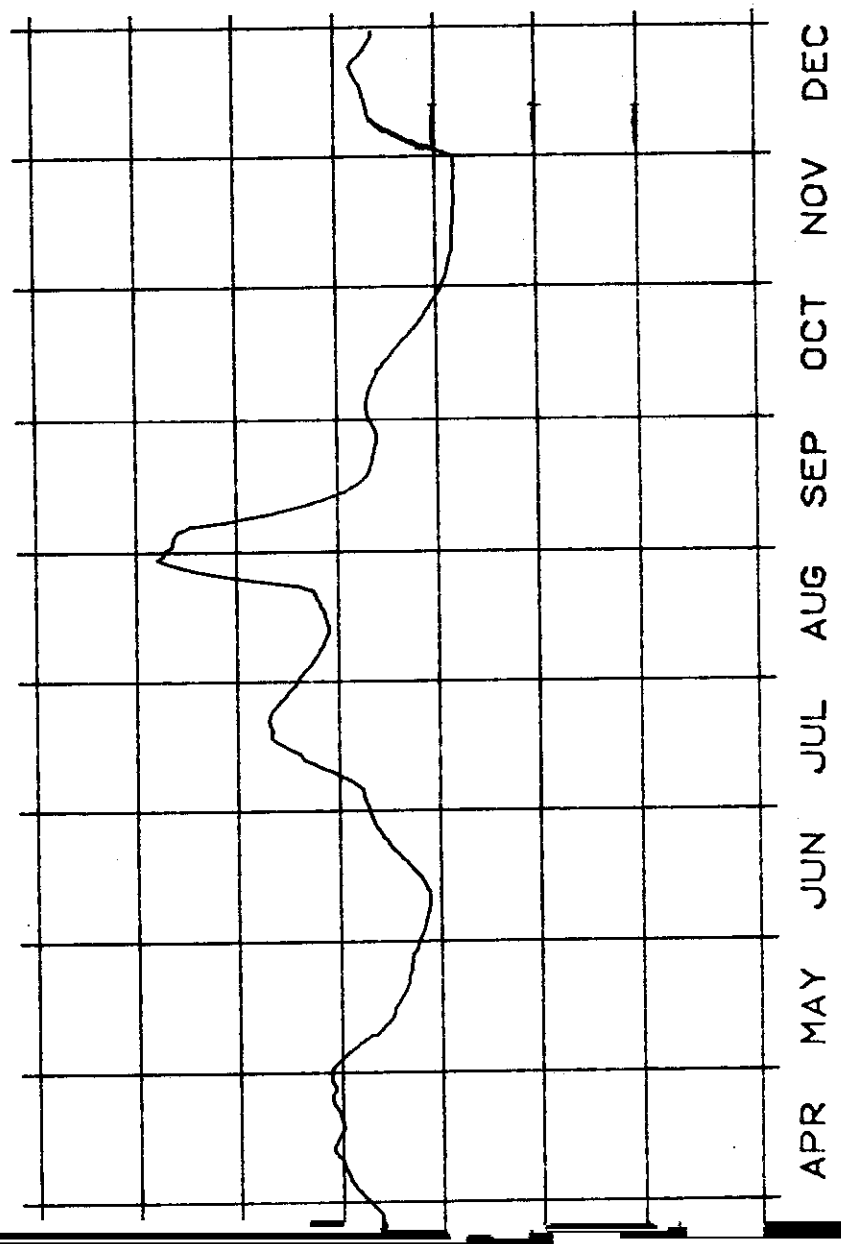
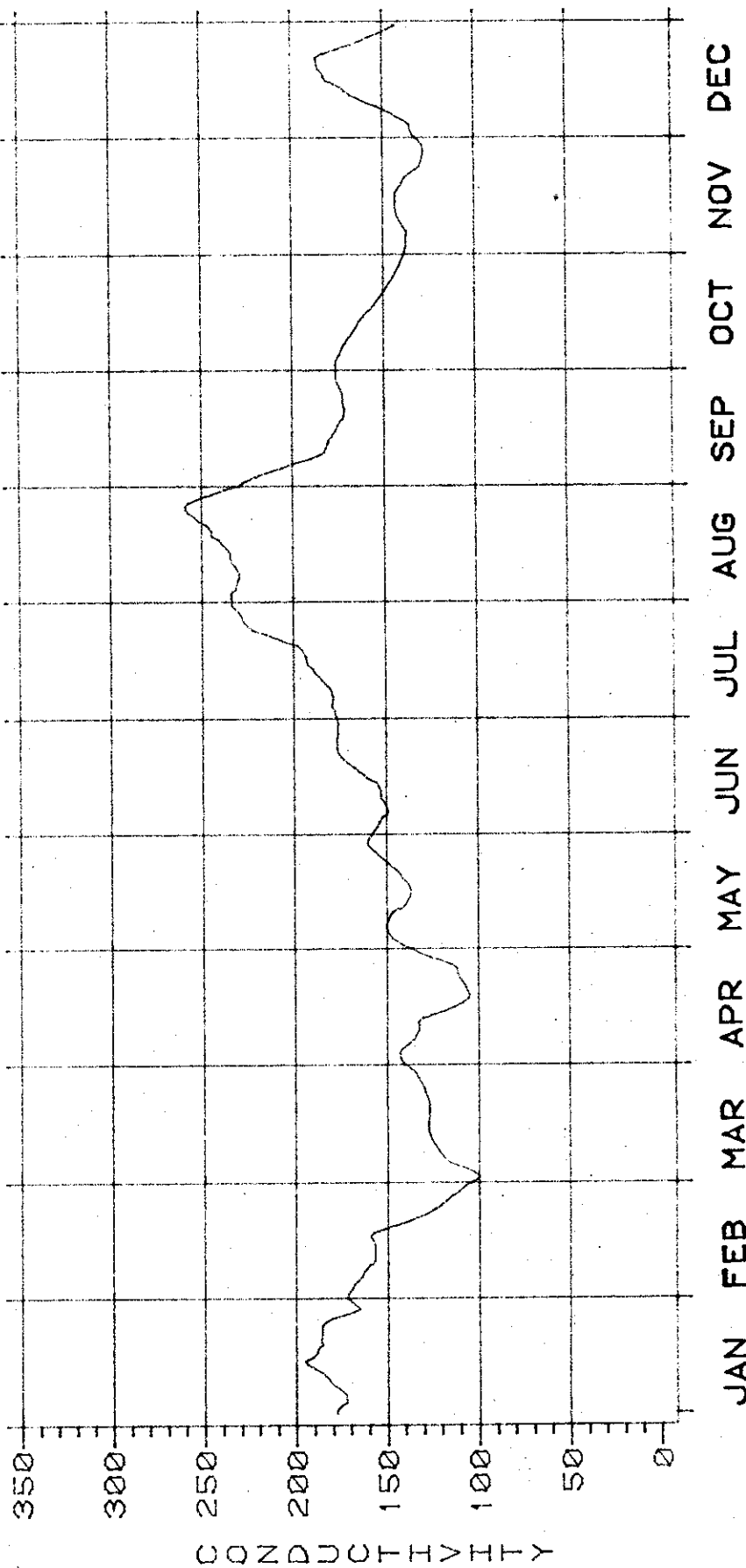


FIGURE 6

1982

SACRAMENTO RIVER AT EMMATON
14 DAY RUNNING AVERAGE OF
MEAN DAILY EC (MICROMHOS)

STANDARD: MAXIMUM OF 450 MICROMHOS FROM APRIL 1 TO AUGUST 15

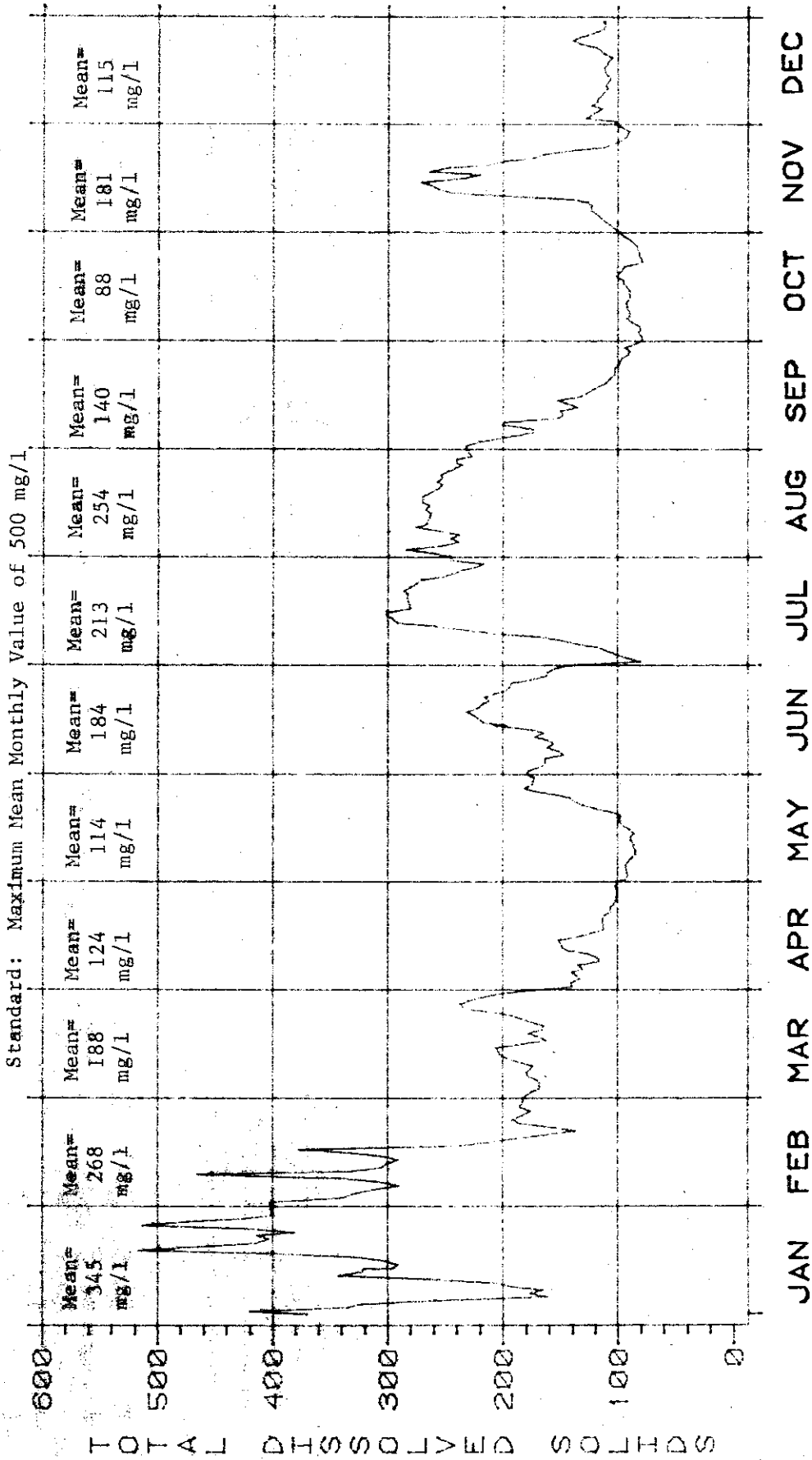


1982

FIGURE 7

FIGURE 8

SAN JOAQUIN RIVER AT VERNALIS MEAN DAILY TOTAL DISSOLVED SOLIDS (MG/L)



Fish and Wildlife Conditions

The Decision 1485 wet year standards for protection of fish and wildlife are listed in Table 3 (p. 5). These flow and salinity standards were designed primarily to protect spawning and survival of striped bass, migration of salmon, and the Suisun Marsh wildlife habitat. The standards were easily met during 1982. In spite of this compliance the decline observed in young striped bass abundance in the estuary since 1977 continued during 1982. In January 1982, the State Board appointed a Work Group of state, federal and private fishery experts to investigate possible causes for this decline and to recommend corrective actions. In November 1982 the Striped Bass Work Group issued its findings in a 58 page report entitled: "The Striped Bass Decline in the San Francisco Bay-Delta Estuary - An Analysis by the Striped Bass Working Group". (A copy of this report may be obtained by contacting the Board's Bay-Delta Program at the address given on Page 1.)

The final report concluded that one or more of the following four factors could be causing the decline:

- o A reduction in the plankton food supply for young bass;
- o Entrainment losses of young fish at the PG&E, SWP/CVP, and Delta agricultural diversions;
- o Additional stress due to toxic substances;
- o Insufficient egg production due to low adult population.

The Work Group's final report also recommended that action be taken immediately to reduce the impact of each of the four factors on the striped bass fishery before the fishery is lost.

The means by which the State Board and Regional Boards would carry out the Work Group's recommendations related to their authorities would be through appropriate changes in Water Right Decision 1485 and the Delta Water Quality Control Plan standards and more stringent waste discharge controls. The State Board is currently planning specific short-term studies to determine if such changes are needed to help restore the fishery.

Specific examples of water quality conditions at key locations important to fish and wildlife are provided in the following paragraphs.

Figure 9 shows graphically the daily Delta Outflow Index at Chipps Island in the Sacramento River during 1982. The Delta Outflow Index is equal to: (1) Delta inflow from the major tributaries, minus (2) net Delta consumptive use, minus (3) SWP and CVP export pumping. This calculation of the Delta Outflow Index does not include flows to the Delta from the Yolo bypass nor the flows from eastside streams tributary to the Delta. During high runoff periods, these flows can be substantial. However they are not significant when flows approach those required in Decision 1485. The mean monthly Delta Outflow Index values for February through May were well above the minimum wet year standard of 10,000 cubic feet per second, which is required to provide salinity protection for Suisun Marsh. The resultant salinities at Chipps Island^{1/} (See Figure 10) remained well below the Marsh standard of 12,500 micromhos (12.5 millimhos) for a 28-day running average during January through May.

^{1/} The Department's electrical conductivity recorder at Chipps Island was destroyed in January 1980 high flood flows. A recorder installed across the channel at Mallard Island began operating in June 1980 and a correlation was used to estimate salinity at Chipps Island during 1982. The State Board has not taken action on whether the Mallard Island correlation is an acceptable substitute for Chipps Island data.

SACRAMENTO RIVER AT CHIPPS ISLAND DAILY DELTA OUTFLOW INDEX (CFS)

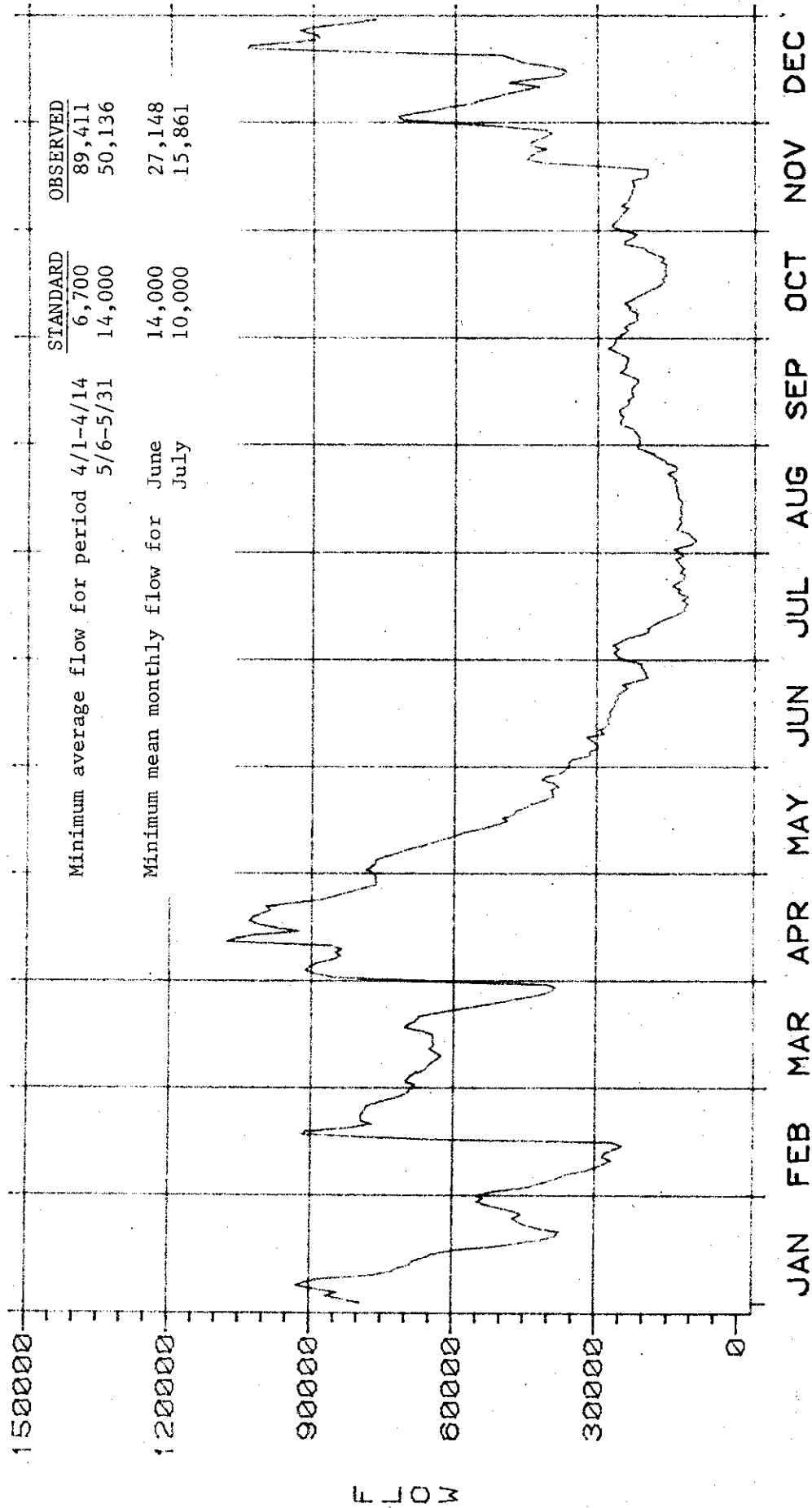


FIGURE 9

1982

The calculation of the Delta Outflow Index does not include flows to the Delta from the Yolo bypass nor the flows from eastside streams tributary to the Delta.

SACRAMENTO RIVER AT CHIPPS ISLAND
28 DAY RUNNING AVERAGE OF
MEAN DAILY EC (MICROMHOS)

STANDARD: MAXIMUM OF 12500 MICROMHOS
FROM JANUARY THROUGH MAY AND OCTOBER THROUGH DECEMBER

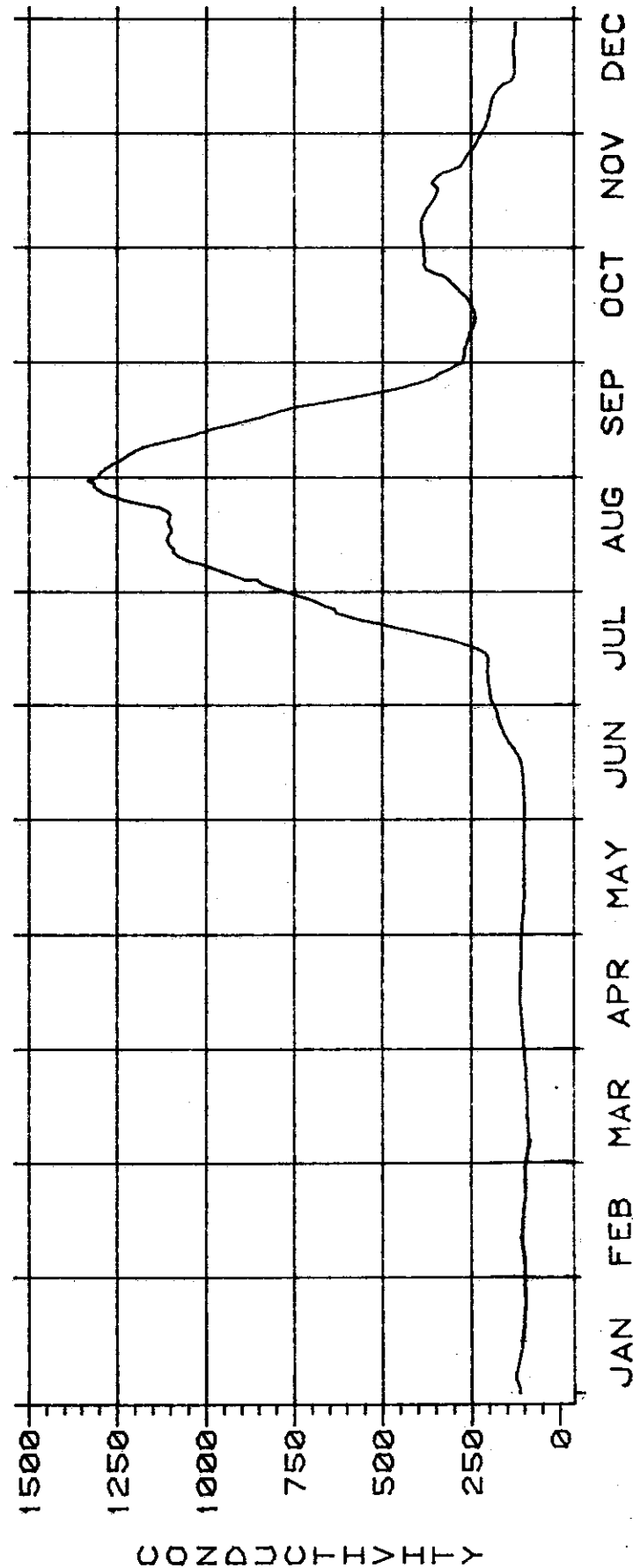


FIGURE 10

1982

Since project water users did not take deficiencies in scheduled water supplies in 1982, the October through December marsh salinity standard of 12,500 micromhos (for a 28-day running average) was also in effect. Figure 10 also shows that this standard was easily met.

Figure 9 also shows that other minimum Delta outflows required from April 1 through April 14 and from May 6 through July 31 (for protection of striped bass spawning and survival) were easily met. In addition, the Projects' compliance with the Board's request to provide consistent Delta outflows above 10,000 cubic feet per second through August to help restore the striped bass fishery can be seen.

Figure 11 shows that during the normal striped bass spawning period of April 15 through May 5 average salinities in the San Joaquin River at Antioch were well below the standard of 1500 micromhos. Due to high spring runoff, reduced Sacramento River water temperatures delayed the normal striped bass spawning period until late June. However, Figures 9 and 11 show that flow and salinity conditions remained adequate.

During the period of May through June, the Delta standards require that Central Valley Project exports into the Delta-Mendota Canal and State Water Project exports into the California Aqueduct each be limited to mean monthly values of no greater than 3,000 cubic feet per second. During July, the mean monthly export limit is 4,600 cubic feet per second. The purpose of this standard is to reduce the physical effects of the export pumping on the Delta fishery. Figure 12 shows that during May and June, Central Valley

SAN JOAQUIN RIVER AT ANTIOCH MEAN DAILY ELECTRICAL CONDUCTIVITY (MICROMHOS)

STANDARD: MAXIMUM AVERAGE FOR PERIOD APRIL 1
THROUGH MAY 5 OF 1500 MICROMHOS

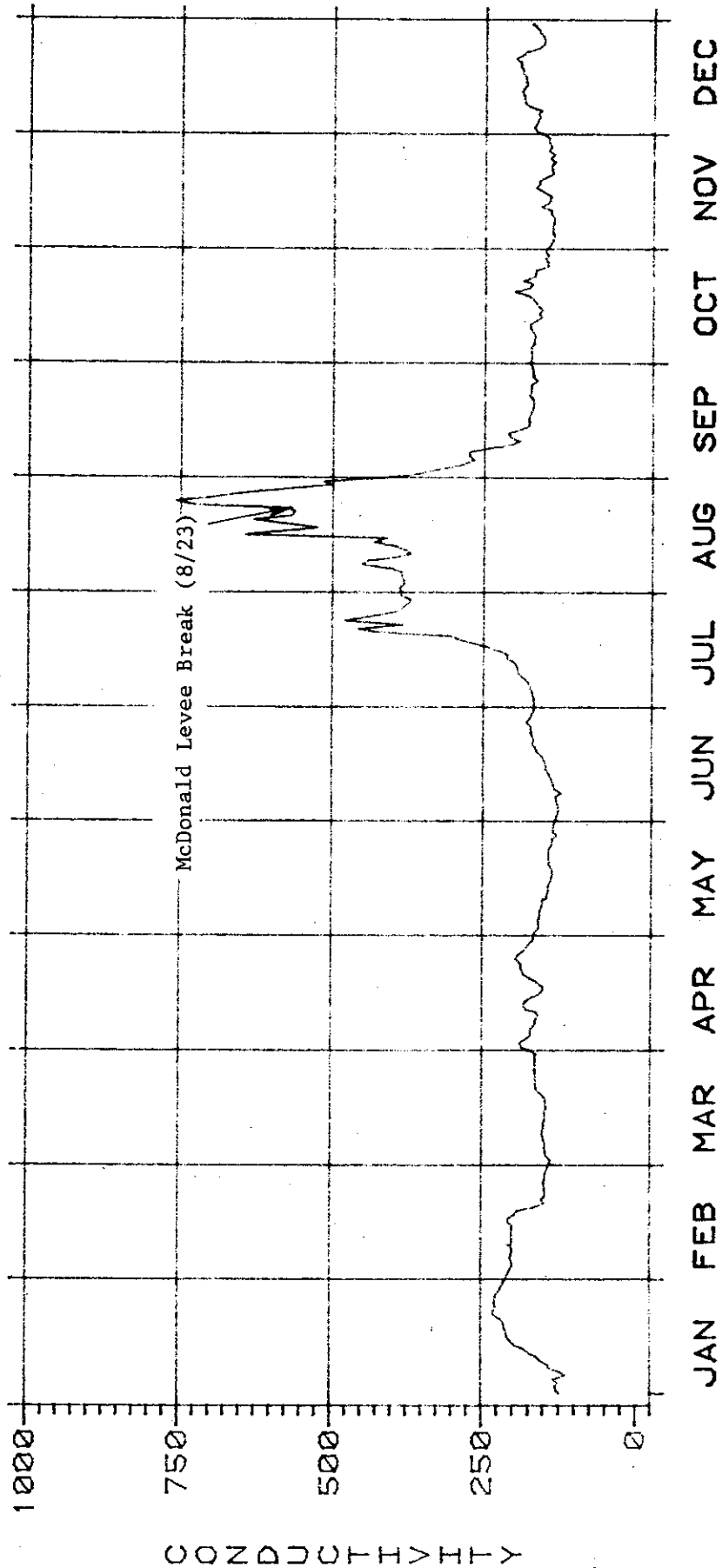


FIGURE 11

1982

CONDUCTIVITY

Project exports were held below the standard. Figure 13 shows that State Water Project exports met the May through July standards. State Water Project exports were reduced far below the standard in June and July because of repair work on San Luis Reservoir.

Table 3 (p. 5) shows that standards for minimum flows in the Sacramento River at Rio Vista to provide for salmon migration were met easily in 1982 primarily due to uncontrolled winter and spring flows and water quality requirements for other standards in Decision 1485. The standards for closure of the Delta cross channel gates (operated by the Bureau) to minimize cross-Delta movement of salmon between January 1 and April 15 were also met. In addition, because of the delayed striped bass spawning period, the Department of Fish and Game requested additional closure of the gates during the weekdays of June 14-25. The Bureau cooperated by complying with this request.

MEAN DAILY CVP EXPORT (CFS) INTO DELTA-MENDOTA CANAL

STANDARD: MAXIMUM MEAN MONTHLY VALUE OF 3000 CFS
FOR MAY AND JUNE

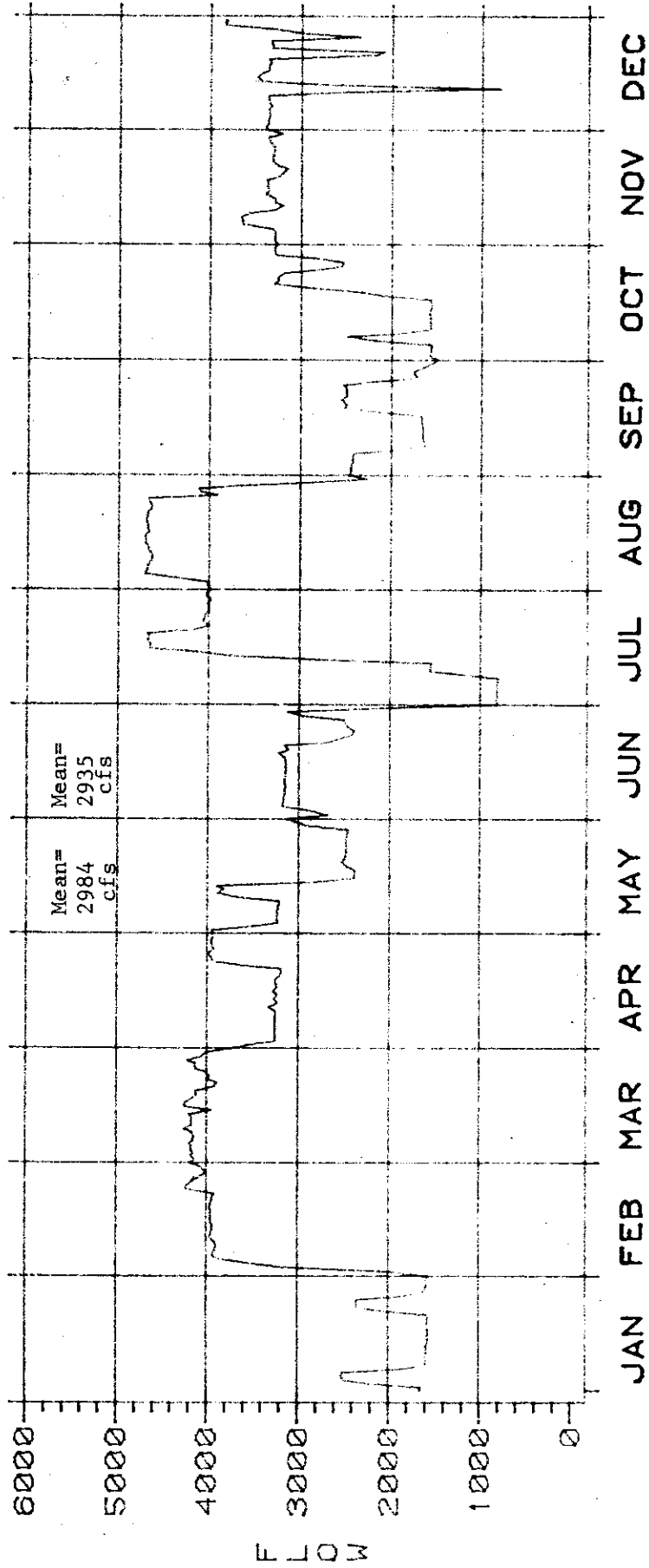


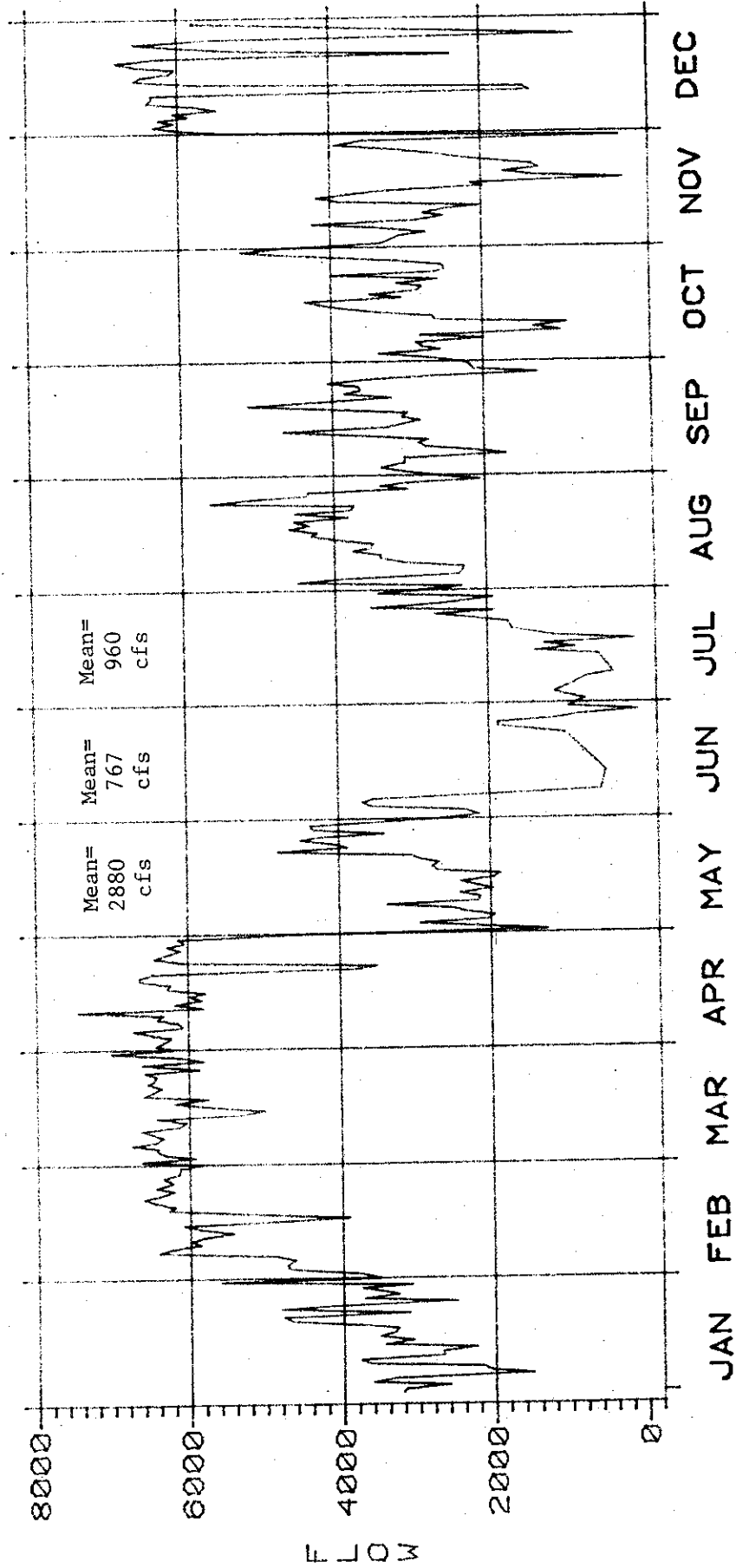
FIGURE 12

1982

FIGURE 13

MEAN DAILY SWP EXPORT (CFS) INTO CALIFORNIA AQUEDUCT

STANDARD: MAXIMUM MEAN MONTHLY VALUE OF 3000 CFS
FOR MAY AND JUNE AND 4600 CFS FOR JULY



1982

LEGEND

● WATER QUALITY CONTROL LOCATIONS

