SUPPLEMENT 1

SUMMARY OF THE CONDITION OF SOUTH FLORIDA WATER STORAGE AREAS IN THE 1972-73 DRY SEASON

Central and Southern Florida
Flood Control District

July 1973

SUMMARY OF THE CONDITIONS OF SOUTH FLORIDA WATER STORAGE AREAS IN THE 1972-73 DRY SEASON

Introduction

This is the first supplement to the original summary report which compiled and compared various meteorologic and hydrologic data for the 1970-1971, and 1971-1972 dry seasons. This supplement presents similar information for the 1972-1973 dry season and provides commentary and comparison thereon.

Rainfall

Table 1 summarizes monthly rainfall data for the four reservoir areas, and compares the monthly and seasonal values with normal values.

October rainfall was more than 3 inches deficient over the entire region, with the major impact being felt in the Lake Okeechobee area where rainfall was 20% of normal. From November through March rainfall was uniformly above normal. Substantial defiencies showed up again, however, in April and May; particularly in the central and southern Everglades areas. Dry season rainfall averaged about 80% of normal for the entire region.

Figures 1-A and 1-B show the accumulated dry season rainfall for all four areas and compares the 1972-73 values with normal and with those for 1970-71 and 1971-72. Although both 1970-71 and 1972-73 were rainfall deficient seasons the pattern of deficiency was different. In the former period October rainfall in all areas was not substantially below normal and the severely deficient months were November through January with deficiencies again in March and April. In 1972-1973 almost the reverse was the case. October was deficient, whereas in November through March

there was an excess above normal.

In all areas there is an accumulated rainfall deficiency since October 1970 which is about 5 inches in the Lake Okeechobee area and about 7 inches in the southern Everglades area.

Evaporation

Table 2 lists monthly open pan evaporation data for Lake Okeechobee and at Pumping Station 7.

The Lake Okeechobee data tend to support the observation made in the original report that higher seasonal evaporation losses appear to be associated with seasonal rainfall deficiencies. However, the S-7 data do not show this; the 1972-1973 losses being greater than those in 1970-1971. The high values for April and May are noted and these are obviously associated with the strong sustained winds which occurred on several occasions, particularly around April 21-24, during that period.

Table 3 lists the estimated monthly evaporation and total drafts on Lake Okeechobee, and makes comparisons of the 1972-73 percentages with those for 1970-71 and 1971-72. There is no particular pattern to these data other than confirmation of the obvious fact that evaporation represents a smaller share of the total draft during periods of heavier irrigation water withdrawls.

Water Delivery and Use

Table 4 is a summary of the water deliveries to the service areas of all four reservoirs. Lake Okeechobee deliveries were less than in 1970-71, but more than in 1971-72. This is evidence of the relationship between increased need for supplemental irrigation water and deficient precipitation. Monthly values show this as well; the largest deliveries were made in October, April and May, the months of deficient rainfall.

Tables 5 and 6 show the demands related to points of delivery and to seepage.

Total system delivery was about 11% greater than in 1971-1972 and about 19% less than in the drought of 1970-71.

Figure 3 shows the mass total system delivery curves for the past 3 dry seasons.

Deliveries to Everglades National Park were deficient in the months of October and November because of low stages in Conservation Area No. 3. A portion of these deficiencies were made up in December through February.

Low stages in the conservation areas are a partial explanation for the reduced deliveries from the conservation areas when compared with 1971-1972, since seepage is considered to be a beneficial use delivery.

Reservoir Inflow

Table 7 lists selected data on inflow (surface runoff) into each of the four reservoir areas. These data are a generalized reflection of precipitation in the areas contributory to the reservoirs. For most of the inflow points (except the Kissimmee River) the values for 1972-73 lie closer to those for 1970-71 than for 1971-72. This indicates the scarcity of runoff producing events in an area such as the Agricultural Area even though total seasonal rainfall was on the order of 80% of normal.

Kissimmee River inflow was significally greater than in either 1970-71 or 1971-72 because of close to normal rainfall in the Kissimmee Valley. This factor contributed substantially to the maintenance of adequate stages in Lake Okeechobee during the critical months of April and May.

Figure 3 is a set of bar graphs, for each reservoir, showing the proportions of total inflow contributed by rainfall and by runoff. Throughout the period rainfall was by far the greater contributor to inflow to all

these conservation areas. On the other hand, from January on, runoff was the major factor for Lake Okeechobee.

Stage - Storage

Figures 4A and 4B depict reservoir stages in comparison with the regulation schedules and historical maximum, minimum and mean stages.

Figures 5 through 9 are curves showing the relationships between available reservoir storage and the 1970-1971 demand.

Water Budget, October 1972 - May 1973

Figures 10 through 13 are graphical summaries of the water budget parameters of the 1972-73 dry season for each reservoir.

The data for Conservation Areas 2 A and 3 A indicate a reasonably good balance. The poor balance for Lake Okeechobee is unexplainable at at this time and is being analyzed.

TABLE I

SUMMARY OF RAINFALL DATA (INCHES)

MONTH	LAKE OKEECHOBEE			N. EVERGLADES			C. EVERGLADES			S. EVERGLADES		
	NORMAL	1972-73	DEP.	NORMAL	1972-73	DEP.	NORMAL	1972-73	DEP.	NORMAL	1972-73	DEP.
OCTOBER	4.16	0.81	-3.35	5.17	1.44	-3.73	5.99	2.82	-3.17	7.11	3.65	-3.46
NOVEMBER	1.12	2.52	+1.40	1.46	2.40	+0.94	1.76	2.65	+0.89	1.72	3.67	+1.95
DECEMBER	1.16	1.58	+0.42	1.54	1.77	+0.23	1.50	1.92	+0.42	1.04	1.26	+0.22
JANUARY	1.09	2.26	+1.17	1.66	1.96	+0.30	1.76	2.52	+0.76	1.64	1.70	+0.06
FEBRUARY	1.84	1.79	-0.05	1.80	1.20	-0.60	1.86	0.60	-1.26	1.70	1.98	+0.28
MARCH	2.26	2.88	+0.62	2.60	3.18	+0.58	2.23	3.92	+1.69	2.02	1.97	-0.05
APRIL	2.75	1.00	-1.75	2.14	0.99	-1.15	2.82	0.92	-1.90	2.72	0.84	-1.88
MAY	3.87	4.53	+0.66	4.52	3.67	-0.85	5.02	3.49	-1.53	5.81	3.44	-2.37
TOTAL	18.25	17.37	-0.88	20.89	16.61	-4.28	22.94	18.84	-4.10	23.76	18.51	-5.25

TABLE 2

MONTHLY EVAPORATION - LAKE OKEECHOBEE AND S-7 (INCHES)

MONTH	LAKE OKEECHOBEE NORMAL	LAKE OKEECHOBEE 1972-73	LAKE OKEECHOBEE DEP.	S-7 NORMAL	S-7 1972-73	S-7 DEP.
OCTOBER	4.50	5.76	+1.26	3.35	4.30	+0.95
NOVEMBER	3.70	3.10	-0.60	3.16	2.74	-0.42
DECEMBER	3.00	3.19	+0.19	2.67	3.18	+0.51
JANUARY	3.00	2.48	-0.52	2.51	3.15	+0.64
FEBRUARY	3.60	3.32	-0.28	3.06	3.48	+0.42
MARCH	5.00	4.96	-0.04	4.70	5.30	+0.60
APRIL	5.70	6.16	+0.46	5.80	6.54	+0.74
MAY	6.30	7.54	+1.24	5.20	6.63	+1.43
TOTAL	34.80	36.51	+1.71	30.45	35.32	+4.87

TABLE 3

LAKE OKEECHOBEE - RELATION OF EVAPORATION TO TOTAL DRAFT

MONTH	Q (AF)	EVAPORATION 1972-73 Inches	EVAPORATION 1972-73 AF	TOTAL DRAFT[a] 1972-73 AF	EVAPORATION DRAFT (%)[b] 1972-73	1970-71	1971-72
OCTOBER	97,565	5.8	195,750	293,315	66.7	80.7	91.0
NOVEMBER	50,569	3.1	100,647	151,216	66.6	53.3	77.9
DECEMBER	38,111	3.2	102,933	141,044	73.0	49.2	67.9
JANUARY	26,047	2.5	79,916	105,963	75.4	53.7	67.4
FEBRUARY	15,912	3.3	107,140	123,052	87.1	71.0	76.5
MARCH	47,919	5.0	162,750	210,669	77.3	63.9	70.4
APRIL	122,052	6.2	202,650	324,702	62.4	56.6	79.2
MAY	145,941	7.5	238,516	384,457	62.0	65.9	91.5
AVERAGE	--	--	--	--	71.3	61.8	77.7

(a) Total draft (AF) = Outflow (AF) + Evaporation (AF)

(b) Evaporation draft (%) = Evaporation (AF)/Total draft (AF)

TABLE 4

SUMMARY OF WATER DELIVERY - OCTOBER 1972 THROUGH MAY 1973
ACRE-FEET

MONTH	LAKE OKEECHOBEE	CONSERVATION AREA 1	CONSERVATION AREA 2A	CONSERVATION AREA 3A	EVERGLADES NATIONAL PARK	MONTHLY TOTAL
1972						
OCTOBER	97,565	15,609	12,912	36,278	55,150	217,514
NOVEMBER	50,569	15,409	12,496	30,347	48.040	156,861
DECEMBER	38,111	14,993	11,068	27,055	35,940	127,167
1973						
JANUARY	26,047	16,600	10,453	25,210	28,380	106,690
FEBRUARY	15,912	14,722	5,554	22,215	12,110	70,513
MARCH	47,919	16,898	4,870	20,291	5,450	95,428
APRIL	122,052	16,330	8,910	13,100	2,440	162,832
MAY	145,941	12,224	6,605	15,843	1,650	182,263
TOTAL	544,116	122,785	72,868	190,339	189,160	1,119,268

TABLE 5

LAKE OKEECHOBEE SERVICE AREA DEMAND (ACRE FT.)

MONTH	Lake Shore AREA	HGS-3	HGS-4	HGS-5	ST. LUCIE & CALOOSAHATCHEE CANALS	MARTIN CO. IRRIGATION	MONTHLY DEMAND
1972 OCTOBER	3,283	13,795	37,787	21,695	10,822	10,183	97,565
NOVEMBER	2,801	5,681	16,443	8,535	9,331	7,778	50,569
DECEMBER	0	4,272	13,575	9,092	3,116	8,056	38,111
1973 JANUARY	2,152	2,501	5,794	4,268	4,220	7,112	26,047
FEBRUARY	833	887	3,394	2,047	1,430	7,321	15,912
MARCH	1,229	3,631	15,106	12,444	6,139	9,370	47,919
APRIL	2,706	17,534	50,517	30,567	9,907	10,821	122,052
MAY	2,905	41.030	51,287	26,366	13,214	11,139	145,941
TOTAL	15,909	89,331	193,903	115,014	58,179	71,780	544,116

TABLE 6

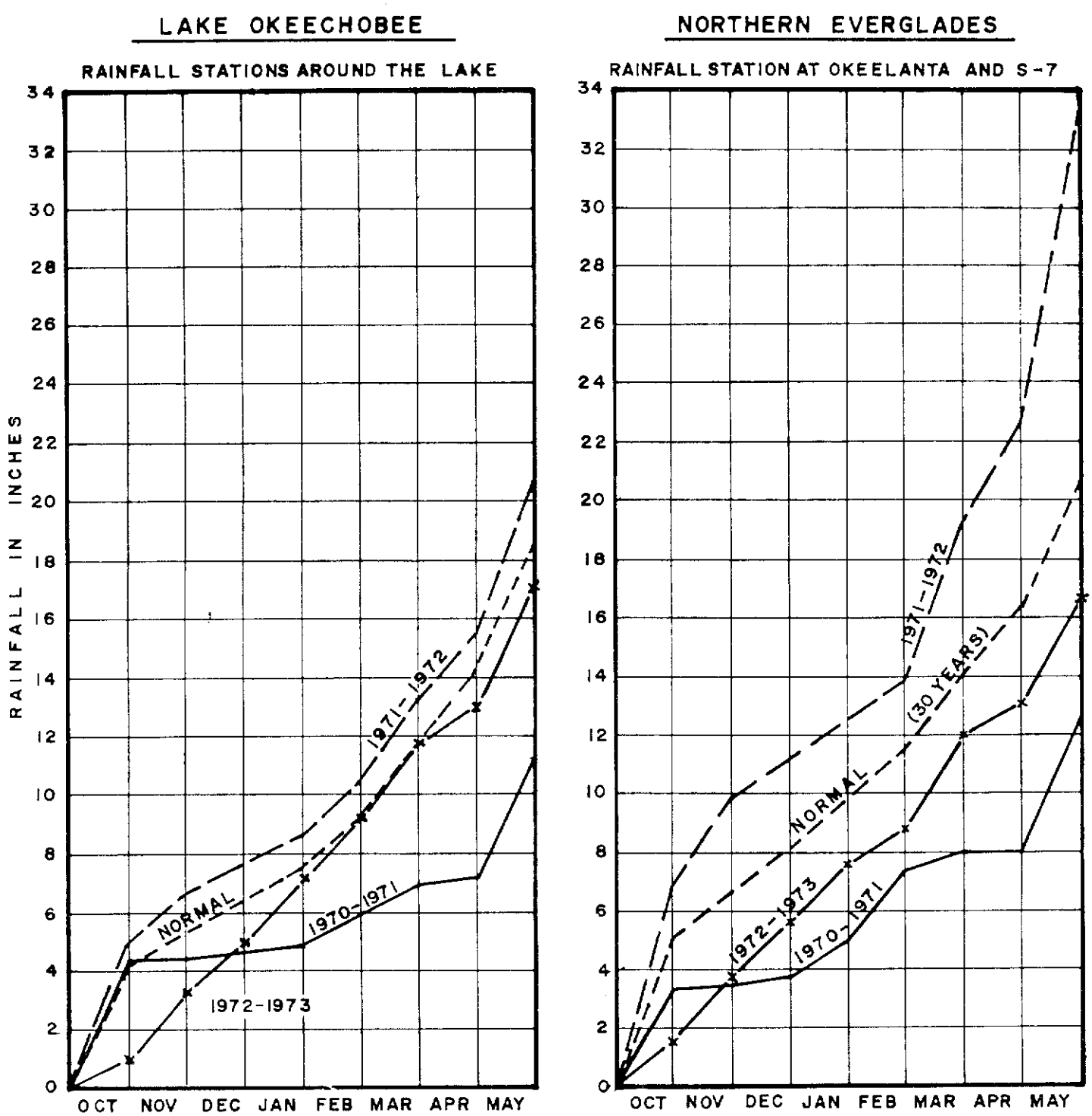
DEMAND OF CONSERVATION AREAS (ACRE-FT)

MONTH	CONSERVATION AREA 1			CONSERVATION AREA 2A			CONSERVATION AREA 3A				MONTHLY TOTAL
	S-39 & LWDD	SEEPAGE	SUB-TOTAL	S-34 S-38	SEEPAGE	SUB-TOTAL	S-151	SEEPAGE	EVERG. NAT'L PARK	SUB-TOTAL	
1972 OCTOBER	1,651	13,958	15,609	0	12,912	12,912	0	36,278	55,150	91,428	119,949
NOVEMBER	2,259	13,150	15,409	0	12,496	12,496	0	30,347	48,040	78,387	106,292
DECEMBER	1,589	13,404	14,993	0	11,068	11,068	0	27.055	35,940	62,995	89,056
1973 JANUARY	3,380	13,220	16,600	0	10,453	10,453	0	25,210	28,380	53,590	80,643
FEBRUARY	2,670	12,052	14,722	0	5,554	5,554	0	22,215	12,110	34,325	54,601
MARCH	5,400	11,498	16,898	2,410	2,460	4,870	0	20,291	5,450	25,741	47,509
APRIL	7,940	8,390	16,330	7,720	1,190	8,910	0	13,100	2,440	15,540	40,780
MAY	7,305	4,919	12,224	5,990	615	6,605	4,160	11,683	1,650	17,493	36,322
TOTAL	32,194	90,591	122,785	16,120	56,748	72,868	4,160	186,179	189,160	379,499	575,152

TABLE 7

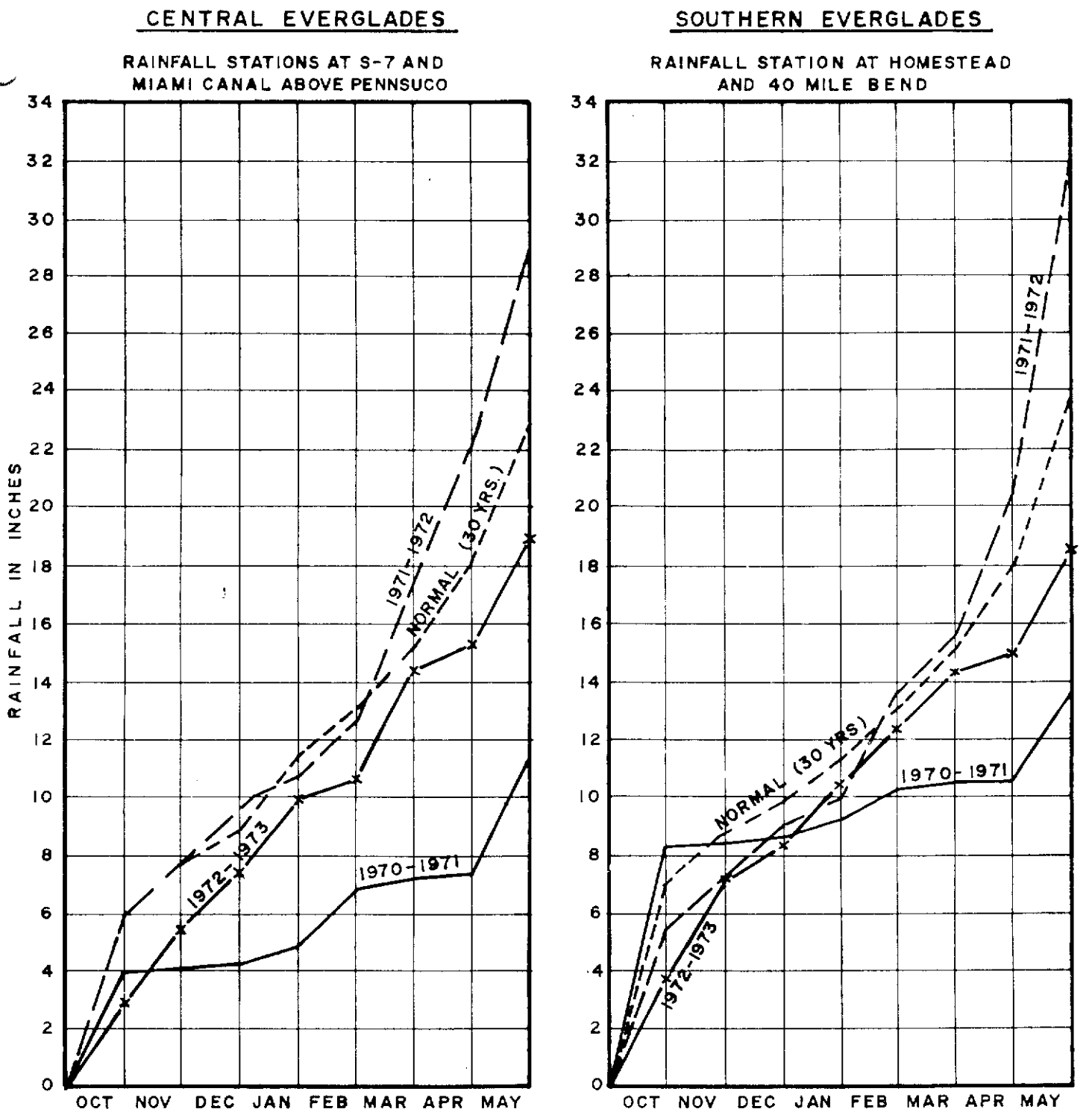
SELECTED INFLOW DATA - OCTOBER THROUGH MAY

STATION	AVERAGE DISCHARGE OCT - MAY (ACRE-FT)	DISCHARGE OCT. 72 THRU MAY 73		
		TOTAL (ACRE-FT)	DEP. FROM NORMAL ACRE-FT	DEP. FROM NORMAL %
LAKE OKEECHOBEE				
Kissimmee River	771,570 (1964-70)	624,550	-147,020	-19.05
Taylor Creek	33,155 (1956-70)	9,850	- 23,305	-70.29
Fisheating Creek	86,922 (1956-70)	28,076	- 58,846	-67.70
CONSERVATION AREA 1				
S-5A	130,460 (1958-70)	31,880	- 98,580	-75.56
S-6	81,744 (1960-70)	14,230	- 67,514	-82.59
CONSERVATION AREA 2A				
S-7	84,069 (1961-70)	19,550	- 64,519	-76.75
CONSERVATION AREA 3A				
S-8	105,676 (1962-70)	27,300	- 78,376	-74.17
S-9	50,101 (1958-70)	52,380	+ 2,279	+ 4.55



ACCUMULATED RAINFALL FROM OCTOBER TO MAY

FIGURE I-A



ACCUMULATED RAINFALL FROM OCTOBER TO MAY

FIGURE 1-B

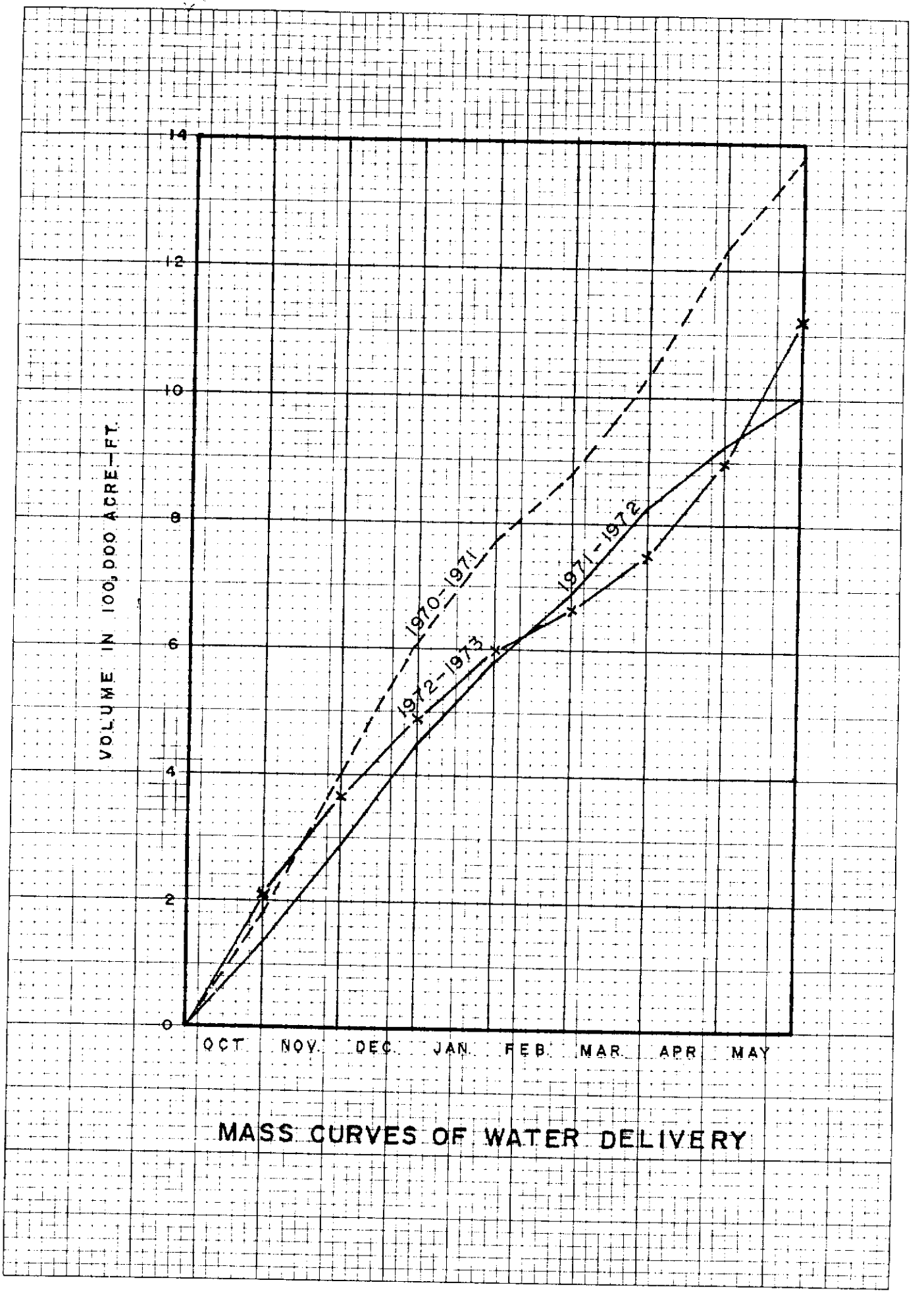


FIGURE 2

EUGENE DIETZGEN CO.
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10 X 10 PER INCH

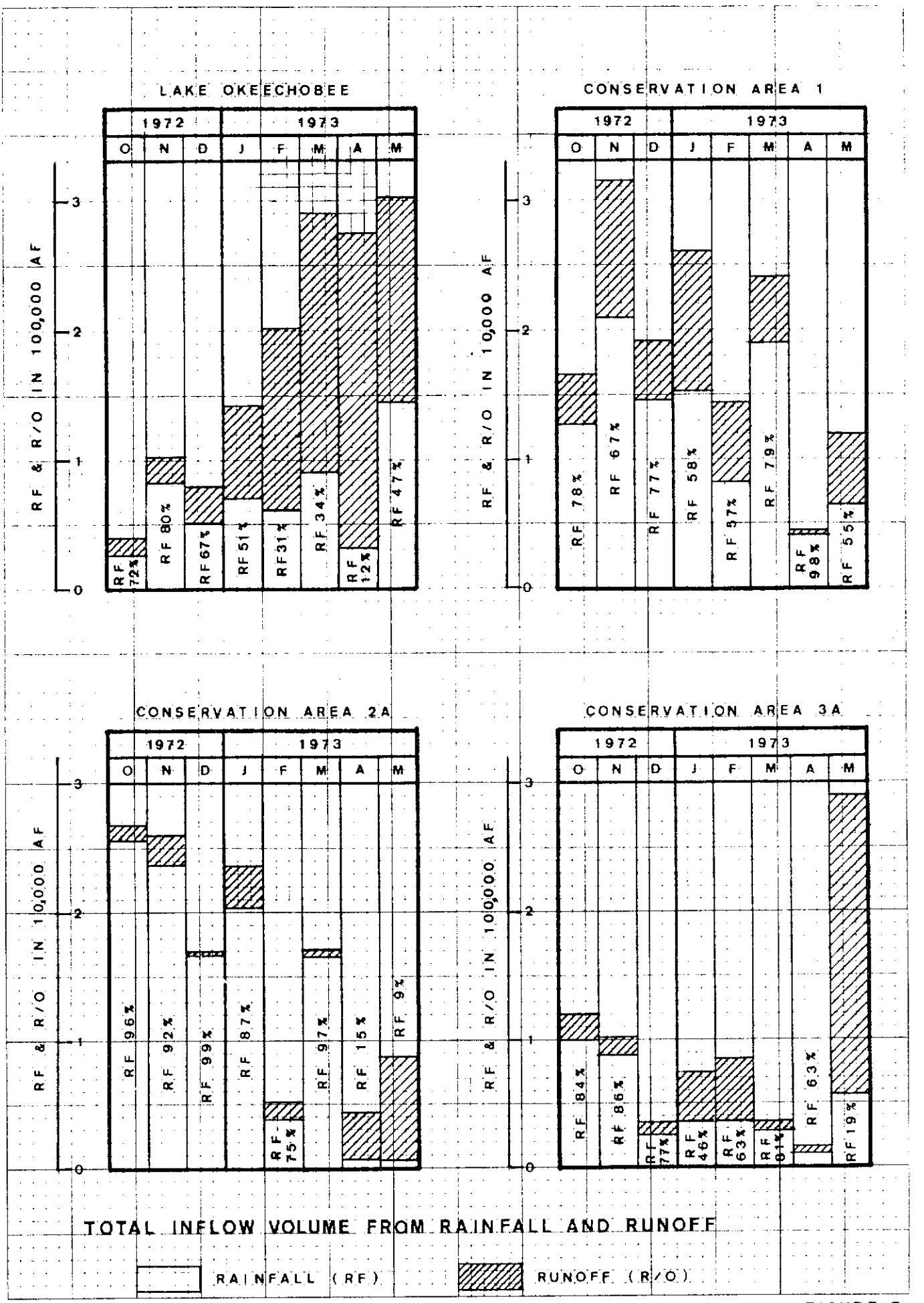
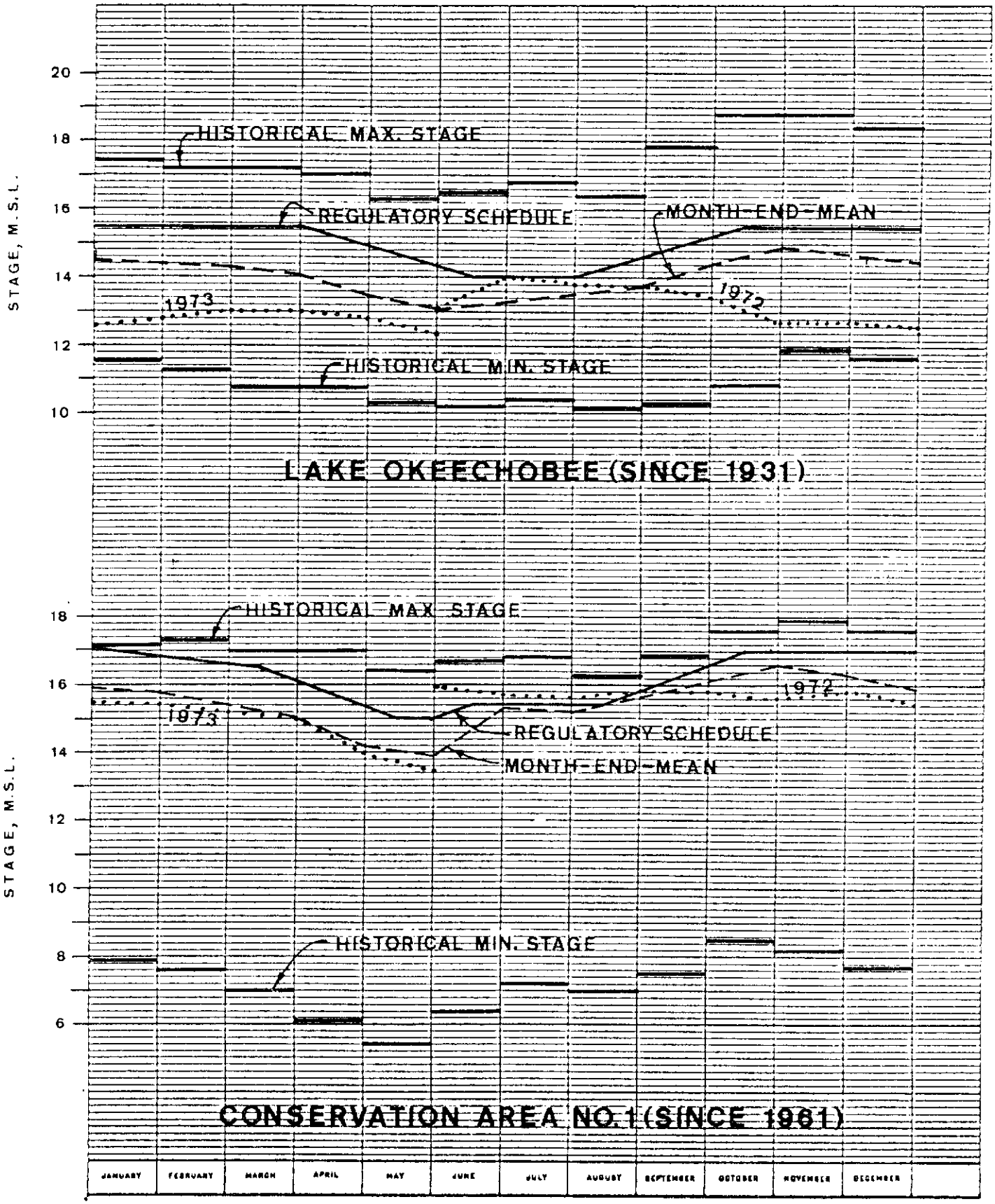
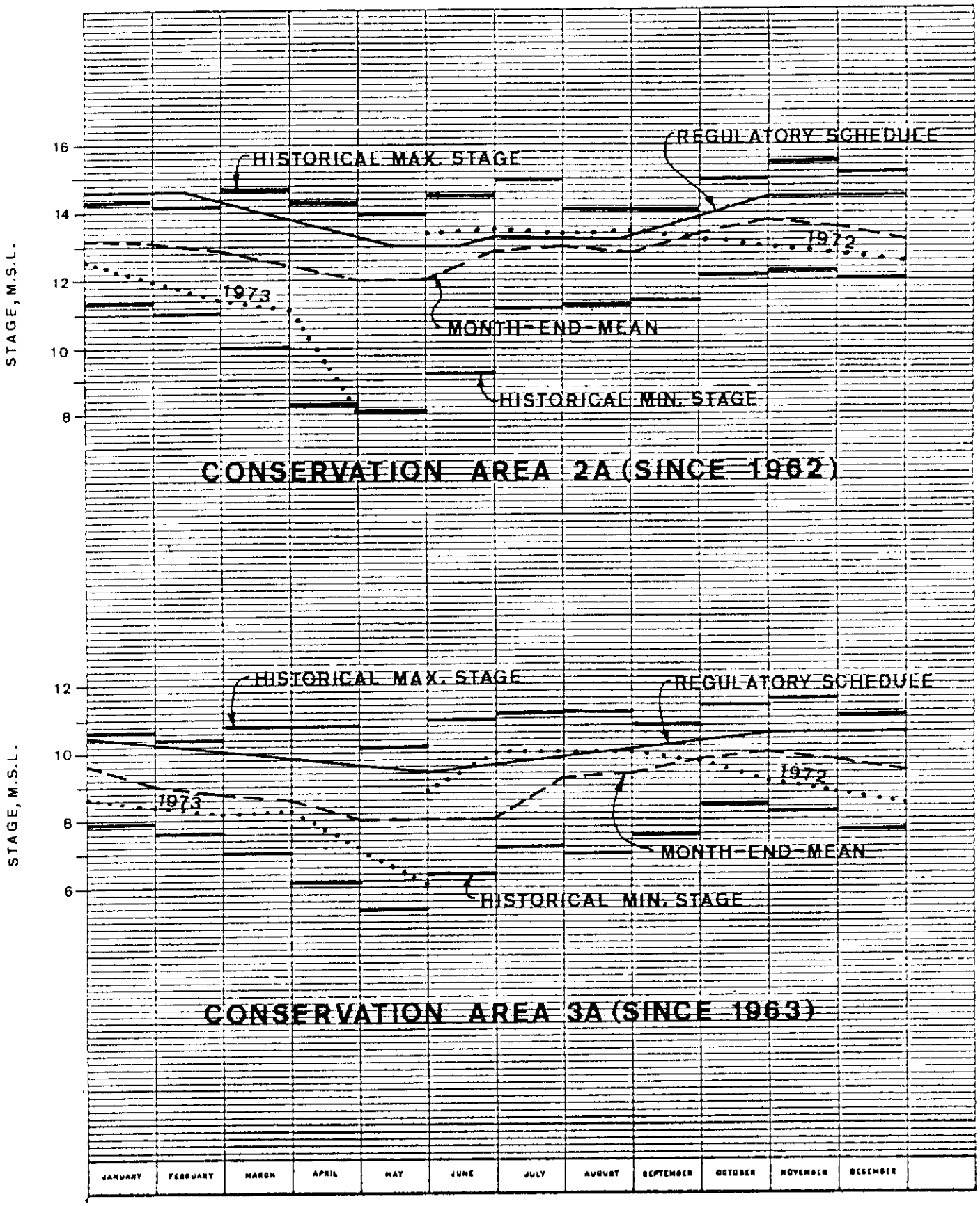

LAKE OKEECHOBEE
1972
1973
O N D J F M A M
RF & R/O IN 100,000 AF
0 1 2 3
RF 72%
RF 80%
RF 67%
RF 51%
RF 31%
RF 34%
RF 12%
RF 47%
CONSERVATION AREA 1
1972
1973
O N D J F M A M
RF & R/O IN 10,000 AF
0 1 2 3
RF 78%
RF 67%
RF 77%
RF 58%
RF 97%
RF 79%
RF 98%
RF 55%
CONSERVATION AREA 2A
1972
1973
O N D J F M A M
RF & R/O IN 10,000 AF
0 1 2 3
RF 96%
RF 92%
RF 99%
RF 87%
RF 75%
RF 97%
RF 15%
RF 9%
CONSERVATION AREA 3A
1972
1973
O N D J F M A M
RF & R/O IN 100,000 AF
0 1 2 3
RF 84%
RF 86%
RF 77%
RF 46%
RF 63%
RF 81%
RF 63%
RF 19%
TOTAL INFLOW VOLUME FROM RAINFALL AND RUNOFF
RAINFALL (RF)
RUNOFF (R/O)

FIGURE 3



MONTH-END STAGE OF THE RESERVOIRS

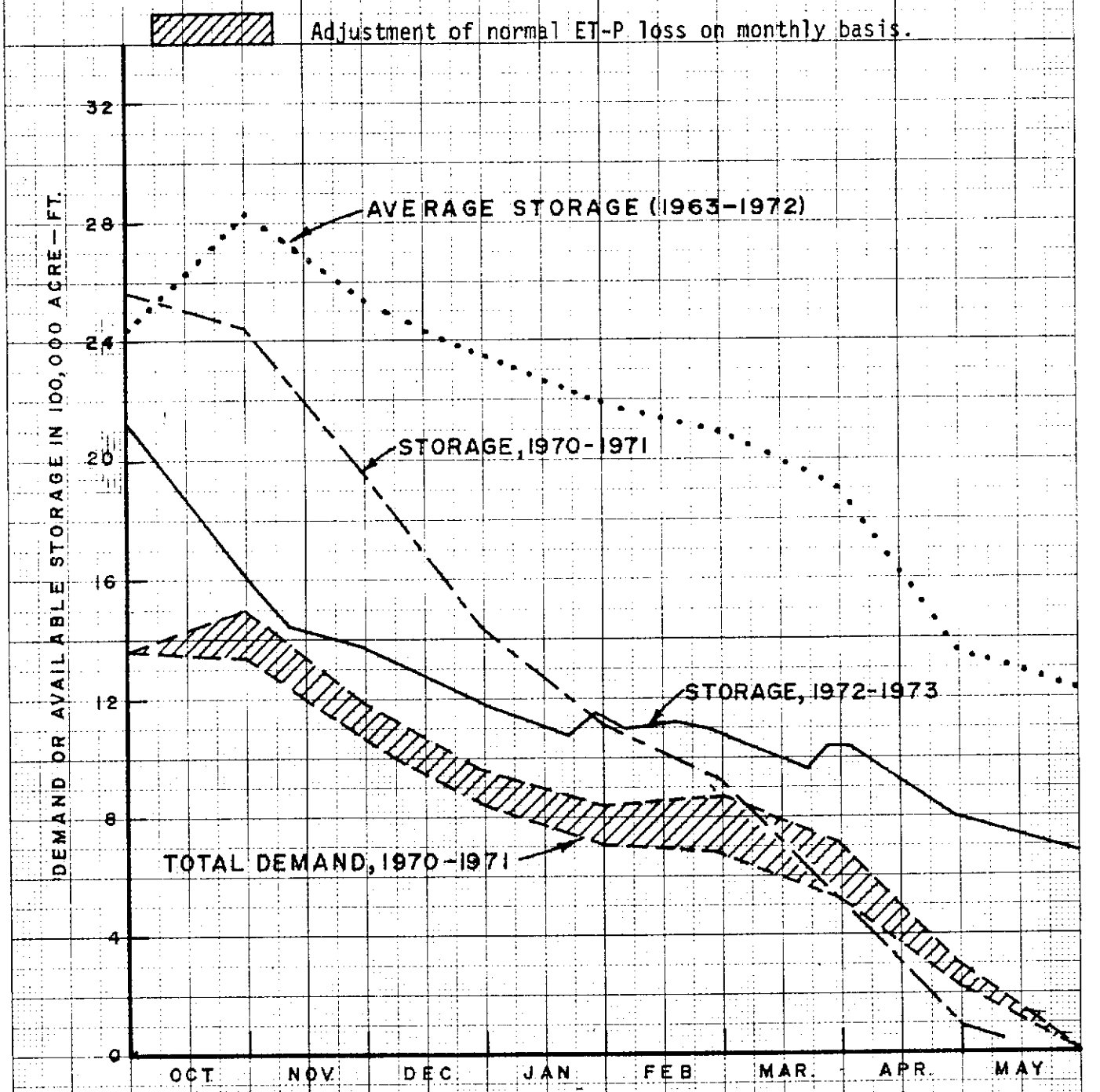
FIGURE 4-A



MONTH-END STAGE OF THE RESERVOIRS

FIGURE 4-B

NOTES: (1) The total available storage is the storage above the floor elevation of Conservation Areas 1, 2A, 3A and Lake Okeechobee.
(2) The total demand is reverse mass curve with adjustment of normal rainfall and evapotranspiration monthly.
(3) The Everglades National Park's scheduled delivery and seepage from Conservation Areas are included in total demand.



THE DISTRICT TOTAL STORAGE AND DEMAND CURVES

FIGURE 5

EUGENE DIETZGEN CO. MADE IN U.S.A.
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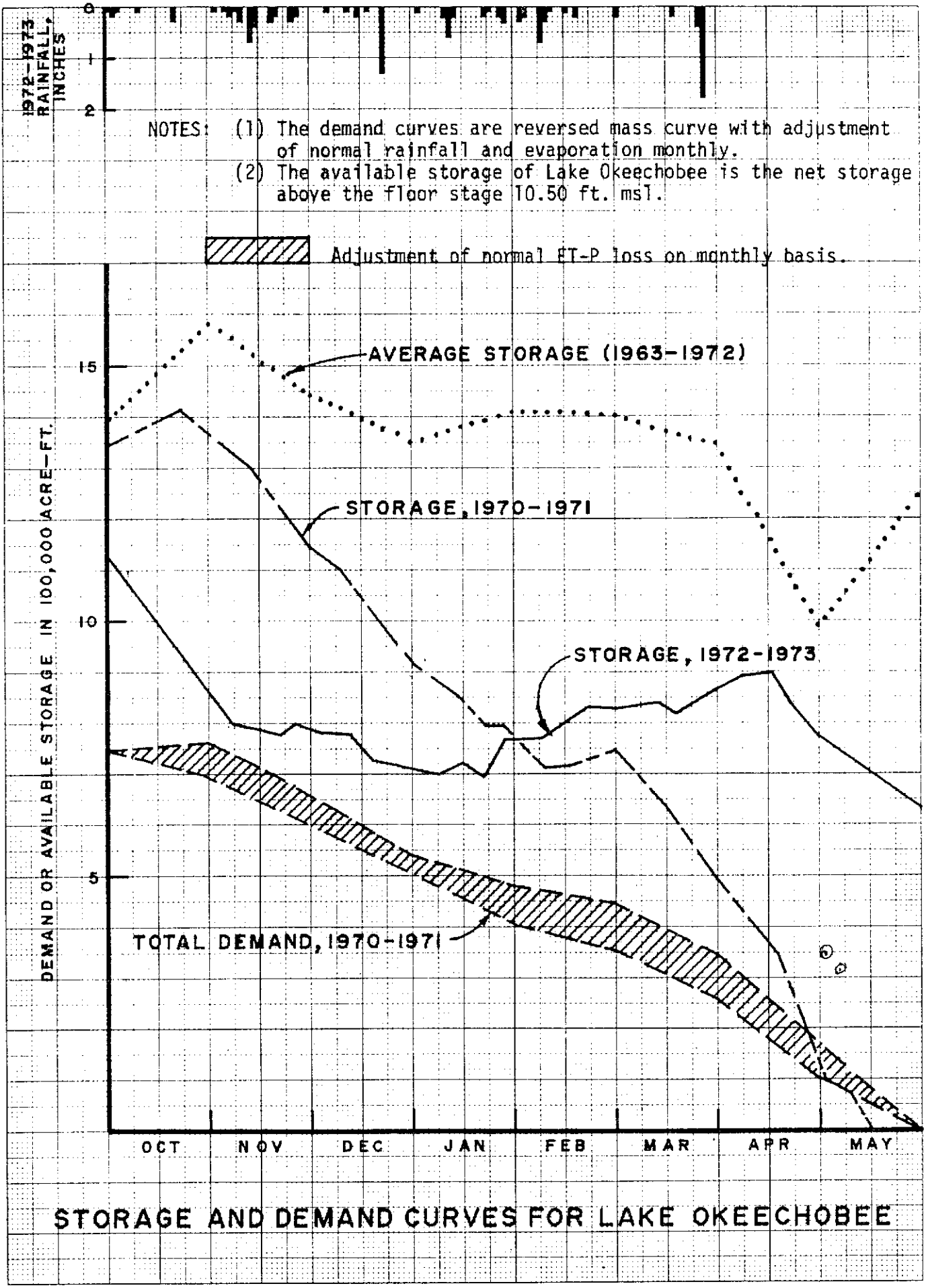

STORAGE AND DEMAND CURVES FOR LAKE OKEECHOBEE

FIGURE 6

EUGENE DIETZGEN CO. MADE IN U.S.A.
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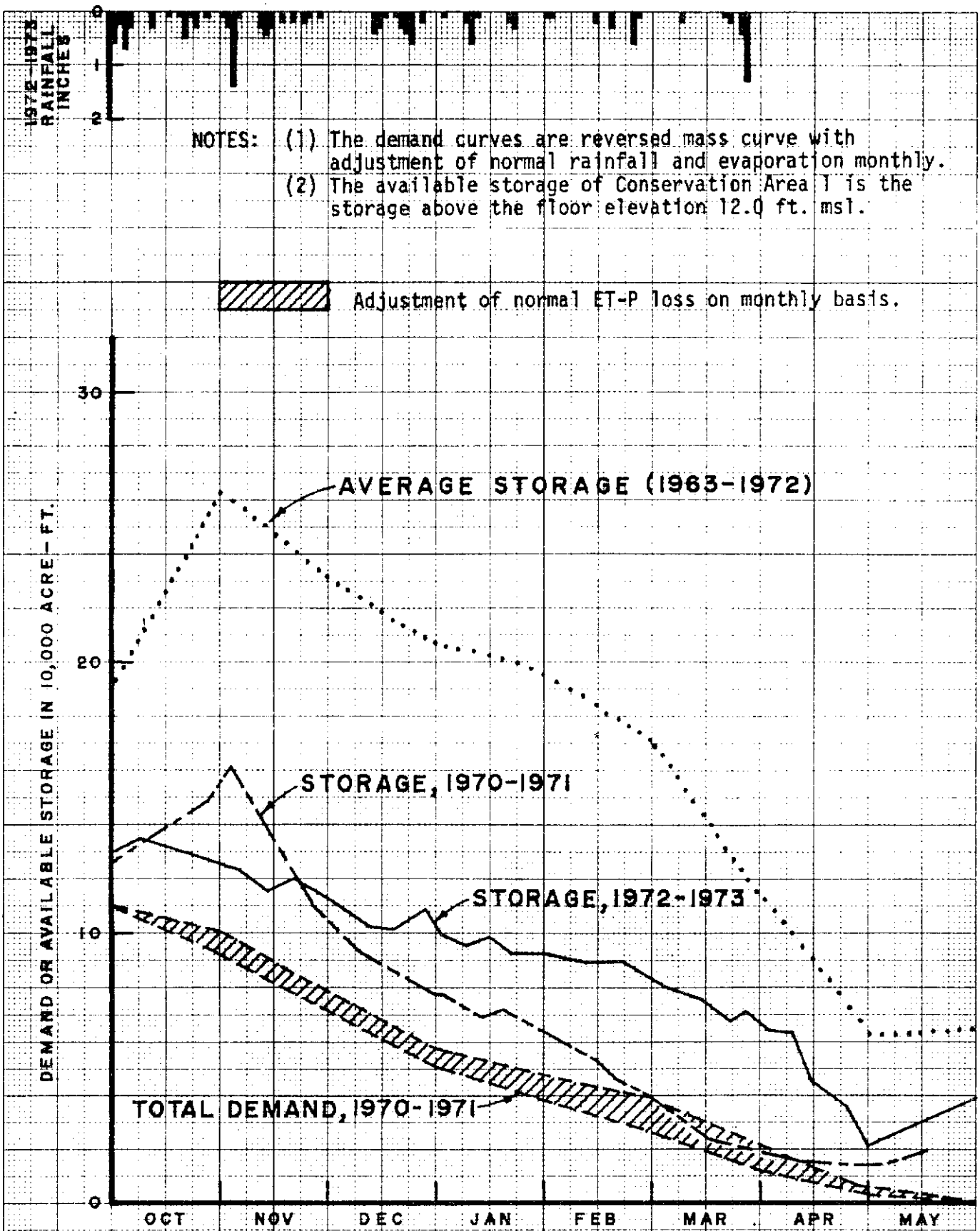

STORAGE AND DEMAND CURVES FOR CONSERVATION AREA 1

FIGURE 7

EUGENE DIETZGEN CO. MADE IN U.S.A.
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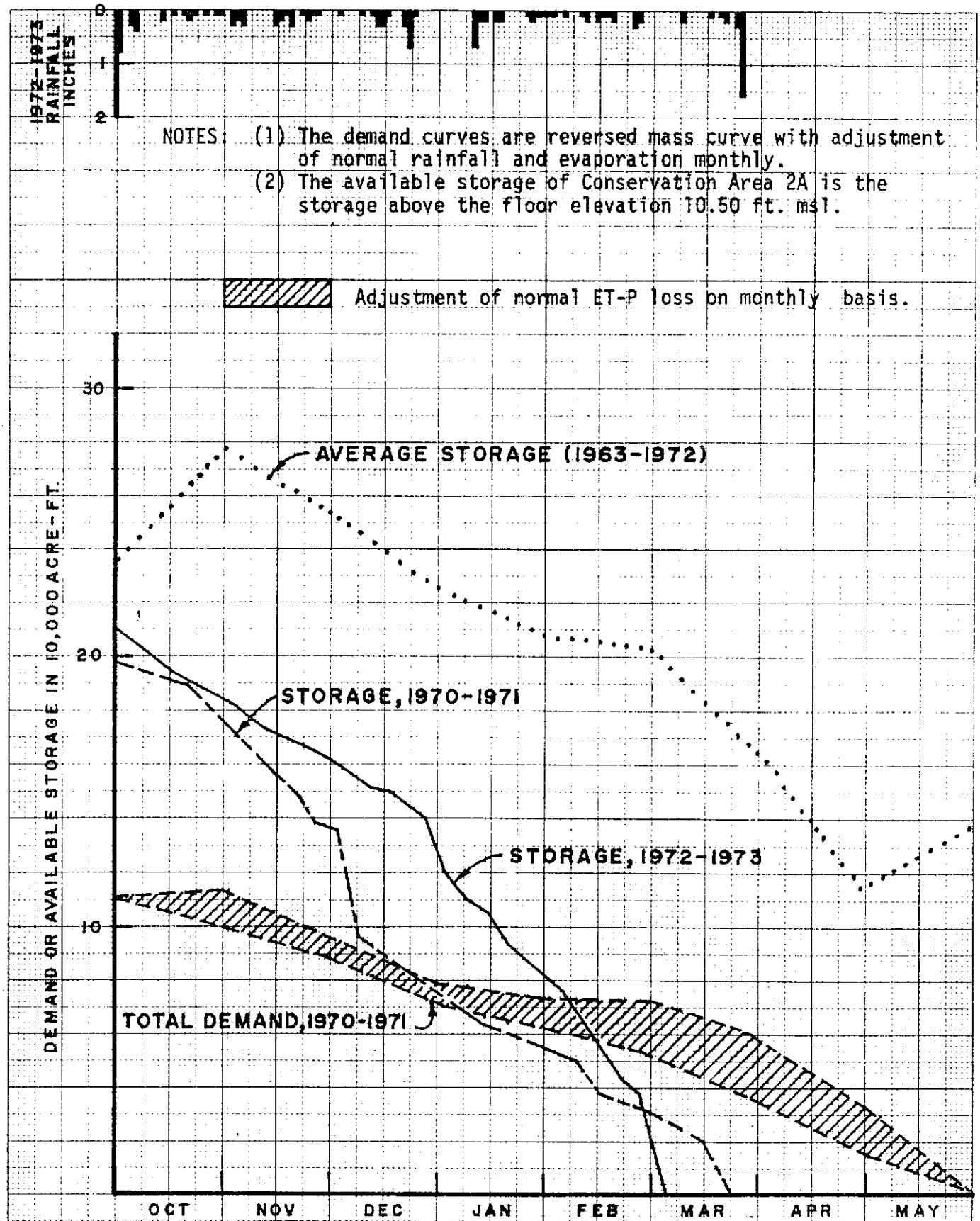

STORAGE AND DEMAND CURVES FOR CONSERVATION AREA 2A

FIGURE 8

EUGENE DIETZGEN CO. MADE IN U.S.A.
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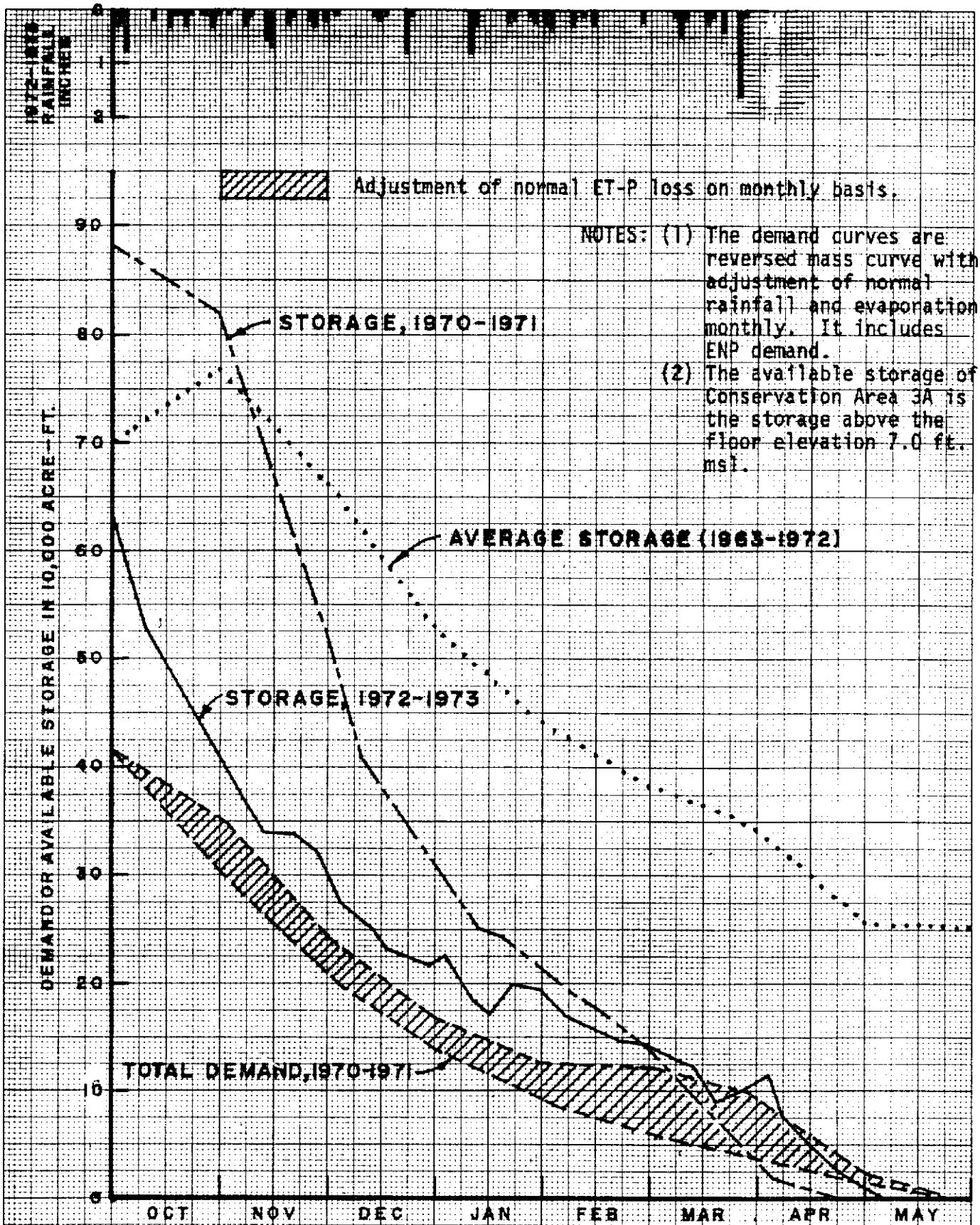
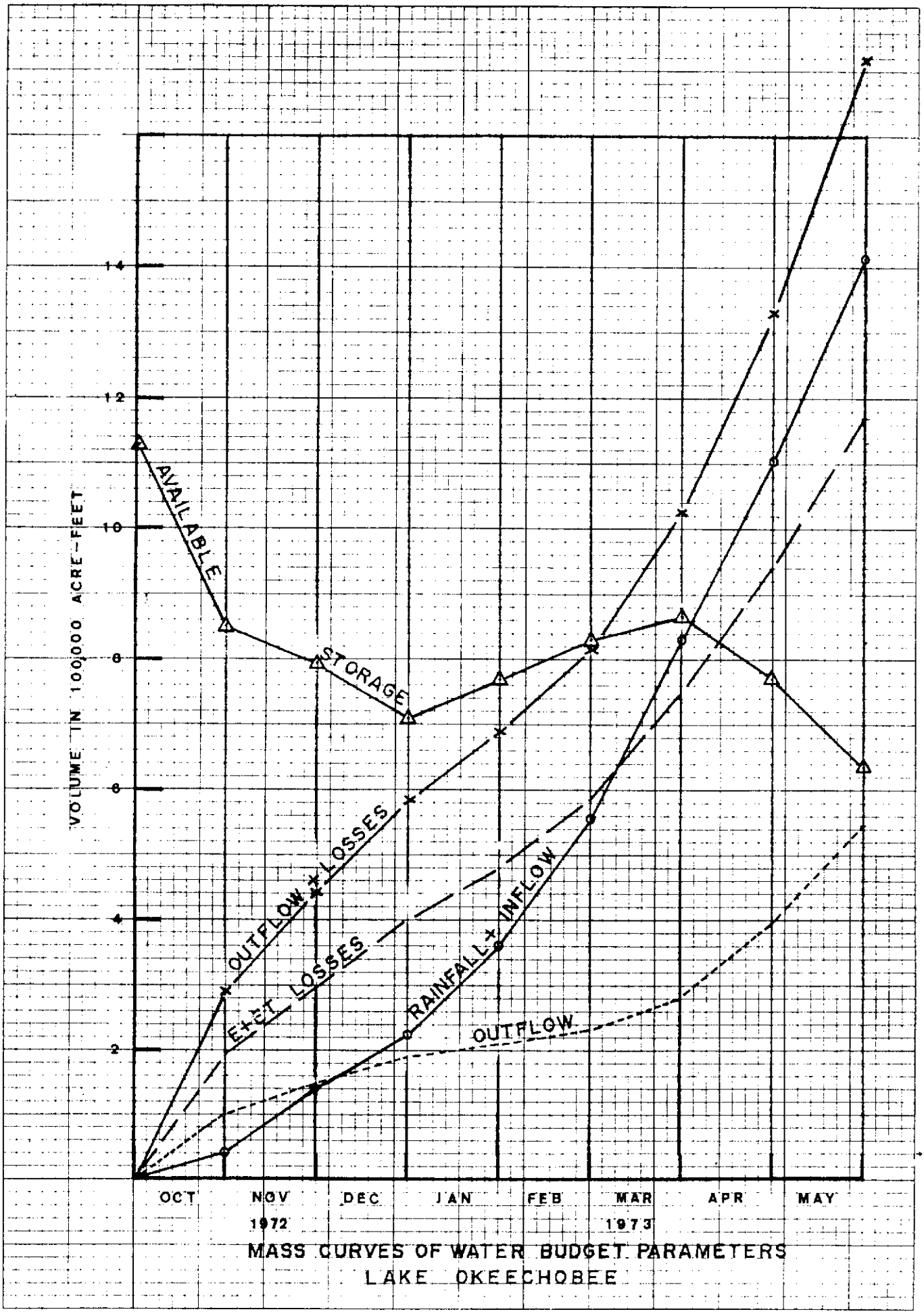


STORAGE AND DEMAND CURVES FOR CONSERVATION AREA 3A

FIGURE 9



MASS CURVES OF WATER BUDGET PARAMETERS
LAKE OKEECHOBEE

FIGURE 10

EUGENE DIETZGEN CO.
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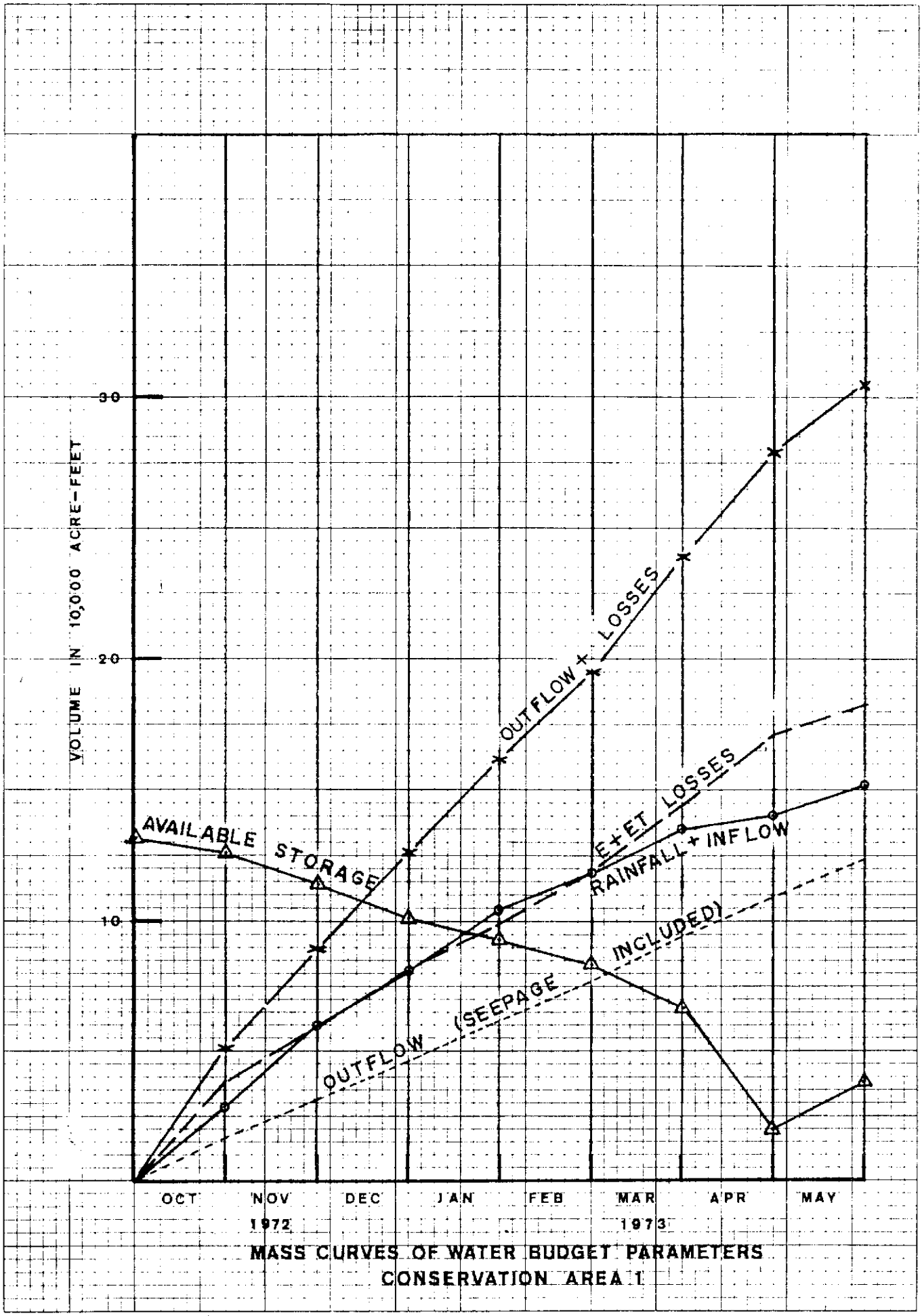
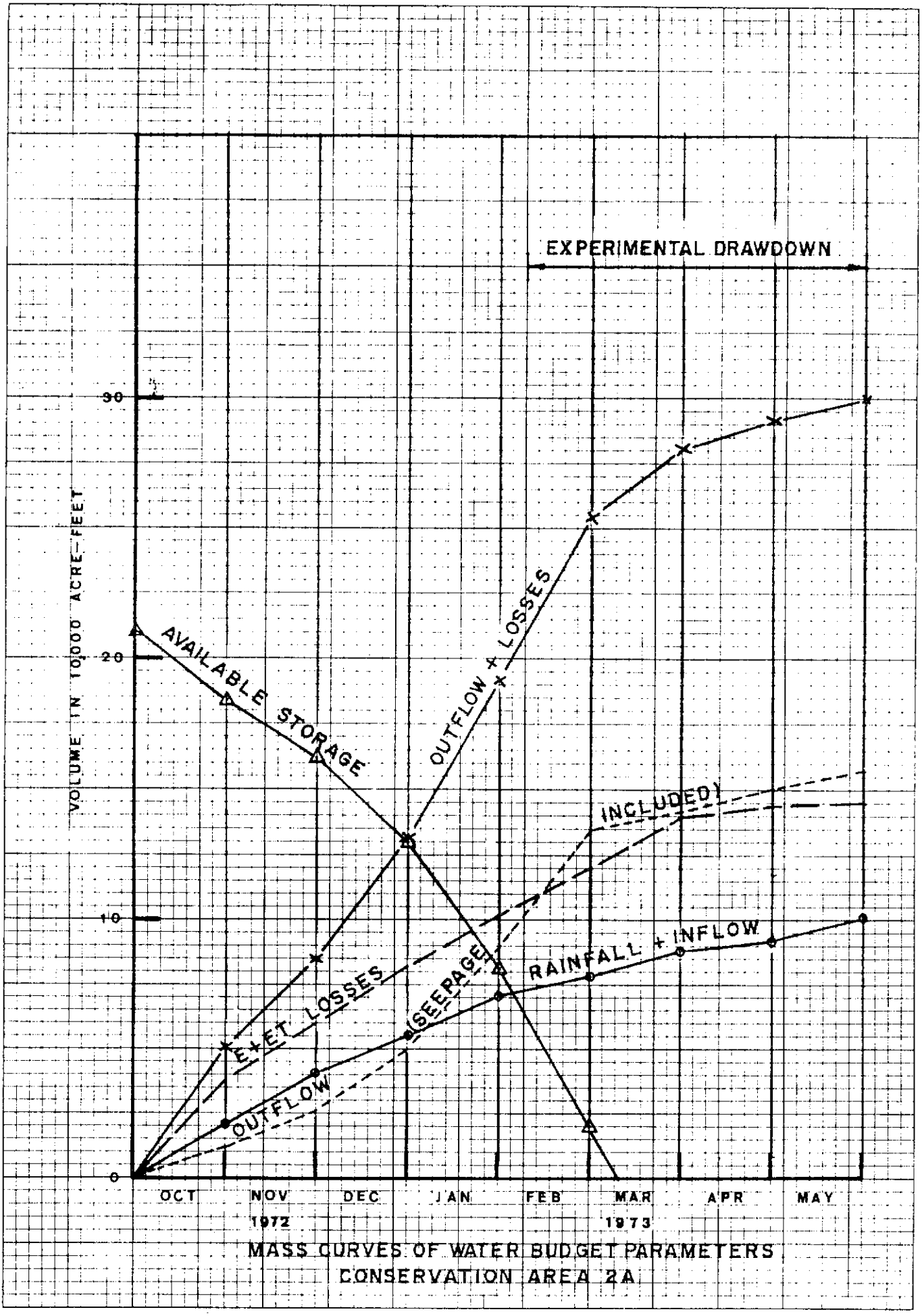


MASS CURVES OF WATER BUDGET PARAMETERS
CONSERVATION AREA 1

FIGURE 11



MASS CURVES OF WATER BUDGET PARAMETERS
CONSERVATION AREA 2A

FIGURE 12

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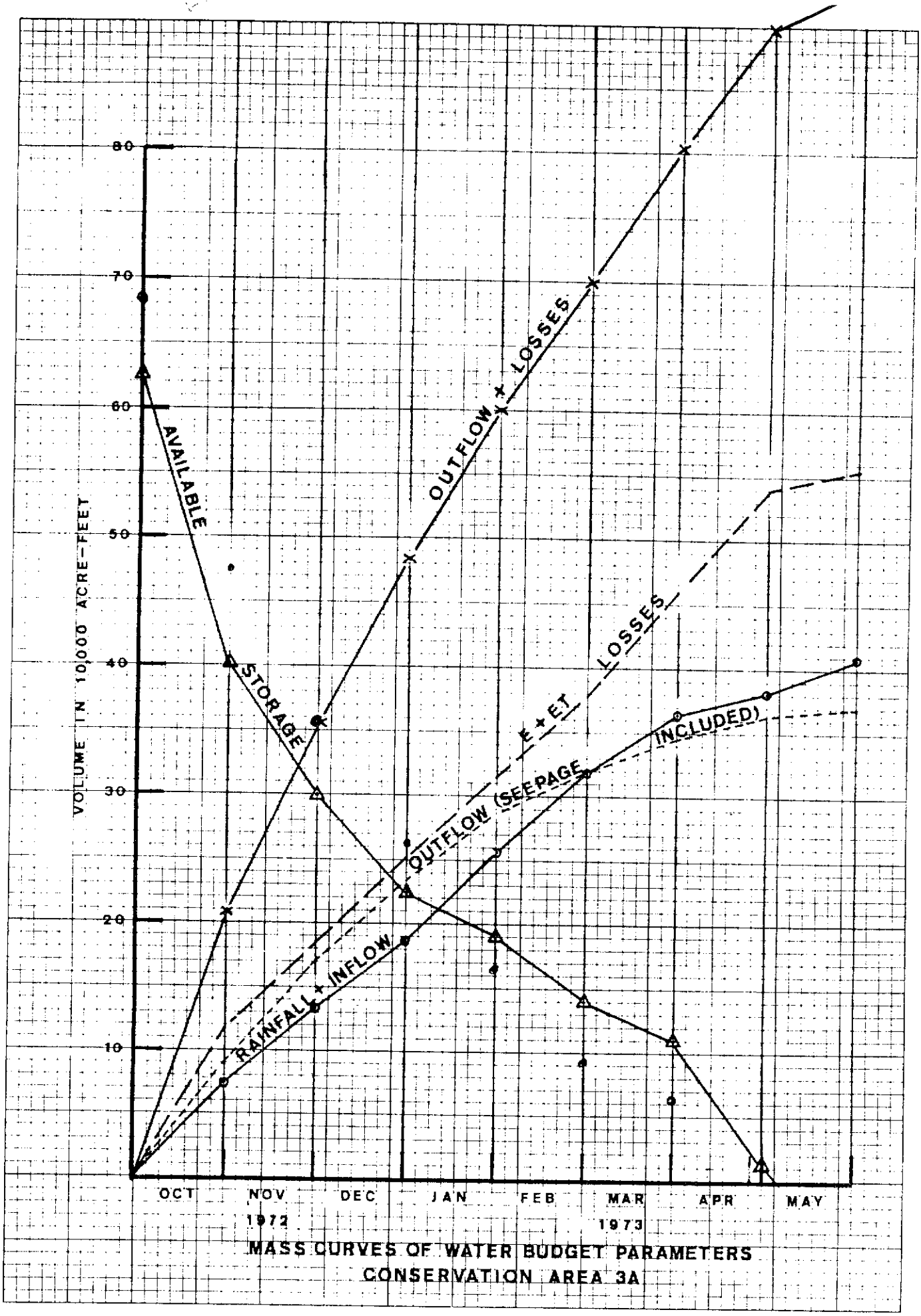

MASS CURVES OF WATER BUDGET PARAMETERS
CONSERVATION AREA 3A

FIGURE 13

EUGENE DIETZGEN CO.
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