



LAWRANCE, FISK & MCFARLAND, INC.

CONSULTING ENGINEERS • SANTA BARBARA • ORANGE

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LFM Public Presentation,
For NCSD,
By RRM design Group,

#0032, Studies and Reports,
01/07/88,

January 7, 1988

Honorable Board of Directors,
Nipomo Community Services District
Post Office Box 326
Nipomo, California 93444

Attn: Mr. Robert A. Paul, General Manager and Chief Engineer

Subject: Public Presentation of Final Report: Water,
Wastewater and Drainage Studies, Nipomo Mesa
Planning Study

Ladies and Gentlemen:

Thank you for the invitation to make a public presentation of the Water, Wastewater, and Drainage Studies, Nipomo Mesa Planning Study, that was performed recently by Lawrance, Fisk & McFarland, Inc. (LFM) for RRM Design Group for the Nipomo Mesa Technical Study Sponsors. The undersigned has coordinated this presentation with your General Manager and Chief Engineer, Mr. Bob Paul, and is looking forward to the adjourned meeting of your Board at 7:30 p.m., Wednesday, January 13, 1988.

To facilitate the presentation, a number of "slides" have been prepared for projection in the auditorium, and these will serve as the basis of the comments that I propose to make. These sequential illustrations provide summaries of principles as well as data and analyses that pertain to the water situation on Nipomo Mesa. There are a few that deal with Wastewater Management and Drainage also. For the convenience of the meeting attendees, it is understood that these will be reproduced and made available to the public at the time of the meeting. Copies of these slides are attached hereto for that purpose.

Much of the water resources information available for Nipomo Mesa originates from the State Department of Water Resources (DWR), while a 1982 update on certain aspects of the DWR work was done by James M. Montgomery, Consulting Engineers, Inc. (JMM) in connection with the Black Lake Project. The subsequent work by LFM has built upon this previous work. However, it should be recognized that, currently, there are still some lingering uncertainties regarding a few elements of the "hydrologic equation" due to limitations of data. Assumptions made about these inevitably affect the calculations of water yield. LFM has used conservative assumptions in such cases.

CIVIL & ENVIRONMENTAL ENGINEERS • CONSTRUCTION MANAGERS • CLAIMS CONSULTANTS • CONTRACT ADMINISTRATORS

Since the DWR and JMM reports, there has been considerable activity on Nipomo Mesa in both urban type development and agricultural development. In most cases, this has affected the "hydrologic equation," thus modifying not only the total pumpage from the groundwater sub-basin but also the amounts of water that return to it after use. The new calculations take these matters into account. They also recognize the fact that the past several years have averaged more rainfall than is normal for the area.

The calculations regarding present water supply conditions indicate that there is no longer a surplus on the Mesa; hence, the planning for future development does not consider any specific arrangements of land use or of water supply. Rather, we have elected to pose certain Scenarios for consideration of possible future conditions by which the probable effects on the water balance of certain combinations of land use developments and groundwater table conditions may be judged. These Scenarios are stated with relation to current conditions of municipal and industrial (M&I) pumpage, agricultural (Ag) pumpage, and groundwater sub-basin drawdown, assuming that rainfall is "normal." For purposes of illustration, the effects of importation of 2,000 acre-feet per year (AFY) of imported water from the State Water Project (SWP) are included in three of the eight Scenarios.

The water-using activities on Nipomo Mesa do have some effect upon the adjacent sub-basins in Arroyo Grande Plain - Tri-Cities Mesa and in the Santa Maria Valley (portion within San Luis Obispo County). The report addresses this.

Very truly yours,

LAWRANCE, FISK & McFARLAND, INC.



Charles H. Lawrance, P.E.
Vice President

Atts: Copies of Slides

January 13, 1988

NIPOMO COMMUNITY SERVICES DISTRICT BOARD OF DIRECTORS
ADJOURNED MEETING

LIST OF ILLUSTRATIONS ACCOMPANYING PRESENTATION

1. Water Supply for Nipomo Mesa
2. Nature of Nipomo Mesa Sub-Basin
3. Nipomo Mesa Sub-Basin
4. Approximate Section Along Willow Road
5. Approximate Section Along Highway 1 from South of Mesa

6. Capacity of Nipomo Mesa Sub-Basin
7. Yield of Nipomo Mesa Sub-Basin
8. Land Use Effects Upon Basin Yield - 1
9. Land Use Effects Upon Basin Yield - 2
10. Simplified Schematic of Nipomo Mesa Sub-Basin

11. Rainfall Periods and Effects on Storage
12. Examples of Water Level Responses to Rainfall
13. Schematic of Subsurface Outflow to Adjacent Sub-Basins
14. Schematic of Subsurface Outflow to Pacific Ocean
15. Water Levels, Fall 1975

16. Subsurface Outflow, AFY
17. Nipomo Mesa Sub-Basin Inflow, AFY
18. Nipomo Mesa Sub-Basin Pumpage, AFY
19. Yield of Nipomo Mesa Sub-Basin - 1
20. Yield of Nipomo Mesa Sub-Basin - 2

21. Water Demands and Trends
22. Sub-Basin Yields vs. Water Demands
23. Small Water Systems
24. Groundwater Quality Conditions and Trends
25. Water Quality Limitations

26. Flood Control Considerations

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WATER SUPPLY FOR NIPOMO MESA

NIPOMO MESA SUB-BASIN

- NATURE
- CAPACITY
- YIELD

WATER DEMANDS

- M & I (PUBLIC, PRIVATE)
- A G

YIELDS vs. DEMANDS

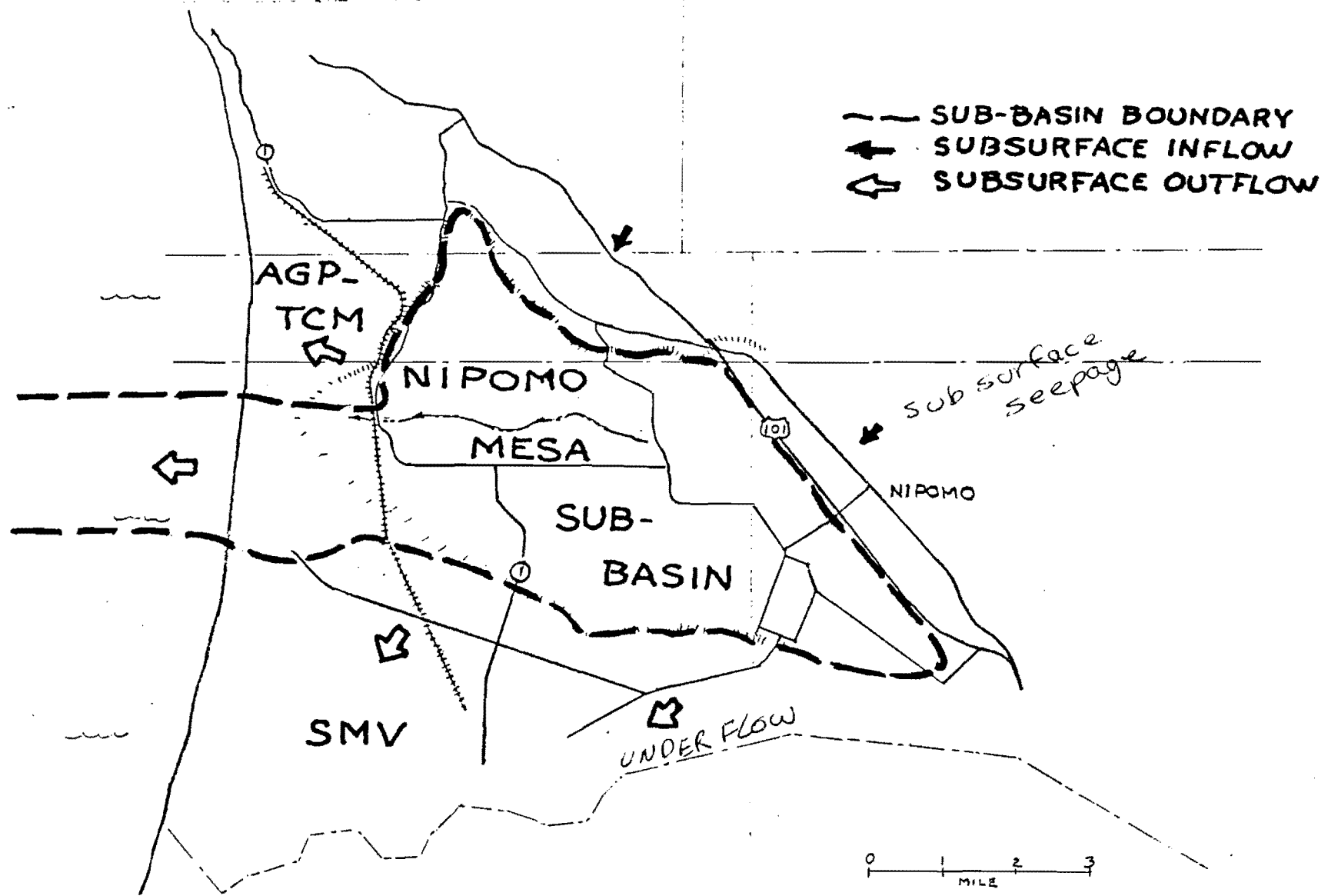
- HISTORIC
- PRESENT
- FUTURE

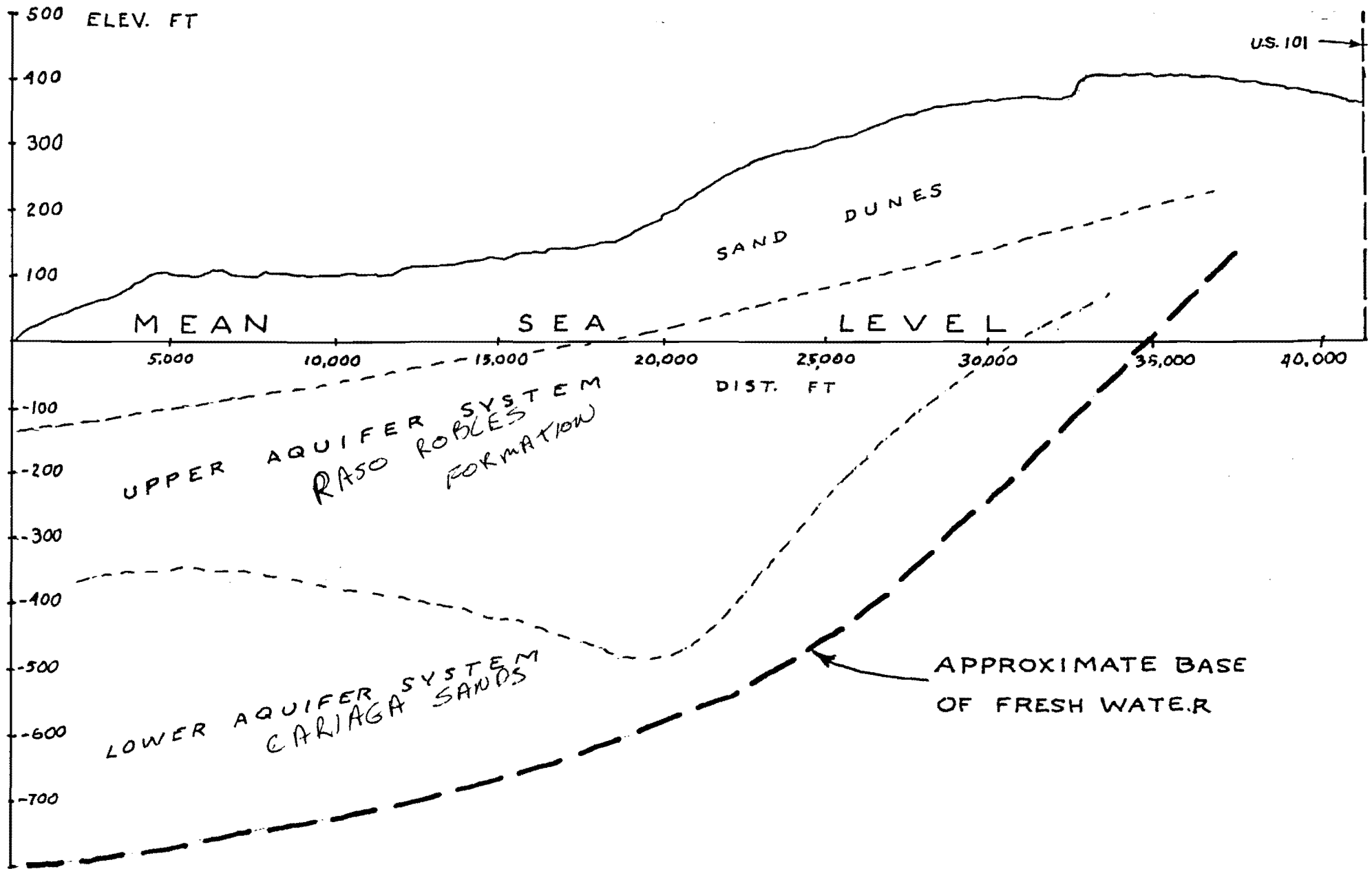
NATURE OF NIPOMO MESA SUB-BASIN

SBCO LINE NO. TO TRI CITIES Boundary

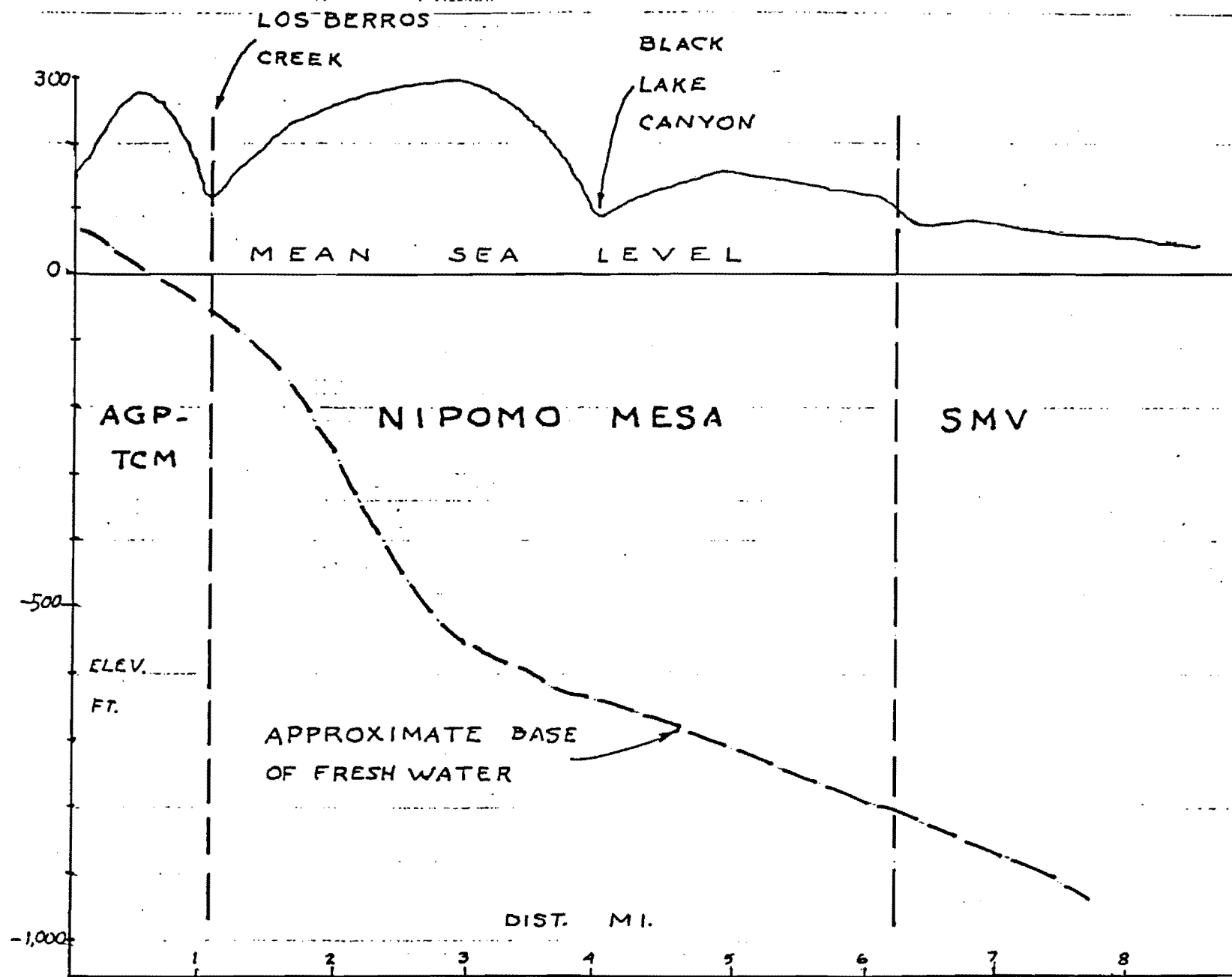
- DEFINED AS BEING THE CENTRAL SUB-BASIN WITHIN THE ARROYO GRANDE AREA GROUNDWATER BASIN
- ADJOINING SUB-BASINS ARE: ARROYO GRANDE PLAIN - TRI-CITIES MESA (AGP-TCM) TO THE NORTH AND SANTA MARIA VALLEY (SMV WITHIN SLOCO) TO THE SOUTH
- UNLIKE ADJOINING SUB-BASINS, RECEIVES NO SURFACE INFLOW AND EXPERIENCES NEGLIGIBLE SURFACE OUTFLOW
- EXPERIENCES SUBSURFACE OUTFLOW, BOTH TO ADJOINING SUB-BASINS AND TO THE PACIFIC OCEAN

NIPOMO MESA SUB-BASIN





APPROXIMATE SECTION ALONG WILLOW ROAD



APPROX. SECTION ALONG HWY 1 FROM SO. OF MESA

CAPACITY OF NIPOMO MESA SUB-BASIN

- o AREA - 21,100 ACRES DWR REPORT
- o AVERAGE SPECIFIC YIELD - 14 PERCENT (DRAIN BY GRAVITY)
- o APPROXIMATE DEPTH BELOW MEAN SEA LEVEL (MSL) TO EFFECTIVE BASE OF FRESH WATER - NEGL. TO 800 FT.
- o HEIGHT OF WATER TABLE ABOVE MSL:
 - 1975 - 10[±] FT TO 295[±] FT
 - 1985 - 10[±] FT TO 295[±] FT
- o FRESH WATER IN STORAGE ABOVE MSL:
 - 1967 - 194,000 AF (DWR)
 - 1975 - 172,000 AF (DWR)
 - 1985 - 173,000⁺ AF (LFM)

YIELD OF NIPOMO MESA SUB-BASIN

- o YIELD IS INFLUENCED BY LAND USE, RAINFALL, AND AMOUNT OF GROUNDWATER IN STORAGE
- o YIELD IS USUALLY EXPRESSED IN TERMS OF "AVERAGE"
- o SAFE YIELD OR PERENNIAL YIELD IS ANNUAL AMOUNT OF WATER THAT CAN BE WITHDRAWN INDEFINITELY WITHOUT CREATING UNDESIRABLE EFFECT(S) SUCH AS:
 - ~ LAND SUBSIDENCE
 - ~ EXCESSIVE PUMPING LIFTS
 - ~ WATER QUALITY DETERIORATION
 - ~ INTERFERENCE WITH WATER RIGHTS

LAND USE EFFECTS UPON BASIN YIELD - 1

TYPES OF WATER-SUPPLIED LANDS (BY PUMPAGE)

- o MUNICIPAL AND INDUSTRIAL (URBAN TYPE OF DEVELOPMENT) COLLECTIVELY KNOWN AS "M & I"
- o RURAL DOMESTIC DEVELOPMENT, SOMETIMES INCLUDED IN "M & I" EVEN THOUGH IT IS SCATTERED
- o IRRIGATED AGRICULTURE ("AG")

TYPES OF UNWATERED LANDS

- o DRY-FARMED LANDS
- o NATIVE VEGETATION
- o STREETS, HIGHWAYS, RAILROAD
- o VACANT LANDS

LAND USE EFFECTS UPON BASIN YIELD -2

M&I LANDS

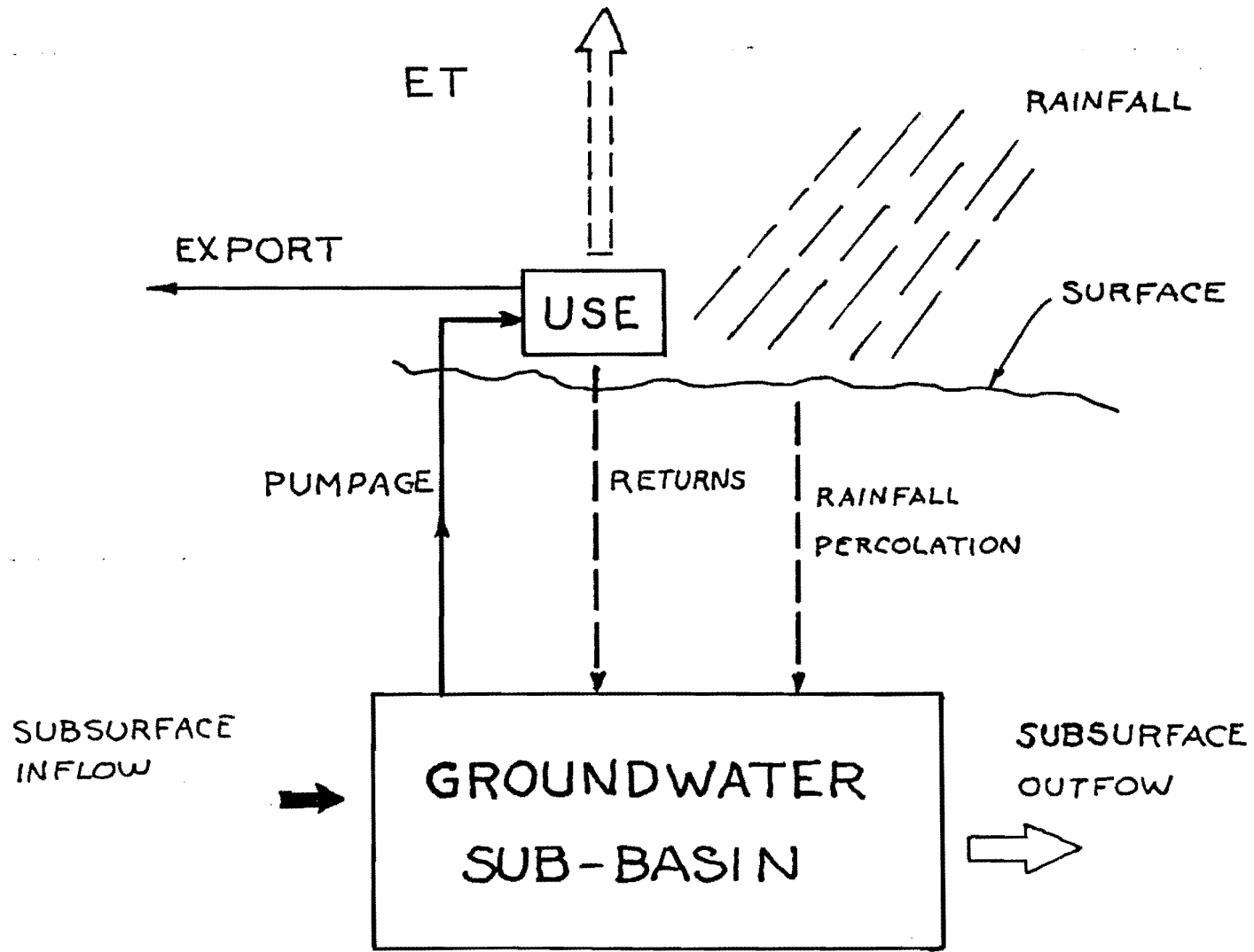
- o ONLY A SMALL PORTION OF LANDSCAPE IRRIGATION WATER PERCOLATES BACK TO THE UNDERLYING GROUNDWATER.
- o MOST OF THE SEPTIC TANK EFFLUENT PERCOLATES.
- o NCSD'S NEW SEWERAGE SYSTEM CENTRALIZES THE PERCOLATION OF (TREATED) EFFLUENT FROM MANY HOMES, INCLUDING RECOVERY OF FLOW FROM EAST OF IOI THAT USED TO HAVE ONLY LIMITED PERCOLATION.
- o UNOCAL REFINERY PUMPAGE IS NEARLY ALL LOST TO COOLING TOWER EVAPORATION OR ELSE SENT TO SEA BY OUTFALL.

AG LANDS

- o A SIGNIFICANT PORTION OF AGRICULTURAL IRRIGATION PERCOLATES BACK TO THE UNDERLYING GROUNDWATER.

IRRIGATION (BOTH M&I AND AG) ENHANCES RAINFALL PERCOLATION BY LOWERING THE THRESHOLD FOR PERCOLATION.

URBANIZATION INCREASES RUNOFF, BUT VIRTUALLY ALL OF THE RUNOFF IS CAPTURED IN THE NATURAL SUMPS AND PERCOLATES ANYWAY.



SIMPLIFIED SCHEMATIC OF NIPOMO MESA SUB-BASIN

RAINFALL PERIODS AND EFFECTS ON STORAGE

- o A BASE PERIOD SELECTED FOR HYDROLOGIC STUDY SHOULD HAVE APPROXIMATELY AVERAGE CLIMATIC CONDITIONS COVERING A CYCLE OF DRY YEARS FOLLOWED BY WET YEARS.
- o DWR'S 31-YR BASE PERIOD (6/79 REPORT) RAN FROM 1935-36 TO 1966-67.
- o DURING DWR'S BASE PERIOD, THE AVERAGE RAINFALL WAS ONLY 1.35 % ABOVE LONG-RANGE NORMAL.
- o ESTIMATES OF STORAGE AND RAINFALL INTERVENING YEARS

FALL, 1967

FALL, 1975

FALL, 1985

194,000 AF

172,000 AF

173,000* AF

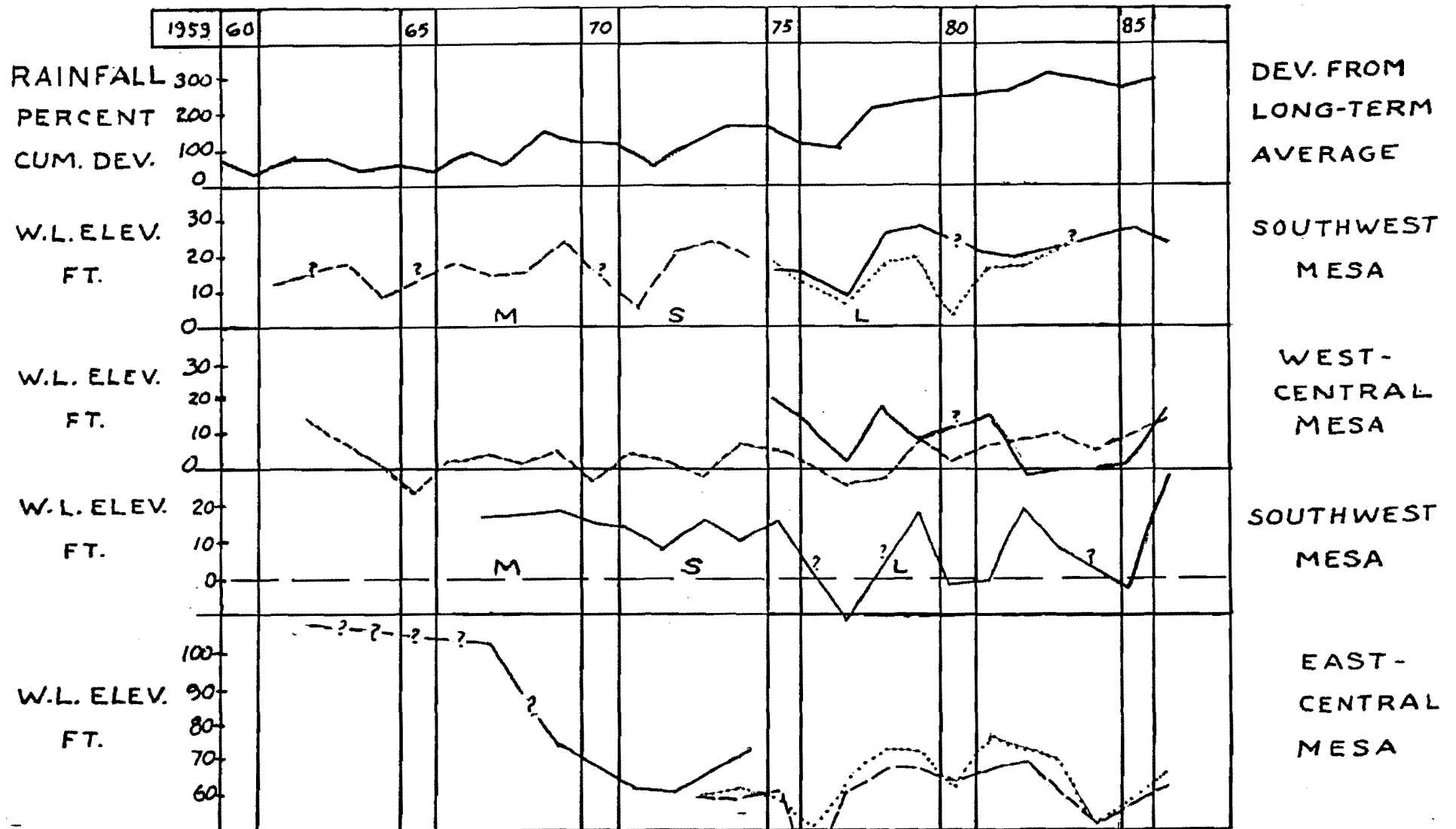
8 YR

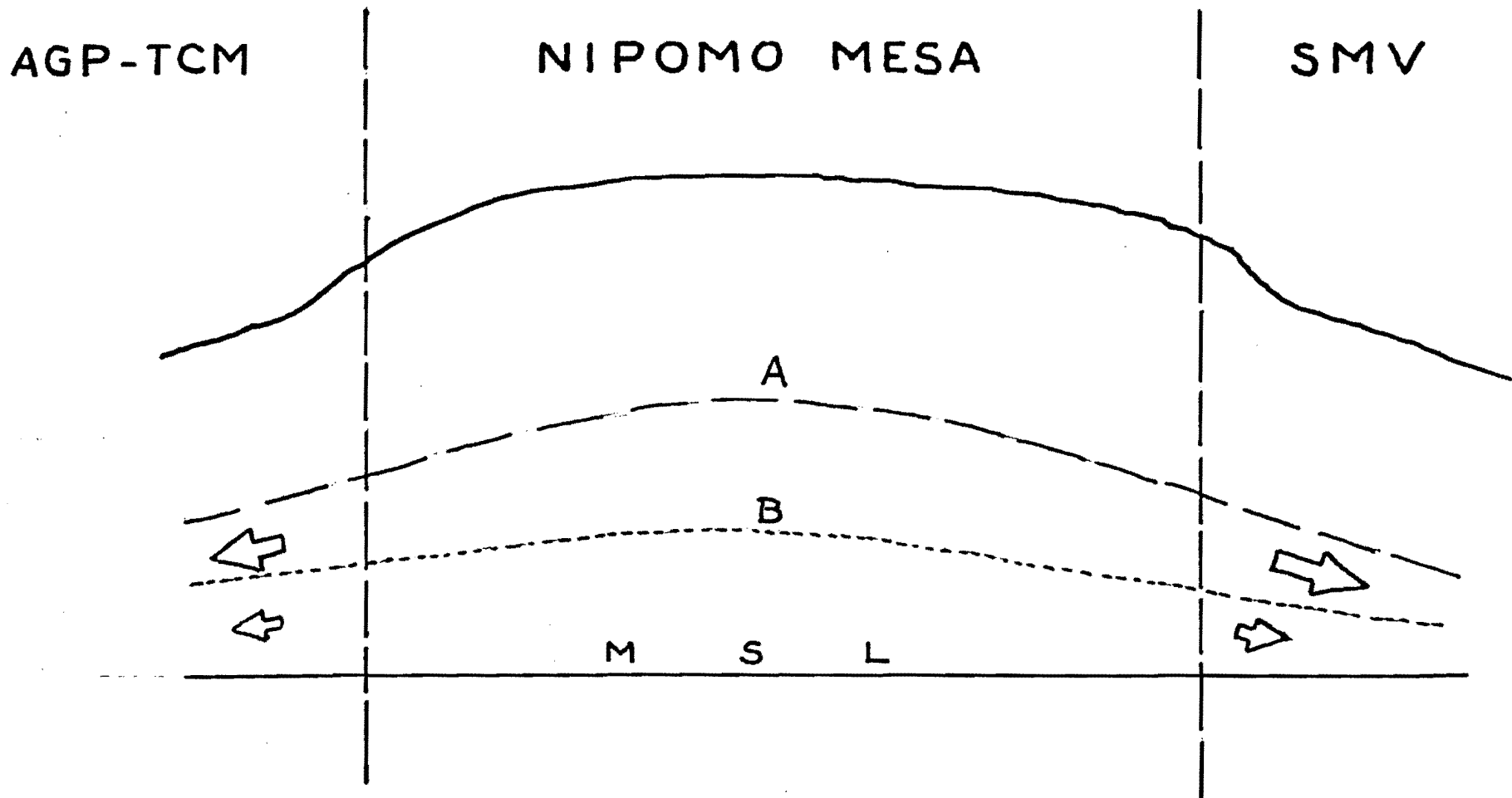
10 YR

RAIN ABOVE AVG. 9.3 %

10.7 %

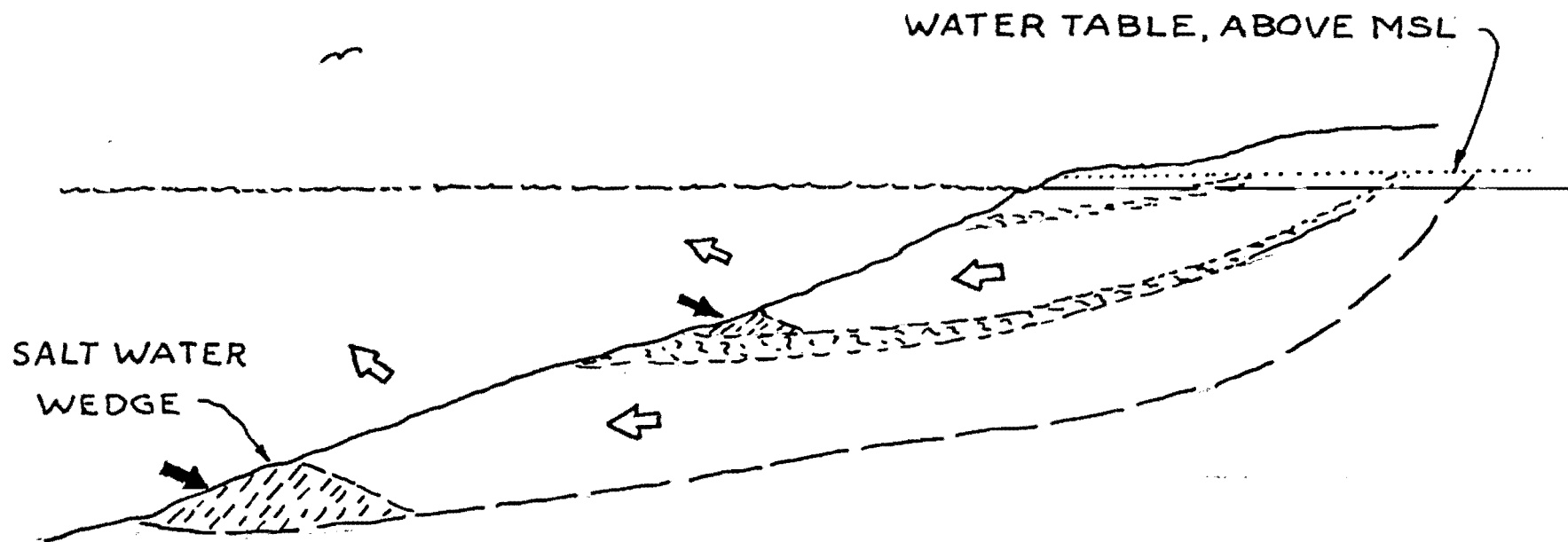
EXAMPLES OF WATER LEVEL RESPONSE TO RAINFALL



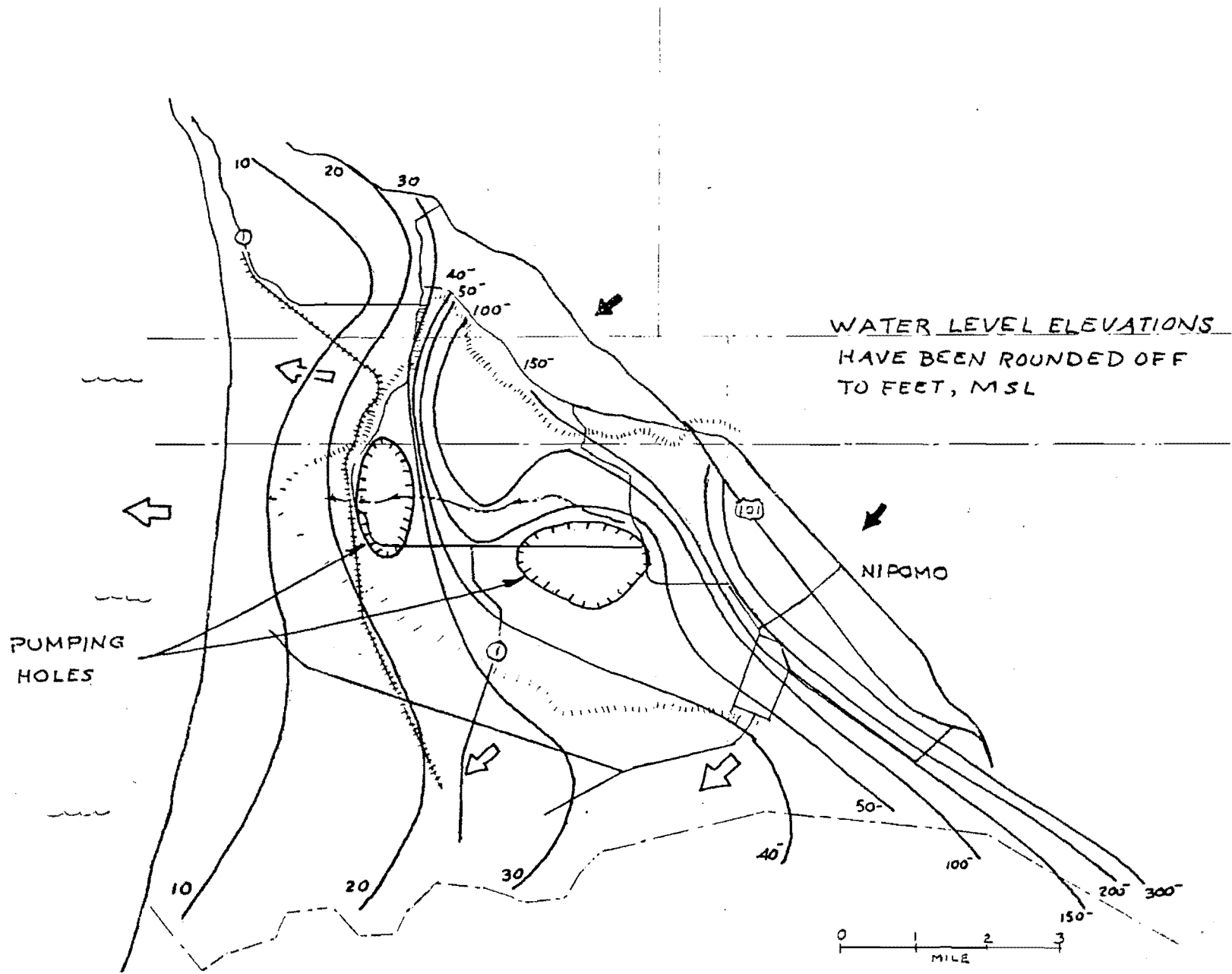


WATER TABLES: A PRESENT, 1985-86
 B FUTURE, DRAWN DOWN

**SCHEMATIC OF SUBSURFACE OUTFLOW
 TO ADJACENT SUB-BASINS**



SCHEMATIC OF SUBSURFACE OUTFLOW TO PACIFIC OCEAN



WATER LEVELS IN FALL, 1975

SUBSURFACE OUTFLOW, AFY

	DWR 6/79	JMM 6/82	LFM 1985-86	LFM FUT.
TO OCEAN	225	260	260	260
TO AGP-TCM	225	--	290	145
TO SMV	2,850	--	2,500	1,250
TOTAL	3,300	260	3,050	1,655

(2,500-3,500)

NIPOMO MESA SUB-BASIN INFLOW, AFY

	DWR	JMM	LFM	LFM
	6/79	6/82	1986	FUT.
PERCOL. PRECIP.	3,300	3,300	3,510	3,120 - 3,510
SUBSURF. SEEP.	500	500	500	500 OR MORE
RETURNS*				
M & I	--	--	1,090	1,090 - 2,480
AG	--	--	220+	0 - 220+
TOTAL	1,000	1,000	1,310	VARIABLES
TOTAL INFLOW	4,800	4,800	5,320	VARIABLES WITH SCENARIO

* RETURNS ARE GENERALLY PROPORTIONAL TO PUMPAGE
- FOR CERTAIN M&I AND AG USES.

NIPOMO MESA SUB-BASIN PUMPAGE, AFY

	DWR	JMM	LFM	LFM
	6/79	6/82	1986	FUT.
M & I				
NCSD+SOCAL)		1,020±	1,600	VARIABLES w/
MUT. W. COS.) 300) 80±	270	SCENARIO
RURAL))	850	
UNOCAL	650	650+	1,320	SAME
TOTAL	950	1,750+	4,040	UP TO 6,080
AG	2,000	2,000	2,430	0 TO 2,430
TOTAL	2,950	3,750+	6,470	VARIABLES
REPRESENTS CONDITION	1977±	1980±	NEAR-FUT.	FUTURE SCENARIO

YIELD OF NIPOMO MESA SUB-BASIN - 1

- o YIELD OF PARTICULAR INTEREST IS THAT WHICH IS AVAILABLE FOR USE ON THE MESA.
- o MAGNITUDE OF YIELD IS ESPECIALLY SENSITIVE TO:
 - ~ ASSUMPTIONS ABOUT SUBSURFACE OUTFLOW.
 - ~ VALUE USED FOR PERCOLATION OF PRECIPITATION.
- o SUBSURFACE OUTFLOW TO OCEAN SHOULD BE MAINTAINED.
- o SUBSURFACE OUTFLOW TO ADJACENT SUB-BASINS WILL DIMINISH. THIS WILL LEAVE A GREATER PROPORTION OF THE SUPPLY ON THE MESA WHERE IT LARGELY ORIGINATES. HOWEVER, REDUCTION OF INFLOW TO ADJACENT SUB-BASINS IS OF SOME CONCERN.
- o DWR FEELS THAT THEIR ESTIMATE FOR RECHARGE FROM RAINFALL IS PROPER. LFM HAS ACCEPTED THIS BUT BELIEVES THAT IT MAY BE CONSERVATIVE.
- o ALTHOUGH THERE MAY CURRENTLY BE A DEFICIT BETWEEN GROUNDWATER SUB-BASIN INFLOW AND OUTFLOW, IT IS NOT KNOWN WHAT WATER RIGHTS RAMIFICATIONS MAY NOW EXIST, IF ANY.

YIELD OF NIPOMO MESA SUB-BASIN - 2

	DWR	JMM	LFM	LFM
	6/79	6/82	1986	FUT.
INFLOW, AFY				
PERC. PRECIP.	3,300	3,300	3,510	VARIABLE
SUBSUR. SEEP.	500	500	500	
RETURNS	1,000	1,000	1,160	WITH
PIPELINE LEAK.	--	--	<u>150</u>	
TOTAL	4,800	4,800	5,320	SCENARIO
OUTFLOW, AFY				
M & I PUMPAGE	950	950	4,040	VARIABLE
AG PUMPAGE	2,000	2,000	2,430	WITH
SUBSURF. SEEP.	<u>3,050</u>	<u>260</u>	<u>3,050</u>	
TOTAL	6,000	3,120	9,520	SCENARIO
DIFFERENCE, AFY	(1,200)	1,590	(4,200)	VARIABLE *

* WITHOUT IMPORTED WATER, DIFFERENCE IS (2,800) TO (4,200) AFY.

WITH 2,000 AFY IMPORTED WATER, DIFF. IS (110) TO (770) AFY.

WATER DEMANDS AND TRENDS

M&I	1977	1986-87	REMARKS
MESA POP'N	4,540	13,200	ABOUT 200% INCREASE
NON-INDL AFY <small>INDUSTRIAL</small>	690	2,720	NEARLY 300% INCREASE
PER CAPITA, AFY	0.152	0.206	35.5% INCREASE
GPCD	136	184	
AG			
IRRIG. AC.	800	1,095-	LAND USE SURVEYS BY DWR
IRRIG. AFY	2,000	2,453	IN 1977 AND 1984
AFY/AC.	2.50	2.24	SOME CROPPING CHANGES

1977 URBAN WATER IS PROBABLY NET DELIVERIES. 1986-87 URBAN WATER USE IS GROSS PUMPAGE, INCLUDING PIPELINE LEAKAGE. LATER FIGURE EXCLUDES 700 PERSONS LIVING OFF THE MESA.

DESPITE PER CAPITA INCREASES, NEWER DEVELOPMENTS ARE STRESSING CONSUMER CONSERVATION. THIS TREND PLUS GRADUALLY FALLING WATER TABLES SHOULD EVENTUALLY MAKE FOR MORE MODERATE PER CAPITA DEMANDS.

SUB-BASIN YIELDS VS. WATER DEMANDS

SCENARIO NO.	PERCENT OF 1987 CONDITION				IMPORT SUPPLY	LOSS IN STORAGE, AFY
	M&I	AG	STOR.	ADJ. SUBS.		
I	100	100	100	100	0	4,200
II	"	"	50	50	"	2,800
III	"	50	100	100	"	3,470
IV	"	100	50	50	2,000 AFY	110
V	150	50	"	"	0	3,280
VI	"	"	"	"	2,000 AFY	1,400
VII	200	0	"	"	0	3,770
VIII	"	"	"	"	2,000 AFY	770

- o NET BALANCE OF YIELD AND DEMAND SHOWN AS LOSS IN STORAGE.
- o ALL VALUES ILLUSTRATIVE AND APPROX. NORMAL RAINFALL ASSUMED.
- o EFFECTS OF BLACK LAKE EFFLUENT RECYCLING NOT CREDITED ABOVE.
- o IMPORTED WATER, IF SUPPLIED, IS FOR MUNICIPAL USE ONLY, ASSUMED TO GIVE ABOUT 35 PERCENT RETURNS.

PALO MESA

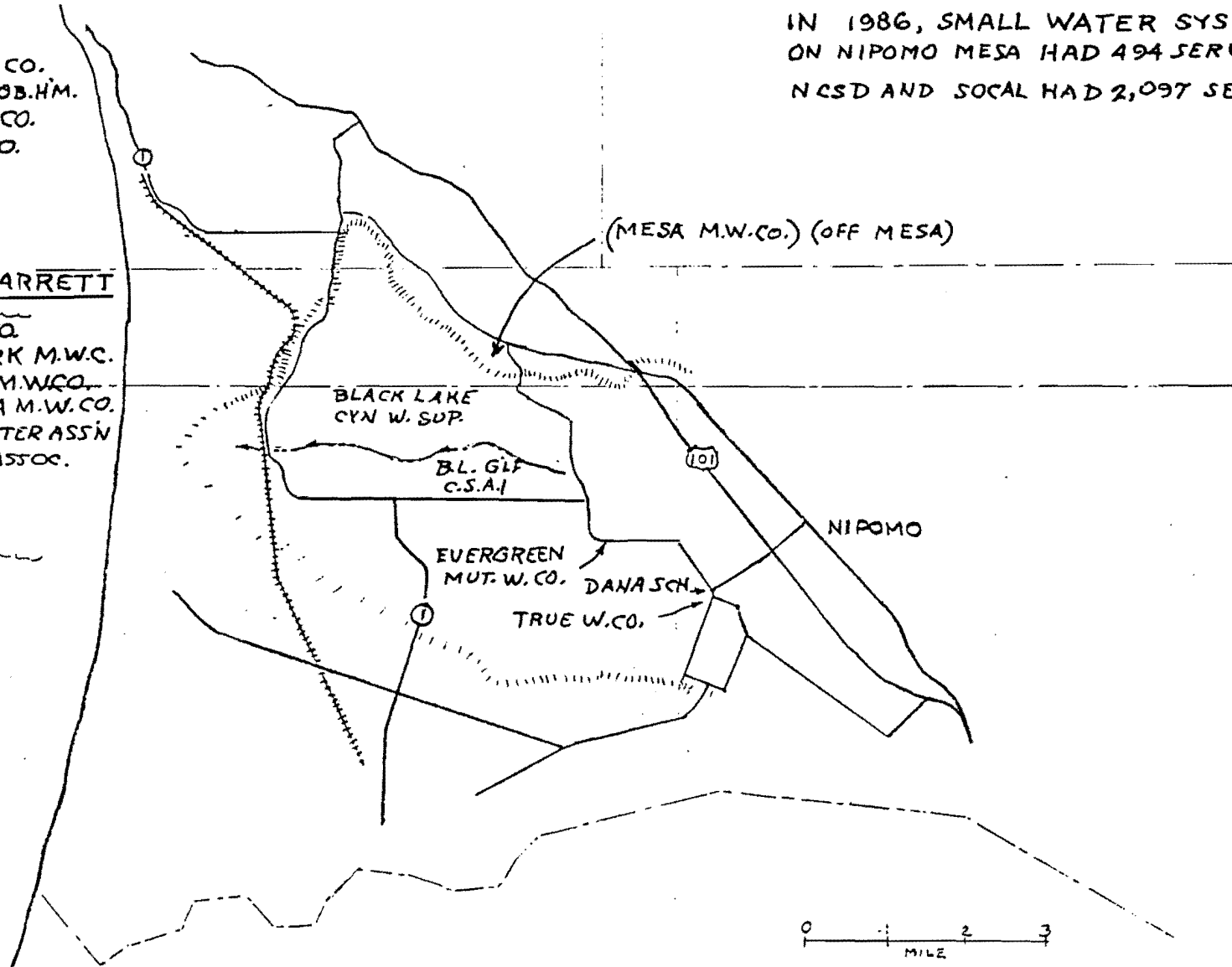
LAS FLORES W. CO.
MESA DUNES MOB. H.M.
NUNES WATER CO.
RURAL WATER CO.

IN 1986, SMALL WATER SYSTEMS
ON NIPOMO MESA HAD 494 SERVICES.
NCSD AND SOCAL HAD 2,097 SERVICES.

CALLENDAR-GARRETT

LA MESA M.W.CO.
WOODLAND PARK M.W.C.
NIPOMO MESA M.W.CO.
LAGUNA NEGRA M.W.CO.
CALLENDAR WATER ASSN
MUTUAL WATER ASSOC.

(MESA M.W.CO.) (OFF MESA)



SMALL WATER SYSTEMS

GROUNDWATER QUALITY CONDITIONS AND TRENDS

RANGE OF QUALITY IN REPRESENTATIVE WELLS, MG/L

AREA	TDS	TH	Na	SO ₄	Cl	NO ₃	REMARKS
SW MESA 1962-86	179- 1,005	32- 591	33- 75	0- 677	39- 57	0- ⁴⁶ 25	FAIRLY STABLE
W.CENTRAL 1961-85	220- 809	47- 454	42- 69	5- 349	38- 70	0.9- 69.8	SOME MINERALIZ'N AND HIGH NO ₃
COASTAL MON. 1976	357- 1,043	119- 599	72- 98	81- 505	39- 96	0.4- 29.0	SINGLE YEAR OF DATA
NW MESA 1962-81	162- 661	35- 460	28- 71	0- 168	38- 80	12- 22.2	MOSTLY STABLE
N.CENTRAL 1962-81	132- 786	29- 477	31- 69	41- 197	41- 71	4.2- 9.4	LIMITED SAMPLES
E.CENTRAL 1953-81	233- 900	38- 320	27- 85	1.0- 140	44- 98	1.0- 13	MOSTLY STABLE
CENTRAL 1962-85	150- 613	22- 381	32- 60	4.0- 230	41- 66	1.0- 17	MOSTLY STABLE
SE MESA 1985	131- 613	38- 381	28- 60	12- 230	37- 66	5- 27	

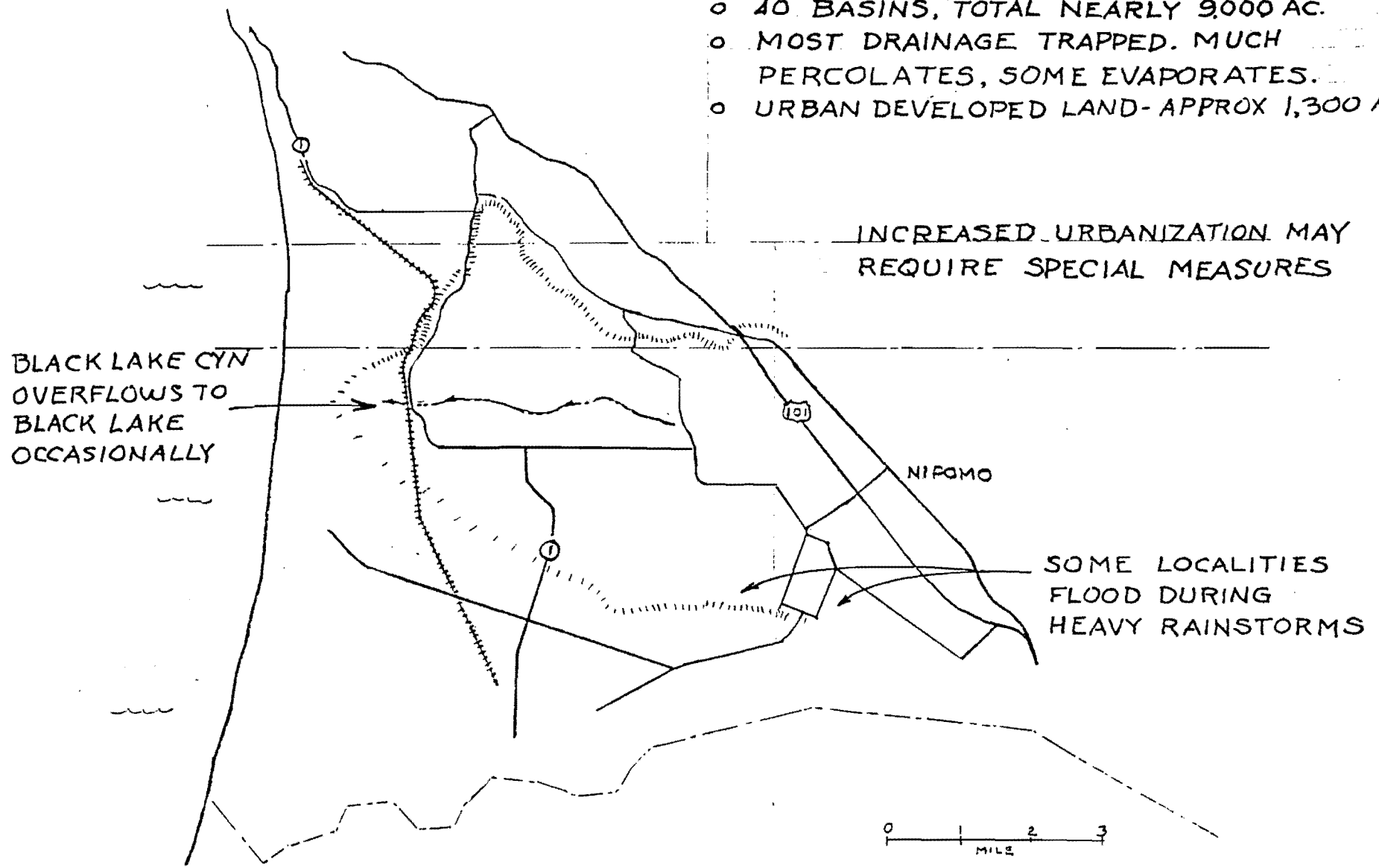
BASED ON REVIEW OF 175 SAMPLES FROM 81 WELLS COVERING 1953-86.

CURRENTLY, SALTS DO NOT APPEAR TO BE ACCUMULATING WITHIN THE SUB-BASIN.

WATER QUALITY LIMITATIONS

- o MANY OF THE RWQCB MINERAL WATER QUALITY OBJECTIVES SHOULD GENERALLY REMAIN ACHIEVABLE FOR THE FORSEEABLE FUTURE, BUT ISOLATED LOCAL DIFFICULTIES MAY DEVELOP ON NIPOMO MESA SUB-BASIN
- o ONE EXCEPTION IS SODIUM (Na) WHERE CURRENT GROUNDWATER QUALITY SOMETIMES DOES NOT COMPLY WITH THE 50 MG/L LIMITATION, LEAVING LITTLE ROOM FOR PICKUP BY NORMAL USE, LET ALONE SOFTENING.
- o THE CHLORIDE OBJECTIVE OF 100 MG/L LEAVES LITTLE MARGIN FOR MINERAL PICKUP BY WATER USE IN HOMES.
- o NCSD'S NEW WASTEWATER TREATMENT AND DISPOSAL FACILITY INCLUDES CAPABILITY TO OXIDIZE AMMONIA NITROGEN AND SUBSEQUENTLY TO DENITRIFY THE EFFLUENT AS IT PERCOLATES TO THE WATER TABLE, THUS COMPLYING WITH RWQCB'S RESOLUTION 83-12.
- o INASMUCH AS NIPOMO MESA WEST OF U.S. 101 IS A RECHARGE AREA FOR GROUNDWATER, RESOLUTION 83-12 LIMITS CONCENTRATION OF URBAN LAND DEVELOPMENT WITH LOCAL WASTEWATER EFFLUENT DISPOSAL IN ORDER TO PROTECT AGAINST NITROGEN BUILDUP.

- NIPOMO MESA BTW SOPACRR & U.S.101:
- o 40 NATURAL SUMPS, TOTAL 282 AC.
 - o 40 BASINS, TOTAL NEARLY 9,000 AC.
 - o MOST DRAINAGE TRAPPED. MUCH PERCOLATES, SOME EVAPORATES.
 - o URBAN DEVELOPED LAND- APPROX 1,300 AC.



FLOOD CONTROL CONSIDERATIONS