22-107

IMPERIAL IRRIGATION DISTRICT
El Centro, California

United States District Court
Southern District of Southern California
Case No. 82-1790

USA obo Torres Martinez Band of Mission Indians
Plaintiffs,

V.

Imperial Irrigation District; et al.,
Defendants

SUMMARY DATA ON WATER OPERATIONS AFFECTING SALTON SEA

BOOKMAN-EDMONSTON ENGINEERING, INC.

Glendale, California

JUNE 1992

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JUNE 1992

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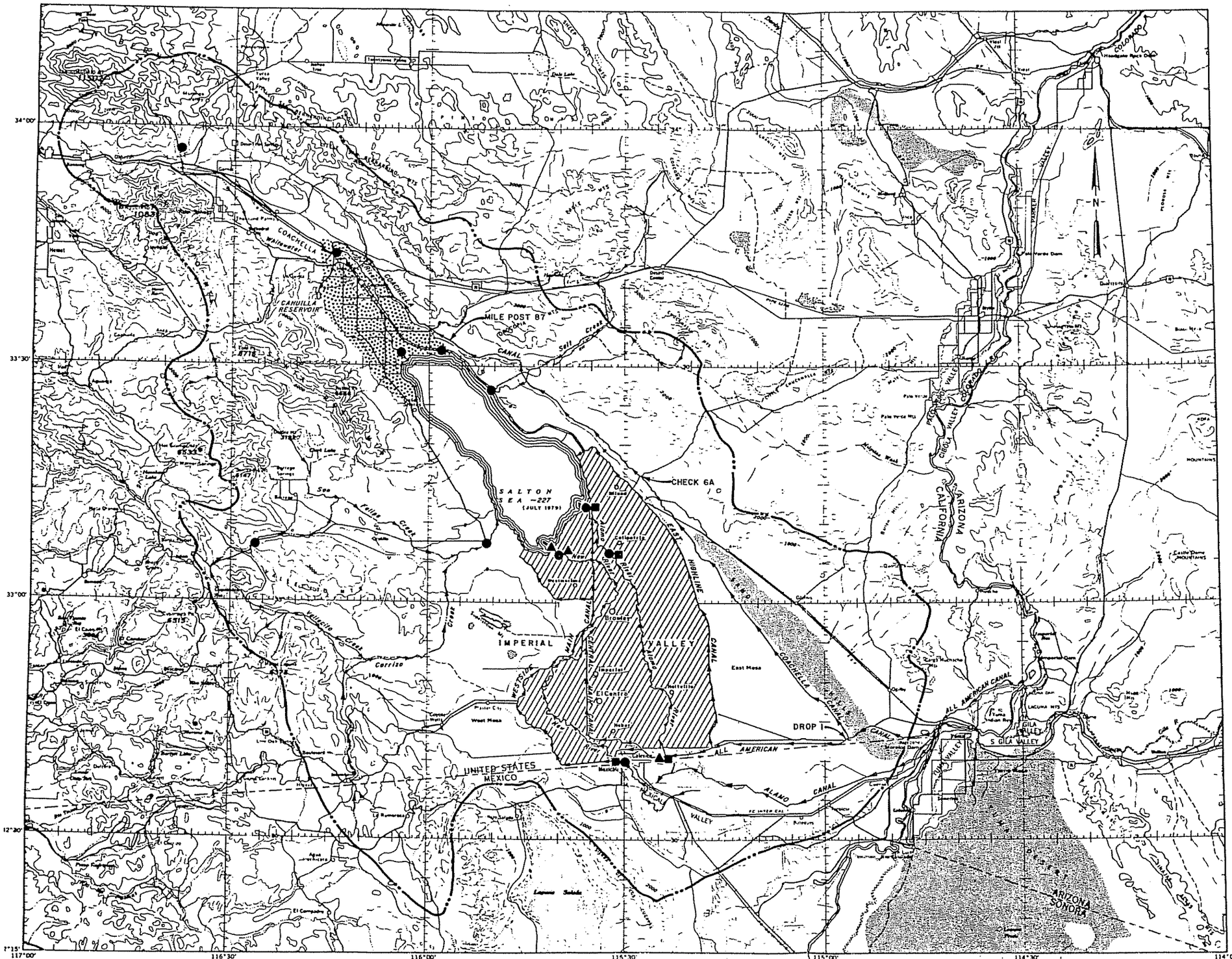


LEGEND

- HYDROLOGIC BOUNDARY.
- INDICATES DIRECTION OF FLOW.
- APPROXIMATE EXTENT OF IRRIGATED AREA WITHIN IMPERIAL IRRIGATION DISTRICT.
- APPROXIMATE EXTENT OF IRRIGATED AREA WITHIN COACHELLA VALLEY WATER DISTRICT.
- ● U.S.G.S. STREAM GAGING STATION.
- ■ U.S.G.S. WATER QUALITY STATION.
- ▲ I.I.D. STREAM GAGING STATION.(SELECTED)

NOTE

SOURCE OF BASE MAP, U.S. GEOLOGICAL SURVEY.

SALTON SEA DRAINAGE BASIN

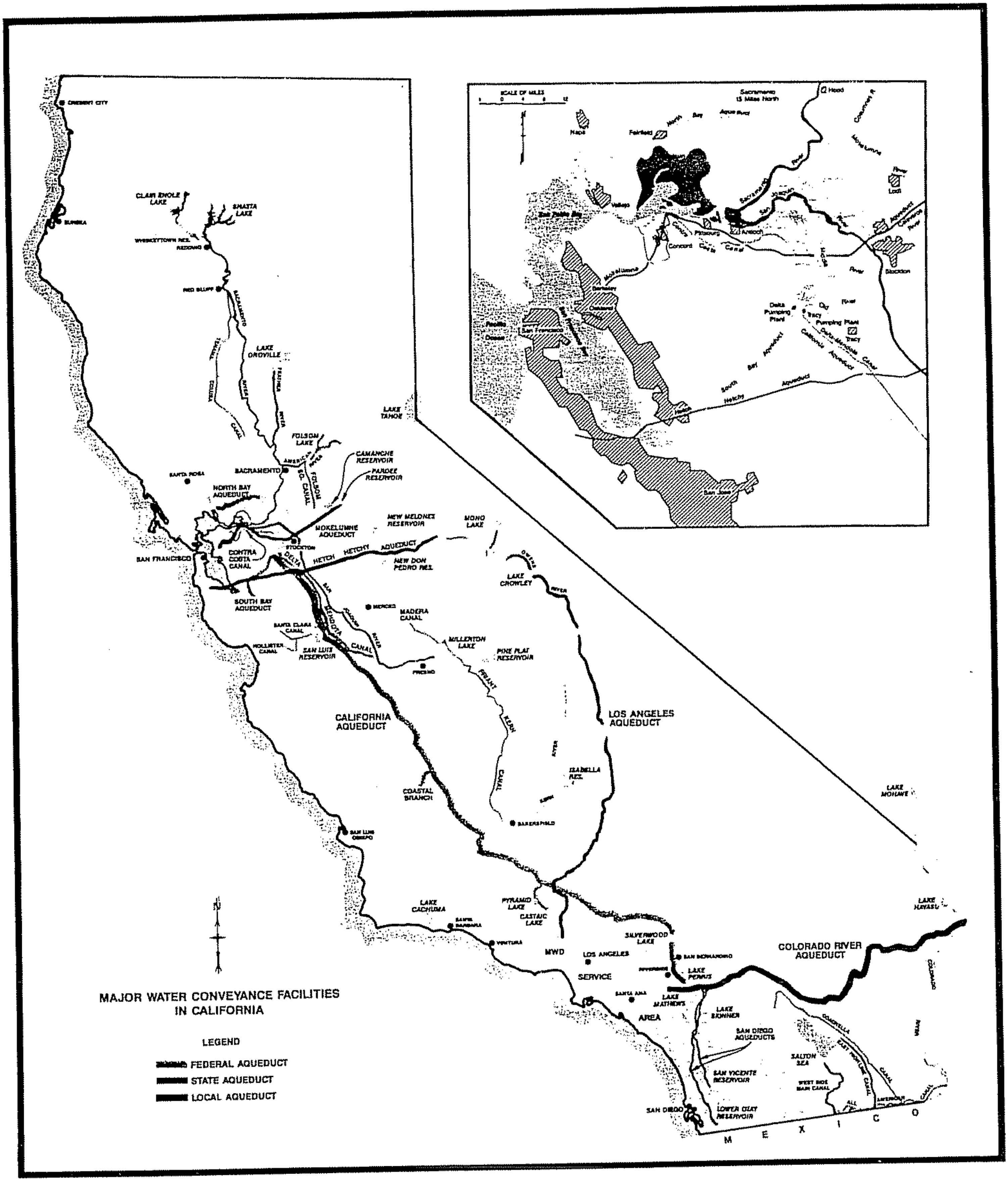
BOOKMAN-EDMONSTON ENGINEERING, INC.
GLENDALE CALIFORNIA

FEBRUARY 1988

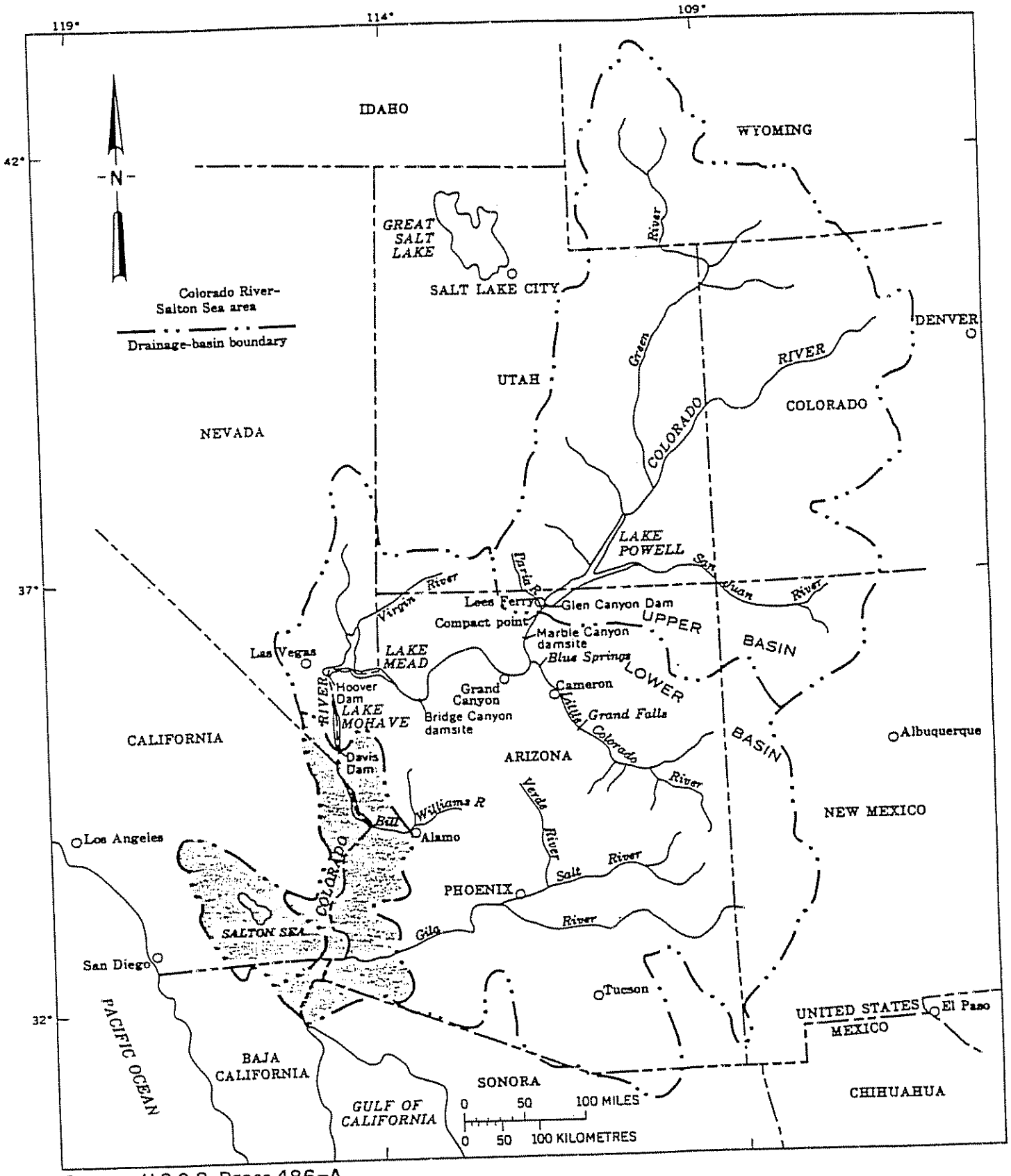
SCALE OF MILES

8 0 8 16 24

Attachment 2



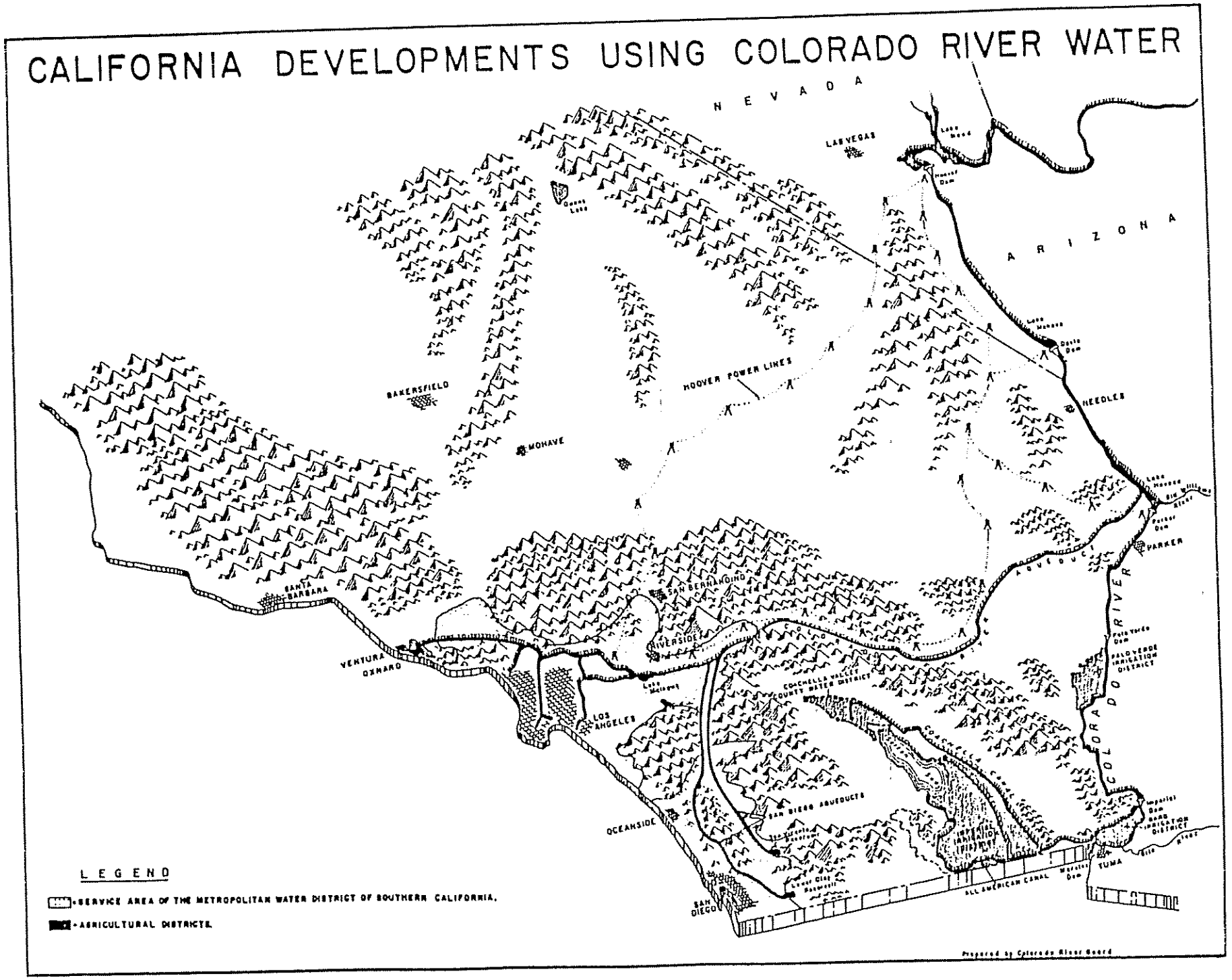
Attachment 3



Source: U.S.G.S. Paper 486-A

COLORADO RIVER AND SALTON SEA DRAINAGE BASIN

CALIFORNIA DEVELOPMENTS USING COLORADO RIVER WATER



Attachment 4

COLORADO WATER USE BY CALIFORNIA AGENCIES[a]

(Values in Thousands of Acre-Feet)

Calendar Year	All American Canal: Imperial Irrigation District	All American Canal: Coachella Valley Water District	All American Canal: Subtotal	Palo Verde Irrigation District	Yuma Project Reservation District	Metropolitan Water District	Total
1961	3,036	522	3,558	380	40	1,054	5,032
62	3,006	565	3,571	381	46	1,029	5,027
63	3,062	538	3,600	367	45	1,065	5,077
64	2,808	511	3,319	401	50	1,092	4,862
1965	2,688	515	3,203	349	44	1,180	4,776
1966	2,886	480	3,366	407	53	1,121	4,947
67	2,770	456	3,226	364	48	1,182	4,820
68	2,864	473	3,337	393	58	1,105	4,893
69	2,714	486	3,200	391	60	1,139	4,790
1970	2,808	444	3,252	409	51	1,195	4,907
1971	2,939	466	3,405	465	49	1,207	5,126
72	2,903	501	3,404	436	47	1,220	5,107
73	3,009	512	3,521	475	48	1,165	5,209
74	3,133	552	3,685	457	44	1,125	5,311
1975	3,047	566	3,613	451	46	782	4,892
1976	2,831	516	3,347	387	47	800	4,581
77	2,717	499	3,216	431	41	1,285	4,973
78	2,715	501	3,216	425	45	715	4,401
79	2,844	523	3,367	462	49	809	4,687
1980	2,817	526	3,343	409	40	817	4,609
1981	2,839	447	3,286	518	41	825	4,670
82	2,565	420	2,985	456	58	711	4,210
83	2,509	355	2,864	322	36	903	4,125
84	2,687	359	3,046	332	36	1,231	4,645
1985	2,678	336	3,014	387	41	1,269	4,771
1986	2,693	342	3,035	404	33	1,298	4,770
87	2,759	332	3,091	418	45	1,278	4,832
88	2,944	331	3,275	445	65	1,199	4,984
89	3,005	359	3,364	464	70	1,200	5,098
1990	3,050	369	3,419	462	70	1,238	5,189
1991	2,894	317	3,211	421	66	1,251	4,949

(a) Diversions less return to the River. Data from Colorado River Board.

Attachment 5
(Updated 5/92)

Attachment 6
(Updated 5/92)

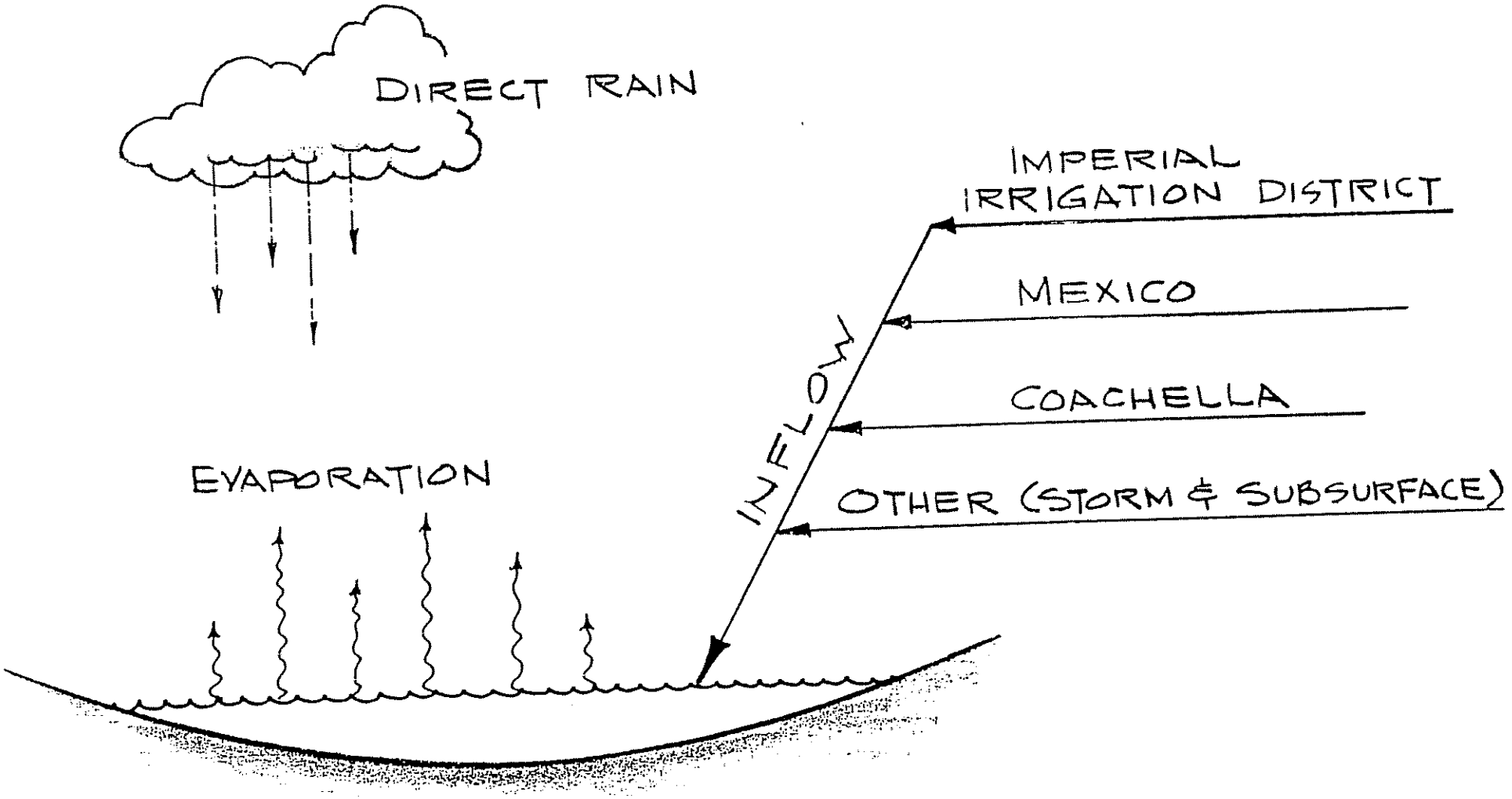
DELIVERIES OF COLORADO RIVER WATER TO MEXICO

(Values in Acre-Feet)

Calendar Year	Total Arrivals	Basic Treaty Delivery	Excess Arrivals (a)
1977	1,779,000	1,500,000	279,000
78	1,727,000	"	227,000
79	3,345,000	"	1,845,000 (b)
80	7,195,000	"	5,695,000 (b)
81	2,191,000	"	691,000
82	1,699,000	"	199,000
83	14,369,000	"	12,869,000 (c)
84	15,669,000	"	14,169,000 (c)
85	11,942,000	"	10,442,000 (c)
86	10,924,000	"	9,424,000 (c)
87	4,747,000	"	3,247,000 (c)
88	2,459,000	"	759,000
89	1,729,000	"	229,000
90	1,676,000	"	176,000
91	1,662,000	"	162,000

Source: Colorado River Board

(a) Amount in range of 200,000 ac. ft. represents primarily scheduled deliveries when water is available.
(b) Primarily anticipated flood releases in 1979 and 1980.
(c) Large flood releases beginning in 1983.



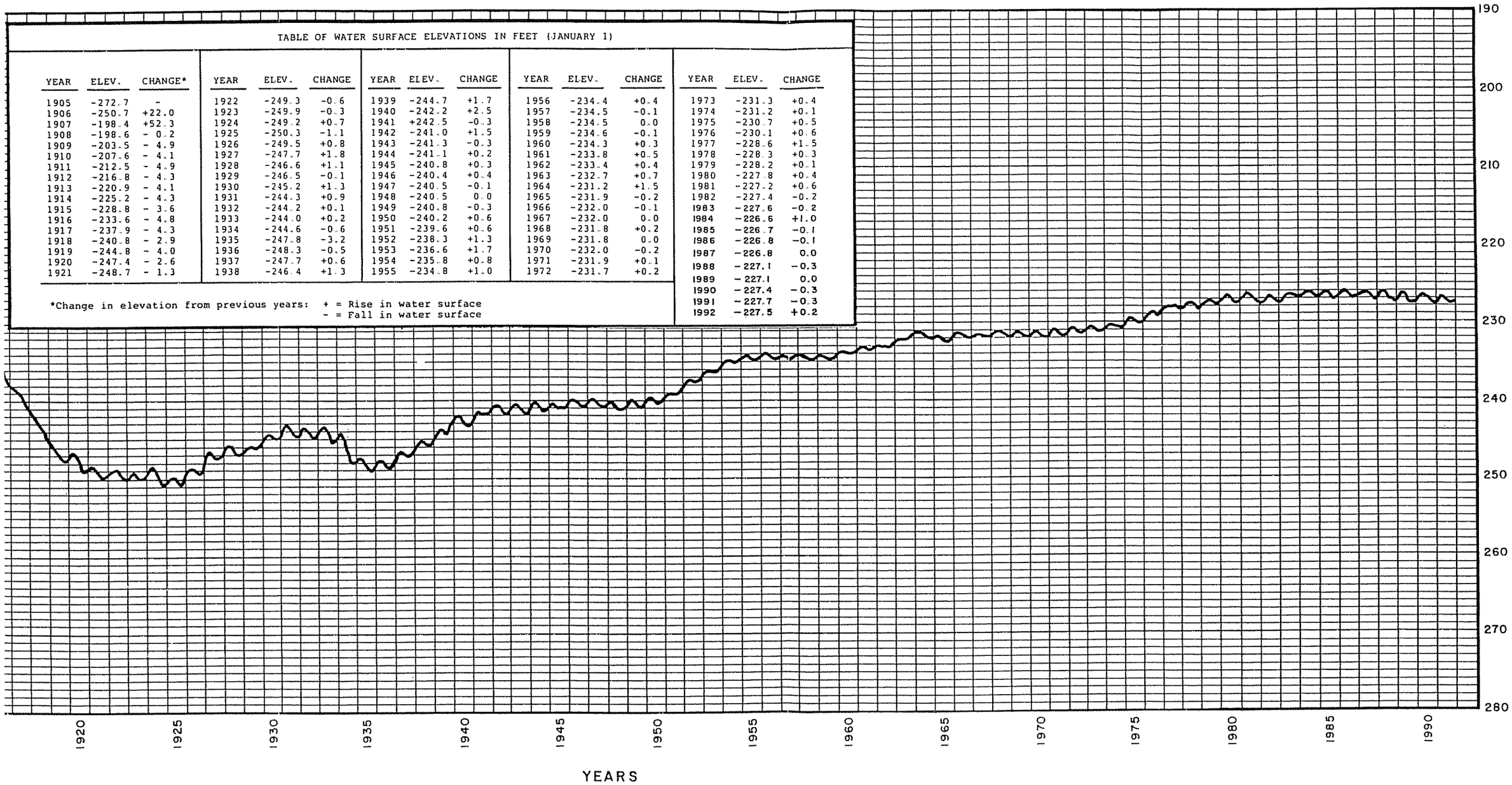
WATER BALANCE OF SALTON SEA

Attachment 7

TABLE OF WATER SURFACE ELEVATIONS IN FEET (JANUARY 1)

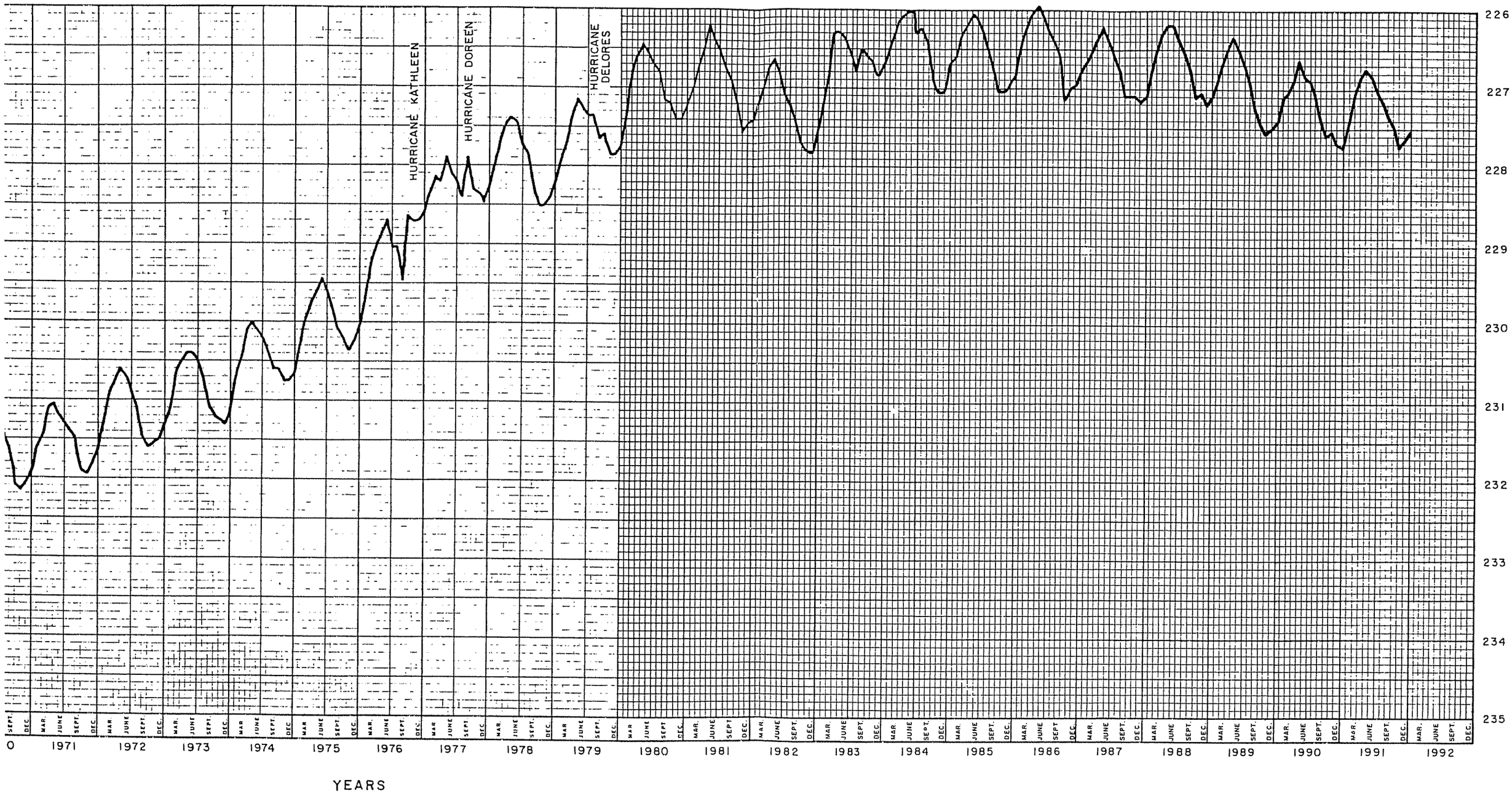
YEAR	ELEV.	CHANGE*	YEAR	ELEV.	CHANGE	YEAR	ELEV.	CHANGE	YEAR	ELEV.	CHANGE	YEAR	ELEV.	CHANGE
1905	-272.7	-	1922	-249.3	-0.6	1939	-244.7	+1.7	1956	-234.4	+0.4	1973	-231.3	+0.4
1906	-250.7	+22.0	1923	-249.9	-0.3	1940	-242.2	+2.5	1957	-234.5	-0.1	1974	-231.2	+0.1
1907	-198.4	+52.3	1924	-249.2	+0.7	1941	+242.5	-0.3	1958	-234.5	0.0	1975	-230.7	+0.5
1908	-198.6	- 0.2	1925	-250.3	-1.1	1942	-241.0	+1.5	1959	-234.6	-0.1	1976	-230.1	+0.6
1909	-203.5	- 4.9	1926	-249.5	+0.8	1943	-241.3	-0.3	1960	-234.3	+0.3	1977	-228.6	+1.5
1910	-207.6	- 4.1	1927	-247.7	+1.8	1944	-241.1	+0.2	1961	-233.8	+0.5	1978	-228.3	+0.3
1911	-212.5	- 4.9	1928	-246.6	+1.1	1945	-240.8	+0.3	1962	-233.4	+0.4	1979	-228.2	+0.1
1912	-216.8	- 4.3	1929	-246.5	-0.1	1946	-240.4	+0.4	1963	-232.7	+0.7	1980	-227.8	+0.4
1913	-220.9	- 4.1	1930	-245.2	+1.3	1947	-240.5	-0.1	1964	-231.2	+1.5	1981	-227.2	+0.6
1914	-225.2	- 4.3	1931	-244.3	+0.9	1948	-240.5	0.0	1965	-231.9	-0.2	1982	-227.4	-0.2
1915	-228.8	- 3.6	1932	-244.2	+0.1	1949	-240.8	-0.3	1966	-232.0	-0.1	1983	-227.6	-0.2
1916	-233.6	- 4.8	1933	-244.0	+0.2	1950	-240.2	+0.6	1967	-232.0	0.0	1984	-226.6	+1.0
1917	-237.9	- 4.3	1934	-244.6	-0.6	1951	-239.6	+0.6	1968	-231.8	+0.2	1985	-226.7	-0.1
1918	-240.8	- 2.9	1935	-247.8	-3.2	1952	-238.3	+1.3	1969	-231.8	0.0	1986	-226.8	-0.1
1919	-244.8	- 4.0	1936	-248.3	-0.5	1953	-236.6	+1.7	1970	-232.0	-0.2	1987	-226.8	0.0
1920	-247.4	- 2.6	1937	-247.7	+0.6	1954	-235.8	+0.8	1971	-231.9	+0.1	1988	-227.1	-0.3
1921	-248.7	- 1.3	1938	-246.4	+1.3	1955	-234.8	+1.0	1972	-231.7	+0.2	1989	-227.1	0.0
												1990	-227.4	-0.3
												1991	-227.7	-0.3
												1992	-227.5	+0.2

*Change in elevation from previous years: + = Rise in water surface
- = Fall in water surface



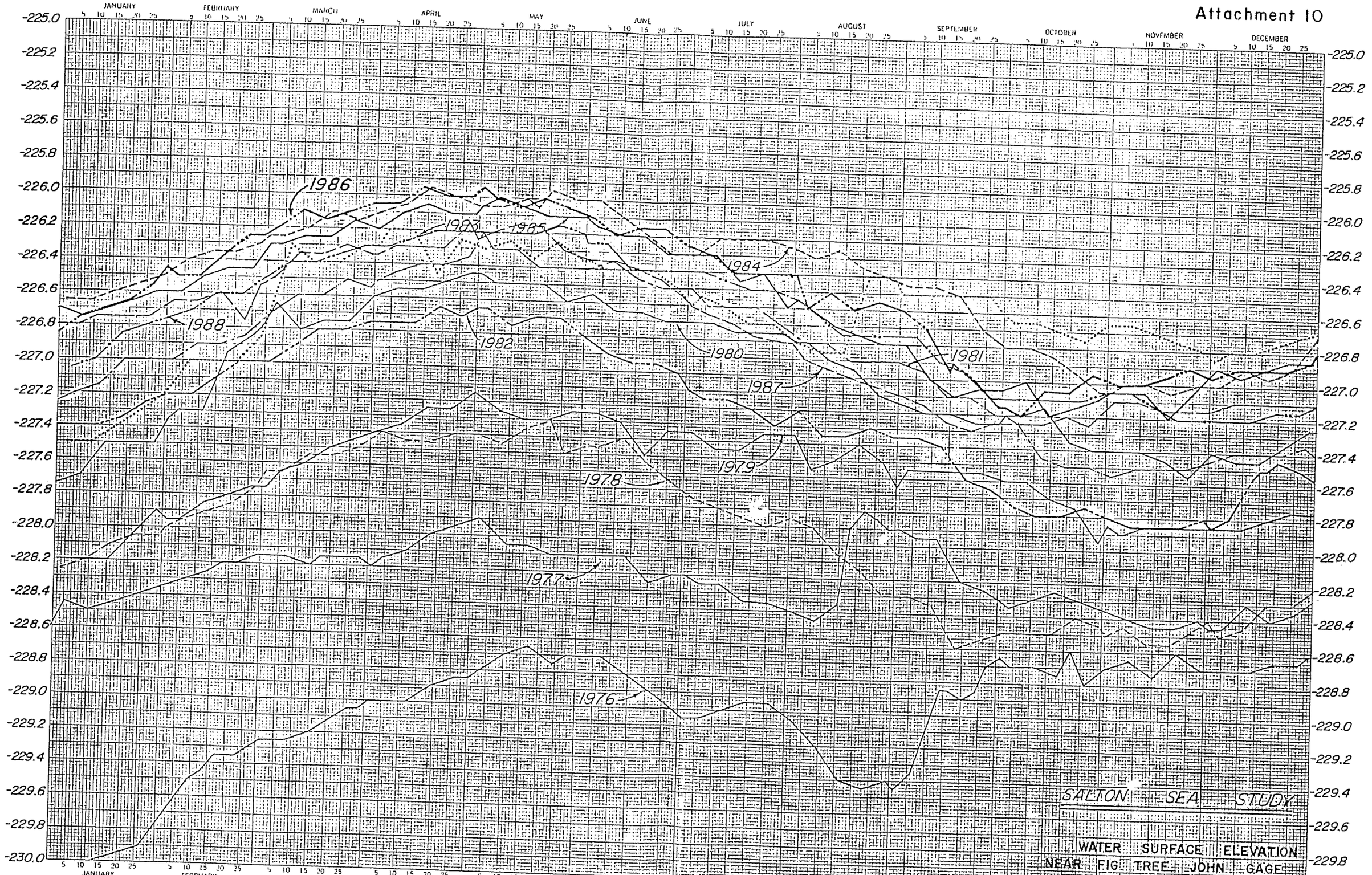
I NEAR FIG TREE JOHN SPRING)

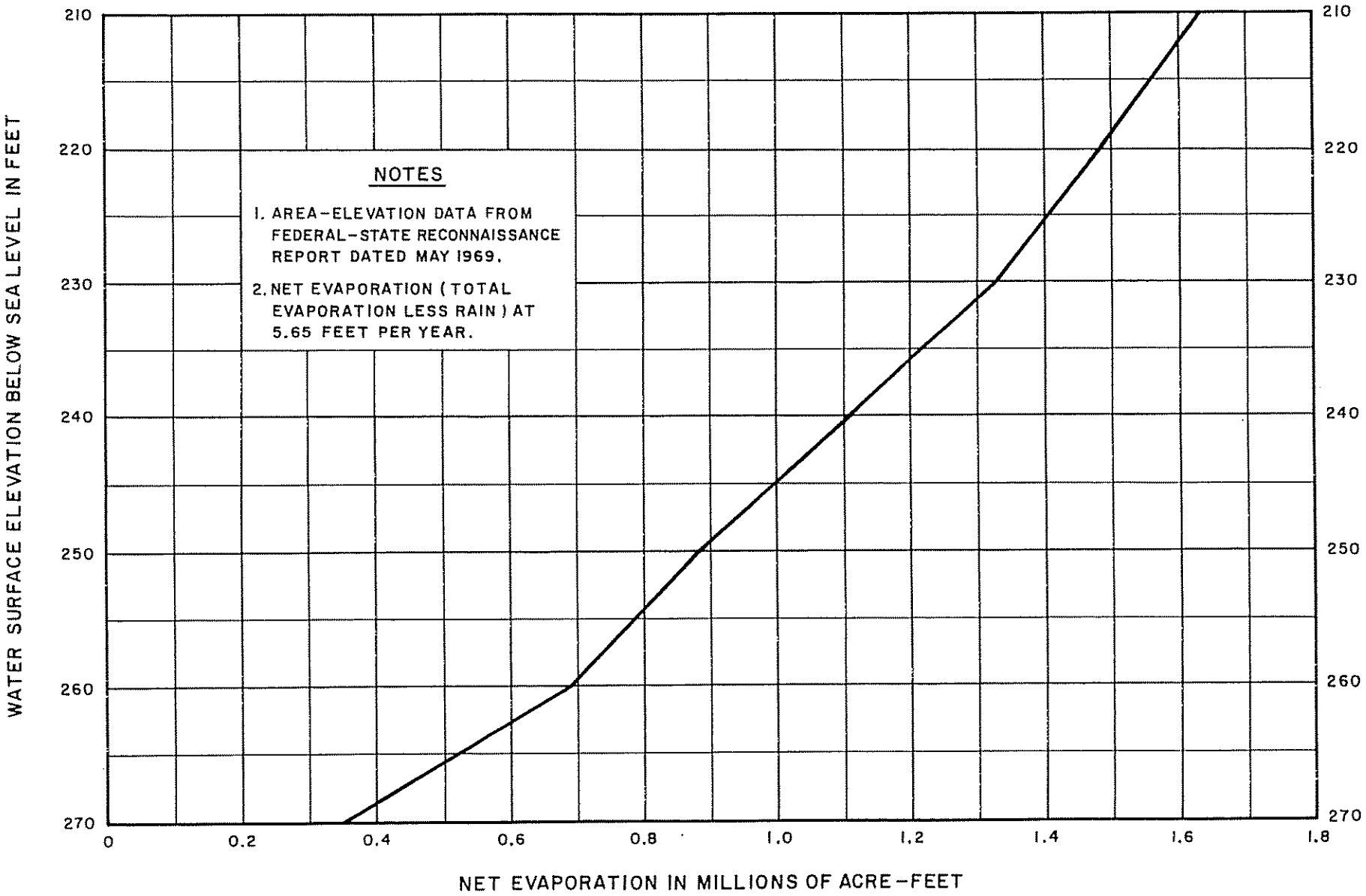
SALTON SEA
HISTORICAL WATER SURFACE ELEVATIONS



SALTON SEA
WATER SURFACE ELEVATIONS 1961—1991

Attachment 10



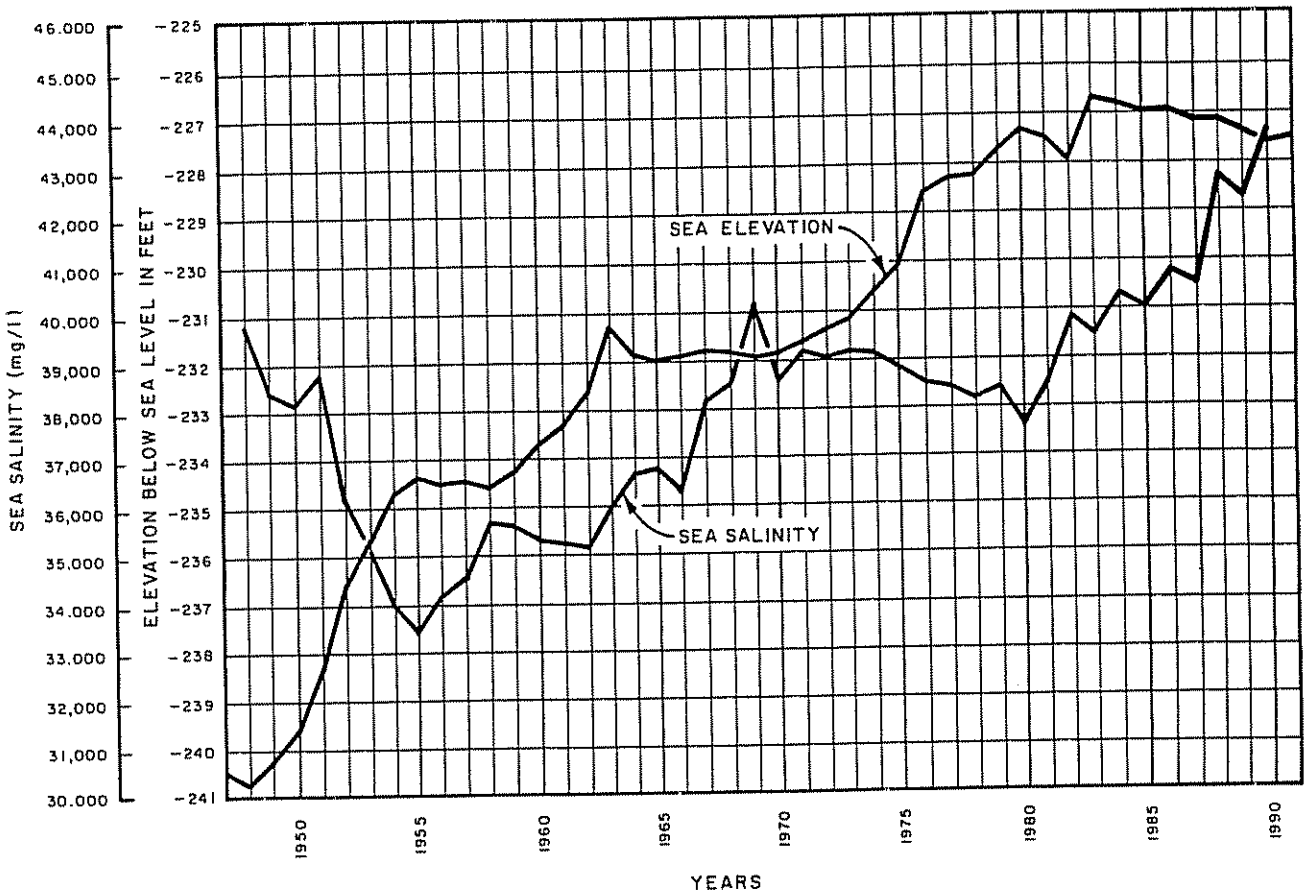


RELATIONSHIP BETWEEN SALTON SEA ELEVATION AND EVAPORATION

OOKMAN-EDMONSTON ENGINEERING, INC.

OCTOBER 1983

Attachment 11

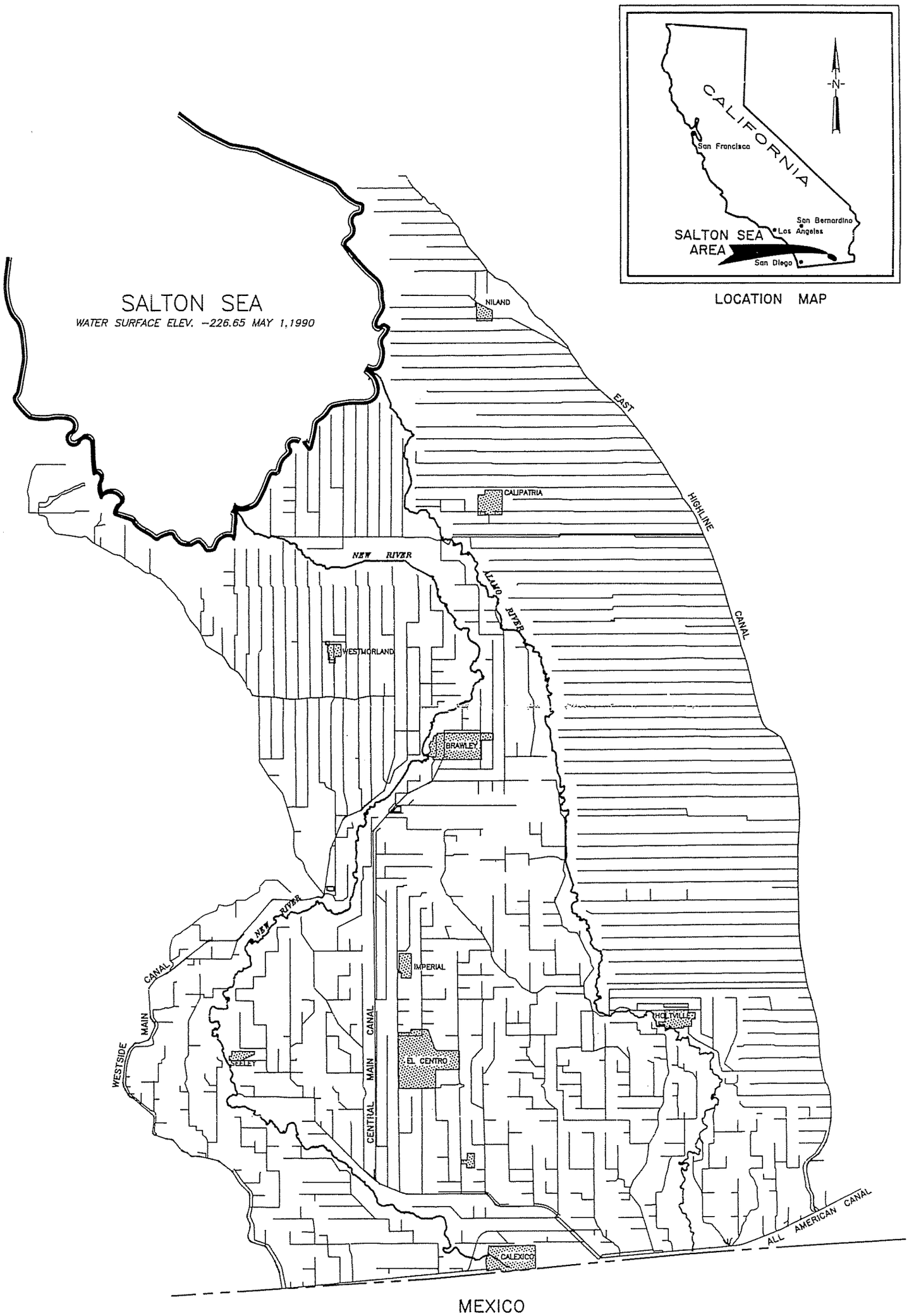


NOTES

1. END OF YEAR ELEVATIONS NEAR FIG TREE JOHN SPRING (I I D DATA)

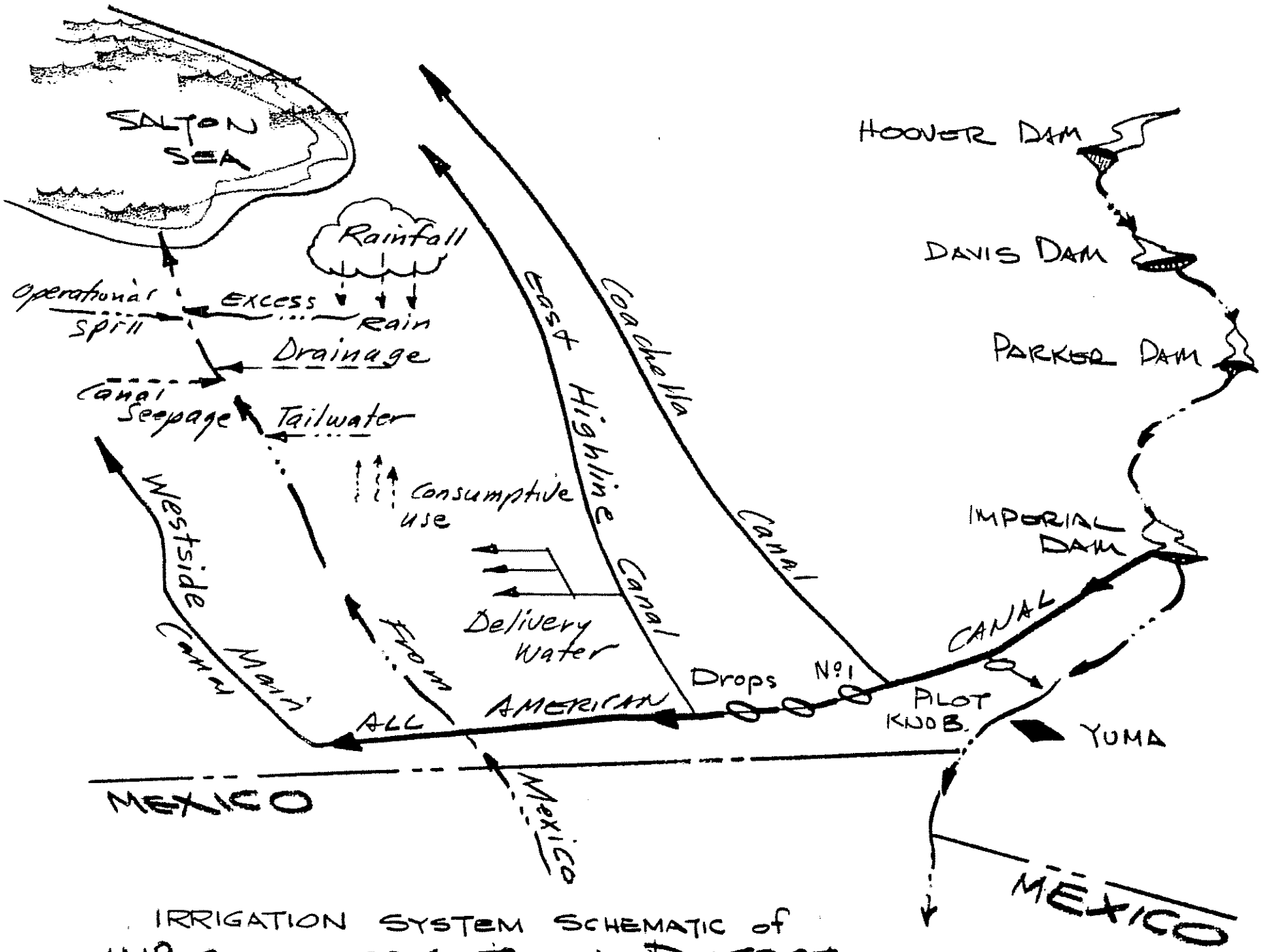
2. AVERAGE OF SAMPLES AT FOUR OR FIVE STATIONS TAKEN IN MAY AND NOVEMBER BY I.I D.

HISTORICAL CHANGE IN SALTON SEA'S SALINITY AND ELEVATION



IRRIGATION DISTRIBUTION SYSTEM
OF
IMPERIAL IRRIGATION DISTRICT

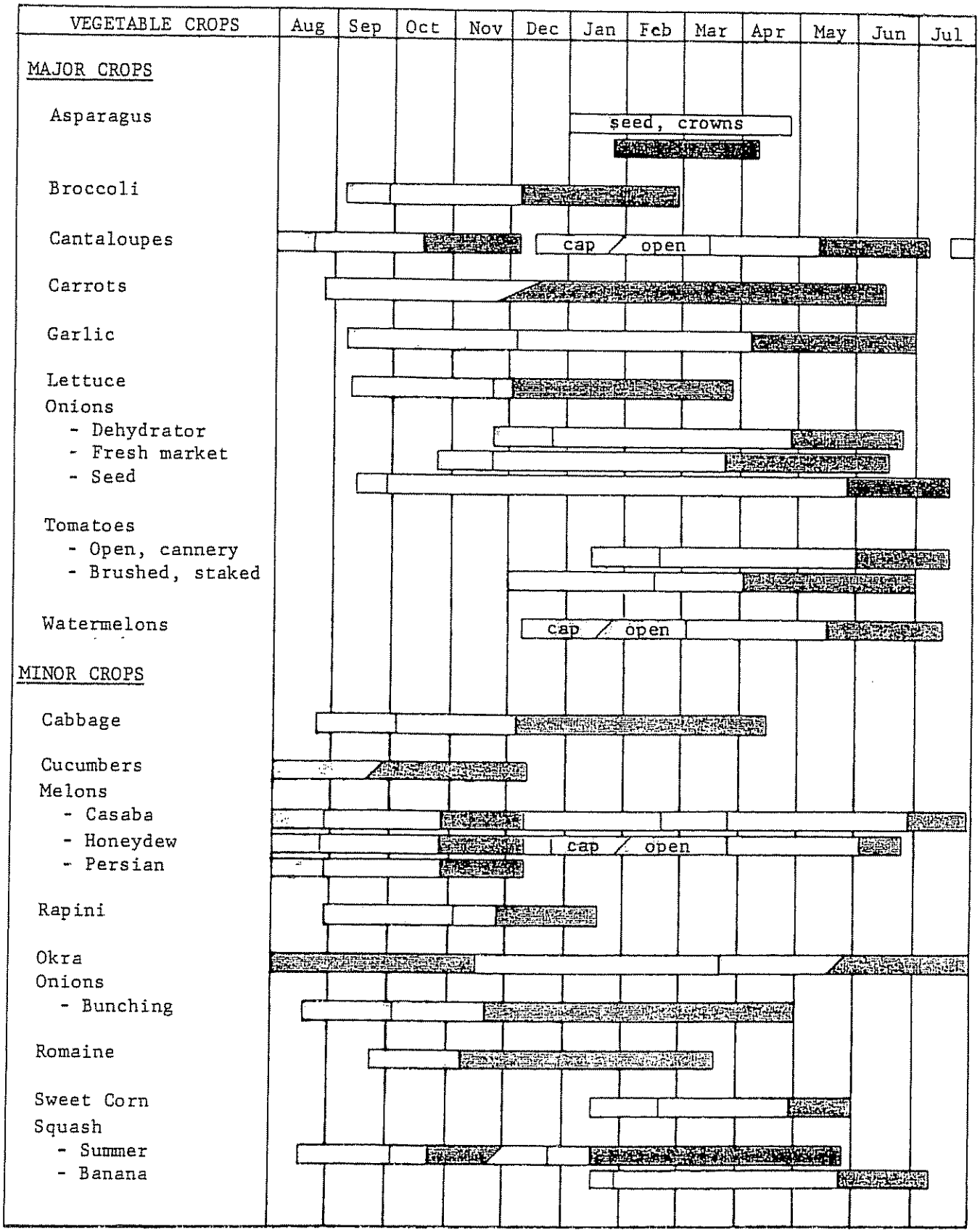
Attachment 13



IRRIGATION SYSTEM SCHEMATIC of
IMPERIAL IRRIGATION DISTRICT

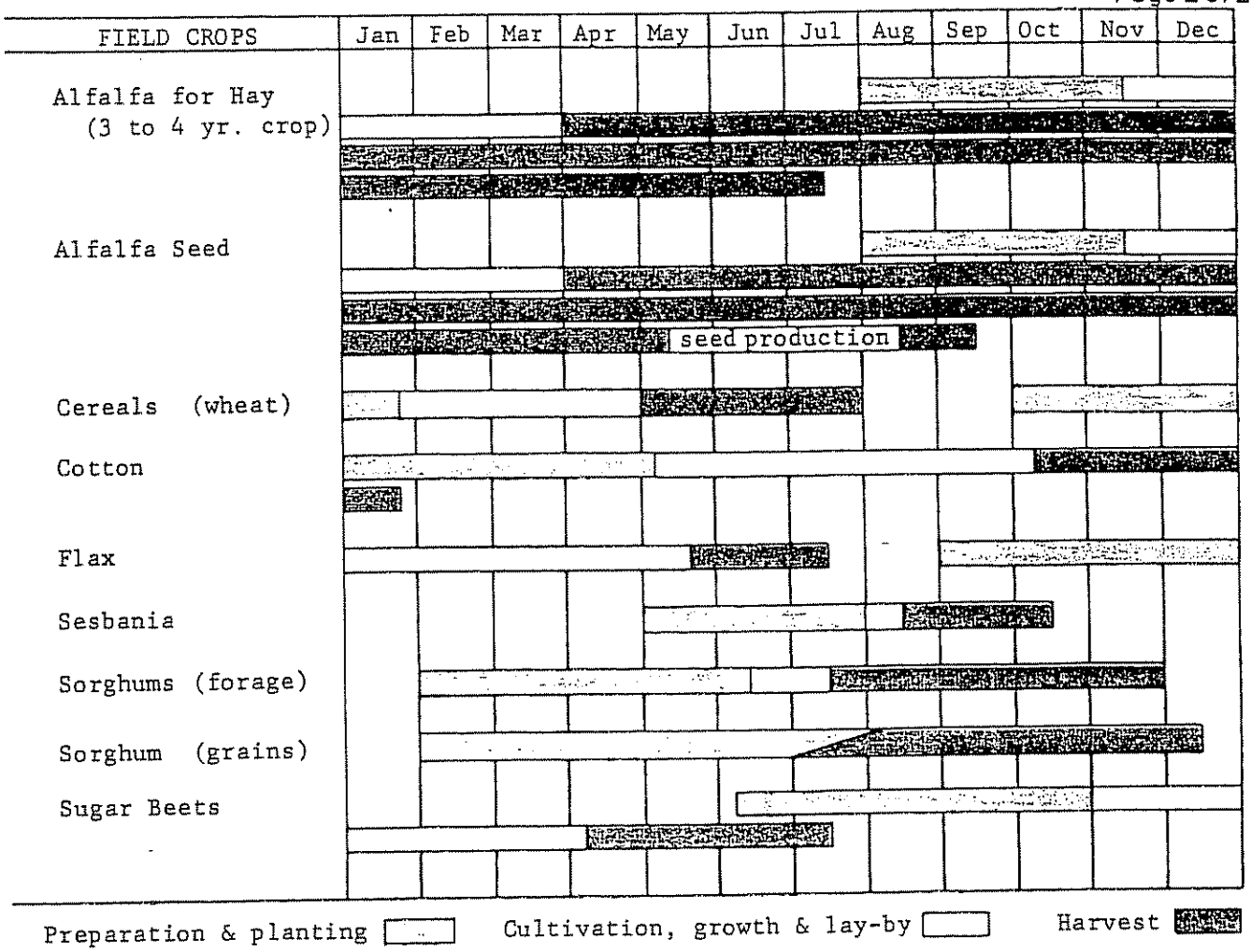
Attachment 14

SCHEDULE OF MAJOR CROPS - PLANTING AND HARVEST - IMPERIAL VALLEY



Preparation & planting ▭ Cultivation, growth & lay-by ▭ Harvest ■

Seed crops follow seasonal cropping.
Cattle feeding is a major operation throughout the year.
Lamb feeding - December through March.



Alfalfa seed is usually produced in the last year of hay production. Hay is harvested until about May 15; then seed is produced during June, July and August. Seed is harvested from about August 15 through September 15.

Grain sorghums may be planted from February 15 to August 10. The crop may be harvested from July 1 to December 15. Decisions on when to plant and the variety to be grown depend on management practices and other crop schedules.

These charts graphically illustrate the calendar of events for major crops grown in Imperial County. The periods of planting and harvesting represent the general trend and do not illustrate the variations in practices which may be utilized.

Prepared by Imperial Irrigation District from statistics supplied by Agricultural Extension Service, University of California, Imperial County.
Bulletin No. 1075

IMPERIAL IRRIGATION DISTRICT

CROPPING PATTERN AND
CONSUMPTIVE USE[a]
1977-79

Crop Category	Area ac.	Estimated Consumptive Use AF/ac.	AF
Alfalfa	145,250[b]	5.4[b]	784,350
Barley	6,198	1.8	11,156
Cotton	94,208	3.6	339,149
Sorghum, Grain	10,240	2.5	25,600
Sudan	14,280	2.5	35,700
Sugar Beets	48,017	3.7	177,663
Wheat	100,974	2.1	212,045
Miscellaneous Field Crops	15,582	2.5	38,955
Melons	15,797	2.3	36,333
Lettuce	41,521	1.4	58,129
Carrots	6,694	1.3	8,702
Tomatoes	3,625	2.3	8,338
Miscellaneous Garden Crops	15,062	1.7	25,605
Citrus	1,798	3.8	6,832
Miscellaneous Permanent Crops	12,173	4.2	51,127
Total[c]	531,419	3.4	1,819,684
Net Cropped Area	457,048	4.0	1,819,684

(a) Source: Imperial Irrigation District
(b) Source: California Department of Water Resources
(c) Includes multiple-cropped areas

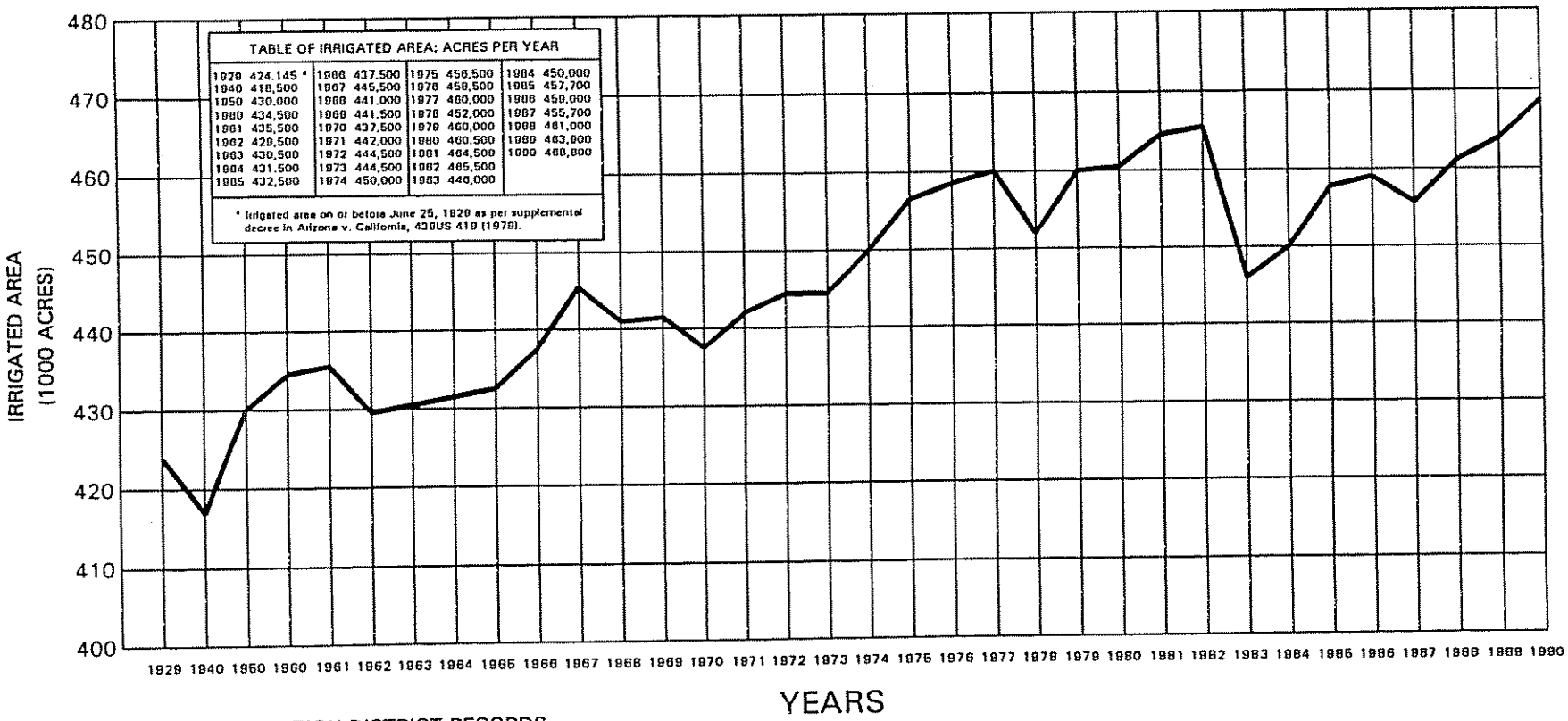


TABLE OF IRRIGATED AREA: ACRES PER YEAR

1929	424,145 *	1966	437,500	1975	456,500	1984	450,000
1940	418,500	1967	445,500	1976	459,500	1985	457,700
1950	430,000	1968	441,000	1977	460,000	1986	459,000
1960	434,500	1969	441,500	1978	452,000	1987	455,700
1961	435,500	1970	437,500	1979	460,000	1988	461,000
1962	429,500	1971	442,000	1980	460,500	1989	463,900
1963	430,500	1972	444,500	1981	464,500	1990	468,800
1964	431,500	1973	444,500	1982	465,500		
1965	432,500	1974	450,000	1983	446,000		

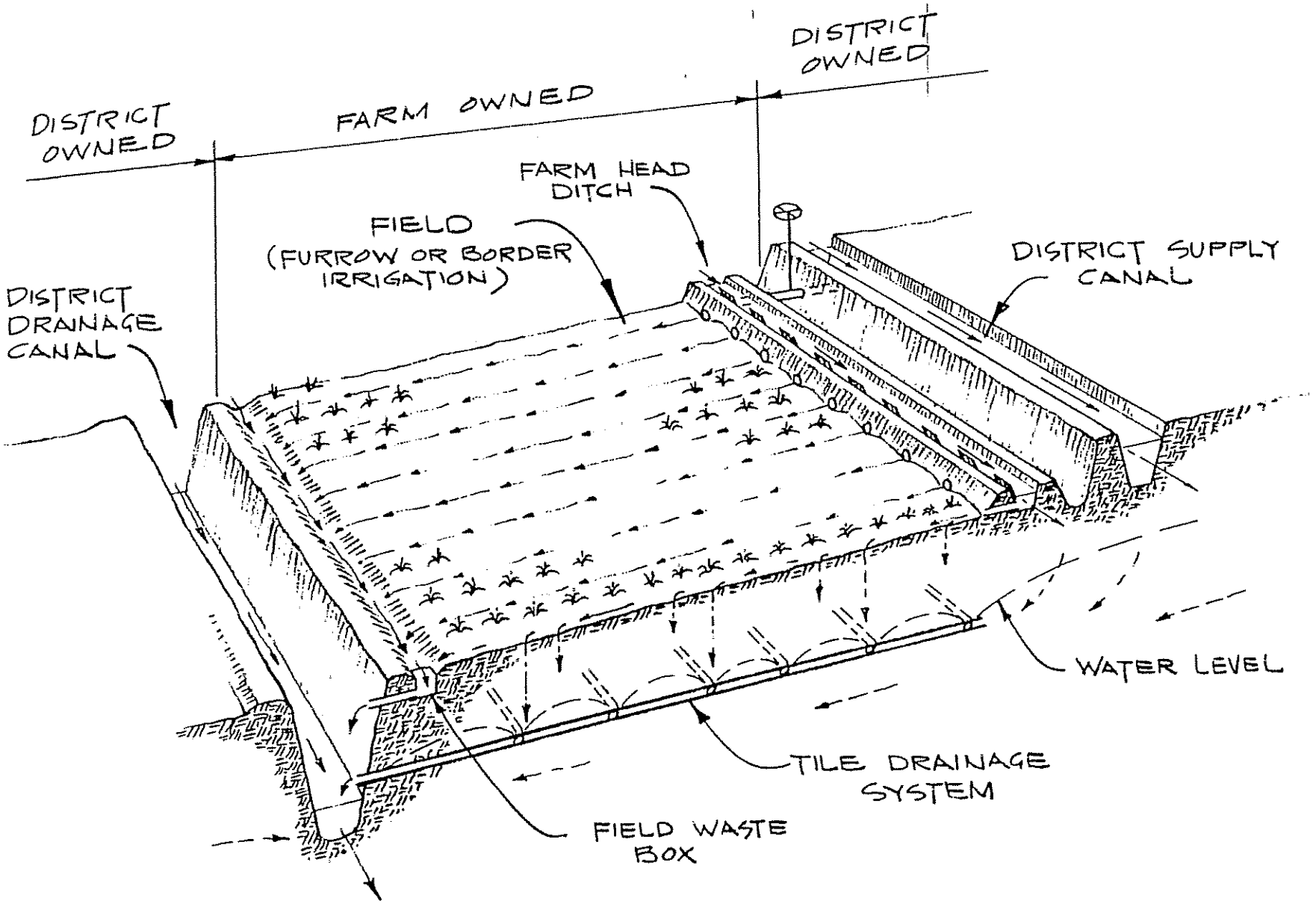
* Irrigated area on or before June 25, 1929 as per supplemental decree in Arizona v. California, 439US 419 (1979).

SOURCE: IMPERIAL IRRIGATION DISTRICT RECORDS

IMPERIAL IRRIGATION DISTRICT
IRRIGATED AREA 1929 - 1990

Bookman-Edmonston Engineering, Inc.

Attachment 17



FARM IRRIGATION FACILITIES

Attachment 18

WATER BALANCE OF IMPERIAL VALLEY FOR 1975 AND 1987

(Values in Thousands of Acre-Feet)

Item	1975	1987
Supply		
Colorado River inflow at Drop No. 4	2,934	2,625
Surface inflow from Mexico	101	253
Subsurface inflow		
Coachella Canal	64	30
Westside	15	15
Mexico	7	7
Precipitation	70	132
Total	3,191	3,062
Use		
Crop consumptive use [a]	1,808	1,785
Consumptive use (minor items)	34	36
Water Surface Evaporation	30	31
Consumptive use of native vegetation	20	37
Consumptive use of phreatophytes	67	67
Total	1,959	1,956
Difference supply and use	1,232	1,106
Inflow to Salton Sea		
Alamo River	682	512
New River	435	493
Drains flowing directly to sea	113	99
Subsurface outflow	2	2
Total	1,232	1,106

[a] Closure term in hydrologic balance.

IMPERIAL IRRIGATION DISTRICT
WATER OPERATIONS
FOR 1975 AND 1987

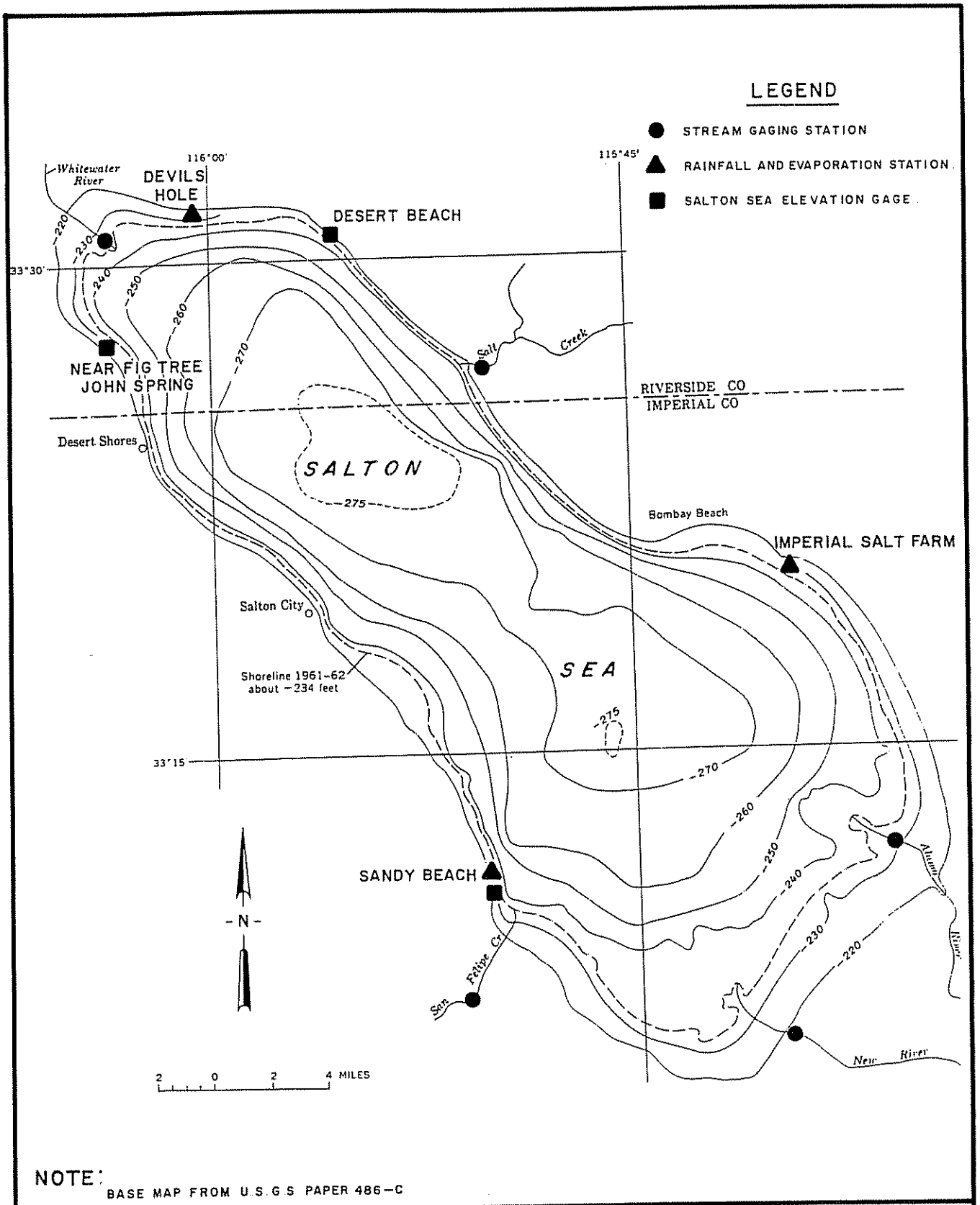
Item	(Values in Thousands of Acre-Feet) 1975	1987
Water Available for Delivery	2,934	2,625
Inflow at Drop No. 4		
Plus seepage recovery	25	25
Less canal seepage	233	195
Less carriage water and operational discharge	137	88
Less canal and reservoir evaporation	18	19
Equals water delivered to users	2,571	2,348
Water flow to drains	345	258
Water Delivered (applied water)		
Crops	2,513	2,286
Other uses	58	62
Consumptive Use of Applied Water		
Crops	1,770	1,702
Other uses	34	36
Applied Water Flowing to Drains		
From crops (leaching and tailwater)	743	584
Other uses	24	26
Total IID inflow to Drains	1,112	868
Other inflow to Drains and Losses		
Surface inflow from Mexico	101	253
Plus Subsurface Inflow	86	52
Plus Precipitation	70	132
Less Losses (evaporation from drains, rivers and ponds)	12	12
Less consumptive use of phreatophytes and native vegetation	87	104
Less crop consumptive use of precipitation	38	83
Less subsurface outflow	2	2
Equals other inflow	118	236
Total Surface Outflow from IID	1,230	1,104

IMPERIAL IRRIGATION DISTRICT WATER SUPPLY AND DELIVERIES AND IRRIGATED AREA

Year	Water Received By District at Drop 1 (1,000 AF)(a)	Water Delivered to Users (1,000 AF)(b)	Area Irrigated (1,000 Acres)
1960	2,984	2,396	434.5
61	2,957	2,416	435.5
62	2,951	2,446	429.5
63	2,991	2,514	430.5
64	2,770	2,399	431.5
1965	2,624	2,312	432.5
66	2,818	2,470	437.5
67	2,720	2,365	445.5
68	2,806	2,476	441.0
69	2,676	2,352	441.5
1970	2,755	2,418	437.5
71	2,884	2,535	442.0
72	2,847	2,531	444.5
73	2,956	2,670	444.5
74	3,072	2,777	450.5
1975	3,001	2,704	456.5
76	2,784	2,515	458.5
77	2,693	2,455	460.0
78	2,672	2,441	452.0
79	2,803	2,571	460.0
1980	2,769	2,520	460.5
81	2,769	2,500	464.2
82	2,516	2,248	465.3
83	2,416	2,180	446.0
84	2,647	2,386	450.0
1985	2,617	2,335	457.7
86	2,576	2,337	459.0
87	2,667	2,386	455.7
88	2,885	2,544	461.0
89	2,942	2,631	463.9
1990	2,975	2,681	468.8
Average	2,792	2,468	449.0

(a) Data from IID Annual Reports and DWR 1981 Report.

(b) Deliveries from 1960-1963 increased by 10 percent to adjust for rerating of Delivery Gates.



NOTE: BASE MAP FROM U.S.G.S. PAPER 486-C

LOCATION OF HYDROGRAPHIC STATIONS
IN
THE VICINITY OF SALTON SEA

HISTORIC RAINFALL
SALTON SEA
(In Inches)

Year	Salt Farm	Sandy Beach	Devils Hole	Average
1948	1.43	1.71	1.88	1.67
49	1.73	2.10	1.75	1.86
1950	0.09	0.42	0.08	0.20
1951	1.81	1.59	2.07	1.82
52	1.76	2.26	3.36	2.46
53	0.12	0.05	0.00	0.06
54	1.56	0.75	1.54	1.28
1955	1.03	0.88	0.87	0.93
1956	0.23	0.06	0.09	0.13
57	2.09	1.36	2.01	1.82
58	2.37	2.25	1.99	2.20
59	2.06	1.10	2.22	1.79
1960	2.37	1.66	1.74	1.92
1961	1.71	2.69	0.86	1.75
62	1.29	1.67	0.75	1.24
63	2.65	2.95	3.61	3.07
64	0.41	0.41	0.82	0.55
1965	2.17	2.64	2.90	2.57
1966	1.07	1.08	0.85	1.00
67	2.78	4.78	1.75	3.10
68	2.18	1.37	1.32	1.62
69	0.91	1.25	1.36	1.17
1970	0.55	1.17	1.56	1.09
1971	1.27	1.50	0.64	1.14
72	0.75	1.54	1.69	1.33
73	0.76	1.27	0.82	0.95
74	1.87	2.90	3.80	2.86
1975	0.41	1.04	0.80	0.75
1976	5.76	7.91	8.17	7.28
77	2.66	4.98	2.59	3.41
78	6.56	6.57	5.58	6.24
79	3.23	3.08	4.71	3.67
1980	4.01	4.44	4.81	4.42
1981	1.33	3.43	2.35	2.37
82	1.88	4.70	2.92	3.17
83	9.29	6.42	8.60	8.10
84	2.64	3.30	2.13	2.69
1985	1.88	2.57	2.59	2.35
1986	1.74	4.97	2.96	3.22
87	INC	2.88	3.33	3.10
88	1.88	.88	2.00	1.59
89	1.15	.80	1.04	1.00
1990	3.37	3.95[a]	3.45	3.59

Source: Imperial Irrigation District

[a] Three Flags replaced Sandy Beach in June 1990. The first five months of 1990 are estimated for Three Flags based on five-month rainfall average of 0.14 inches at the other two stations.

HISTORIC PAN EVAPORATION
SALTON SEA(a)
(In Inches)

Year	Salt Farm	Sandy Beach	Devils Hole	Average
1948	94.73	121.57	99.26	105.19
49	90.02	114.44	96.13	100.20
1950	88.60	112.44	91.24	97.43
1951	90.22	122.88	93.66	102.25
52	86.92	115.42	88.88	97.07
53	87.90	128.02	94.70	103.54
54	81.30	112.70	86.17	93.39
1955	82.92	134.56	88.75	102.08
1956	88.21	135.46	90.70	104.79
57	82.92	117.12	87.00	95.68
58	84.24	121.09	85.32	96.88
59	89.49	122.37	88.91	100.26
1960	91.48	124.39	89 71	101.86
1061	95.78	125.28	94.21	105.09
62	95.23	124.44	90.64	103.44
63	96.23	126.28	92.29	104.93
64	102.01	119.90	85.27	102.39
1065	90.95	109.52	86.47	95.65
1966	92.02	116.01	89.04	99.02
67	91.36	121.71	91.35	101.47
68	91.62	136.67	94.47	107.59
69	95.69	133.22	90.10	106.34
1970	91.96	112.32	87.99	97.42
1971	89.42	110.73	85.79	95.31
72	87.20	112.08	87.70	95.66
73	87.81	120.10	88.20	98.70
74	91.74	130.80	90.11	104.22
1975	88.24	124.33	86.58	99.72
1976	92.73	112.76	88.12	97.87
77	99.82	119.69	100.36	106.62
78	112.18	129.74	111.76	117.89
79	105.29	127.55	106.21	113.04
1980	98.21	118.20	96.26	104.22
1981	103.31	112.90	80.90	99.06
82	99.40(b)	110.90(b)	92.30(b)	100.87
83	91.80(b)	105.00(b)	85.30(b)	94.03
84	93.40(b)	104.10(b)	89.70(b)	95.73
1985	91.70(b)	107.10	74.00(b)	92.60
1986	87.73	94.40	81.87	88.00
87	98.60	106.50	82.30	95.80
88	95.70	119.30	81.60	98.87
89	106.80	110.30	100.40	105.83
1990	109.17	120.10(c)	101.19	110.48

(a) Source: Imperial Irrigation District.
(b) Fiberglass pans were used in the mid-1980's. Data shown is for fiberglass pans converted to the original metal pans based on IID report of December 1990.
(c) Three Flags replaced Sandy Beach in June 1990 and is located two miles south.

HISTORIC SALTON SEA WATER BUDGET

Year (1)	Elevation Below Sea Level (2)	Surface Area in Thousands of Acres (3)	Water Balance in Thousands of Acre-Feet: Inflow (4)	Direct Rain (5)	Evaporation (6)	Change in Storage (7)
1949	240.2	192	--	--	--	--
1950	239.6	195	1,191	3	1,077	+117
1951	238.3	201	1,374	30	1,147	+257
52	236.6	209	1,431	41	1,123	+349
53	235.8	214	1,426	1	1,247	+180
54	234.8	219	1,341	23	1,148	+216
1955	234.4	221	1,357	17	1,285	+89
1956	234.5	220	1,296	2	1,332	-33
57	234.5	220	1,189	33	1,212	+11
58	234.6	220	1,155	40	1,228	-33
59	234.3	221	1,300	33	1,267	+66
1960	233.8	224	1,383	36	1,296	+122
1961	233.4	224	1,413	33	1,355	+91
62	232.7	226	1,467	23	1,333	+157
63	231.2	230	1,638	58	1,364	+332
64	231.9	228	1,195	11	1,355	-149
1965	232.0	228	1,171	49	1,256	-36
1966	232.0	228	1,290	19	1,297	+12
67	231.8	228	1,318	59	1,330	+47
68	231.8	228	1,372	31	1,414	-11
69	232.0	228	1,339	22	1,397	-35
1970	231.9	228	1,268	21	1,277	+12
1971	231.7	229	1,286	22	1,250	+57
72	231.3	230	1,313	25	1,259	+80
73	231.2	230	1,321	18	1,304	+35
74	230.7	232	1,441	55	1,380	+116
1975	230.1	233	1,452	14	1,328	+138
1976	228.6	238	1,513	142	1,313	+341
77	228.3	239	1,472	67	1,456	+83
78	228.2	239	1,506	124	1,617	+13
79	227.8	240	1,587	73	1,552	+108
1980	227.3	241	1,469	88	1,438	+119
1981	227.4	241	1,292	48	1,376	-36
82	227.6	243	1,492	64	1,409	+158
83	226.6	246	1,370	166	1,330	+220
84	226.7	245	1,285	55	1,348	-12
1985	226.8	245	1,223	48	1,304	-36
1986	226.8	245	1,185	66	1,240	+11
87	227.1	244	1,215	63	1,344	-72
88	227.1	244	1,355	32	1,387	-2
89	227.4	243	1,368	47	1,479	-72
1990	227.7	244	1,390	73	1,550	+63

(1) Calendar year.
(2) IID record of station Near Fig Tree John Spring at end of year.
(3) Salton Sea Area in thousands of acres.
(4) Computed inflow to balance hydrologic equation. Inflow equals change in storage plus evaporation less direct rainfall.
(5) Direct rain is computed as area times average rainfall as measured at three stations near Sea.
(6) Evaporation is pan evaporation (average of three stations) times 0.69 times surface area. Values adjusted by correlation with Barwley station for 1983-1987.
(7) Determined from change in elevations and area-capacity relationship. Area-capacity relationship based on formula developed by the Aerospace Corporation (1971) adjusted to Near Fig Tree John Station.

INFLOW FROM MEXICO [a] AT INTERNATIONAL BOUNDARY

(Values in Thousands of Acre-feet)

Year	Measured Surface Flow: New River	Measured Surface Flow: Alamo River	Subsurface Inflow	Total
1950	38		7	45
51	37		7	44
52	37		7	44
53	32		7	39
54	31		7	38
1955	49		7	56
1956	78		7	85
57	73		7	80
58	106		7	113
59	124		7	131
1960	123		7	130
1961	115	2	7	124
62	132	2	7	141
63	139	2	7	148
64	104	2	7	113
1965	111	2	7	120
1966	103	2	7	112
67	96	2	7	105
68	106	1	7	114
69	103	2	7	112
1970	99	2	7	108
1971	107	2	7	116
72	112	1	7	120
73	118	1	7	126
74	112	1	7	120
1975	99	2	7	108
1976	103	1	7	111
77	108	1	7	116
78	99	1	7	107
79	145	1	7	153
1980	156	2	7	165
1981	156	2	7	165
82	157	2	7	166
83	243	2	7	252
84	268	2	7	277
1985	260	2	7	269
1986	265	2	7	274
87	251	2	7	260
88	227	2	7	236
89	153	2	7	162
1990	133	2	7	142

(a) Data from IID and USGS records - For years 1950-1960 New River flow includes New and Alamo Rivers.

INFLOW TO SALTON SEA FROM COACHELLA VALLEY WATER DISTRICT OPERATION

(Values in Thousands of Acre-feet)

Calendar Year	Reported Surface Inflow CVWD(a)	Coachella Canal Inflow: Subsurface Flow Via IID	Coachella Canal Inflow: North of Check 6A	Total
1953	63	45	8	116
1954	72	53	8	133
1955	85	49	8	142
1956	71	44	8	123
1957	53	43	8	104
1958	56	41	8	105
1959	57	37	8	102
1960	70	41	8	119
1961	84	48	8	140
1962	113	52	8	173
1963	133	46	8	187
1964	123	51	8	182
1965	139	56	8	203
1966	128	50	8	186
1967	134	48	8	190
1968	133	48	8	189
1969	131	49	8	188
1970	131	45	8	184
1971	143	45	8	196
1972	155	48	8	211
1973	163	48	8	219
1974	157	51	8	216
1975	174	49	8	231
1976	175	49	8	232
1977	157	44	8	209
1978	144	47	8	199
1979	151	51	8	210
1980	144	48	8	200
1981	157	46	8	211
1982	152	39	8	199
1983	151	34	8	193
1984	141	30	8	179
1985	124	26	8	158
1986	123	22	8	153
1987	117	20	8	145
1988	117	18	8	143
1989	111	16	8	135
1990	110	15	8	133

(a) Coachella Valley Water District (Form E-13C).

WATER DISTRIBUTION COACHELLA CANAL FROM DROP NO. 1 TO CHECK 6A[a]
(Values in Acre-feet)

Calendar Year	Coachella Canal At Drop No. 1	Diversion Above 6A Check	Measured Discharge Below 6A Check	Calculated Loss from Drop No. 1 6A Check
1947	109,163[b]			
48	164,788			
49	197,824	2,856	63,254[c]	87,128[d]
1950	346,490	1,109	190,659	154,722
51	487,911	-	314,667	173,244
52	495,612	762	328,556	166,294
53	525,431	1,229	357,481	166,721
54	561,780	4,323	370,560	186,897
1955	572,106	4,850	392,187	175,069
56	547,789	4,253	386,068	157,468
57	498,214	723	346,984	150,507
58	491,865	2,361	346,696	142,808
59	492,892	2,625	361,940	128,327
1960	493,252	773	355,135	137,344
61	508,287	1,590	354,834	151,863
62	554,415	2,578	394,482	157,355
63	525,307	2,177	392,309	130,821
64	503,363	1,821	359,086	142,456
1965	501,515	1,099	349,922	150,494
66	468,132	650	336,144	131,338
67	446,842	-	320,331	126,511
68	463,235	-	335,791	127,444
69	478,634	-	349,393	129,241
1970	434,105	-	317,456	116,649
71	457,499	-	340,806	116,693
72	490,871	1,721	362,888	126,262
73	502,550	1,268	375,798	125,484
74	540,365	1,935	404,345	134,085
1975	557,474	1,614	427,589	128,271
76	505,733	2,531	373,563	129,639
77	493,546	2,150	378,367	113,029
78	492,717	4,252	364,604	123,861
79	515,295	6,673	374,323	134,299
1980	516,554	5,043	385,992	125,519
81	435,341	5,419		
82	409,875	3,739		
83	341,726	4,495		
84	352,338	3,688		
1985	327,113	3,962		
86	326,157	4,247		
87	320,303	-		
88	324,751	-		
89	351,264	13,378		
1990	359,402	739		

(a) Data from IID Water Department File No. 42
(b) First water delivered in May 1947
(c) Meter at 6A Check activated May 1949. Loss shown is from May through December 1949
(d) If loss for 1947-1949 were same percentage as for 1950, amounts would be 49,000 AF, 74,000 AF and 88,000 AF respectively.

INFLOW TO SALTON SEA FROM IMPERIAL IRRIGATION DISTRICT OPERATIONS

(Values in Thousands of Acre-Feet)

Year (1)	Inflow To Sea From Imperial Valley (2)	Less Inflow From Mexico (3)	Increased Flow Resulting from Coachella Canal (4)	Inflow To Sea From IID Operations
1950	1,145	45	22	1,078
51	1,208	44	29	1,135
52	1,300	44	28	1,228
53	1,380	39	45	1,296
54	1,306	38	53	1,215
1955	1,121	56	49	1,016
1956	1,172	85	44	1,043
57	1,086	80	43	963
58	1,082	113	41	928
59	1,147	131	37	979
1960	1,185	130	41	1,014
1961	1,170	124	48	998
62	1,225	141	52	1,032
63	1,297	148	46	1,103
64	1,013	113	51	849
1965	998	120	56	822
1966	1,112	112	50	950
67	1,128	105	48	975
68	1,110	114	48	948
69	1,070	112	49	909
1970	1,124	108	45	971
1971	1,204	116	45	1,043
72	1,179	120	48	1,011
73	1,186	126	48	1,012
74	1,238	120	51	1,067
1075	1,231	108	49	1,074
1976	1,191	111	49	1,031
77	1,132	116	44	972
78	1,098	107	47	944
79	1,205	153	51	1,001
1980	1,203	165	48	990
1981	1,123	165	46	912
82	1,050	166	39	845
83	1,114	252	34	828
84	1,167	277	30	860
1985	1,095	269	26	800
1986	1,102	274	22	806
87	1,106	260	20	826
88	1,150	236	18	896
89	1,123	162	16	945
1990	1,141	142	15	984

(1) Calendar year.

(2) Includes measured inflow in New and Alamo Rivers, 36 drains flowing directly to Sea and subsurface inflow of 2,000 acre-feet per year.

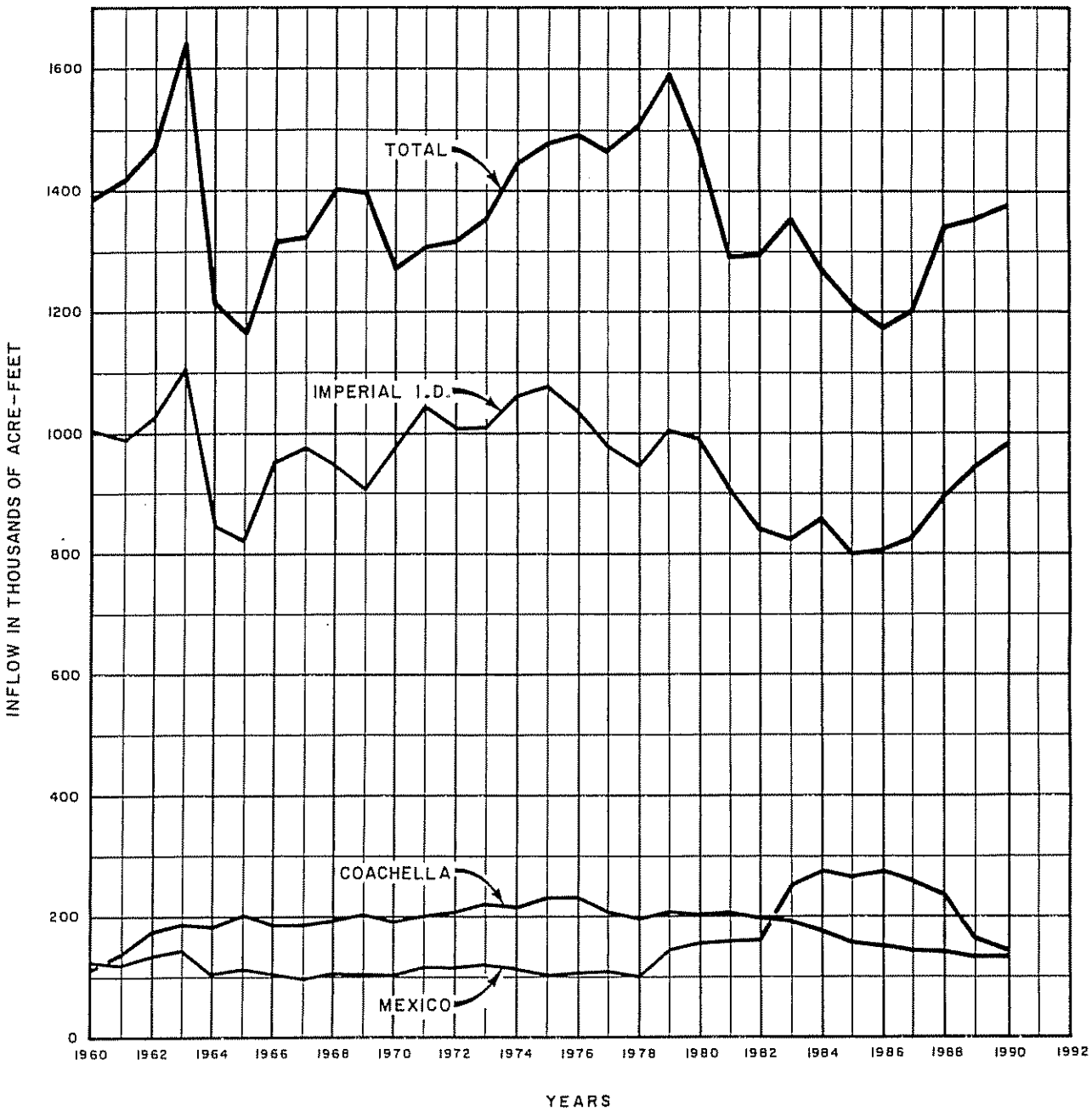
(3) Measured surface inflow in New and Alamo River and estimated subsurface inflow of 7,000 acre-feet per year.

(4) Subsurface flow from East Mesa less amount of 15,000 acre-feet per year which existed prior to construction of Coachella Canal.

COMPONENTS OF INFLOW TO SALTON SEA
(Values in Thousands of Acre-Feet)

Year (1)	IID (2)	Mexico (3)	CVWD (4)	Other (5)	Total (6)
1950	1,078	45	95	-48	1,170
1951	1,135	44	145	48	1,372
52	1,228	44	122	34	1,428
53	1,296	39	116	-29	1,422
54	1,215	38	133	-47	1,339
1955	1,016	56	142	138	1,352
1956	1,043	85	123	43	1,294
57	963	80	104	39	1,186
58	928	113	105	6	1,152
59	979	131	102	85	1,297
1960	1,014	130	119	117	1,380
1961	998	124	140	148	1,410
62	1,032	141	173	118	1,464
63	1,103	148	187	205	1,637
64	849	113	182	49	1,193
1965	822	120	203	26	1,171
1966	950	112	186	40	1,288
67	975	105	190	46	1,316
68	948	114	189	119	1,370
69	909	112	188	128	1,337
1970	971	108	184	5	1,268
1971	1,043	116	196	-71	1,284
72	1,011	120	211	-31	1,311
73	1,012	126	219	-38	1,319
74	1,067	120	216	36	1,439
1975	1,074	108	231	39	1,452
1976	1,031	111	232	136	1,510
77	972	116	209	173	1,470
78	944	107	199	254	1,504
79	1,001	153	210	221	1,585
1980	990	165	200	112	1,467
1981	912	165	211	2	1,290
82	845	166	199	88	1,298
83	828	252	193	82	1,355
84	860	277	179	-46	1,270
1985	800	269	158	-17	1,210
1986	806	274	153	-60	1,173
87	826	260	145	-31	1,200
88	896	236	143	66	1,341
89	945	162	135	111	1,353
1990	984	142	133	116	1,375

(1) Calendar year
(2) From Table 6
(3) From Table 11
(4) From Table 10
(5) Amount to balance table and includes Salt Creek, San Felipe Creek and unmeasured surface and subsurface inflow; excludes subsurface inflow from Imperial Valley and direct rainfall on Salton Sea.
(6) Total inflow computed from water balance of Salton Sea (Table 16).



COMPONENTS OF INFLOW TO SALTON SEA

EFFECTS OF STORMS ON ELEVATION OF SALTON SEA
(Values in Feet Unless Otherwise Noted)

Month (1)	Rainfall in Inches (2)	Actual Changes in Salton Sea Elevation (3)	Normal Changes in Sea Elevation For Month (4)	Effect of Weather On Change In Sea Elevation (5)	Years From Storm To 1987 (6)	Evaporation Factor (7)	Residual Effect of Storms in 1987 (8)
Feb. 1976	2.02	+.45	+.25	+.20	10	.48	+.10
Sept. 1976	4.02	+.80	-.21	+1.01	10	.48	+.48
Aug. 1977	2.51	+.50	-.31	+.81	9	.52	+.42
Jan. 1978	2.05	+.25	+.26	None	8	.55	-
Oct. 1978	1.04	0.00	-.16	+.16	8	.55	+.09
Jan. 1979	1.63	+.25	+.26	None	7	.60	-
Jan. 1980	1.02	+.40	+.26	+.14	6	.64	+.09
Feb. 1980	2.93	+.55	+.25	+.30	6	.64	+.20
Dec. 1982	1.47	+.30	+.12	+.18	4	.74	+.13
Mar. 1983	3.23	+.55	+.19	+.36	3	.80	+.29
Aug. 1983	2.54	+.30	-.31	+.61	3	.80	+.49
Dec. 1984	1.23	+.30	+.12	+.18	2	.86	+.16
Jul. 1986	1.02	-.15	-.10	None	0	1.00	-
TOTAL	26.71	4.50		3.95			2.45

(1) All months since Jan. 1976 which have rainfall totals in excess of 1.0 inches.
(2) Averaged monthly rainfall at Salt Farm, Sandy Beach and Devils Hole.
(3) Change in Salton Sea level based on IID station near Fig Tree John Spring.
(4) Average change in Salton Sea elevation for month determined as average change for month for all years from 1976 through 1984 excluding months with rainfall of 0.5 inches or greater.
(5) Column (3) less Column (4). This shows the true effect that the storm has on the elevation. As an example, in Feb. 1976 the Sea rose 0.45 feet with rainfall of 2.02 inches. Since in Feb. the Sea normally rises 0.25 feet, 0.20 feet of rise is attributable to the storm.
(6) Number of years (assumed whole numbers) from storm until 1987.
(7) Factor accounting for evaporation of additional storm water. As an example, of the water added in 1976, only 48 percent remains. Factor is based on average net evaporation of 5.6 feet per year on increased area.
(8) Column (5) times Column (7) is the amount left from storms as of Jan. 1987.

Attachment 32

ANNUAL EFFECT OF STORMS ON ELEVATION OF SALTON SEA

Year	Annual Elevation Increase Caused by Storms	Increased Evaporation (in feet)	Accumulated Change in Elevations	Comparison with Actual Elevations Below Sea Level at End of Year	
				Historic	Without Storms
1975	-	-	-	230.05	230.05
1976	1.21	0	1.21	228.60	229.81
1977	.81	.09	1.93	228.25	230.18
1978	.16	.16	1.93	228.20	230.13
1979	0	.16	1.77	227.75	229.52
1980	.44	.13	2.08	227.25	229.33
1981	0	.14	1.94	227.40	229.34
1982	.18	.12	2.00	227.55	229.55
1983	.97	.15	2.82	226.65	229.47
1984	.18	.20	2.80	226.70	229.50
1985	0	.19	2.61	226.85	229.46
1986	0	.16	2.45	226.80	229.25

ELEVATION AND SALINITY OF SALTON SEA UNDER DIFFERENT INFLOW CONDITIONS

	Condition	Estimated Elevation as of Dec. 1990	Elevation Difference from Historic	Estimated Salinity as of Dec. 1990 PPT	Salinity Difference from Historic PPT
1.	Historic Inflow (b)	−227.74 (actual)	---	47.4	---
2.	Historic Inflow less 100,000 AF/yr. since 1950 (b)	−233.40	−5.66	56.4	+9.0
3.	Historic Inflow less 100,000 AF/yr. since 1965 (b)	−233.09	−5.35	56.5	+9.1
4.	Historic Inflow less 100,000 AF/yr. since 1975 (b)	−232.02	−4.28	54.6	+9.2
5.	Historic Inflow less 200,000 AF/yr. since 1975 (b)	−236.31	−8.57	64.3	+16.9
6.	Historic Inflow less Mexico 120,000 AF/yr. since 1978	−232.38	−4.64	55.3	+7.9

(a) Computed elevations.
(b) Operation study attached hereto.

OPERATION STUDIES OF SALTON SEA – 1950–1990

Assumed Inflow Conditions: Historic Data for Precipitation, Evaporation, and Sea Elevation.

CALENDER YEAR	INFLOW 1000 AF	PRECIP Inches	PAN EVAP. Inches	ELEVATION Feet	AREA 1000 Ac	VOLUME 1000 AF	SALT 1000 Tons	SALT PPM
Averages:								
1949		1.86	100.20	−240.20	192.27	4120.01		
1950	1170	0.20	97.43	−239.60	194.55	4216.08	220000	38369
1951	1372	1.82	102.25	−238.30	200.69	4473.73	225598	37079
1952	1428	2.46	97.07	−236.60	209.00	4822.71	231424	35284
1953	1422	0.06	103.54	−235.75	213.26	5001.45	237226	34876
1954	1339	1.28	93.39	−234.75	218.42	5218.02	242689	34198
1955	1352	0.93	102.08	−234.35	220.49	5304.93	248205	34403
1956	1294	0.13	104.79	−234.50	219.72	5272.80	253485	35349
1957	1186	1.82	95.68	−234.45	219.97	5283.30	258324	35952
1958	1152	2.20	96.88	−234.60	219.18	5250.26	263024	36836
1959	1297	1.79	100.26	−234.30	220.76	5316.37	268316	37110
1960	1380	1.92	101.86	−233.75	223.67	5438.72	273946	37036
1961	1410	1.75	105.09	−233.35	223.85	5529.76	279699	37192
1962	1464	1.24	103.44	−232.66	225.76	5685.48	285672	36946
1963	1637	3.07	104.93	−231.20	229.83	6018.13	292351	35719
1964	1193	0.55	102.39	−231.85	228.00	5868.57	297218	37240
1965	1171	2.57	95.65	−232.00	227.58	5834.43	301996	38060
1966	1288	1.00	99.02	−231.95	227.72	5845.64	307251	38648
1967	1316	3.10	101.47	−231.75	228.28	5891.84	312620	39015
1968	1370	1.62	107.59	−231.80	228.14	5880.41	318210	39789
1969	1337	1.17	106.34	−231.95	227.71	5844.66	323665	40719
1970	1268	1.09	97.42	−231.90	227.87	5857.82	328838	41277
1971	1284	1.14	95.31	−231.65	228.56	5914.69	334077	41531
1972	1311	1.33	95.66	−231.30	229.53	5993.82	339426	41639
1973	1319	0.95	98.70	−231.15	229.95	6028.34	344808	42057
1974	1439	2.86	104.22	−230.65	231.37	6144.12	350679	41967
1975	1452	0.75	99.72	−230.05	233.08	6283.92	356603	41727
1976	1510	7.28	97.87	−228.60	237.24	6623.64	362764	40271
1977	1470	3.41	106.62	−228.25	238.26	6706.61	368762	40430
1978	1504	6.24	117.89	−228.20	238.41	6719.44	374898	41024
1979	1585	3.67	113.04	−227.75	239.74	6827.71	381365	41070
1980	1467	4.42	104.22	−227.25	241.19	6946.34	387350	41002
1981	1290	2.37	99.06	−227.40	240.75	6910.15	392613	41777
1982	1298	3.17	100.87	−227.55	240.32	6875.40	397909	42555
1983	1355	8.10	94.03	−226.65	242.99	7093.26	403437	41821
1984	1270	2.69	95.73	−226.70	242.83	7080.19	408619	42436
1985	1210	2.35	92.60	−226.85	242.40	7044.79	413556	43165
1986	1173	3.22	88.00	−226.80	242.54	7056.30	418342	43593
1987	1200	3.10	95.80	−227.10	241.64	6982.94	423238	44566
1988	1341	1.59	98.87	−227.10	241.63	6982.23	428709	45147
1989	1353	2.31	105.83	−227.40	240.76	6911.30	434229	46198
1990	1375	3.59	110.48	−227.74	239.75	6828.85	439839	47359

OPERATION STUDIES OF SALTON SEA – 1950–1990

Assumed Inflow Conditions: Historic Inflow Less 100,000 Acre–Feet Per Year Since 1950

CALENDER YEAR	INFLOW 1000 AF	PRECIP Inches	PAN EVAP Inches	ELEVATION Feet	AREA 1000 Ac	VOLUME 1000 AF	SALT 1000 Tons	SALT PPM
Averages:								
1949		1.86	100.20	−240.20	192.27	4120.01		
1950	1070	0.20	97.43	−240.12	192.17	4116.08	220000	39301
1951	1272	1.82	102.25	−239.24	196.25	4287.37	225190	38621
1952	1328	2.46	97.07	−237.87	202.75	4560.22	230608	37183
1953	1322	0.06	103.54	−237.30	205.51	4676.15	236002	37110
1954	1239	1.28	93.39	−236.54	209.26	4833.49	241057	36671
1955	1252	0.93	102.08	−236.35	210.21	4873.45	246165	37141
1956	1194	0.13	104.79	−236.69	208.54	4803.12	251037	38430
1957	1086	1.82	95.68	−236.83	207.83	4773.47	255468	39352
1958	1052	2.20	96.88	−237.16	206.22	4705.84	259760	40588
1959	1197	1.79	100.26	−236.97	207.15	4744.77	264644	41012
1960	1280	1.92	101.86	−236.49	209.53	4844.67	269866	40959
1961	1310	1.75	105.09	−236.14	211.30	4919.14	275211	41138
1962	1364	1.24	103.44	−235.53	214.37	5048.21	280776	40896
1963	1537	3.07	104.93	−234.16	221.48	5346.65	287047	39476
1964	1093	0.55	102.39	−235.08	216.70	5145.85	291506	41653
1965	1071	2.57	95.65	−235.42	214.93	5071.45	295876	42898
1966	1188	1.00	99.02	−235.50	214.50	5053.65	300723	43755
1967	1216	3.10	101.47	−235.41	214.98	5073.54	305684	44302
1968	1270	1.62	107.59	−235.56	214.24	5042.64	310866	45329
1969	1237	1.17	106.34	−235.80	213.00	4990.55	315913	46546
1970	1168	1.09	97.42	−235.83	212.86	4984.75	320678	47303
1971	1184	1.14	95.31	−235.65	213.76	5022.43	325509	47655
1972	1211	1.33	95.66	−235.38	215.16	5081.35	330450	47818
1973	1219	0.95	98.70	−235.31	215.52	5096.29	335424	48395
1974	1339	2.86	104.22	−234.85	217.87	5195.14	340887	48247
1975	1352	0.75	99.72	−234.32	220.64	5311.51	346403	47954
1976	1410	7.28	97.87	−232.97	227.84	5613.69	352156	46126
1977	1370	3.41	106.62	−232.81	225.34	5651.63	357746	46544
1978	1404	6.24	117.89	−232.83	225.27	5645.28	363474	47342
1979	1485	3.67	113.04	−232.44	226.36	5735.00	369533	47378
1980	1367	4.42	104.22	−232.02	227.51	5828.86	375110	47319
1981	1190	2.37	99.06	−232.29	226.77	5767.90	379965	48438
1982	1198	3.17	100.87	−232.54	226.06	5710.56	384853	49554
1983	1255	8.10	94.03	−231.73	228.33	5895.88	389973	48635
1984	1170	2.69	95.73	−231.89	227.90	5860.22	394747	49530
1985	1110	2.35	92.60	−232.14	227.18	5801.42	399276	50606
1986	1073	3.22	88.00	−232.21	226.99	5785.86	403654	51298
1987	1100	3.10	95.80	−232.62	225.86	5694.15	408142	52704
1988	1241	1.59	98.87	−232.68	225.70	5681.04	413205	53481
1989	1253	2.31	105.83	−233.02	224.76	5603.98	418317	54887
1990	1275	3.59	110.48	−233.40	223.71	5518.42	423519	56431

OPERATION STUDIES OF SALTON SEA – 1950–1990

Assumed Inflow Conditions: Historic Inflow Less 100,000 Acre–Feet Per Year Since 1965.

CALENDER YEAR	INFLOW 1000 AF	PRECIP Inches	PAN EVAP. Inches	ELEVATION Feet	AREA 1000 Ac	VOLUME 1000 AF	SALT 1000 Tons	SALT PPM
Averages:								
1949		1.86	100.20	−240.20	192.27	4120.01		
1950	1170	0.20	97.43	−239.60	194.55	4216.08	220000	38369
1951	1372	1.82	102.25	−238.30	200.69	4473.73	225598	37079
1952	1428	2.46	97.07	−236.60	209.00	4822.71	231424	35284
1953	1422	0.06	103.54	−235.75	213.26	5001.45	237226	34876
1954	1339	1.28	93.39	−234.75	218.42	5218.02	242689	34198
1955	1352	0.93	102.08	−234.35	220.49	5304.93	248205	34403
1956	1294	0.13	104.79	−234.50	219.72	5272.80	253485	35349
1957	1186	1.82	95.68	−234.45	219.97	5283.30	258324	35952
1958	1152	2.20	96.88	−234.60	219.18	5250.26	263024	36836
1959	1297	1.79	100.26	−234.30	220.76	5316.37	268316	37110
1960	1380	1.92	101.86	−233.75	223.67	5438.72	273946	37036
1961	1410	1.75	105.09	−233.35	223.85	5529.76	279699	37192
1962	1464	1.24	103.44	−232.66	225.76	5685.48	285672	36946
1963	1637	3.07	104.93	−231.20	229.83	6018.13	292351	35719
1964	1193	0.55	102.39	−231.85	228.00	5868.57	297218	37240
1965	1071	2.57	95.65	−232.44	226.36	5734.43	301588	38671
1966	1188	1.00	99.02	−232.80	225.35	5652.51	306435	39862
1967	1216	3.10	101.47	−232.98	224.86	5611.89	311396	40800
1968	1270	1.62	107.59	−233.39	223.75	5521.19	316578	42161
1969	1237	1.17	106.34	−233.88	222.41	5411.91	321625	43698
1970	1168	1.09	97.42	−234.14	221.70	5354.26	326390	44823
1971	1184	1.14	95.31	−234.17	221.42	5344.32	331221	45571
1972	1211	1.33	95.66	−234.09	221.84	5361.93	336162	46099
1973	1219	0.95	98.70	−234.20	221.52	5339.47	341136	46978
1974	1339	2.86	104.22	−233.90	222.84	5403.77	346599	47162
1975	1352	0.75	99.72	−233.52	223.39	5491.96	352115	47143
1976	1410	7.28	97.87	−232.24	226.92	5780.36	357868	45523
1977	1370	3.41	106.62	−232.05	227.45	5823.69	363458	45890
1978	1404	6.24	117.89	−232.13	227.21	5804.16	369186	46770
1979	1485	3.67	113.04	−231.79	228.16	5881.83	375245	46910
1980	1367	4.42	104.22	−231.42	229.19	5965.59	380822	46939
1981	1190	2.37	99.06	−231.73	228.33	5895.42	385677	48103
1982	1198	3.17	100.87	−232.02	227.52	5829.43	390565	49264
1983	1255	8.10	94.03	−231.24	229.70	6007.88	395685	48427
1984	1170	2.69	95.73	−231.43	229.18	5964.97	400459	49364
1985	1110	2.35	92.60	−231.71	228.38	5899.60	404988	50476
1986	1073	3.22	88.00	−231.81	228.12	5878.28	409366	51206
1987	1100	3.10	95.80	−232.24	226.92	5780.63	413854	52642
1988	1241	1.59	98.87	−232.32	226.69	5761.65	418917	53462
1989	1253	2.31	105.83	−232.69	225.68	5678.77	424029	54904
1990	1275	3.59	110.48	−233.09	224.56	5587.66	429231	56484

OPERATION STUDIES OF SALTON SEA – 1950–1990

Assumed Inflow Conditions: Historic Inflow Less 100,000 Acre–Feet Per Year Since 1975.

CALENDER YEAR	INFLOW 1000 AF	PRECIP Inches	PAN EVAP. Inches	ELEVATION Feet	AREA 1000 Ac	VOLUME 1000 AF	SALT 1000 Tons	SALT PPM
Averages:								
1949		1.86	100.20	−240.20	192.27	4120.01		
1950	1170	0.20	97.43	−239.60	194.55	4216.08	220000	38369
1951	1372	1.82	102.25	−238.30	200.69	4473.73	225598	37079
1952	1428	2.46	97.07	−236.60	209.00	4822.71	231424	35284
1953	1422	0.06	103.54	−235.75	213.26	5001.45	237226	34876
1954	1339	1.28	93.39	−234.75	218.42	5218.02	242689	34198
1955	1352	0.93	102.08	−234.35	220.49	5304.93	248205	34403
1956	1294	0.13	104.79	−234.50	219.72	5272.80	253485	35349
1957	1186	1.82	95.68	−234.45	219.97	5283.30	258324	35952
1958	1152	2.20	96.88	−234.60	219.18	5250.26	263024	36836
1959	1297	1.79	100.26	−234.30	220.76	5316.37	268316	37110
1960	1380	1.92	101.86	−233.75	223.67	5438.72	273946	37036
1961	1410	1.75	105.09	−233.35	223.85	5529.76	279699	37192
1962	1464	1.24	103.44	−232.66	225.76	5685.48	285672	36946
1963	1637	3.07	104.93	−231.20	229.83	6018.13	292351	35719
1964	1193	0.55	102.39	−231.85	228.00	5868.57	297218	37240
1965	1171	2.57	95.65	−232.00	227.58	5834.43	301996	38060
1966	1288	1.00	99.02	−231.95	227.72	5845.64	307251	38648
1967	1316	3.10	101.47	−231.75	228.28	5891.84	312620	39015
1968	1370	1.62	107.59	−231.80	228.14	5880.41	318210	39789
1969	1337	1.17	106.34	−231.95	227.71	5844.66	323665	40719
1970	1268	1.09	97.42	−231.90	227.87	5857.82	328838	41277
1971	1284	1.14	95.31	−231.65	228.56	5914.69	334077	41531
1972	1311	1.33	95.66	−231.30	229.53	5993.82	339426	41639
1973	1319	0.95	98.70	−231.15	229.95	6028.34	344808	42057
1974	1439	2.86	104.22	−230.65	231.37	6144.12	350679	41967
1975	1352	0.75	99.72	−230.48	231.86	6183.92	356195	42353
1976	1410	7.28	97.87	−229.42	234.87	6429.79	361948	41391
1977	1370	3.41	106.62	−229.44	234.83	6426.64	367538	42051
1978	1404	6.24	117.89	−229.72	234.03	6360.91	373266	43148
1979	1485	3.67	113.04	−229.57	234.46	6396.37	379325	43605
1980	1367	4.42	104.22	−229.36	235.05	6444.70	384902	43915
1981	1190	2.37	99.06	−229.80	233.80	6342.28	389757	45187
1982	1198	3.17	100.87	−230.21	232.62	6246.01	394645	46458
1983	1255	8.10	94.03	−229.55	234.51	6400.32	399765	45927
1984	1170	2.69	95.73	−229.84	233.67	6332.05	404539	46976
1985	1110	2.35	92.60	−230.22	232.59	6243.62	409068	48175
1986	1073	3.22	88.00	−230.40	232.08	6202.13	413446	49016
1987	1100	3.10	95.80	−230.91	230.63	6083.67	417934	50513
1988	1241	1.59	98.87	−231.08	230.15	6044.08	422997	51460
1989	1253	2.31	105.83	−231.53	228.88	5940.83	428109	52987
1990	1275	3.59	110.48	−232.02	227.53	5830.30	433311	54647

OPERATION STUDIES OF SALTON SEA – 1950–1990

Assumed Inflow Conditions: Historic Inflow Less 200,000 Acre–Feet Per Year Since 1975.

CALENDER YEAR	INFLOW 1000 AF	PRECIP Inches	PAN EVAP. Inches	ELEVATION Feet	AREA 1000 Ac	VOLUME 1000 AF	SALT 1000 Tons	SALT PPM
Averages:								
1949		1.86	100.20	−240.20	192.27	4120.01		
1950	1170	0.20	97.43	−239.60	194.55	4216.08	220000	38369
1951	1372	1.82	102.25	−238.30	200.69	4473.73	225598	37079
1952	1428	2.46	97.07	−236.60	209.00	4822.71	231424	35284
1953	1422	0.06	103.54	−235.75	213.26	5001.45	237226	34876
1954	1339	1.28	93.39	−234.75	218.42	5218.02	242689	34198
1955	1352	0.93	102.08	−234.35	220.49	5304.93	248205	34403
1956	1294	0.13	104.79	−234.50	219.72	5272.80	253485	35349
1957	1186	1.82	95.68	−234.45	219.97	5283.30	258324	35952
1958	1152	2.20	96.88	−234.60	219.18	5250.26	263024	36836
1959	1297	1.79	100.26	−234.30	220.76	5316.37	268316	37110
1960	1380	1.92	101.86	−233.75	223.67	5438.72	273946	37036
1961	1410	1.75	105.09	−233.35	223.85	5529.76	279699	37192
1962	1464	1.24	103.44	−232.66	225.76	5685.48	285672	36946
1963	1637	3.07	104.93	−231.20	229.83	6018.13	292351	35719
1964	1193	0.55	102.39	−231.85	228.00	5868.57	297218	37240
1965	1171	2.57	95.65	−232.00	227.58	5834.43	301996	38060
1966	1288	1.00	99.02	−231.95	227.72	5845.64	307251	38648
1967	1316	3.10	101.47	−231.75	228.28	5891.84	312620	39015
1968	1370	1.62	107.59	−231.80	228.14	5880.41	318210	39789
1969	1337	1.17	106.34	−231.95	227.71	5844.66	323665	40719
1970	1268	1.09	97.42	−231.90	227.87	5857.82	328838	41277
1971	1284	1.14	95.31	−231.65	228.56	5914.69	334077	41531
1972	1311	1.33	95.66	−231.30	229.53	5993.82	339426	41639
1973	1319	0.95	98.70	−231.15	229.95	6028.34	344808	42057
1974	1439	2.86	104.22	−230.65	231.37	6144.12	350679	41967
1975	1252	0.75	99.72	−230.91	230.63	6083.92	355787	43000
1976	1310	7.28	97.87	−230.25	232.50	6235.94	361132	42582
1977	1270	3.41	106.62	−230.64	231.40	6146.66	366314	43820
1978	1304	6.24	117.89	−231.26	229.64	6002.39	371634	45525
1979	1385	3.67	113.04	−231.43	229.18	5965.03	377285	46507
1980	1267	4.42	104.22	−231.52	228.91	5943.06	382454	47318
1981	1090	2.37	99.06	−232.26	226.85	5774.41	386901	49267
1982	1098	3.17	100.87	−232.96	224.91	5616.63	391381	51237
1983	1155	8.10	94.03	−232.56	226.03	5707.39	396093	51029
1984	1070	2.69	95.73	−233.11	224.51	5583.91	400459	52733
1985	1010	2.35	92.60	−233.74	222.78	5442.46	404580	54660
1986	973	3.22	88.00	−234.16	221.63	5347.96	408550	56172
1987	1000	3.10	95.80	−234.90	217.62	5184.40	412630	58523
1988	1141	1.59	98.87	−235.21	216.01	5117.08	417285	59961
1989	1153	2.31	105.83	−235.77	213.16	4997.12	421989	62093
1990	1175	3.59	110.48	−236.31	210.41	4881.80	426783	64282

OPERATION STUDIES OF SALTON SEA – 1950–1990

Assumed Inflow Conditions: Historic Inflow Less Mexico Inflow Over 120,000 Acre–Feet Per Year Since 1978.

CALENDER YEAR	INFLOW 1000 AF	PRECIP Inches	PAN EVAP. Inches	ELEVATION Feet	AREA 1000 Ac	VOLUME 1000 AF	SALT 1000 Tons	SALT PPM
Averages:								
1949		1.86	100.20	−240.20	192.27	4120.01		
1950	1170	0.20	97.43	−239.60	194.55	4216.08	220000	38369
1951	1372	1.82	102.25	−238.30	200.69	4473.73	225598	37079
1952	1428	2.46	97.07	−236.60	209.00	4822.71	231424	35284
1953	1422	0.06	103.54	−235.75	213.26	5001.45	237226	34876
1954	1339	1.28	93.39	−234.75	218.42	5218.02	242689	34198
1955	1352	0.93	102.08	−234.35	220.49	5304.93	248205	34403
1956	1294	0.13	104.79	−234.50	219.72	5272.80	253485	35349
1957	1186	1.82	95.68	−234.45	219.97	5283.30	258324	35952
1958	1152	2.20	96.88	−234.60	219.18	5250.26	263024	36836
1959	1297	1.79	100.26	−234.30	220.76	5316.37	268316	37110
1960	1380	1.92	101.86	−233.75	223.67	5438.72	273946	37036
1961	1410	1.75	105.09	−233.35	223.85	5529.76	279699	37192
1962	1464	1.24	103.44	−232.66	225.76	5685.48	285672	36946
1963	1637	3.07	104.93	−231.20	229.83	6018.13	292351	35719
1964	1193	0.55	102.39	−231.85	228.00	5868.57	297218	37240
1965	1171	2.57	95.65	−232.00	227.58	5834.43	301996	38060
1966	1288	1.00	99.02	−231.95	227.72	5845.64	307251	38648
1967	1316	3.10	101.47	−231.75	228.28	5891.84	312620	39015
1968	1370	1.62	107.59	−231.80	228.14	5880.41	318210	39789
1969	1337	1.17	106.34	−231.95	227.71	5844.66	323665	40719
1970	1268	1.09	97.42	−231.90	227.87	5857.82	328838	41277
1971	1284	1.14	95.31	−231.65	228.56	5914.69	334077	41531
1972	1311	1.33	95.66	−231.30	229.53	5993.82	339426	41639
1973	1319	0.95	98.70	−231.15	229.95	6028.34	344808	42057
1974	1439	2.86	104.22	−230.65	231.37	6144.12	350679	41967
1975	1252	0.75	99.72	−230.91	230.63	6083.92	355787	43000
1976	1310	7.28	97.87	−230.25	232.50	6235.94	361132	42582
1977	1270	3.41	106.62	−230.64	231.40	6146.66	366314	43820
1978	1304	6.24	117.89	−231.26	229.64	6002.39	371634	45525
1979	1552	3.67	113.04	−230.70	231.22	6132.03	377966	45322
1980	1422	4.42	104.22	−230.18	232.71	6253.56	383768	45123
1981	1245	2.37	99.06	−230.33	232.29	6219.01	388848	45975
1982	1252	3.17	100.87	−230.47	231.87	6185.10	393956	46834
1983	1223	8.10	94.03	−229.93	233.41	6310.94	398946	46482
1984	1113	2.69	95.73	−230.44	231.95	6191.44	403487	47918
1985	1061	2.35	92.60	−231.00	230.38	6062.84	407816	49459
1986	1019	3.22	88.00	−231.37	229.34	5977.96	411974	50673
1987	1060	3.10	95.80	−232.00	227.57	5833.90	416299	52470
1988	1225	1.59	98.87	−232.17	227.10	5795.29	421297	53453
1989	1311	2.31	105.83	−232.29	226.77	5767.99	426646	54388
1990	1353	3.59	110.48	−232.38	226.53	5748.27	432166	55281

DELIVERY EFFICIENCIES OF IRRIGATION DISTRICTS(a)

Irrigation Districts	1975	1976	1977	1978
Imperial Irrig. Dist.				
onfarm efficiency	73	80	81	77
district efficiency	65	71	73	70
Coachella Valley W.D.				
onfarm efficiency	51	50	55	53
district efficiency	43	44	46	46
Reservation Div. I.D.				
onfarm efficiency	45	47	58	60
district efficiency	36	38	47	50
Y.C.W.U.A. (Valley Div.)I.D.				
onfarm efficiency	64	80	71	72
district efficiency	49	60	54	52
Yuma Mesa Irr.&D.D.				
onfarm efficiency	33	33	29	32
district efficiency	30	30	27	30
Unit "B" Irrig. Dist.				
onfarm efficiency	33	32	35	38
district efficiency	32	31	33	36
Yuma Irrigation Dist.				
onfarm efficiency	62	63	61	61
district efficiency	59	61	59	53
North Gila Irrig. Dist.				
onfarm efficiency	29	40	46	42
district efficiency	28	30	43	40
Wellton-Mohawk Irrig. Dist.				
onfarm efficiency	55	52	63	64
district efficiency	50	47	57	57
Colorado Riv. Indian Tribes				
onfarm efficiency	57	65	76	64
district efficiency	44	50	58	48
Palo Verde Irrig. Dist.				
onfarm efficiency	46	33	45	42
district efficiency	36	26	35	33

(a) Source U.S. Bureau of Reclamation, 1979. Published as Table 10 in DWR Report on Water Use in IID, December 1981.

RELATIONSHIP OF INFLOW TO SALTON SEA FROM IMPERIAL IRRIGATION DISTRICT TO DIVERTED WATER, DELIVERED WATER AND IRRIGATED AREA

Annual Values 1960--1986

Year	IID Inflow to Salton Sea as % of Diverted Water	IID Inflow to Salton Sea as % of Delivered Water	IID Inflow to Salton Sea as Acre Feet Per acre of Irrigated Area
1960	34.0	42.3	2.33
61	33.8	41.3	2.29
62	35.0	42.2	2.40
63	36.9	43.9	2.56
64	30.6	35.4	1.97
1965	31.3	35.6	1.90
66	33.7	38.5	2.17
67	35.8	41.2	2.19
68	33.8	38.3	2.15
69	34.0	38.6	2.06
1970	35.2	40.2	2.22
71	36.2	41.1	2.36
72	35.5	39.9	2.27
73	34.2	37.9	2.28
74	34.7	38.4	2.37
1975	35.8	39.7	2.35
76	37.0	41.0	2.25
77	36.1	39.6	2.11
78	35.3	38.7	2.09
79	35.7	38.9	2.18
1980	35.8	39.3	2.15
81	32.9	36.5	1.96
82	33.6	37.6	1.82
83	34.3	38.0	1.86
84	32.5	36.0	1.91
1985	30.6	34.3	1.75
86	31.3	34.5	1.76
87	31.0	34.6	1.81
88	31.1	35.2	1.94
89	32.1	35.9	2.04
1990	33.1	36.7	2.10

RELATIONSHIP OF INFLOW TO SALTON SEA FROM IMPERIAL IRRIGATION DISTRICT TO DIVERTED WATER, DELIVERED WATER AND IRRIGATED WATER

Five–Year Running Average 1960–1990

Year	IID Inflow to Salton Sea as % of Diverted Water	IID Inflow to Salton Sea as % of Delivered Water	IID Inflow to Salton Sea as Acre Feet Per acre of Irrigated Area
1964	34.0	41.0	2.31
1965	33.5	39.7	2.22
66	33.5	39.1	2.20
67	33.7	38.9	2.16
68	33.1	37.8	2.08
69	33.7	38.4	2.09
1970	34.5	39.4	2.16
71	35.0	39.9	2.20
72	34.9	39.6	2.21
73	35.0	39.6	2.24
74	35.2	39.5	2.30
1975	35.3	39.4	2.33
76	35.5	39.4	2.30
77	35.6	39.3	2.27
78	35.8	39.5	2.23
79	36.0	39.6	2.20
1980	36.0	39.5	2.16
81	35.2	38.6	2.10
82	34.7	38.2	2.04
83	34.5	38.1	1.99
84	33.8	37.5	1.94
1985	32.8	36.5	1.86
86	32.4	36.1	1.82
87	31.9	35.5	1.82
88	31.3	34.9	1.83
89	31.2	34.9	1.86
1990	31.7	35.4	1.93

RELATIONSHIP OF INFLOW TO SALTON SEA FROM IMPERIAL IRRIGATION DISTRICT TO DIVERTED WATER, DELIVERED WATER AND IRRIGATED AREA

Five–Year Running Average 1960–1990

Year (Last Year of 5 Years)	Water Received at Drop 1 1,000 AF	IID Inflow to Salton Sea 1,000 AF	Irrigated Area 1,000 AF	Amount of Water Received at Drop 1 Per Irrigated Acre	IID Inflow to Salton Sea Per Irrigated Acre
1964	2,931	999	432.0	6.8	2.3
1965	2,859	961	432.0	6.6	2.2
66	2,831	951	432.0	6.6	2.2
67	2,785	940	436.0	6.4	2.2
68	2,748	909	438.0	6.3	2.1
69	2,729	921	440.0	6.2	2.1
1970	2,755	951	441.0	6.2	2.2
71	2,768	969	442.0	6.3	2.2
72	2,794	976	441.0	6.3	2.2
73	2,824	989	442.0	6.4	2.2
74	2,903	1021	444.0	6.5	2.3
1975	2,952	1041	448.0	6.6	2.3
76	2,932	1039	451.0	6.5	2.3
77	2,901	1031	454.0	6.4	2.3
78	2,844	1018	456.0	6.2	2.2
79	2,791	1004	457.0	6.1	2.2
1980	2,744	988	458.0	6.0	2.2
81	2,741	964	459.0	6.0	2.1
82	2,706	938	460.0	5.9	2.0
83	2,655	915	459.0	5.8	2.0
84	2,623	887	457.0	5.7	1.9
1985	2,593	849	457.0	5.7	1.9
86	2,554	828	456.0	5.6	1.8
87	2,585	824	454.0	5.7	1.8
88	2,678	838	457.0	5.9	1.8
89	2,737	855	459.0	6.0	1.9
1990	2,809	891	462.0	6.1	1.9

IMPERIAL IRRIGATION DISTRICT ACTIONS TO IMPROVE WATER DELIVERY USE AND DISPOSAL EFFICIENCY

Structural

Canal Lining Program
Regulatory Reservoirs Constructed
Desilting Basins
Seepage and Ground Water Recovery Facilities
Improved Farm Delivery Gates
Install and Maintain Waste Boxes of Standard Design
Automatic Gate Monitoring and Control Devices

Non-Structural

Allocate Funds for Water Conservation
IID/MWD Water Conservation and Transfer Agreement
13 Point Program
21 Point Program
Water Conservation Advisory Board
Participate in Design of Tile Drains
Tailwater Control Checking and Triple Charges
Fines for Tampering with Gates
Flow Data Measuring and Hydrologic Record Keeping
Install Recorders on Spills - Data Collection and Evaluation
Cooperation with USBR (1964, Title 43)
Participate with USBR in Water Conservation Study
Flexible Scheduling of Deliveries
Encourage Use of Drain Water
Drainage Water Delivery to Fish and Game
Provide Radio Equipment
IMS Program
Participating in and Contribution to Water Use Research
Crop Specific Modified Irrigation Program
IID Staffing Ratios
Education and Public Relations

Duplicate Original

AGREEMENT FOR THE IMPLEMENTATION OF A WATER CONSERVATION PROGRAM AND USE OF CONSERVED WATER

THIS AGREEMENT is made and entered into this 22nd day of December, 1988, by and between Imperial Irrigation District, a California irrigation district (IID) and The Metropolitan Water District of Southern California, a California metropolitan water district (MWD), each of which is at times referred to individually as "Party" and which are at times collectively referred to as "Parties."

RECITALS

A. MWD and IID, along with Palo Verde Irrigation District (Palo Verde) and Coachella Valley Water District (Coachella), are each contractors with the United States for delivery of Colorado River water, as authorized by the Boulder Canyon Project Act (Act of December 21, 1928; 45 Stat. 1057; as amended).

B. Pursuant to those contracts, and in accordance with their rights under applicable federal and state law, Palo Verde, the Yuma Project (Reservation Division), IID and

by the Board of Directors of The Metropolitan Water District of Southern California on December 22, 1988.

IMPERIAL IRRIGATION DISTRICT

By _____
President

ATTEST: _____
Secretary

APPROVED AS TO FORM:

J. Penn Carter
Chief Counsel
Imperial Irrigation District

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

By _____
General Manager

ATTEST: _____
for Executive Secretary

APPROVED AS TO FORM:

F. Vendig
General Counsel
The Metropolitan Water
District of Southern
California

APPENDIX A

PROJECTS OF PROGRAM AND ESTIMATED ANNUAL AMOUNTS OF WATER CONSERVED (In Acre-Feet)

	Project	Estimated Water Conserved
1)	Trifolium Reservoir	4,600
2)	South Alamo Canal Lining, Phase I	1,510
3)	Lateral Interceptor	5,700
4)	"Z" Reservoir	3,850
5)	South Alamo Canal Lining Phase II	2,400
6)	Sperber Outlet	465
7)	Lateral Canal Lining	29,150
8)	Trifolium Interceptor	10,700
9)	12-Hour Delivery	12,000
10)	Vail Supply Canal Lining	2,000
11)	Rositas Supply Canal Lining	2,000
12)	Non-leak Gates	3,550
13)	Tailwater Assessment	5,000
14)	Irrigation Water Management	3,400
15)	System Automation	9,075
16)	Westside Main Canal Lining, North	4,600
	Total	100,000

APPENDIX B

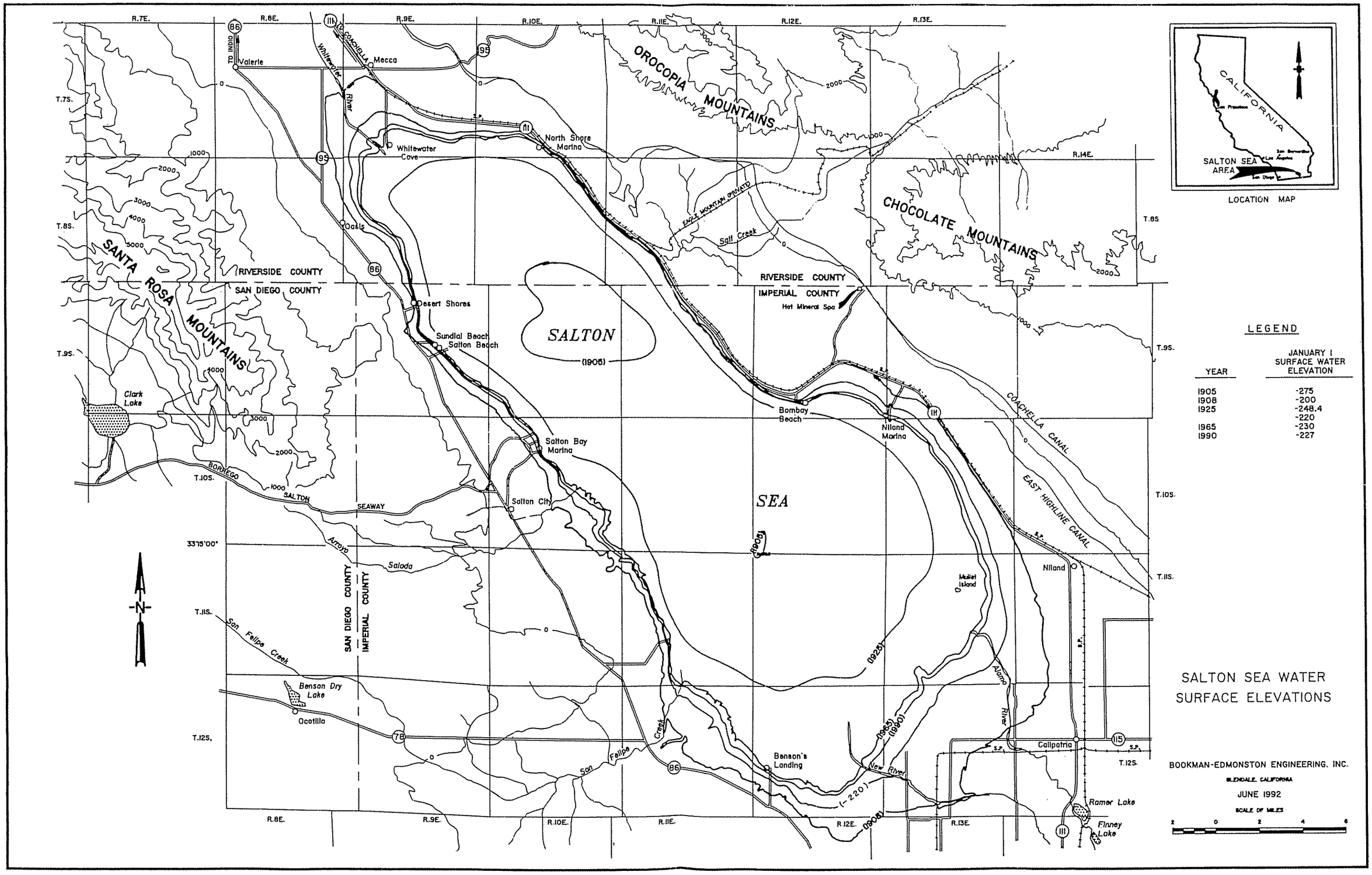
ESTIMATED CAPITAL COSTS
(1988 Dollars)

	Project	Estimated Capital Cost
1)	Trifolium Reservoir	$ 1,600,000
2)	South Alamo Canal Lining, Phase I	992,000
3)	Lateral Interceptor	2,358,000
4)	"Z" Reservoir	1,461,000
5)	South Alamo Canal Lining Phase II	1,455,000
6)	Sperber Outlet	55,000
7)	Lateral Canal Lining	42,674,000
8)	Trifolium Interceptor	5,200,000
9)	12-Hour Delivery	0
10)	Vail Supply Canal Lining	2,800,000
11)	Rositas Supply Canal Lining	2,900,000
12)	Non-leak Gates	284,000
13)	Tailwater Assessment	0
14)	Irrigation Water Management	0
15)	System Automation	14,843,000
16)	Westside Main Canal Lining, North	8,685,000
	Program Coordination and Conserved Water Verification	6,671,000
	Total	91,978,000

APPENDIX C

ESTIMATED ANNUAL COSTS
(1988 Dollars)

	Project	Estimated Annual Costs
1)	Trifolium Reservoir	$ 23,300
2)	South Alamo Canal Lining, Phase I	2,300
3)	Lateral Interceptor	50,700
4)	"Z" Reservoir	18,000
5)	South Alamo Canal Lining Phase II	3,300
6)	Sperber Outlet	4,000
7)	Lateral Canal Lining	79,500
8)	Trifolium Interceptor	94,200
9)	12-Hour Delivery	833,000
10)	Vail Supply Canal Lining	3,400
11)	Rositas Supply Canal Lining	3,200
12)	Non-leak Gates	15,900
13)	Tailwater Assessment	833,000
14)	Irrigation Water Management	382,000
15)	System Automation	356,000
16)	Westside Main Canal Lining, North	20,000
	Program Coordination and Conserved Water Verification	213,000
	Insurance	200,000
	Total	$3,134,800


SALTON SEA WATER SURFACE ELEVATIONS
BOOKMAN-EDMONSTON ENGINEERING, INC.
GLENDALE, CALIFORNIA
JUNE 1992
SCALE OF MILES
LOCATION MAP
CALIFORNIA
SALTON SEA AREA
LEGEND
YEAR
JANUARY 1 SURFACE WATER ELEVATION
1905 -275
1908 -200
1925 -248.4
-220
1965 -230
1990 -227
SALTON SEA
(1905)
(1908)
(1925)
(1965)
(1990)
(-220)
OROCOPIA MOUNTAINS
CHOCOLATE MOUNTAINS
SANTA ROSA MOUNTAINS
EAGLE MOUNTAIN (PRIVATE)
RIVERSIDE COUNTY
SAN DIEGO COUNTY
IMPERIAL COUNTY
Valerie
Mecca
Whitewater River
Whitewater Cove
North Shore Marina
Oasis
Desert Shores
Sundial Beach
Salton Beach
Salton Bay Marina
Salton City
Hot Mineral Spa
Bombay Beach
Niland Marina
Niland
Mullet Island
Salt Creek
Clark Lake
Borrego Salton Seaway
Arroyo Salada
San Felipe Creek
Benson Dry Lake
Ocotillo
Benson's Landing
New River
Alamo River
Calipatria
Ramer Lake
Finney Lake
Coachella Canal
East Highline Canal
TO INDIO
R.7E.
R.8E.
R.9E.
R.10E.
R.11E.
R.12E.
R.13E.
R.14E.
T.7S.
T.8S.
T.9S.
T.10S.
T.11S.
T.12S.
33°15'00"

ESTIMATED ANNUAL VALUE OF CROPS IN THE IMPERIAL VALLEY

COMMODITY	HARVESTED ACREAGE 1985	1986	1987	1988	1989
Cereals	78,338	94,313	69,688	60,832	99,439
Forage	230,225	235,171	227,178	230,326	221,111
Misc. Field Crops	62,481	56,492	66,995	64,307	47,475
Vegetables	101,163	88,900	116,054	120,207	132,947
Nursery	184	66	98	52	45
Fruits	2,428	1,711	1,920	2,414	2,187
Nuts	31	27	27	27	2,418
Seeds	25,403	25,827	7,888	10,960	12,395
TOTAL	474,819	476,653	481,933	478,138	503,204

COMMODITY	VALUE 1985	1986	1987	1988	1989
Cereals	$32,185,848	$28,246,754	$16,874,680	$39,134,335	$48,991,632
Forage	$151,289,686	$116,865,769	$114,253,928	$161,167,845	$161,917,463
Misc. Field Crops	$65,508,490	$61,354,431	$82,261,037	$71,692,660	$43,271,499
Vegetables	$262,249,939	$241,503,306	$300,785,295	$376,849,482	$315,898,003
Nursery	$331,200	$361,020	$536,060	$284,440	$246,150
Fruits	$5,082,561	$6,609,520	$8,129,680	$11,703,812	$9,684,580
Nuts	$56,319	$7,217	$24,745	$6,473	$1,082,430
Seeds	$18,009,224	$34,032,087	$7,935,201	$10,723,442	$12,483,456
TOTAL	$534,713,267	$488,980,104	$530,800,626	$671,562,489	$593,575,213

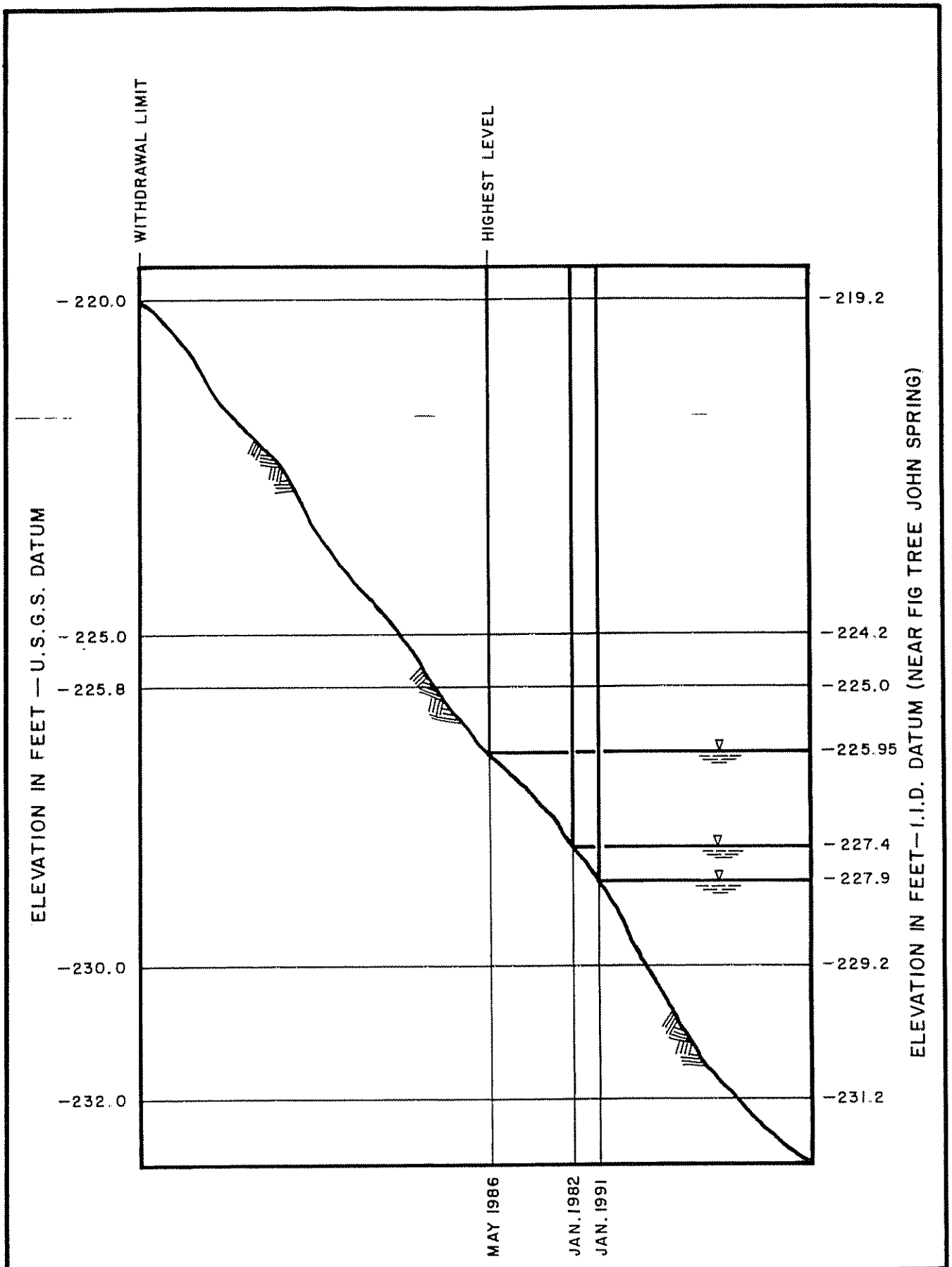
Source: Summary Statistics -- Water, Land, and Related Data; US Department of the Interior Bureau of Reclamation

ESTIMATED ANNUAL VALUE OF CROPS IN THE COACHELLA VALLEY

COMMODITY	HARVESTED ACREAGE 1985	1986	1987	1988	1989
Cereals	1,244	425	772	528	545
Forage	5,826	5,941	5,711	4,761	5,133
Misc. Field Crops	1,382	1,208	1,009	1,206	901
Vegetables	15,333	17,274	19,455	19,919	24,626
Nursery	666	503	570	687	778
Fruits	38,316	38,846	39,421	39,968	39,716
Nuts	27	27	24	24	14
TOTAL	62,794	64,224	66,962	67,093	71,713

COMMODITY	VALUE 1985	1986	1987	1988	1989
Cereals	$282,306	$70,268	$122,316	$187,975	$105,294
Forage	$3,229,843	$3,601,986	$3,077,400	$2,972,636	$5,102,618
Misc. Field Crops	$1,130,911	$1,124,604	$765,831	$863,496	$1,063,180
Vegetables	$50,968,534	$43,881,914	$73,139,947	$83,572,523	$87,193,669
Nursery	$3,644,166	$2,752,275	$5,523,300	$66,570	$7,538,820
Fruits	$226,912,597	$184,366,408	$185,944,010	$196,835,074	$240,881,331
Nuts	$8,202	$7,217	$6,876	$6,876	$4,011
TOTAL	$286,176,559	$235,804,672	$268,579,680	$284,505,150	$341,888,923

Source: Summary Statistics – Water, Land, and Related Data; US Department of the Interior Bureau of Reclamation



RELATIONSHIP BETWEEN U.S.G.S. AND I.I.D. ELEVATIONS OF SALTON SEA