2009 Western Regional Forum

Comparison of HMR 58/59 to HMR 36

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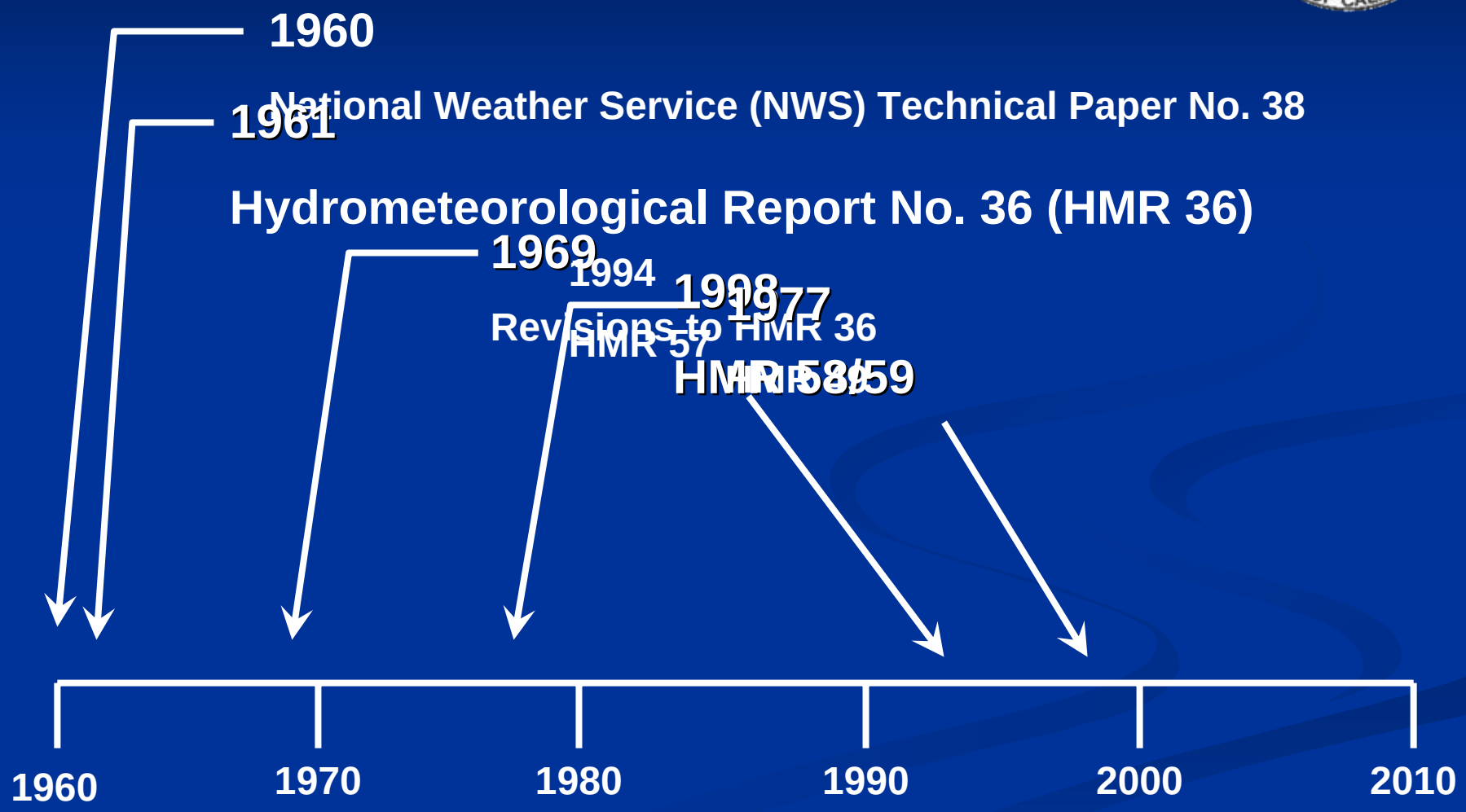
PMP Definition

- In accordance with Hydrometeorological Report 55, the Probable Maximum Precipitation is defined as:

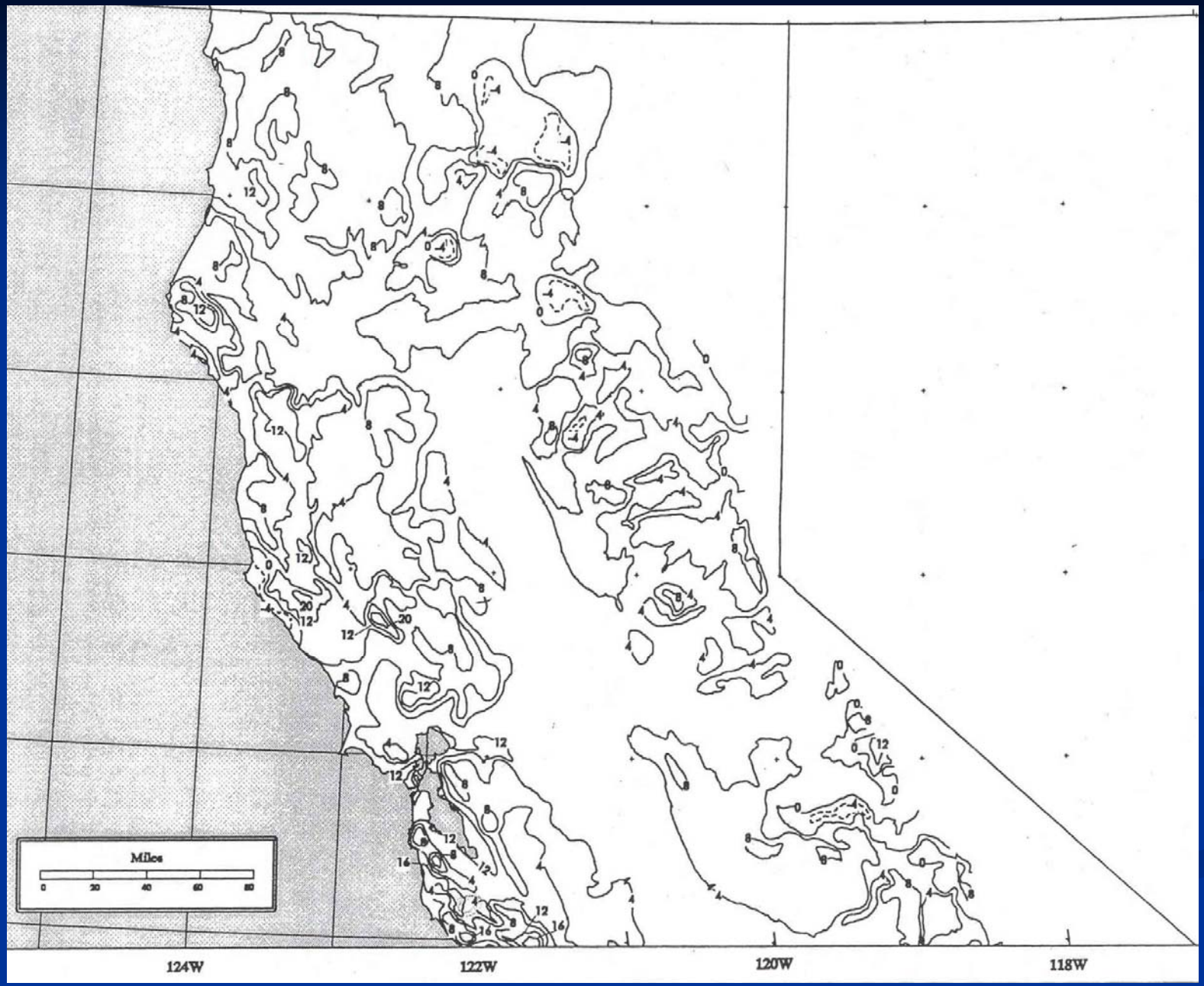
  "theoretically, the greatest depth of precipitation for a given duration that is physically possible over a given storm area at a particular geographical location at a certain time of the year."

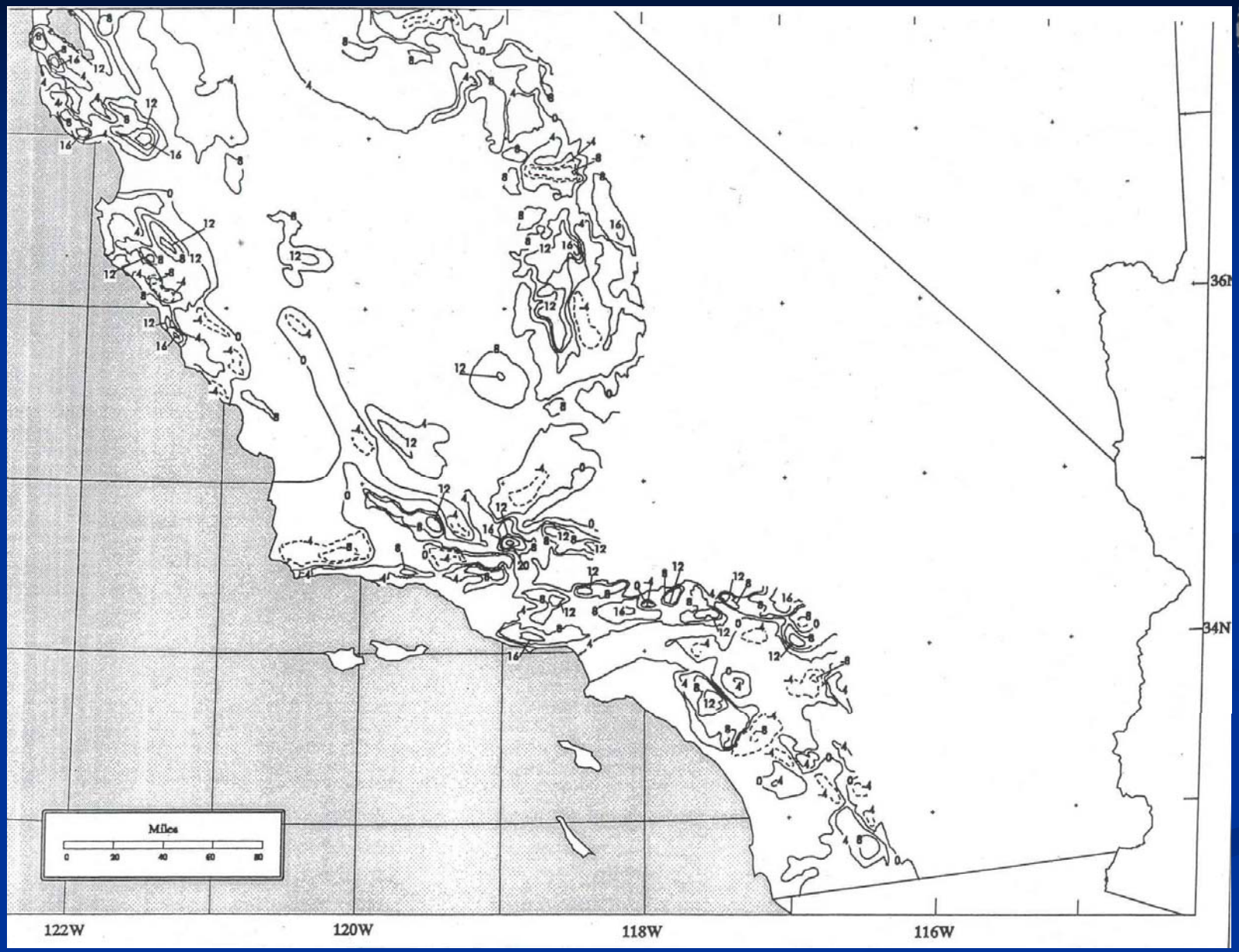
Brief History



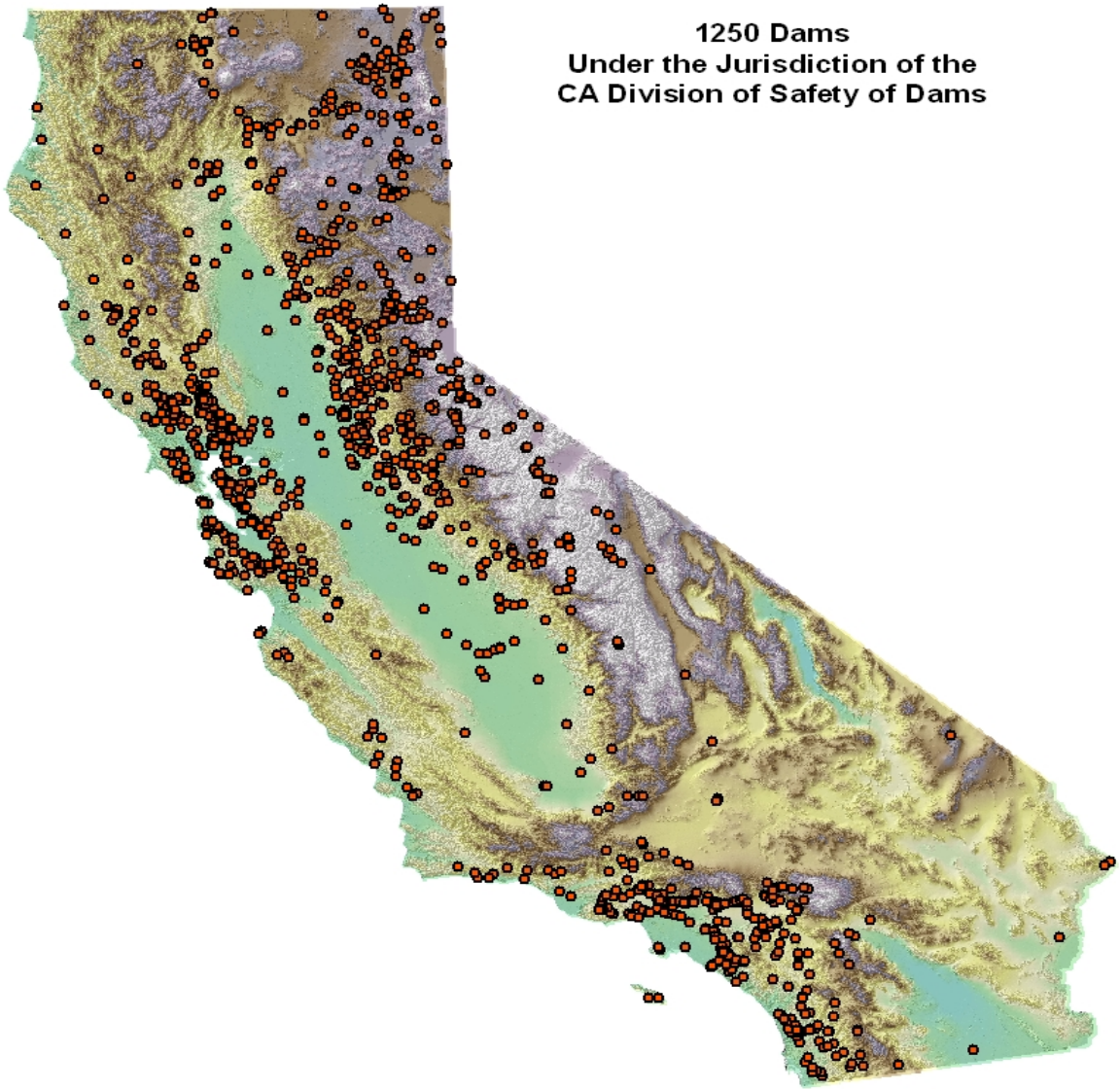
Major Differences Between HMR36 & 58

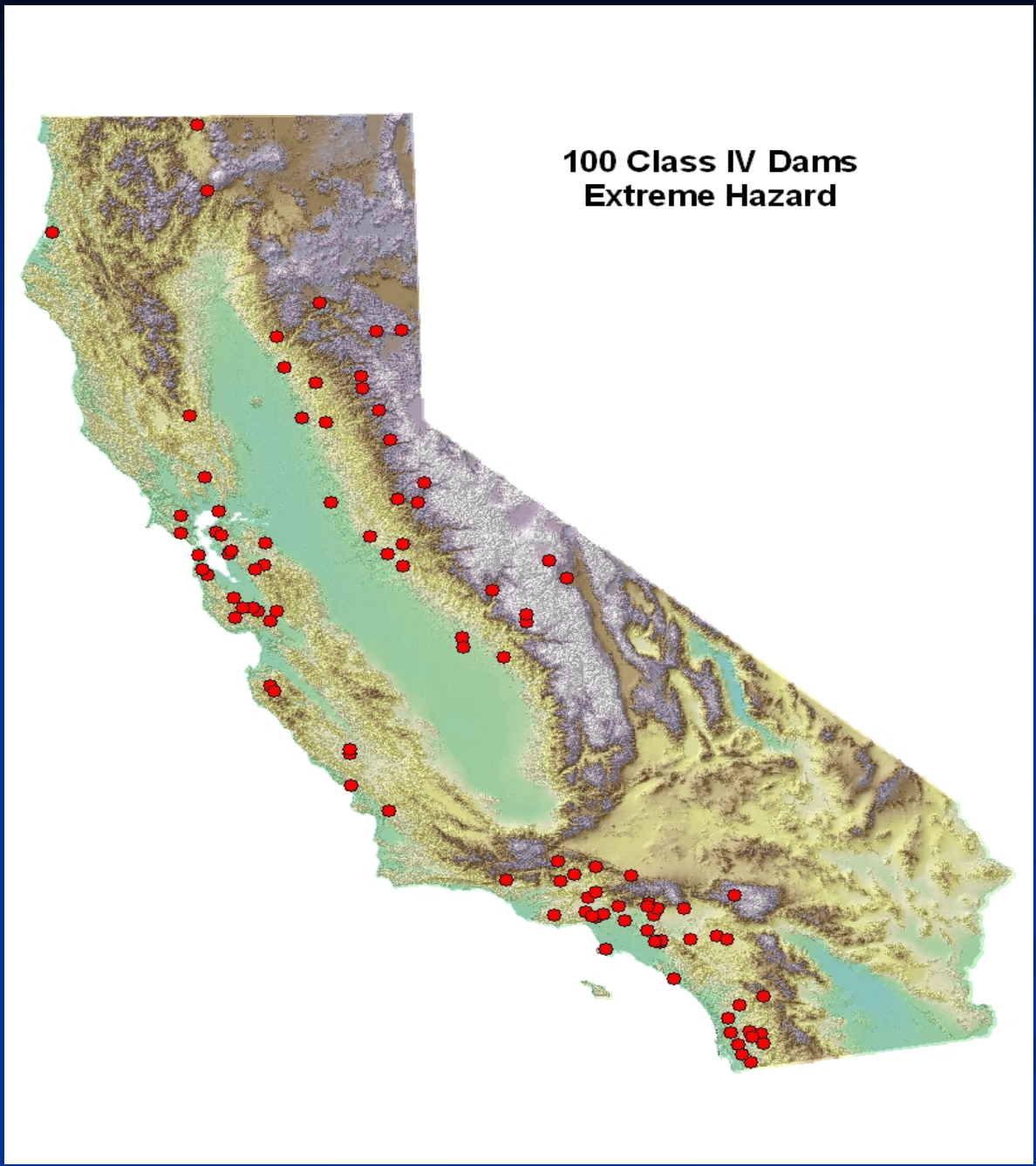
HMR 36	HMR 58/59
Pacific drainages only. Neither Northeast nor Southeast CA were considered	Entire state of California
Only general-storm estimates	Both general and local storms are provided
Based on mass-conservation model: moisture volume difference between air inflow and outflow	Based on extreme storms of record
Unable to account for local convergence, convection, and *seeder-feeder* effect	Better understanding of the physical mechanisms of orographic and nonorographic effects

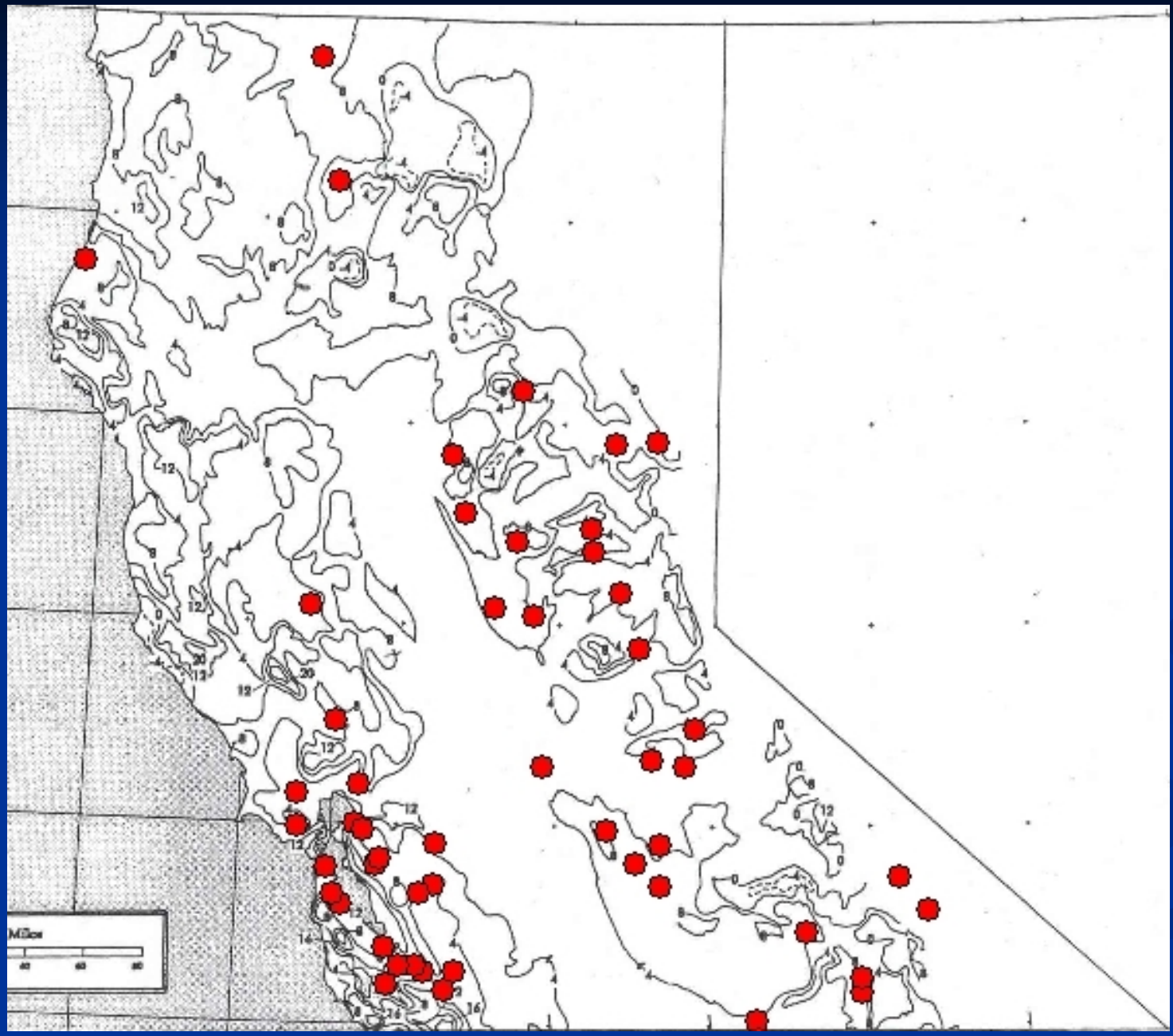

Miles
0
20
40
60
80
124W
122W
120W
118W


Miles
0
20
40
60
80
122W
120W
118W
116W
36N
34N

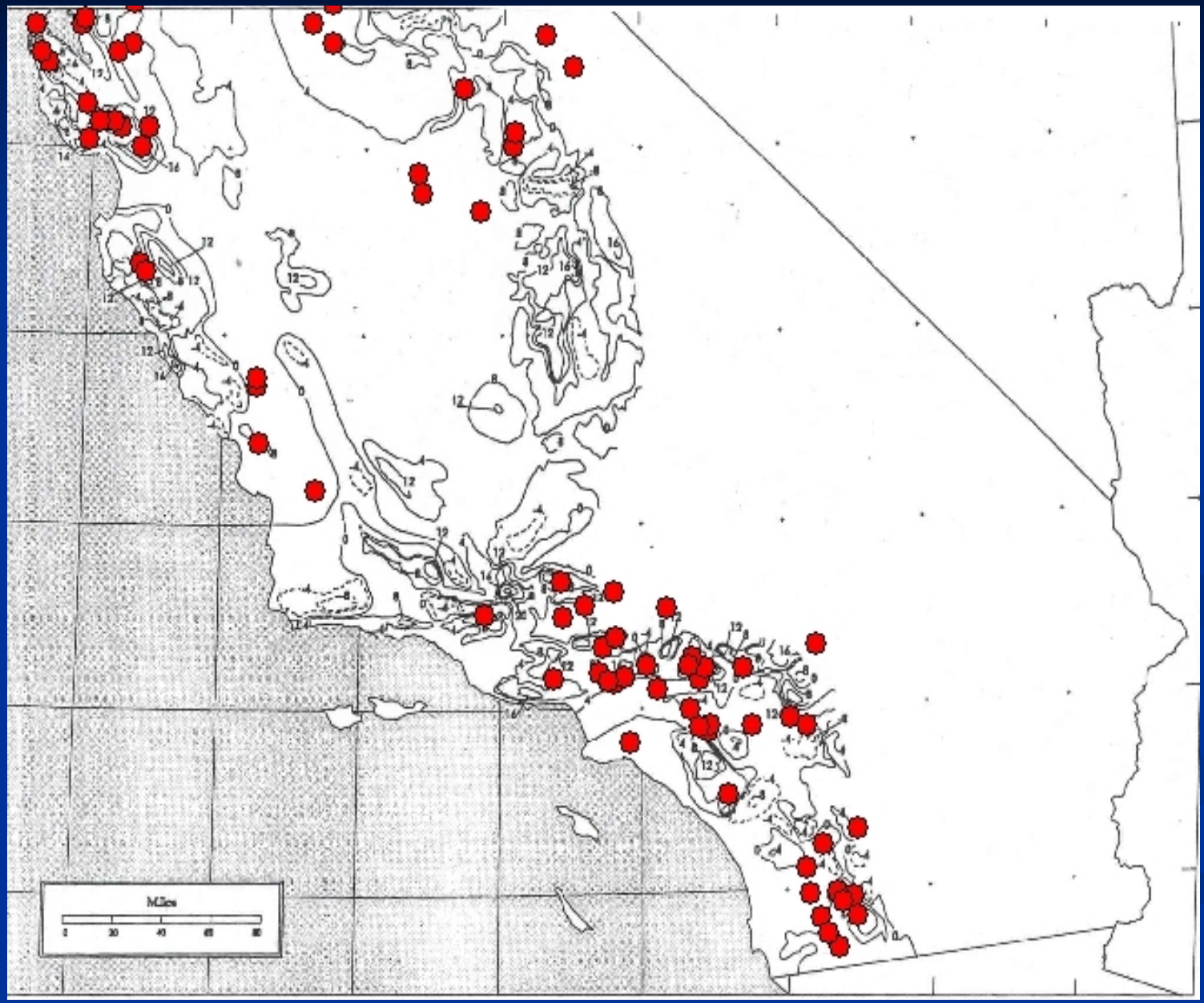
How did the release of HMR 58/59 affect CA State jurisdictional dams?


1250 Dams
Under the Jurisdiction of the
CA Division of Safety of Dams


100 Class IV Dams
Extreme Hazard



HMR 59 Figure 11.2a. HMR59 – HMR 36 at 24 hrs, 10 mi^2 for Northern CA



HMR 59 Figure 11.2b. HMR59 – HMR 36 at 24 hrs, 10 mi^2 for Southern CA

Reasons for No Immediate Requirement of HMR 58 for All HC IV Dams

- Unfamiliarity with HMR 58 at time of release.
- Recent hydrology studies performed using HMR 36.
- Questioned increasing extreme flow values to even higher values.
- Questioned increasing extremely high return periods to even higher values.
- Current DSOD hydrology procedure is outdated.

Hydrology Reevaluation

1. Major repair or alteration
2. Enlargement
3. Seasonal gate restriction
4. Increased downstream hazard
5. Probable Maximum Flood (PMF) studies required by the Federal Energy Regulatory Commission (FERC)
6. Transfer of dam ownership from Federal to local

Dam Name	County	HMR 36 24-hr PMP (in.)	HMR 58 24-hr PMP (in.)	HMR58 – HMR36	
				Calc. 24-hr PMP Difference	HMR 59 Fig. (24-hr 10 mi^2)
Camp Far West	Yuba	16.3	17.5	+1.2	+4
Don Pedro	Tuolumne	18	15	-3	0 to +6
Ice House	El Dorado	19.1	23.6	+4.5	+4
L L Anderson	Placer	21	25.7	+4.7	+4 to +8
Lake Spaulding	Nevada	24.6	23	-1.6	+4
New Exchequer	Mariposa	22.3	15.9	-6.4	-4 to +8
Santa Felicia	Ventura	15.5	18.9	+3.4	+4

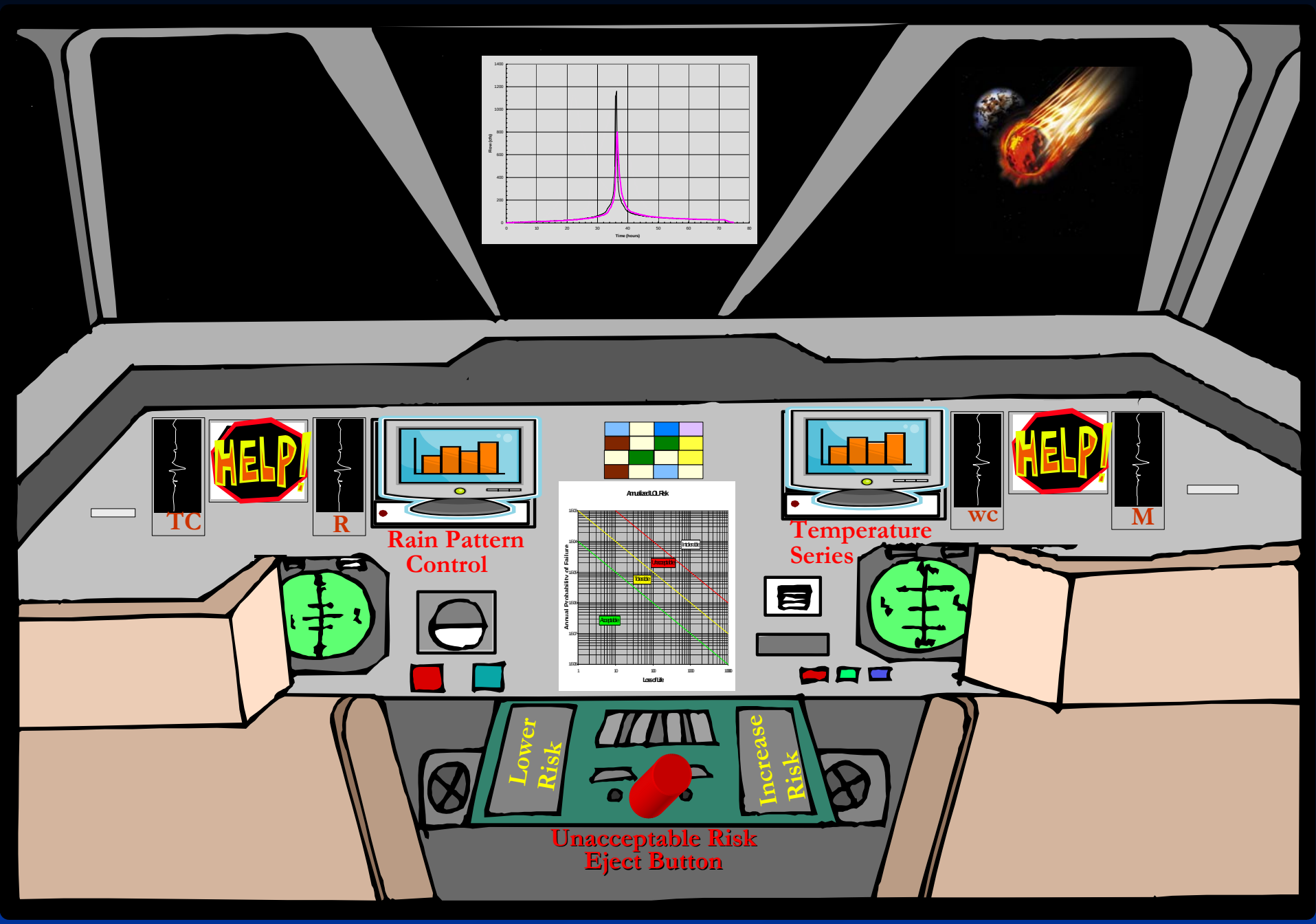
Dam Name	County	HMR 36 72-hr PMP		HMR 58 72-hr PMP		HMR58 – HMR36 PMP Difference (inches)
		(in.)	Return Period	(in.)	Return Period	
Bucks Storage	Plumas	59.5		47.4		-12.1
Camp Far West	Yuba	29.75		33.05		+3.3
Don Pedro	Tuolumne	24.4		29.4		+5
Ice House	El Dorado	35.8		42.4		+6.6
L L Anderson	Placer	39.6		46.6		+7
Lake Spaulding	Nevada	42.3		41.6		-0.7
New Exchequer	Mariposa	40		31		-9
Santa Felicia	Ventura	24.9		32		+7.1
Scott	El Dorado	31.7		34.1		+2.4

Dam Name	County	HMR 36 72-hr PMP		HMR 58 72-hr PMP		HMR58 – HMR36 PMP Difference (inches)
		(in.)	Return Period	(in.)	Return Period	
Bucks Storage	Plumas	59.5	$>10^6$	47.4		-12.1
Camp Far West	Yuba	29.75	$>10^5$	33.05		+3.3
Don Pedro	Tuolumne	24.4	$>10^3$	29.4		+5
Ice House	El Dorado	35.8	$>10^4$	42.4		+6.6
L L Anderson	Placer	39.6	$>10^5$	46.6		+7
Lake Spaulding	Nevada	42.3	$>10^5$	41.6		-0.7
New Exchequer	Mariposa	40	$>10^6$	31		-9
Santa Felicia	Ventura	24.9	$>10^4$	32		+7.1
Scott	El Dorado	31.7	$>10^6$	34.1		+2.4

Dam Name	County	HMR 36 72-hr PMP		HMR 58 72-hr PMP		HMR58 – HMR36 PMP Difference (inches)
		(in.)	Return Period	(in.)	Return Period	
Bucks Storage	Plumas	59.5	>10^6	47.4	>10^4	-12.1
Camp Far West	Yuba	29.75	>10^5	33.05	>10^6	+3.3
Don Pedro	Tuolumne	24.4	>10^3	29.4	>10^4	+5
Ice House	El Dorado	35.8	>10^4	42.4	>10^6	+6.6
L L Anderson	Placer	39.6	>10^5	46.6	>10^6	+7
Lake Spaulding	Nevada	42.3	>10^5	41.6	<=10^5	-0.7
New Exchequer	Mariposa	40	>10^6	31	<=10^5	-9
Santa Felicia	Ventura	24.9	>10^4	32	>10^5	+7.1
Scott	El Dorado	31.7	>10^6	34.1	>10^7	+2.4

Dam Name	HMR 36 72-hr PMP		HMR 58 72-hr PMP		HMR Diff (in.)	Spillway Adequate?	Mitigation Proposed?
	(in.)	RP	(in.)	RP			
Bucks Storage	59.5	>10^6	47.4	>10^4	-12.1	Yes	
Camp Far West	29.75	>10^5	33.05	>10^6	+3.3	No	Proposals under consideration
Don Pedro	24.4	>10^3	29.4	>10^4	+5	Yes	
Ice House	35.8	>10^4	42.4	>10^6	+6.6	Yes	
L L Anderson	39.6	>10^5	46.6	>10^6	+7	No	Structural Mod. Prop
Lake Spaulding	42.3	>10^5	41.6	<=10^5	-0.7	No	Mod. Cert. of Appr. to allow gate closures starting on May 1
New Exchequer	40	>10^6	31	<=10^5	-9	Yes	
Santa Felicia	24.9	>10^4	32	>10^5	+3.9	No	Site-Specific PMP Study
Scott	31.7	>10^6	34.1	>10^7	+2.4	No	Investigation in Progress


DEPARTMENT OF WATER RESOURCES


HELP!
TC
R
Rain Pattern Control
Annualized LO Risk
Annual Probability of Failure
Loss of Life
Unacceptable
Acceptable
Tolerable
Acceptable
HELP!
WC
M
Temperature Series
Lower Risk
Increase Risk
Unacceptable Risk
Eject Button

Lessons Learned

- Same or similar PMP results are easily obtained by dam owner(s), consultants, and regulators.
- Often dam owners, consultants, and regulators develop significantly different basin model parameters.
- The inflow calculated from the PMP and basin models will likely not have the same return period as the PMP storm.
- If stream and rainfall gages are available, calibration of the watershed is highly recommended.

Thank You