

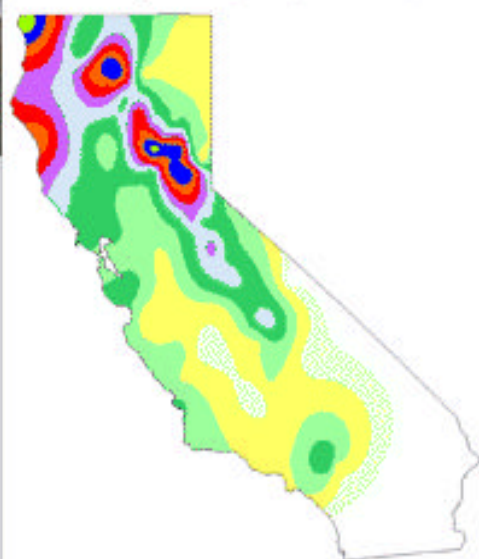
NATIONAL CLIMATIC DATA CENTER

RESEARCH CUSTOMER SERVICE GROUP

The WINTER OF '96-'97 West Coast Flooding



Total Precipitation (inches), December, 1996



NEAL LOTT
Physical Scientist

DOUG ROSS
Meteorologist

MATTHEW SITTEL
Orkand Corporation
Meteorologist



INTRODUCTION

The month of December 1996 and the first week of January 1997 brought tremendous amounts of rain and snow to parts of the states of Washington, Oregon, Idaho, California, Nevada, and Montana. In particular, the period of December 26 through January 3 was especially severe with over 20 inches of rain in some locations. This, along with unusually warm temperatures which produced tremendous snowmelt, resulted in record flooding in some areas. Emergency management officials in these states indicate that as many as a half a million people were forced to evacuate at one time or another during December through early January.

DISCUSSION

The valleys surrounding the Sierra Nevada were especially hard hit, as the Truckee River reached its highest level on record. Lake Tahoe reached its highest level since 1917. The Army Corps of Engineers released a preliminary estimate ranking this flooding as a 50-year event (a 2% chance of occurrence in any given year) for the Sacramento River.

As of January 20, in California, 43 of its 58 counties had been declared disaster areas. US-50 across the Sierra was "cut" in five places by mudslides and flooding. Sacramento was spared the worst of the flooding by a system of levees, although many nearby towns were not so fortunate. Numerous levee breaches and breaks occurred across the state. Approximately 16,000 residences were damaged or destroyed. State officials now estimate at least \$1.6 billion in damages to private and public property, although estimates are still rising as the damage surveys continue.

In Nevada, Reno alone estimates approximately \$170 million in damages, with the state total possibly reaching \$500 million. Damage to casinos and businesses in the Reno area was quite extensive.

In Washington, \$125 million is the estimate for insured losses, but the addition of uninsured losses will add greatly to the total. Mudslides were a severe problem, especially in the Seattle area.

In Oregon, areas along the Rogue River in the south and in the vicinity of the Tualatin River near Portland were among the most-affected areas of the state. Damage estimates were not yet available, but appeared to be less extensive than surrounding states.

In Idaho, about 400 miles of roads were closed, and over 10,000 people were isolated at one time by flooding and mudslides. Approximately one-third of the state's counties were declared disaster areas. Damage estimates were not available at the time of this report.

Also as of January 20, the overall death toll was 36, with the following state totals:

California--8
Oregon--3

Washington--19
Idaho--5
Nevada--1

This is the third consecutive year that the west coast has been impacted by severe flooding. California was severely affected in January and March of 1995, while the Pacific Northwest was affected in February 1996 and again in November 1996. During 1995, El Nino conditions were present in the equatorial region of the eastern Pacific with warmer than normal sea surface temperatures. During 1996 however, there was no evidence to suggest El Nino conditions in the Pacific. Therefore, some of the same areas of the west coast, especially central-northern California, were affected by severe flooding both in 1995 (El Nino period) and in this latest event (non-El Nino period).

Following is a state-by-state summary of river flooding as reported by the U.S. Geological Survey:

California--Significant flooding occurred on 15 rivers, with historical peaks approached or exceeded on three rivers:

- * The Cosumnes River at Michigan Bar exceeded the previous record level by 0.7 feet on January 2 and was still rising at that time. Records began in 1907.
- * The South Fork American River near Camino, with a flow volume of approximately 70,000 cubic feet per second, exceeded the previous record by 20,200 cubic feet per second. Records began in 1922.
- * The Napa River near St. Helena crested January 2 just below the previous record peak set in 1986.

Idaho--Flow of the Payette River near Horseshoe Bend peaked at 24,500 cubic feet per second, approximately a 50-year recurrence flow rate. The Snake River below Hells Canyon Dam reached 102,000 cubic feet per second, a new record.

Nevada--Flooding in northwest Nevada approached or exceeded records for the Truckee, Carson, and Walker Rivers and their tributaries. This event was similar in severity to the historical event of 1955.

Oregon--Flooding was widespread, although no new records have yet been indicated.

Washington--Significant flooding on the following rivers:

- * Hangman Creek at Spokane crested on January 1 at a record high discharge of 25,800 cubic feet per second and peak stage of 14.6 feet. This is 5200 cubic feet per second above the record set in 1963.
- * The Palouse River at Hooper in Whitman County and the Klickitat River near Pitt in Klickitat County reached discharge rates with recurrence intervals of 10 years.

* The White Salmon River near Underwood in Skamania County, the Skookumchuck River in Lewis and Thurston Counties, and the Chehalis River near Grand Mound and at Porter reached discharge rates with recurrence intervals of 10 years.

FIGURES AND TABLES

Figures 1 through 4 are color-contour analyses of December 1996 precipitation for the western U.S. California is shown separately due to the availability of many additional stations from the California Department of Water Resources. Figures 5 through 8 are data plots for December for the same areas. Figure 9 is an analysis for December 20 through January 3, the period of heaviest rainfall which produced the severe flooding. Figure 10 is a color-enhanced infrared satellite image for December 31. Finally, Tables 1-2 provide all of the precipitation amounts used in producing Figures 1-9. These values are preliminary and subject to change.

ADDITIONAL INFORMATION

This report, including all images and analyses in GIF format, is available via NCDC's WWW site--<http://www.ncdc.noaa.gov>. The WWW version of the report also includes MPEG satellite loops of incoming storms and links to other sources of information.

Contributors to this report include the U.S. Geological Survey, individual state emergency management agencies, the California Department of Water Resources, and the National Weather Service. More data will become available over time as additional stations' data are received and processed at NCDC. Please contact NCDC at 704-271-4800 or "orders@ncdc.noaa.gov" for further information and data.

TABLE 1

Western Precipitation--December, 1996
Preliminary data from the National Weather Service and the California
Department of Water Resources.

TOTAL: Total Precipitation Received
NORM : Normal December Precipitation
%NORM: Total Precipitation as Percent of Normal for December

ST STATION	LAT.		LONG.		TOTAL	NORM	% NORM
	DEG	MIN	DEG	MIN			
AZ FLAGSTAFF	35	8	111	40	0.64	2.40	27
AZ PHOENIX	33	26	112	1	0.02	1.00	2
AZ TUCSON	32	7	110	56	0.01	1.07	0
CA ADIN RANGER STN	41	12	120	57	5.25	1.99	264
CA ALTURAS	41	30	120	33	3.12	1.52	205
CA ASH MOUNTAIN	36	29	118	50	9.58	4.50	213
CA AUBERRY 1 NW	37	5	119	30	10.85	3.95	275
CA AUBURN	38	55	121	5	16.78	5.73	293
CA BAKERSFIELD WSO APRT	35	25	119	3	1.71	0.84	204
CA BALCH POWER HOUSE	36	55	119	5	12.61	4.83	261
CA BIG BAR RANGER STATION	40	45	123	15	17.14	6.88	249
CA BISHOP WSO AIRPORT	37	22	118	22	0.98	1.03	95
CA BLUE CANYON	39	17	120	42	43.31	10.46	414
CA BLYTHE	33	37	114	36	0.00	0.00	0
CA BOCA	39	23	120	6	14.92	3.62	412
CA BRUSH CREEK R S	39	39	121	20	43.02	12.15	354
CA BUCKS CREEK P H	39	55	121	20	34.18	11.51	297
CA CALLAHAN	41	19	122	48	9.05	3.66	247
CA CAMP PARDEE	38	15	120	51	8.64	3.40	254
CA CAMPTONVILLE R S	39	27	121	3	26.29	10.23	257
CA CANYON DAM	40	10	121	5	19.37	6.50	298
CA CARIBOU PH	40	0	121	12	18.49	6.93	267
CA CEDARVILLE	41	32	120	10	4.67	1.63	287
CA CHALLENGE R S	39	29	121	13	32.64	11.45	285
CA CHERRY VALLEY DAM	37	58	119	55	25.14	8.30	303
CA CHESTER	40	18	121	14	14.40	5.24	275
CA CLEARLAKE 4 SE	38	54	122	36	14.29	4.49	318
CA COALINGA	36	9	120	21	2.55	1.28	199
CA COFFEE CREEK RS	41	5	122	42	30.74	9.46	325
CA COLFAX	39	6	120	57	26.62	7.90	337
CA COLGATE POWER HOUSE	39	20	121	11	18.06	6.71	269
CA DAVIS 2 WSW EXP FARM	38	32	121	46	6.73	3.16	213
CA DONNER MEMORIAL ST PK	39	19	120	14	20.20	6.58	307
CA DOWNIEVILLE	39	34	120	50	35.25	10.25	344
CA DUNSMUIR TREATMENT PLANT	41	12	122	16	38.29	9.43	406
CA ELECTRA POWER HOUSE	38	20	120	40	13.09	4.96	264
CA ENGLEBRIGHT (COE)	39	14	121	16	10.66	5.08	210
CA EUREKA WSO CITY	40	48	124	10	21.26	6.40	332
CA FAIRFIELD	38	17	122	4	11.67	3.76	310
CA FAIRMONT	34	42	118	26	3.63	2.73	133
CA FIDDLETOWN DEXTER RANC	38	32	120	42	17.25	5.87	294

CA FORESTHILL RANGER STN	39	1	120	51	28.78	8.99	320
CA FORT JONES RANGER STN	41	36	122	51	11.46	4.17	275
CA FRESNO WSO AP	36	47	119	43	4.26	1.76	242
CA FRIANT GOVERNMENT CAMP	36	59	119	43	6.27	2.40	261
CA GASQUET RANGER STN	41	52	123	58	43.43	16.39	265
CA GEORGETOWN RANGER STN	38	55	120	47	28.99	8.84	328
CA GLENNVILLE	35	43	118	42	7.01	2.96	237
CA GRANT GROVE	36	44	118	58	18.08	7.83	231
CA GRASS VALLEY NO 2	39	13	121	4	27.81	9.24	301
CA GREENVILLE RANGER STN	40	8	120	56	9.43	6.25	151
CA GROVELAND RANGER STN	37	49	120	6	18.59	6.08	306
CA HAIWEE	36	8	117	57	1.73	1.05	165
CA HANFORD REFINERY	36	18	119	39	3.03	1.18	257
CA HAPPY CAMP RANGER STN	41	48	123	22	28.56	10.35	276
CA HARRISON GULCH R S	40	22	122	58	16.55	7.26	228
CA HETCH HETCHY	37	57	119	47	15.34	5.62	273
CA HOLLISTER 2	36	51	121	25	4.42	2.44	181
CA HUNTINGTON LAKE	37	14	119	13	14.57	5.20	280
CA IMPERIAL VALLEY	32	51	115	34	0.02	0.40	5
CA INDEPENDENCE LAKE (DWR)	39	27	120	17	1.57	1.05	150
CA ISABELLA	35	37	118	26	4.29	1.86	231
CA KILARC PH	40	42	121	52	18.88	7.23	261
CA LAGUNA BEACH	33	33	117	47	5.15	1.94	265
CA LAKE ARROWHEAD	34	15	117	11	7.05	7.19	98
CA LAKE SPAULDING	39	19	120	38	36.08	11.35	318
CA LEMON COVE	36	23	119	2	5.10	2.26	226
CA LODGEPOLE	36	36	118	44	18.34	7.91	232
CA LOS ANGELES WSO ARPT	33	56	118	24	4.74	2.10	226
CA LYTLE CREEK R S	34	14	117	29	14.79	5.94	249
CA MADERA	36	57	120	2	5.02	2.11	238
CA MARIPOSA R S	37	30	119	59	16.44	5.22	315
CA MARKLEEVILLE	38	42	119	47	10.33	3.07	336
CA MINERAL	40	21	121	36	30.69	8.87	346
CA MODESTO	37	39	121	0	4.51	2.15	210
CA MOUNT HAMILTON	37	20	121	39	11.63	4.58	254
CA NEVADA CITY	39	15	121	1	33.08	9.19	360
CA NORTH FORK R S	37	14	119	30	14.77	5.96	248
CA OCEANSIDE MARINA	33	13	117	24	0.64	1.56	41
CA ORLAND	39	45	122	12	5.09	3.74	136
CA ORLEANS	41	18	123	32	26.17	10.18	257
CA OXNARD	34	12	119	11	5.71	1.98	288
CA PACIFIC HOUSE	38	45	120	30	26.84	8.41	319
CA PANOCH 2 W	36	36	120	52	3.10	1.52	204
CA PASO ROBLES	35	38	120	41	5.83	2.63	222
CA PINECREST STRAWBERRY	38	10	120	1	16.40	7.01	234
CA PIT RIVER P H 1	41	0	121	30	4.69	4.30	109
CA PIT RIVER P H 5	40	59	121	59	40.14	12.54	320
CA PLACERVILLE	38	43	120	49	19.86	6.49	306
CA PLUMAS EUREKA PARK	39	45	120	42	43.24	10.95	395
CA PORTOLA	39	48	120	28	9.40	3.49	269
CA POTTER VALLEY P H	39	22	123	8	19.38	8.39	231
CA PRIEST VALLEY	36	11	120	42	8.31	3.71	224
CA QUINCY	39	58	120	57	15.66	6.75	232
CA REDDING	40	30	122	18	10.05	5.51	182

CA SACRAMENTO	38	31	121	30	5.78	2.51	230
CA SACRAMENTO WSO CITY	38	35	121	30	5.82	3.20	182
CA SALINAS FAA AIRPORT	36	40	121	36	5.69	2.60	219
CA SALT SPRINGS PWR HOUSE	38	30	120	13	14.55	7.39	197
CA SAN BERNARDINO CO HOSP	34	8	117	16	3.33	2.80	119
CA SAN DIEGO	32	44	117	10	0.64	1.57	41
CA SAN FRANCISCO WSO AP	37	37	122	23	6.86	3.73	184
CA SAN LUIS OBISPO POLYTE	35	18	120	40	10.88	4.17	261
CA SANTA BARBARA	34	25	119	41	6.56	3.20	205
CA SANTA CRUZ	36	59	122	1	13.74	5.75	239
CA SANTA ROSA	38	27	122	42	12.40	5.28	235
CA SHASTA DAM	40	43	122	25	27.82	10.87	256
CA SLY PARK	38	43	120	34	23.60	8.28	285
CA SODA SPRINGS 1 E	39	19	120	22	34.92	10.58	330
CA SOUTH ENTRANCE YOSEMITE	37	31	119	35	18.19	7.33	248
CA SPRINGVILLE 7 ENE	36	8	118	47	7.88	4.99	158
CA STANDISH HICKEY PARK	39	53	123	44	35.08	14.32	245
CA STOCKTON	37	54	121	15	4.45	2.11	211
CA STRAWBERRY VALLEY	39	34	121	6	44.67	13.87	322
CA SUSANVILLE AP	40	23	120	34	8.53	2.56	333
CA TAHOE CITY	39	10	120	8	18.50	5.69	325
CA TIGER CREEK PH	38	27	120	29	22.95	7.78	295
CA TRUCKEE RANGER STN	39	20	120	11	16.77	5.50	305
CA TWENTYNINE PALMS	34	8	116	2	0.06	0.43	14
CA TWIN LAKES	38	42	120	2	18.05	7.81	231
CA UKIAH	39	9	123	12	15.72	7.15	220
CA VINTON	39	49	120	11	7.56	2.02	374
CA VOLTA POWER HOUSE	40	28	121	52	11.02	5.40	204
CA WASCO	35	36	119	20	2.81	0.99	284
CA WEAVERVILLE RANGER STN	40	44	122	56	21.04	6.85	307
CA WEST POINT	38	24	120	32	15.84	6.00	264
CA WHISKEYTOWN RESERVOIR	40	37	122	32	26.82	9.75	275
CA YOSEMITE VALLEY	37	45	119	35	12.11	6.58	184
CA YREKA	41	43	122	38	9.67	3.50	276
CO ALAMOSA	37	27	105	52	0.01	0.44	1
CO COLORADO SPRINGS	38	49	104	43	0.14	0.46	30
CO DENVER	39	45	104	52	0.06	0.64	9
CO GRAND JUNCTION	39	7	108	32	0.53	0.61	87
CO PUEBLO	38	17	104	31	0.22	0.42	52
ID LEWISTON	46	23	117	1	2.62	1.20	218
ID POCATELLO	42	55	112	36	3.13	1.11	282
MT BILLINGS	45	48	108	32	0.23	0.79	29
MT BUTTE	45	57	112	30	1.99	0.44	452
MT GLASGOW	48	13	106	37	0.51	0.38	134
MT GREAT FALLS	47	29	111	22	1.22	0.85	144
MT HELENA	46	36	112	0	0.66	0.59	112
MT KALISPELL	48	18	114	16	3.27	1.73	189
MT MILES CITY	46	26	105	52	0.44	0.64	69
MT MISSOULA	46	55	114	5	4.65	1.16	401
NV ELKO	40	50	115	47	3.10	1.10	282
NV ELY	39	17	114	51	0.33	0.70	47
NV LAS VEGAS	36	5	115	10	0.18	0.38	47
NV RENO	39	30	119	47	3.03	0.99	306
NV WINNEMUCCA	40	54	117	48	2.98	0.88	339

OR ASTORIA	46	9	123	53	20.38	10.55	193
OR CORVALLIS	44	38	123	12	17.11	7.72	222
OR EUGENE	44	7	123	13	14.95	8.61	174
OR MEDFORD	42	22	122	52	9.94	3.32	299
OR PENDLETON	45	41	118	51	2.32	1.63	142
OR PORTLAND	45	36	122	36	13.35	6.13	218
OR SALEM	44	55	123	0	14.71	6.80	216
UT SALT LAKE CITY	40	46	111	58	1.73	1.40	124
WA OLYMPIA	46	58	122	54	15.91	8.12	196
WA SEATTLE	47	27	122	18	11.30	5.91	191
WA SPOKANE	47	38	117	32	4.10	2.42	169
WA YAKIMA	46	34	120	32	4.97	1.41	352
WY CASPER	42	55	106	28	0.51	0.66	77
WY CHEYENNE	41	9	104	49	0.01	0.42	2
WY LANDER	42	49	108	44	0.28	0.58	48
WY RIVERTON	43	1	108	23	0.11	0.28	39
WY SHERIDAN	44	46	106	58	0.73	0.70	104

TABLE 2

Total Precipitation (inches), December 20, 1996 - January 3, 1997
Preliminary data from the National Weather Service and the California
Department of Water Resources.

St Station	Lat. deg min	Lon. deg min	Prec. (in.)
CA Alpine	32 50	116 46	0.92
CA Anaheim	33 54	117 52	0.72
CA Avalon	33 21	118 20	1.21
CA Bakersfield	35 25	119 3	1.11
CA Beaumont	33 56	116 58	2.69
CA Big Bar Ranger Station	40 45	123 15	12.80
CA Big Bear Lake	34 15	116 53	0.67
CA Big Sur	36 15	121 47	11.70
CA Blue Canyon	39 17	120 42	39.34
CA Borrego	33 15	116 24	0.03
CA Brush Creek	39 39	121 20	37.04
CA Campo	32 37	116 28	0.58
CA Chester	40 18	121 14	11.60
CA Chula Vista	32 36	117 6	0.32
CA Concord	37 59	122 4	6.29
CA Coronado	32 38	117 10	0.33
CA Cuyamaca Park	32 59	116 35	2.61
CA Del Mar	32 58	117 16	0.53
CA El Cajon	32 49	116 58	0.32
CA El Centro	32 46	115 34	0.00
CA Escondido	33 7	117 5	0.94
CA Eureka	40 48	124 10	10.33
CA Fallbrook	33 22	117 14	2.03
CA Fremont	37 32	122 0	3.93
CA Fresno	36 47	119 43	3.08
CA Hesperia	34 25	117 18	0.23
CA Idyllwild	33 45	116 43	1.37
CA Imperial Beach	32 34	117 7	0.10
CA Kentfield	37 57	122 33	15.37
CA La Mesa	32 46	117 1	0.57
CA Lemon Grove	32 44	117 2	0.45
CA Los Angeles Civic Ctr.	34 3	118 14	1.27
CA McCloud Ranger Stn	41 16	121 58	14.83
CA Mineral	40 21	121 36	27.02
CA Monrovia	34 10	117 59	2.34
CA Monterey	36 36	121 54	4.82
CA Morgan Hill	37 8	121 38	10.28
CA Mt. Shasta	41 18	122 20	10.06
CA Napa	38 18	122 18	10.82
CA National City	32 40	117 6	0.07
CA Newhall	34 22	118 34	0.47
CA Newport Beach	33 36	117 53	0.85
CA Oceanside Harbor	33 13	117 24	0.62
CA Ojai	34 27	119 14	1.88
CA Oxnard-NWS	34 12	119 8	2.05

CA Palm Springs	33	50	116	30	0.00
CA Paradise Fire Station	39	45	121	37	22.66
CA Pasadena	34	9	118	9	2.01
CA Portola	39	48	120	28	10.17
CA Poway	33	1	117	2	0.88
CA Ramona	33	3	116	55	1.06
CA Redwood City	37	29	122	14	10.28
CA Sacramento	38	35	121	30	5.67
CA Salinas	36	40	121	36	4.73
CA San Diego	32	44	117	10	0.17
CA San Francisco	37	44	122	30	6.39
CA San Gabriel	34	6	118	6	2.30
CA San Juan Capistrano	33	30	117	39	1.41
CA Santa Barbara	34	25	119	41	2.48
CA Santa Cruz	36	59	122	1	9.01
CA Santa Maria	34	56	120	26	2.12
CA Santa Rosa	38	27	122	42	10.57
CA Santee	32	51	116	59	0.57
CA SFO Airport	37	37	122	23	5.74
CA Sierraville RS	39	37	120	22	14.45
CA Spring Valley	32	43	116	59	0.06
CA Springville 7 ENE	36	8	118	47	8.02
CA Strawberry Valley	39	34	121	6	37.41
CA Success Dam	36	4	118	55	3.36
CA Ukiah	39	9	123	12	10.02
CA Vallejo	38	6	122	16	8.42
CA Vinton	39	49	120	11	7.72
CA Vista	33	14	117	14	0.89
ID Boise	43	34	116	13	3.81
ID Grangeville	45	55	116	8	3.50
ID Idaho Falls	43	31	112	4	2.13
ID Lewiston	46	23	117	1	2.53
ID Pocatello	42	55	112	36	2.57
MT Billings	45	48	108	32	0.48
MT Bozeman	45	40	111	3	1.97
MT Butte	45	57	112	30	2.52
MT Chester	48	31	110	57	0.79
MT Conrad	48	10	111	57	0.84
MT Cut Bank	48	36	112	22	0.56
MT Dillon	45	15	112	33	0.56
MT Drummond	46	38	113	11	2.96
MT Ekalaka	45	53	104	32	0.65
MT Glasgow	48	13	106	37	0.33
MT Great Falls	47	29	111	22	0.90
MT Havre	48	33	109	46	0.36
MT Helena	46	36	112	0	0.75
MT Kalispell	48	18	114	16	1.90
MT Lewistown	47	3	109	27	0.69
MT Libby	48	24	115	32	4.25
MT Livingston	45	42	110	27	1.41
MT Miles City	46	26	105	52	0.31
MT Missoula	46	56	114	6	3.32
MT Polson	47	41	114	10	1.53
MT Thompson Falls	47	36	115	22	5.21

MT Wisdom	45	37	113	27	2.22
NV Caliente	37	37	114	31	0.00
NV Elko	40	50	115	47	1.60
NV Ely	39	17	114	51	0.82
NV Eureka	39	31	115	58	0.00
NV Fallon	39	27	118	47	0.86
NV Las Vegas	36	5	115	10	0.05
NV Lovelock	40	4	118	33	0.54
NV Mercury/Desert Rock	36	37	116	1	0.20
NV Reno-Airport	39	30	119	47	2.06
NV Tonopah	38	4	117	5	0.20
NV Winnemucca	40	54	117	48	0.61
OR Astoria	46	9	123	53	15.05
OR Brookings	42	2	124	15	14.77
OR Eugene	44	7	123	13	8.49
OR Florence	43	59	124	6	14.89
OR Klamath Falls	42	12	121	47	3.66
OR La Grande	45	19	118	5	0.82
OR Medford	42	23	122	53	6.60
OR Newport	44	38	124	3	14.56
OR North Bend	43	25	124	15	8.55
OR Ontario	44	3	116	58	2.40
OR Pendleton	45	41	118	51	1.56
OR Portland	45	36	122	36	8.38
OR Tillamook	45	27	123	52	16.56
UT Alta	40	36	111	38	6.20
UT Brigham City	41	31	112	3	1.91
UT Cedar City	37	42	113	6	0.63
UT Duchesne	40	10	110	24	0.66
UT Escalante	37	46	111	36	0.12
UT Fillmore	38	57	112	19	1.50
UT Hanksville	38	22	110	43	0.63
UT Heber	40	30	111	25	2.57
UT Manti	39	15	111	38	1.25
UT Midway	40	31	111	28	3.62
UT Milford	38	26	113	1	1.26
UT Monticello	37	52	109	18	0.65
UT Nephi	39	42	111	50	2.04
UT Ogden	41	14	111	58	3.51
UT Orem	40	17	111	44	2.05
UT Provo	40	15	111	39	1.57
UT Randolph	41	40	111	11	1.47
UT Salt Lake City	40	47	111	57	0.92
UT Spanish Fork	40	5	111	36	1.71
UT St. George	37	7	113	34	2.18
UT Tooele	40	32	112	18	0.93
UT Trenton	41	55	111	54	3.01
UT Utah Test Range	41	3	112	56	0.90
WA Arlington	48	12	122	8	4.97
WA Ephrata	47	19	119	31	1.01
WA Everett	47	59	122	11	6.98
WA Hoquiam	46	59	123	56	11.40
WA Kelso	46	8	122	53	8.63
WA Long Beach City	46	22	124	2	10.80

WA NOAA Sandpoint	47	41	122	15	8.75
WA Sea-Tac Airport	47	27	122	18	8.78
WA Spokane	47	38	117	32	2.49
WA Vancouver	45	41	122	39	10.63
WA Yakima	46	34	120	32	4.28
WY Big Piney	42	33	110	7	0.07
WY Casper	42	55	106	28	0.17
WY Cheyenne	41	9	104	49	0.03
WY Cody	44	31	109	4	0.17
WY Evanston	41	16	110	57	0.16
WY Jackson	43	29	110	46	1.27
WY Lake Yellowstone	44	33	110	24	2.65
WY Lander	42	49	108	44	0.26
WY Laramie	41	19	105	41	0.13
WY Rawlins	41	48	107	12	0.25
WY Riverton	43	1	108	23	0.19
WY Rock Springs	41	36	109	4	0.51
WY Sheridan	44	46	106	58	0.40
WY Tower Falls	44	55	110	25	1.80
WY Worland	43	58	107	58	0.16

Total Precipitation (inches), December, 1996

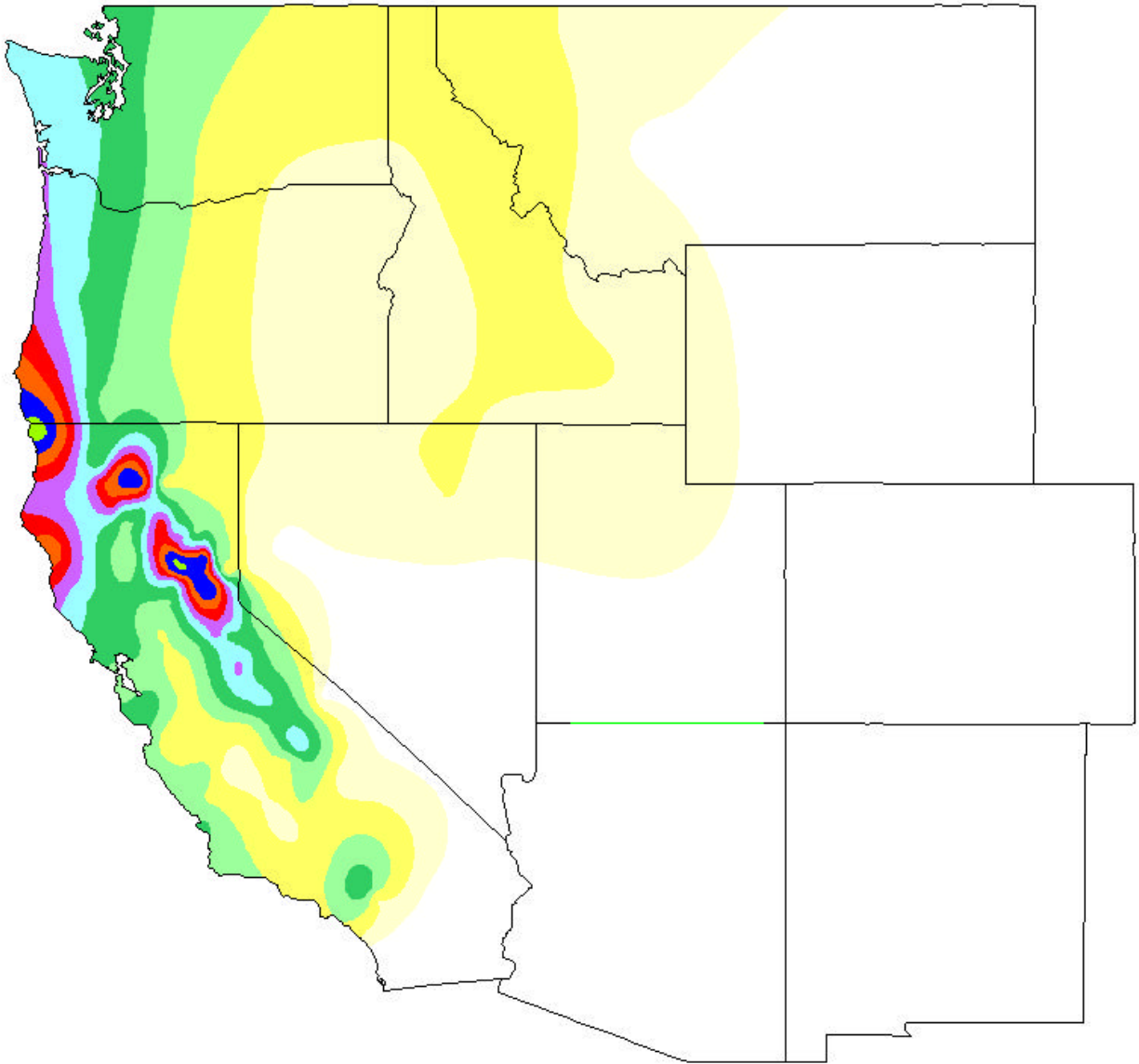
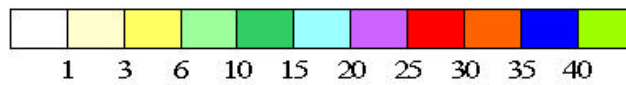


FIGURE 1

Precipitation (inches)



Percent of Normal Precipitation, December, 1996

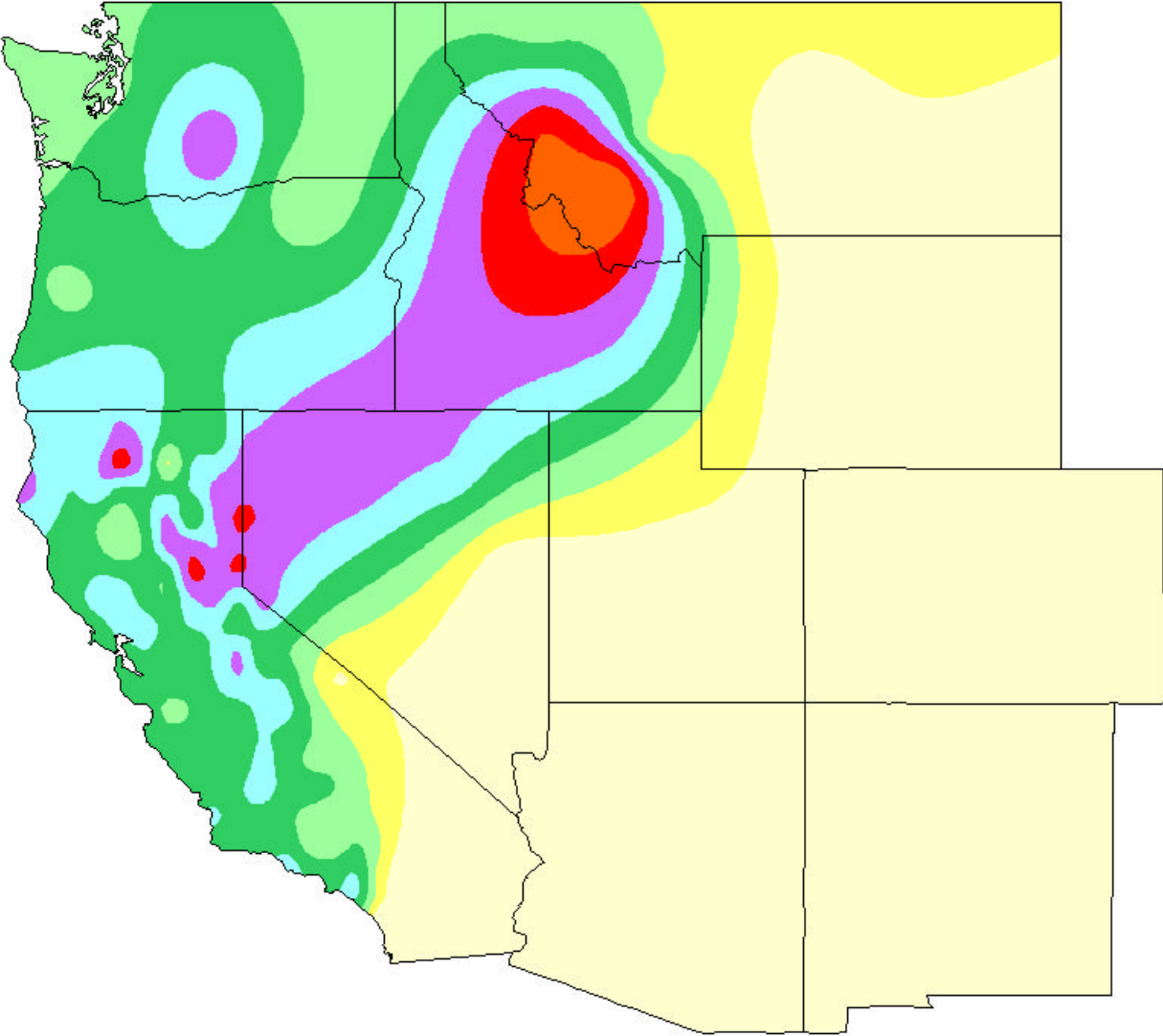


FIGURE 2

Percent of Normal Precipitation



Total Precipitation (inches), December, 1996

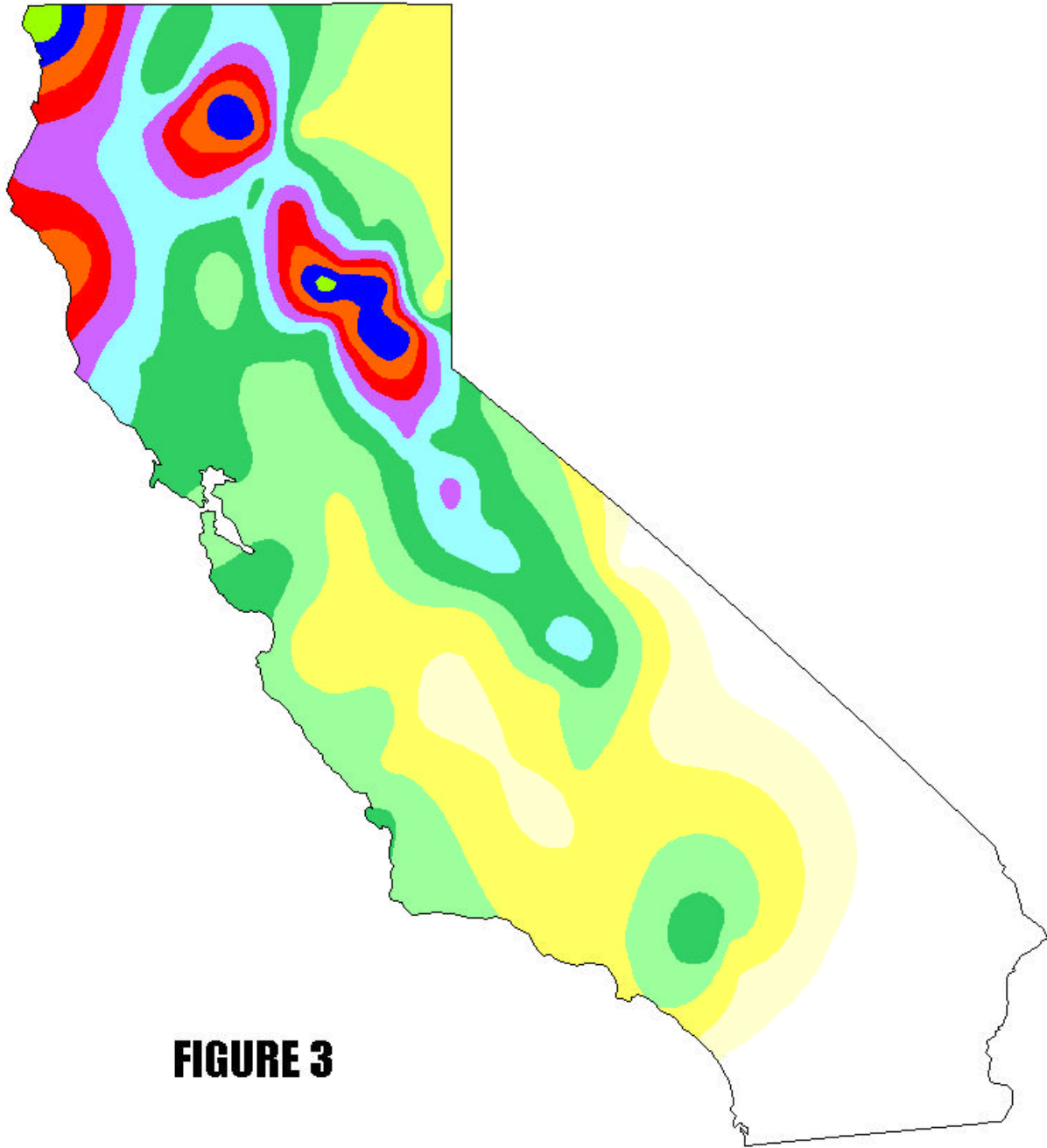
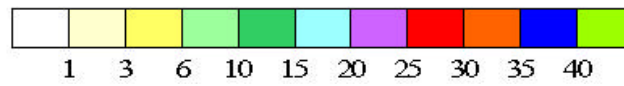


FIGURE 3

Precipitation (inches)



Percent of Normal Precipitation, December, 1996

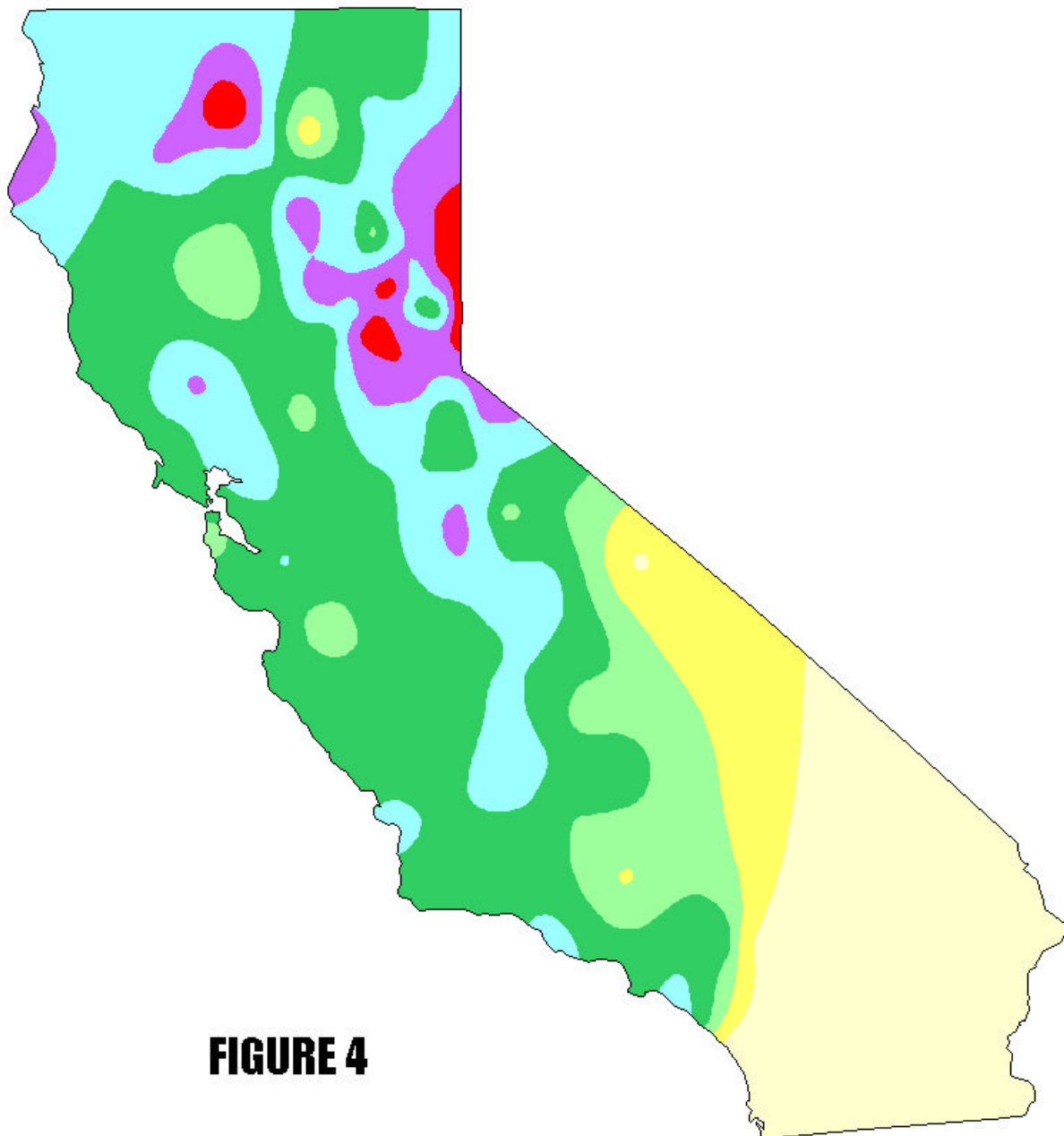
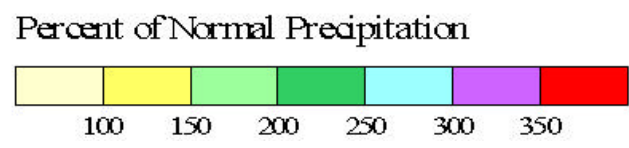


FIGURE 4



Total Precipitation (inches), December, 1996

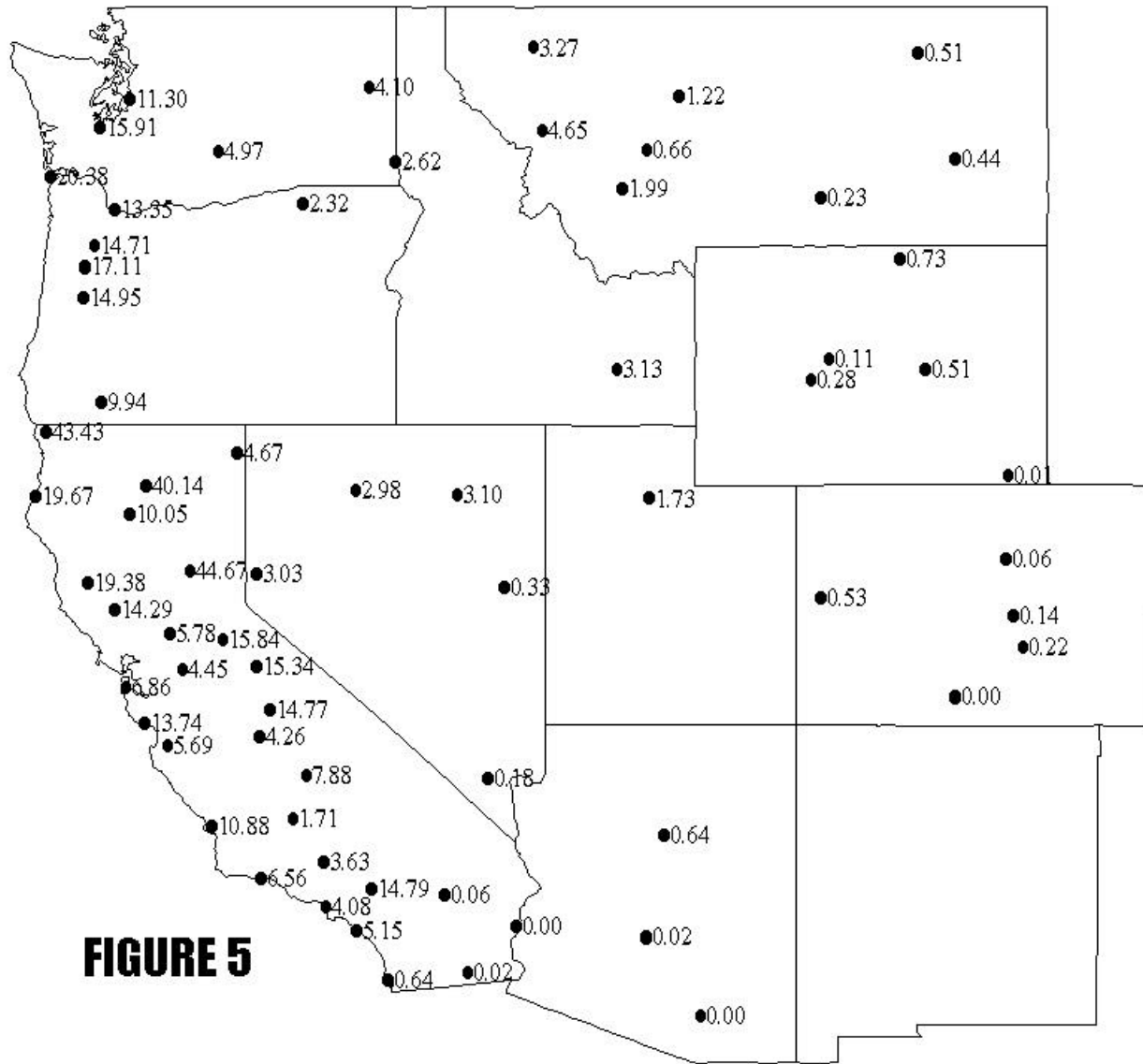


FIGURE 5

Percent of Normal Precipitation, December, 1996

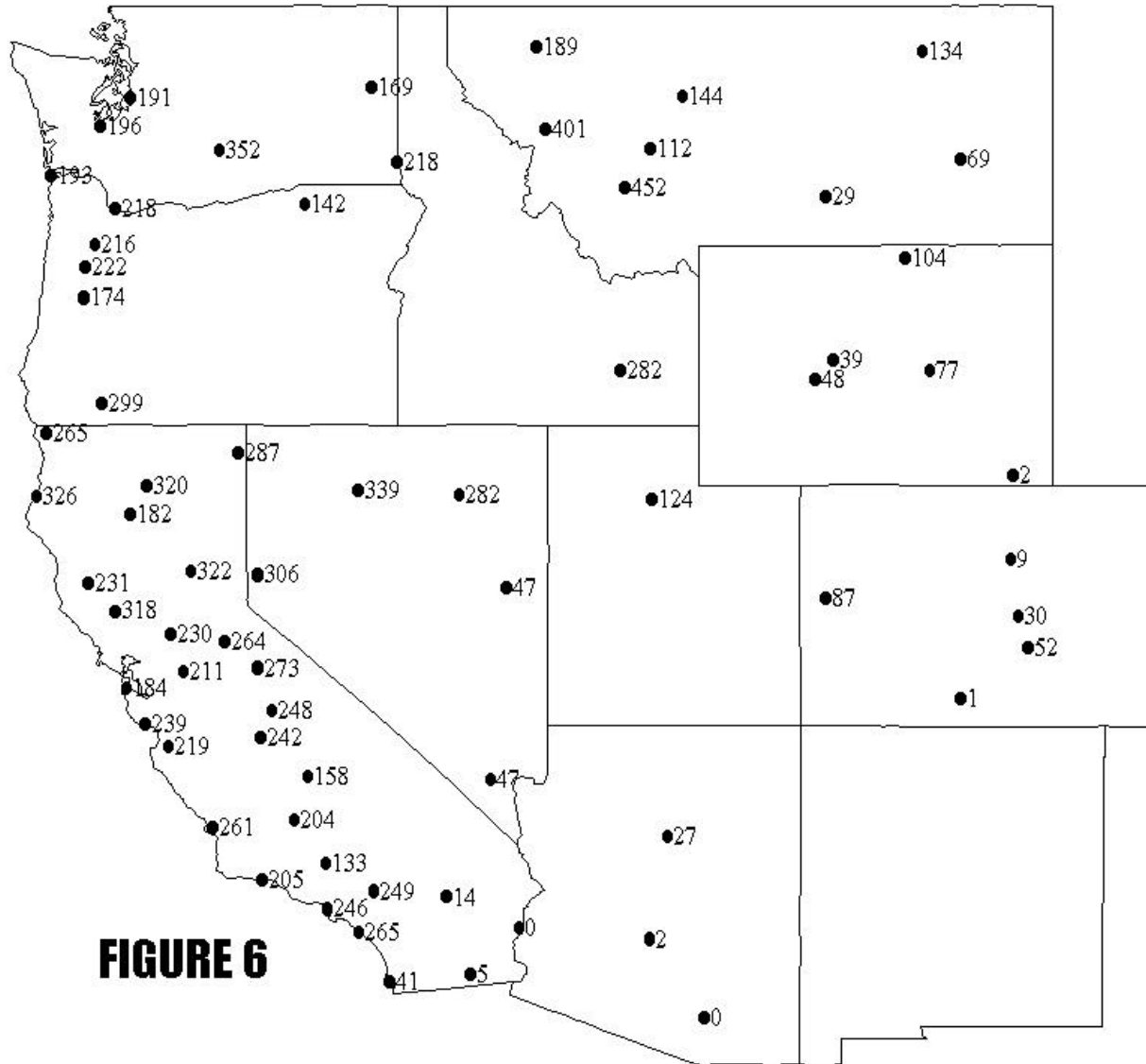


FIGURE 6

Total Precipitation (inches), December, 1996

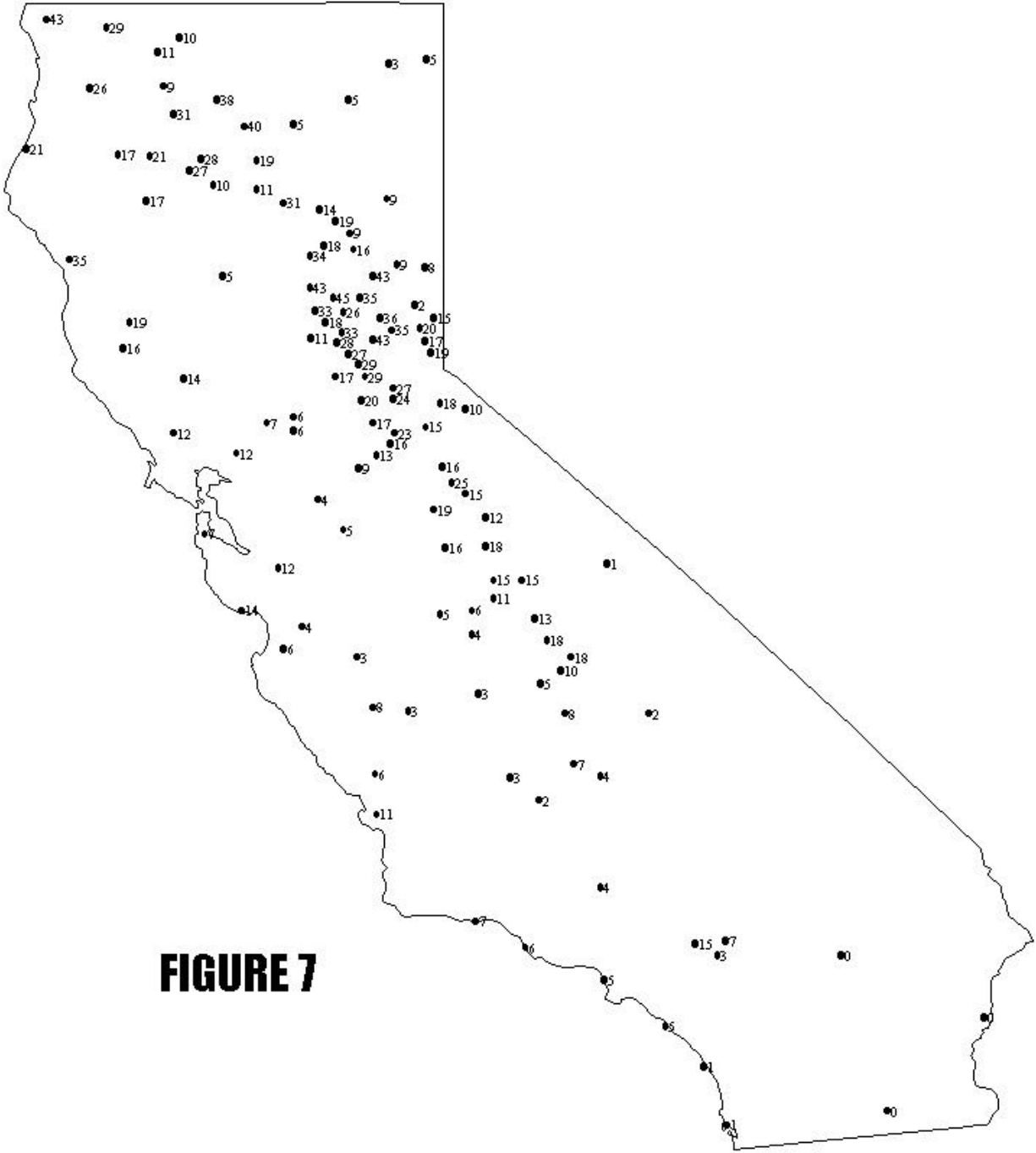


FIGURE 7

Percent of Normal Precipitation, December, 1996

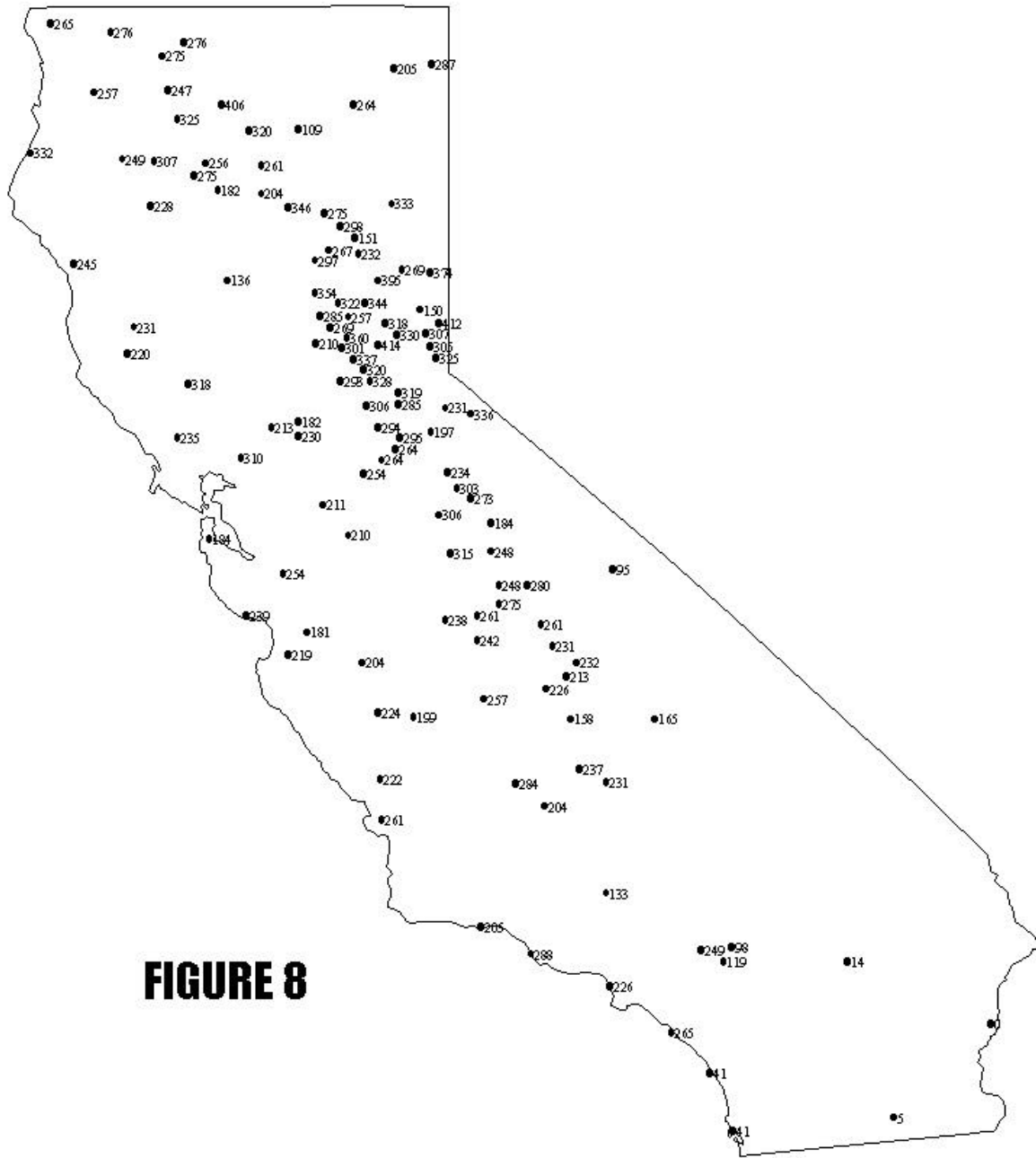
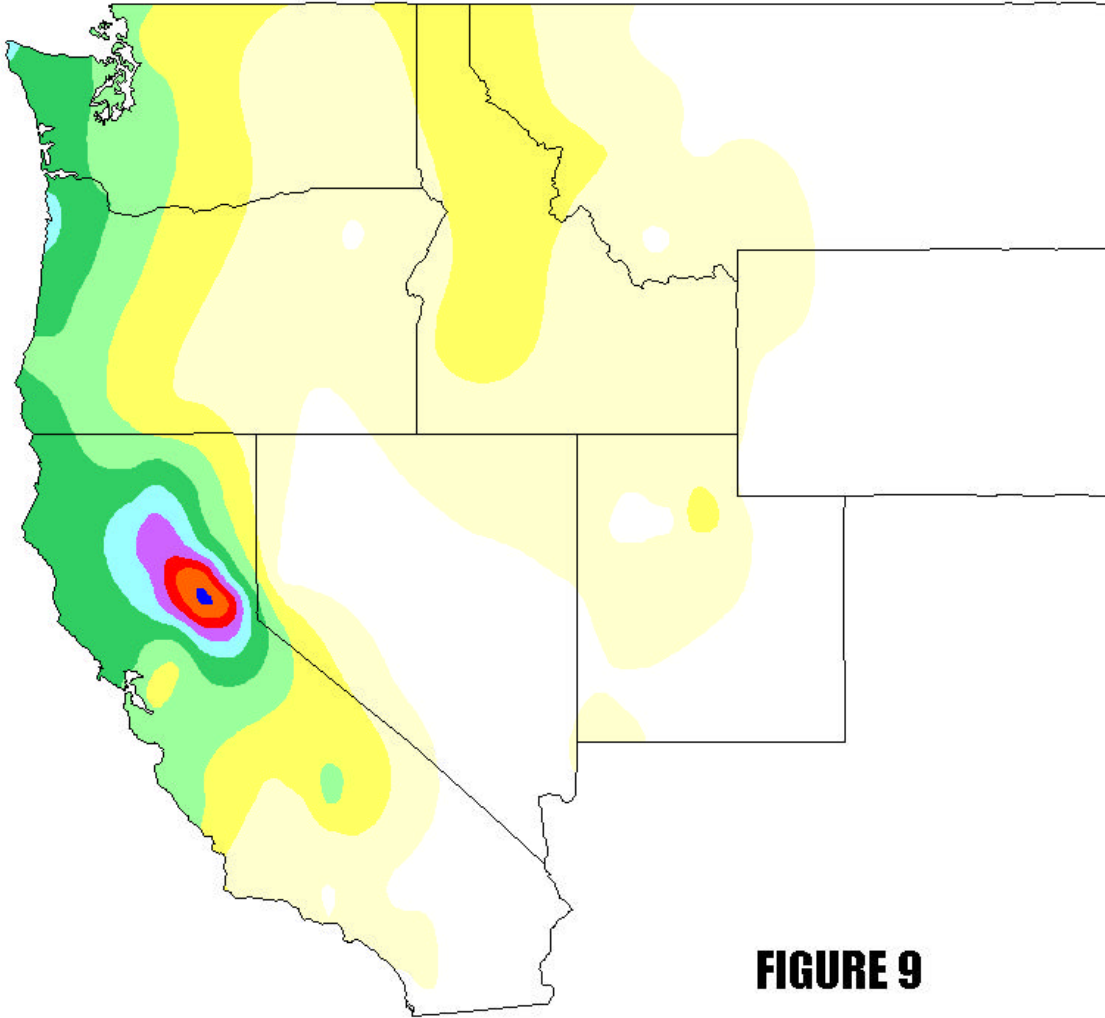


FIGURE 8

Total Precipitation (inches),
December 20, 1996 - January 3, 1997



Precipitation (inches)



FIGURE 10

