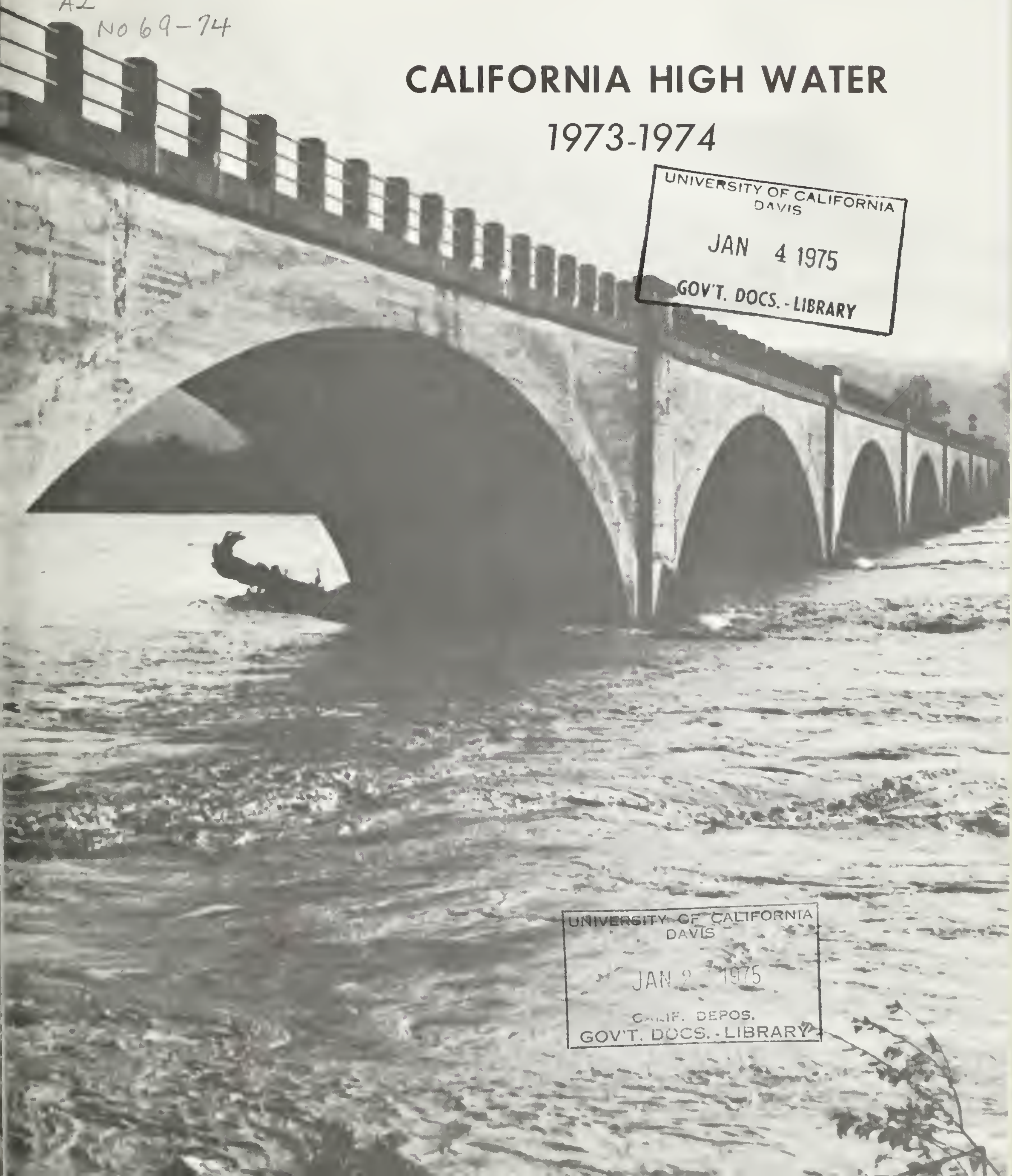
DEPARTMENT OF WATER RESOURCES
THE RESOURCES AGENCY
STATE OF CALIFORNIA

BULLETIN No. 69-74

NOVEMBER 1974

CALIFORNIA HIGH WATER

1973-1974



COVER -- High water passing beneath the bridge over Eel River on Ferndale Road at Fernbridge, Humboldt County. (DWR Photo)

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Errata

BULLETIN NO. 69-74

CALIFORNIA HIGH WATER, 1973-1974

Page 7: Figure 6. Period of record in the legend should read "March 27-April 1, 1974"

Page 25: Figure 16. Period of record in the legend should read "March 27-April 1, 1974"

BULLETIN No. 69-74

NOVEMBER 1974

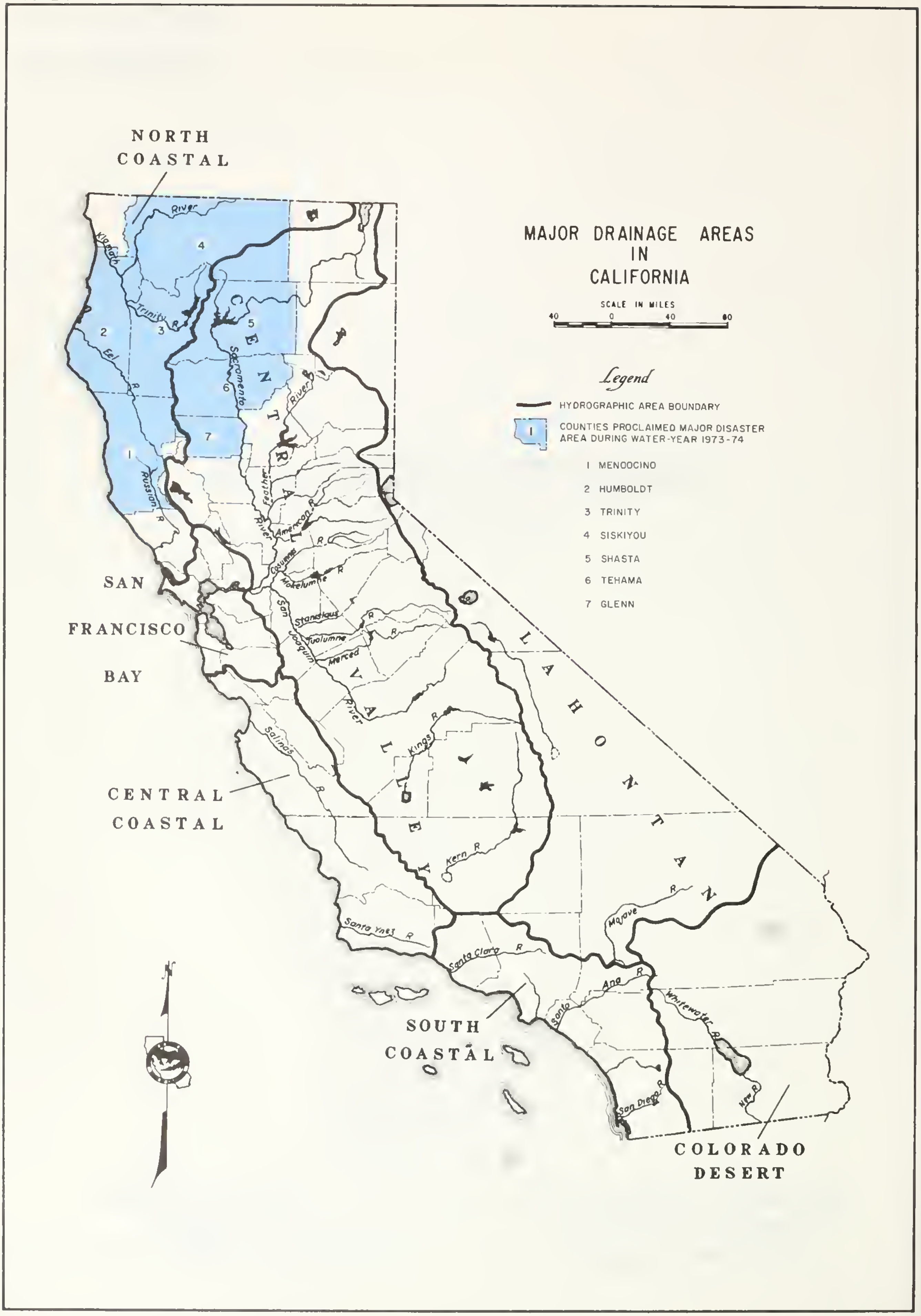
CALIFORNIA HIGH WATER
1973-1974

RONALD REAGAN
Governor
State of California

NORMAN B. LIVERMORE, JR.
Secretary for Resources
The Resources Agency

JOHN R. TEERINK
Director
Department of Water Resources

FIGURE I


MAJOR DRAINAGE AREAS IN CALIFORNIA
SCALE IN MILES
40 0 40 80
Legend
HYDROGRAPHIC AREA BOUNDARY
COUNTIES PROCLAIMED MAJOR DISASTER AREA DURING WATER-YEAR 1973-74
1 MENDOCINO
2 HUMBOLDT
3 TRINITY
4 SISKIYOU
5 SHASTA
6 TEHAMA
7 GLENN
NORTH COASTAL
SAN FRANCISCO BAY
CENTRAL COASTAL
SOUTH COASTAL
COLORADO DESERT
CENTRAL VALLEY
LAHONTAN
Klamath River
Trinity R
Eel R
Russian R
Sacramento River
Feather River
American R
Cosumnes R
Mokelumne R
San Joaquin River
Stanislaus R
Tuolumne R
Merced
Kings R
Kern R
Salinas R
Santa Ynez R
Santa Clara R
Santa Ana R
Mojave R
Whitewater R
San Diego R
New R

FOREWORD

Water year 1973-74 was wet--especially in Northern California: This wet season included two major storms that caused extensive flooding in several basins in the North Coastal Hydrographic Area, and in the Sacramento River Basin of the Central Valley Hydrographic Area. The first major flooding occurred in mid-January 1974; the second occurred at the end of March 1974.

Bulletin No. 69-74, which is the 12th in an annual series of reports on high water events in California, presents information on flooded areas and storm-related damage during the 1973-74 water year (October 1, 1973-September 30, 1974). It also describes the general weather patterns preceding and during significant storm periods, the precipitation characteristics of these storms, and the resulting runoff.

The bulletin also includes tabulations of precipitation comparisons, peak streamflows and stages, hydrographs of stream stages and reservoir operations, weir overflow graphs, and a description of general weather patterns significant to storms affecting California.

Information for this report was supplied by the Department of Water Resources, the National Weather Service, the U. S. Geological Survey, the U. S. Army Corps of Engineers, the U. S. Bureau of Reclamation, and many other agencies, both public and private. The assistance of the cooperating agencies is greatly appreciated.

John R. Teerink

John R. Teerink, Director
Department of Water Resources
The Resources Agency
State of California
November 13, 1974

STATE OF CALIFORNIA
Ronald Reagan, Governor

THE RESOURCES AGENCY
Norman B. Livermore, Jr.
Secretary for Resources

DEPARTMENT OF WATER RESOURCES
John R. Teerink, Director
Robert G. Eiland, Deputy Director

DIVISION OF RESOURCES DEVELOPMENT

Herbert W. Greydanus . . . . .Division Engineer
Robert E. Whiting . . . . Chief, Flood Forecasting and Operations Branch

This report was prepared under
the immediate supervision of

Donald H. Neudeck. . . . . .Chief, Flood Operations and Flood Control Maintenance Section

by

William A. Arvola. . . . . .Senior Meteorologist, Water Resources
John S. Bartok . . . . .Water Resources Technician II
William B. Chan. . . . . .Assistant Engineer, Water Resources
Jess C. Bringham . . . . Water Resources Technician I
George W. Patrick. Water Resources Technician I
William McKane . . . . .Senior Delineator
Liz Flaherty . . . . .Stenographer II

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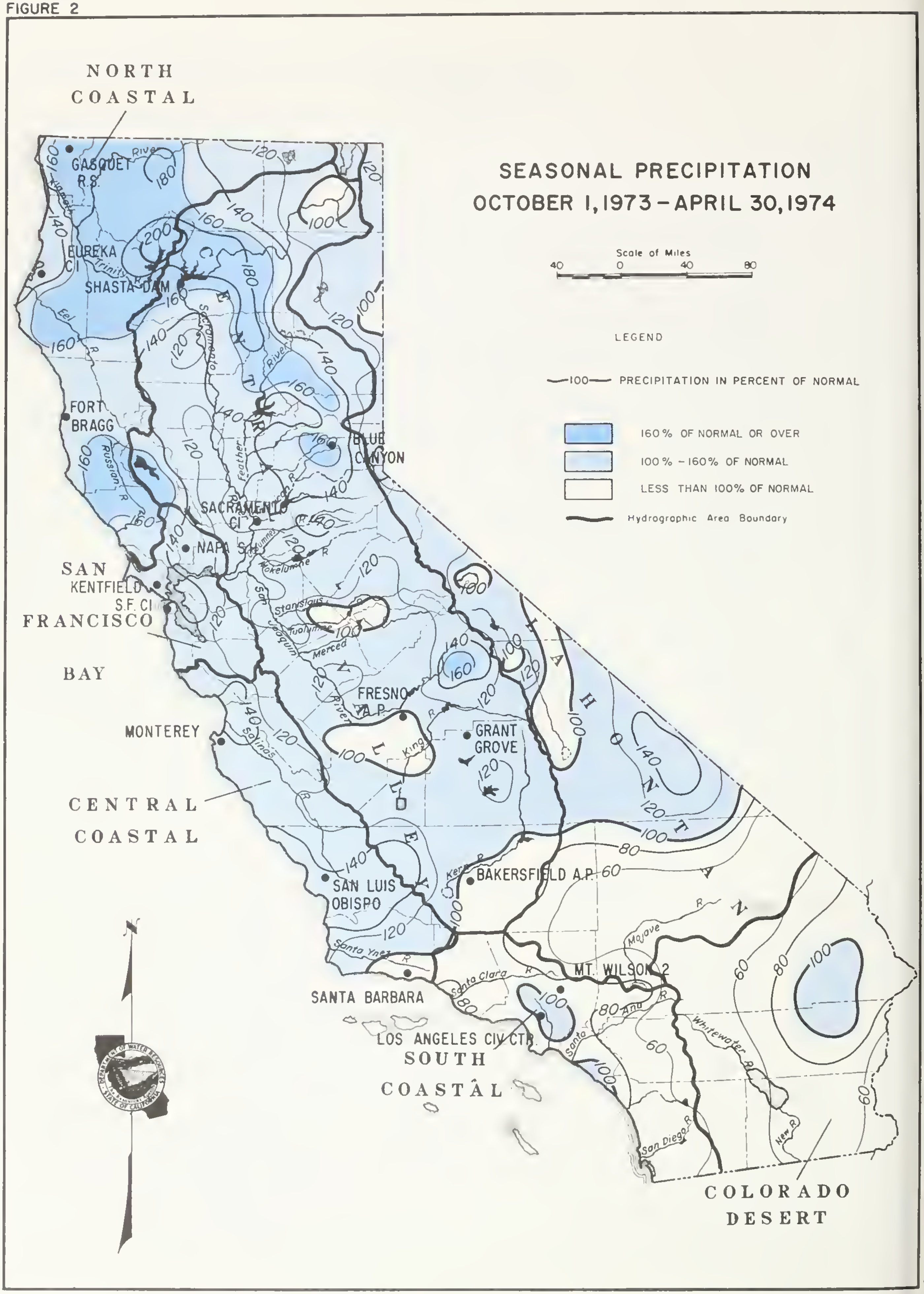
FIGURE 2



SEASONAL PRECIPITATION
OCTOBER 1, 1973 - APRIL 30, 1974
Scale of Miles
40 0 40 80
LEGEND
—100— PRECIPITATION IN PERCENT OF NORMAL
160% OF NORMAL OR OVER
100% - 160% OF NORMAL
LESS THAN 100% OF NORMAL
Hydrographic Area Boundary
NORTH COASTAL
GASQUET R.S.
EUREKA CI
SHASTA DAM
FORT BRAGG
BLUE CANYON
SACRAMENTO CI
NAPA S.H.
SAN FRANCISCO BAY
KENTFIELD
S.F. CI
MONTEREY
FRESNO A.P.
GRANT GROVE
CENTRAL COASTAL
SAN LUIS OBISPO
BAKERSFIELD A.P.
SANTA BARBARA
MT. WILSON 2
LOS ANGELES CIV CTR
SOUTH COASTAL
COLORADO DESERT
CENTRAL VALLEY
LAHONTAN
N

STORMS OF THE 1973-74 SEASON

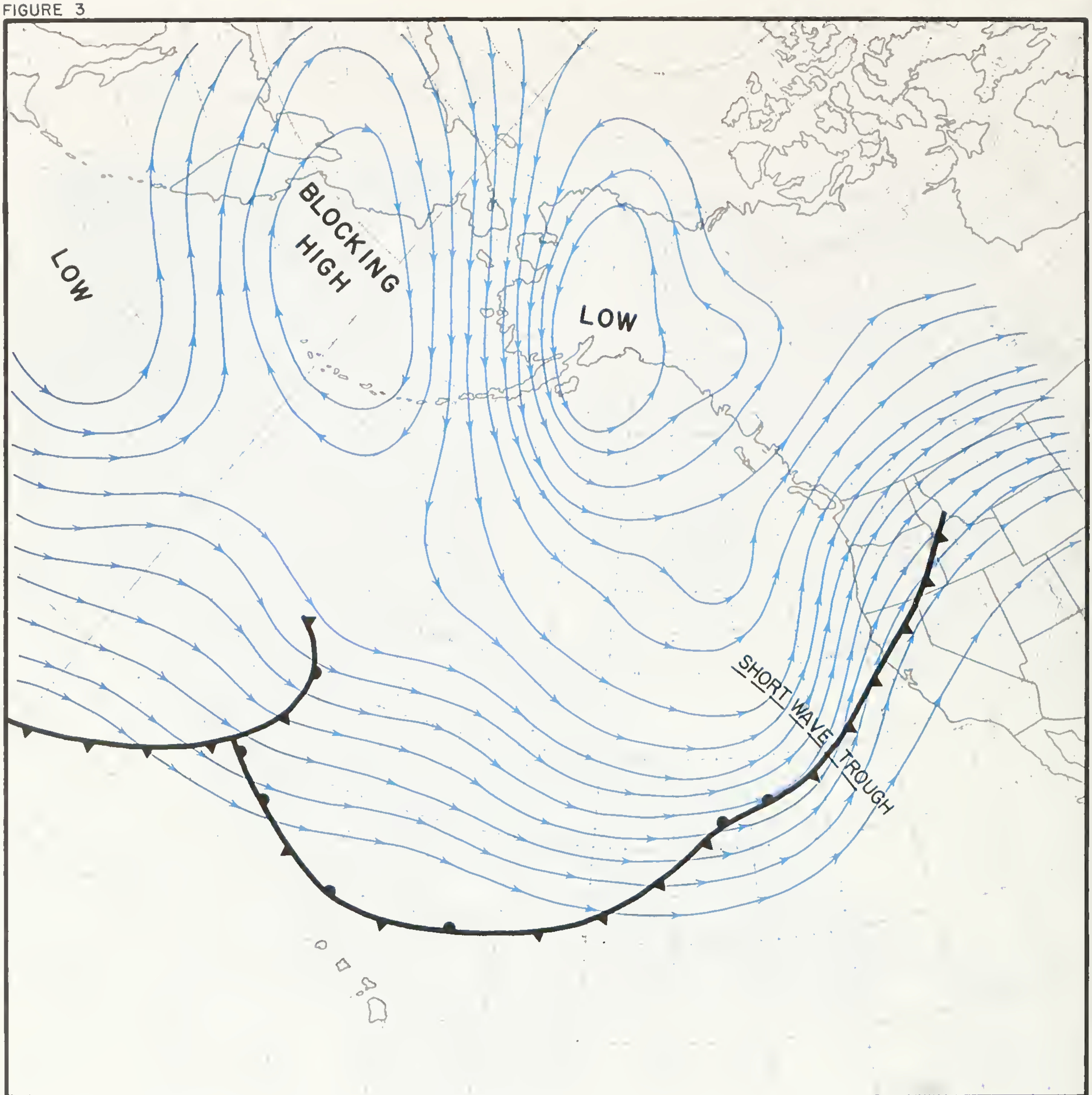
The succession of storms and other events of nature that took place during the winter of 1973-74 could well cause it to be regarded as a classic among California flood seasons. In Northern California it was a very wet year.

Four notable weather periods characterized the season. These included an early period of seemingly interminable rain that totaled as much as 46 inches in a single month at one measurement station on the North Coast, yet caused no major flooding; a combination cold-warm storm series that brought snow as low as valley floors in most of the State and then washed it away with heavy rains that did bring major flooding in Northern California; a dry mid-winter period in which rainfall decreased to 50 percent of normal and which ended with a brief, intense storm; and a surprise late-season storm of sufficient intensity and duration to produce a second North State flood.

TABLE 1: PRECIPITATION AMOUNTS AT SELECTED STATIONS DURING WATER YEAR 1973-74

Station	Elevation	Total Precipitation-Selected Storms (In Inches)					Maximum One-Day Amounts	
		October (Total)	November (Total)	January (Total)	January (11-19)	March 27-April 1	Day	Amount
North Coastal Area								
Gasquet RS	384	7.40	45.96	17.95	16.92	10.95	11/11	6.52
Eureka CI	43	4.14	16.58	6.02	4.88	5.35	3/30	2.43
Fort Bragg	80	5.67	12.98	7.60	5.78	7.95	1/16	2.99
Sacramento Valley Area								
Shasta Dam	1076	5.05	27.62	15.96	15.01	14.27	3/30	4.97
Blue Canyon	5280	4.83	28.36	13.62	9.62	12.54	3/1	4.12
Sacramento CI	19	1.56	6.69	3.80	1.97	1.67	3/1	3.72
San Joaquin Valley Area								
Grant Grove	6600	3.39	7.62	10.60	2.07	5.88	3/2	4.58
Fresno AP	328	1.02	1.39	2.82	0.74	1.56	3/28	0.68
Bakersfield AP	475	0.16	0.64	1.16	0.74	0.59	3/8	0.98
San Francisco Bay Area								
Napa State Hospital	60	1.64	8.24	4.96	2.28	3.41	11/5	1.83
Kentfield	128	4.51	26.00	9.79	6.28	8.73	11/6	6.35
San Francisco CI	52	1.62	7.80	3.40	1.16	2.49	11/5	2.18
Central Coastal Area								
Monterey	345	2.20	3.87	3.73	0.51	3.99	4/1	2.11
San Luis Obispo	315	2.18	3.55	8.17	1.92	4.54	3/2	4.26
Santa Barbara	5	0.70	1.75	8.04	1.16	1.30	3/2	1.91
South Coastal Area								
Mt. Wilson 2	5709	0.29	5.38	24.24	0.99	1.44	1/7	9.50
Los Angeles AP	270	0.12	1.68	8.35	0.56	0.38	1/7	3.52

FIGURE 3



STREAMLINES OF WINDFLOW AT THE 500mb LEVEL (About 18,000 Feet)

OCCLUDED FRONT (Cold Front Overtakes and Lifts Warm Front)

COLD FRONT (Cold Air Replaces Warm Air)

WARM FRONT (Warm Air Replaces Cold Air)

STATIONARY FRONT (Sloping Frontal Surface Moves Very Little or Remains In Same Place)

WEATHER MAP FOR 1600 PST JANUARY 15, 1974

October 1973 began a season of above-normal rainfall with positive departures from normal in all areas of the State except the South Coastal, Lahontan, and Colorado Desert Hydrographic Areas (Figure 1). The two principal rainy periods were October 6 to 9 and October 19 to 25, but no significant runoff occurred because, as usual, the first rains of the season fall on dry terrain.

November 1973 was a distinctively wet month except for the southeastern desert region. It began with the formation of an upper level trough over the eastern Pacific. The resultant southwest flow over California carried in a number of warm storm systems that produced high snow levels. In mid-November the trajectory of weather systems began traveling from a more westerly direction; the snow levels dropped and the season's snow accumulation began. The month closed with two days of heavy rain as a strong meridional pattern over the eastern Pacific brought a strong frontal system into the State.

The persistent rains that fell almost every day of the month on the North Coast and Sacramento drainage basins produced some of the highest runoff of recent record for so early in the season. Inflow to Shasta Lake on the upper Sacramento River was the largest for the month since 1942 when Shasta Dam was completed. Despite this, no major streams in California exceeded flood stage during the month, and damages were confined principally to rock slides, wind damage, and local drainage problems.

December 1973 continued the wet pattern with an orderly progression of troughs and ridges across the Pacific. Rainfall amounts were less than during November but were sufficient to produce periodic rises in Northern California streams, and a damaging mud flow in Los Angeles County on the fire-denuded slopes of Topanga Canyon.

January 1974 was a month characterized by contrasting weather regimes. The month began with a blocking high pressure center in the Gulf of Alaska. This block effectively prevented a storm track from the southwest reaching Northern California, but the northerly flow aloft on the forward side of the block did initiate cyclogenesis* off the Northern California coast in the cold air mass. Precipitation from this cyclogenesis produced snow at low elevations in Northern California, and moderate rain in Central and Southern California. In addition, a westerly storm track broke into the central coastal and south coastal areas on January 6, resulting in heavy rain.

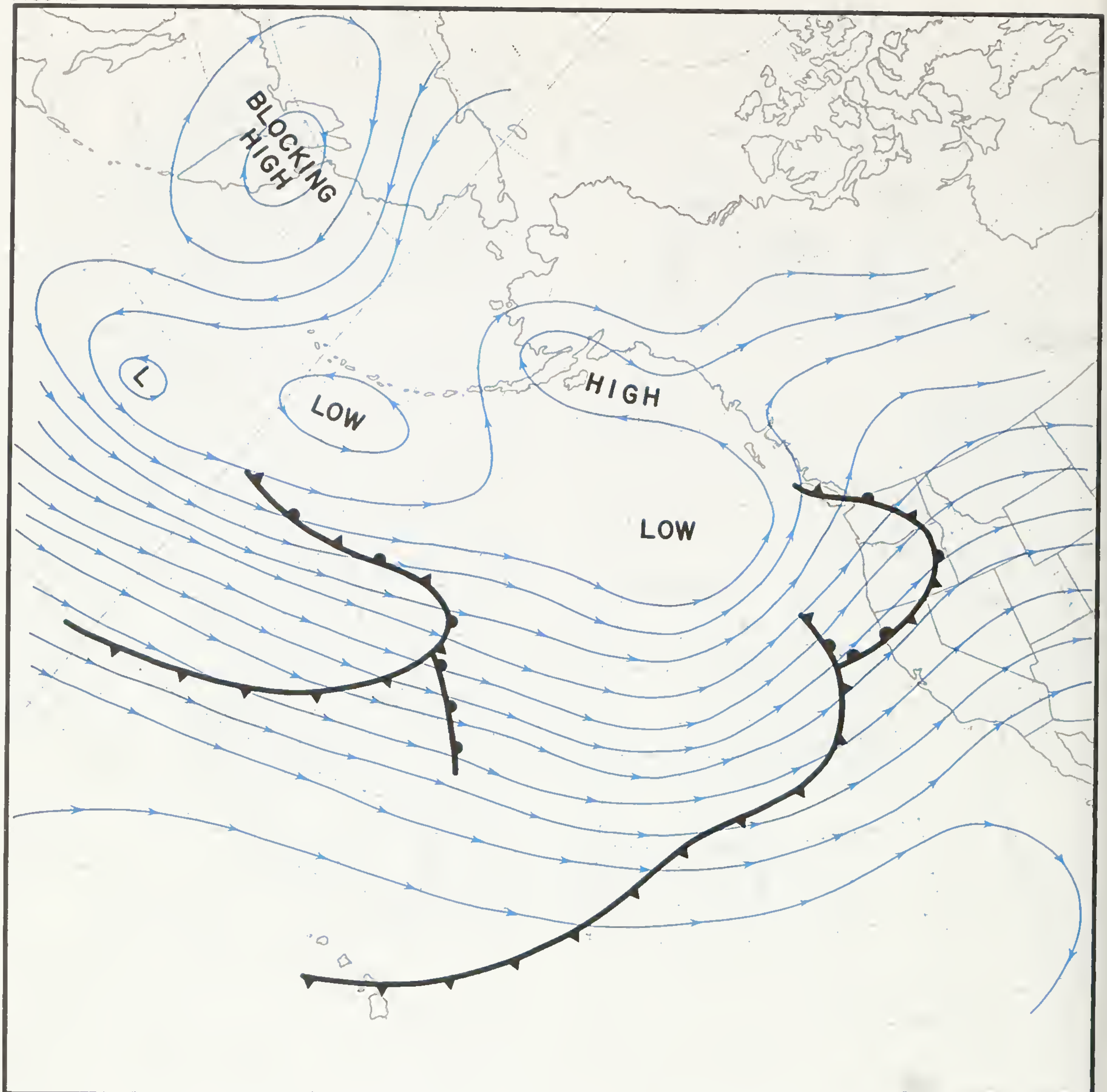
Mt. Wilson in Los Angeles County was drenched with $9\frac{1}{2}$ inches of rain within 24 hours during this period, and the Los Angeles Civic Center recorded 3.5 inches of rain in 24 hours--the greatest 24-hour rainfall of record for this station. Damages from this storm were principally from mud and rock slides along the coastal areas, and from the second major mud flow in Topanga Canyon.

A major development took place on January 12, when the blocking high retreated westward to southwestern

⇦ Figure 3 shows the blocking high over the Bering Sea, a northerly flow of cold, polar air over western Alaska flowing into the Gulf of Alaska and merging into confluence with a westerly airstream south of the 40th latitude circle. A short wave trough oriented northwest-southeast appears off the California coast in association with the cold front (with waves).

*Cyclogenesis: The formation of a low pressure center, which is commonly called a storm. The term is more fully explained in Appendix C.

FIGURE 4



STREAMLINES OF WINDFLOW AT THE 500mb LEVEL (About 18,000 Feet)

OCCLUDED FRONT (Cold Front Overtakes and Lifts Warm Front)

COLD FRONT (Cold Air Replaces Warm Air)

WARM FRONT (Warm Air Replaces Cold Air)

STATIONARY FRONT (Sloping Frontal Surface Moves Very Little or Remains In Same Place)

WEATHER MAP FOR 1600 PST MARCH 29, 1974

Alaska and a westerly flow pattern broke through in the latitude band 30°-40°N to bring California an air mass of Pacific origin. Moisture was plentiful with this air mass, and brought an 8-day period of moderate to heavy precipitation to Northern California as shown in Figures 5 and 15. Rainfall was especially heavy on January 15 and 16 when this southwest flow of moist air was augmented by a strong front over the Northern California coast as depicted in Figure 3. This warm mid-January storm produced the first major flooding of the season in several basins in the North Coastal Hydrographic Area, and in the Sacramento Valley. As a result, seven northern counties were declared disaster areas (Figure 1.).

February 1974 was a relatively uneventful month for storm activity. The persistence of an upper-level ridge of high pressure over the eastern Pacific in the first part of the month kept the storm track north of California, but, following February 12, a more zonal flow brought a sequence of troughs and accompanying frontal systems with light precipitation. A deep trough became entrenched over the eastern Pacific in the last four days of the month. An intense storm moved rapidly over Northern California on February 28 and dropped heavy amounts of rain for a short period. Streams rose rapidly, but no flood stages were reached. Total rainfall amounts for the month were below normal over the entire State.

March 1974 resumed the wet pattern for the season with above-normal precipitation over the entire State, except in the South Coastal, Lahontan, and Colorado Desert Hydrographic Areas.

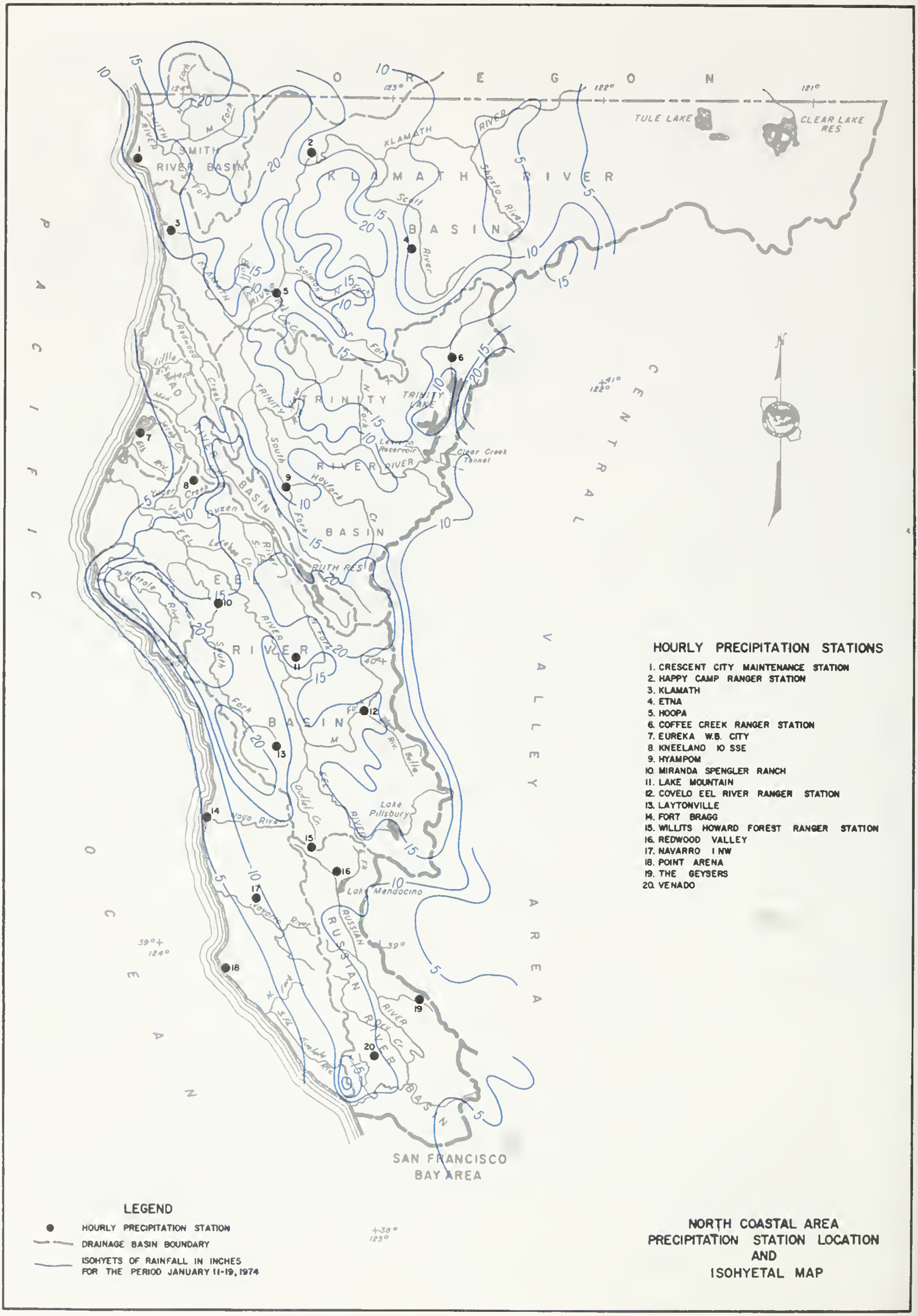
The first half of the month saw the development of a number of similar weather patterns involving a cold trough near the coast that brought precipitation on more than half the days between March 1 and 15. These cold storm systems brought additional accumulations of snow to the mountains, compensating for the deficient snow accumulations in February.

These cold storms were followed by a brief dry period at mid-month when an upper-level ridge built up over the eastern Pacific. However, on March 25 the ridge collapsed and a fast zonal flow from the Pacific extended into the State. This westerly flow brought a sequence of occlusions, the first of which arrived on March 27. Two more swept in closely together from the ocean on March 28 and 29. The last one came on April 1. These storms brought precipitation that produced the second major flood of the season on several major streams and their tributaries along the North Coast and in northern Sacramento Valley. The moderately warm air mass of this flow pushed the snow level up to 7,000 feet in the State's northern mountain ranges, and rainfall amounts of nearly 9 inches within 24 hours, and 12 inches within 48 hours were reported.

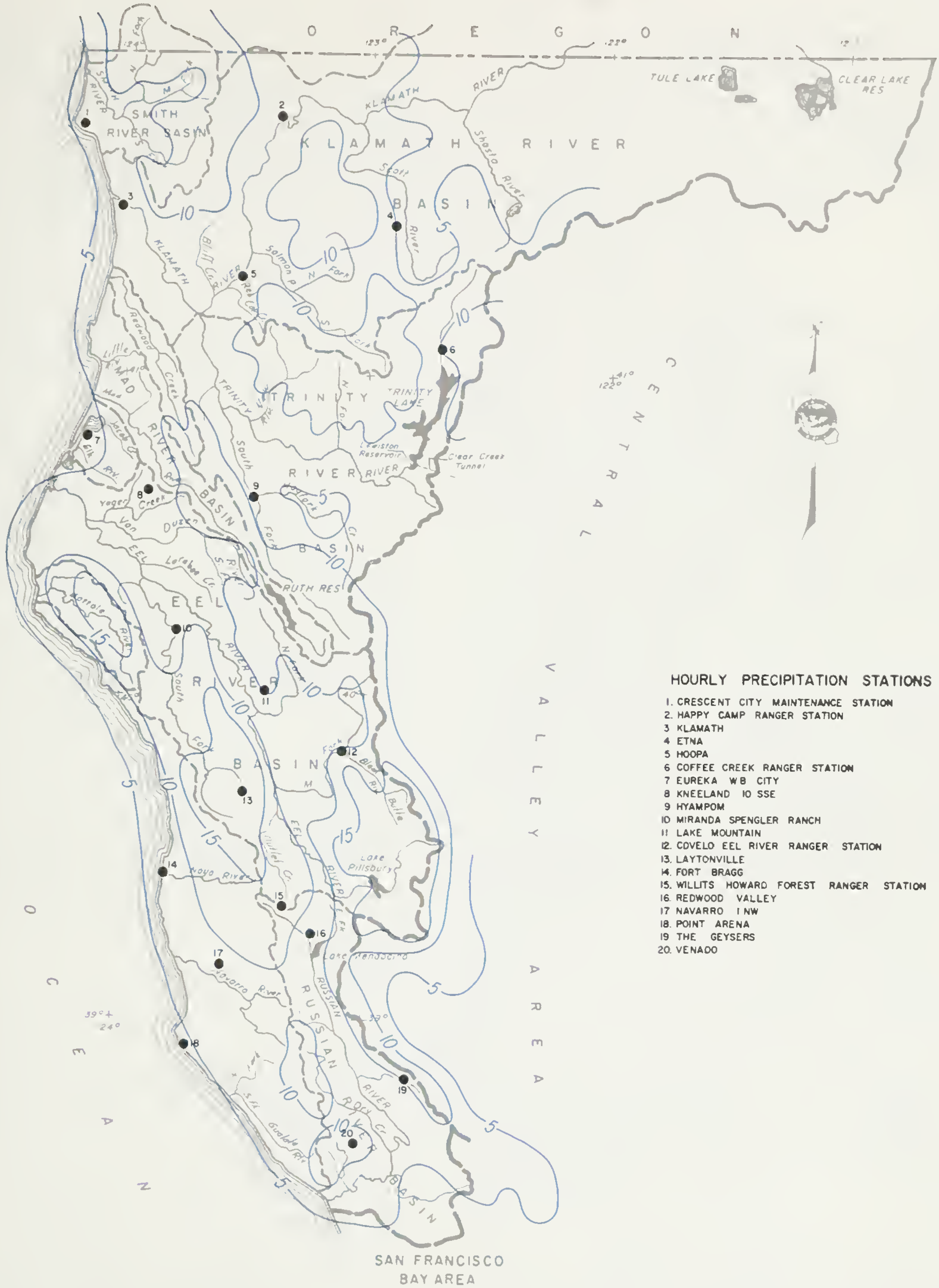
This series of storms closed out the flood season of this water year. An isohyetal map for the six days from March 27 through April 1 for the northern and central areas of California is shown in Figures 6 and 16.

⇦ A composite weather map for 1600 PST on March 29 (Figure 4) shows the 500-mb pressure contours and fronts from the surface map. It depicts two occlusions: the one in eastern Washington trails as a cold front into the northern part of California; it then connects with the second occlusion just west of the California coast. Upper level flow at the time was southwest.

FIGURE 5



HOURLY PRECIPITATION STATIONS
1. CRESCENT CITY MAINTENANCE STATION
2. HAPPY CAMP RANGER STATION
3. KLAMATH
4. ETNA
5. HOOPA
6. COFFEE CREEK RANGER STATION
7. EUREKA W.B. CITY
8. KNEELAND 10 SSE
9. HYAMPOM
10. MIRANDA SPENGLER RANCH
11. LAKE MOUNTAIN
12. COVELO EEL RIVER RANGER STATION
13. LAYTONVILLE
14. FORT BRAGG
15. WILLITS HOWARD FOREST RANGER STATION
16. REDWOOD VALLEY
17. NAVARRO 1 NW
18. POINT ARENA
19. THE GEYSERS
20. VENADO
LEGEND
HOURLY PRECIPITATION STATION
DRAINAGE BASIN BOUNDARY
ISOHYETS OF RAINFALL IN INCHES FOR THE PERIOD JANUARY 11-19, 1974
OREGON
PACIFIC OCEAN
CENTRAL VALLEY AREA
SAN FRANCISCO BAY AREA
SMITH RIVER BASIN
KLAMATH RIVER BASIN
TRINITY RIVER BASIN
MAD RIVER BASIN
EEL RIVER BASIN
RUSSIAN RIVER BASIN
TULE LAKE
CLEAR LAKE RES
TRINITY LAKE
RUTH RES
Lake Pillsbury
Lake Mendocino
Clear Creek Tunnel
Lewiston Reservoir
NORTH COASTAL AREA
PRECIPITATION STATION LOCATION
AND
ISOHYETAL MAP



HOURLY PRECIPITATION STATIONS

1. CRESCENT CITY MAINTENANCE STATION
2. HAPPY CAMP RANGER STATION
3. KLAMATH
4. ETNA
5. HOOPA
6. COFFEE CREEK RANGER STATION
7. EUREKA WB CITY
8. KNEELAND 10 SSE
9. HYAMPOM
10. MIRANDA SPENGLER RANCH
11. LAKE MOUNTAIN
12. COVELO EEL RIVER RANGER STATION
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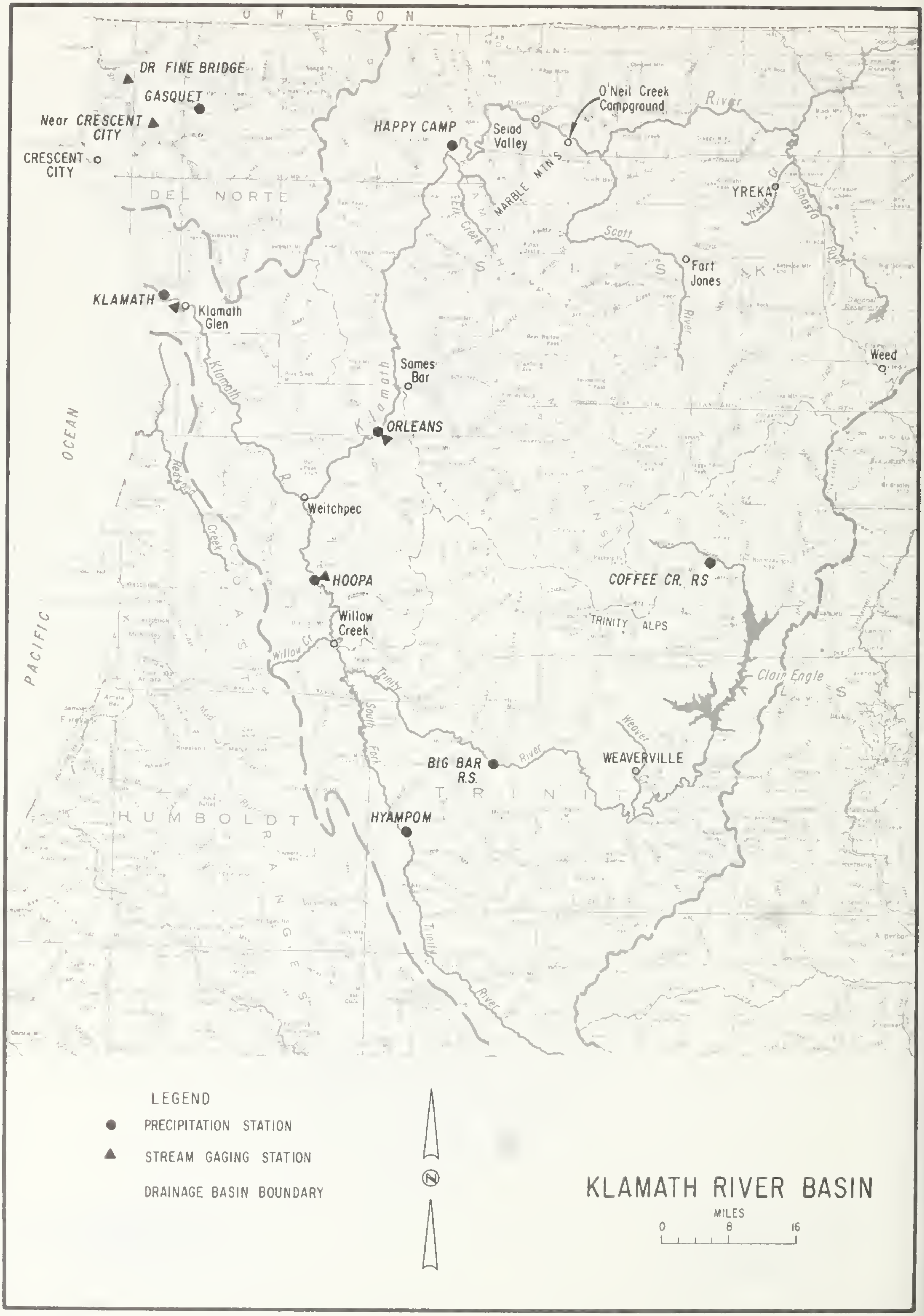
16. REDWOOD VALLEY
17. NAVARRO 1 NW
18. POINT ARENA
19. THE GEYSERS
20. VENADO

LEGEND

- ● HOURLY PRECIPITATION STATION
- — - — DRAINAGE BASIN BOUNDARY
- ——— ISOHYETS OF RAINFALL IN INCHES FOR THE PERIOD JANUARY 11-19, 1974

NORTH COASTAL AREA
PRECIPITATION STATION LOCATION
AND
ISOHYETAL MAP

FIGURE 7


KLAMATH RIVER BASIN
MILES
0
8
16
LEGEND
PRECIPITATION STATION
STREAM GAGING STATION
DRAINAGE BASIN BOUNDARY
OREGON
DR FINE BRIDGE
GASQUET
Near CRESCENT CITY
CRESCENT CITY
DEL NORTE
HAPPY CAMP
Seiad Valley
O'Neil Creek Campground
River
MARBLE MTNS
YREKA
Yreka Cr
Shasta
Scott
Fort Jones
KLAMATH
Klamath Glen
Klamath
Sames Bar
Weed
ORLEANS
OCEAN
PACIFIC
Redwood
Creek
Weitchpec
HOOPA
Willow Creek
Willow Cr
COFFEE CR. RS
TRINITY ALPS
Clair Engle
Trinity
South Fork
Weaver
WEAVERVILLE
BIG BAR R.S.
River
HUMBOLDT
HYAMPOM
Trinity
River

The first major flooding occurred in mid-January 1974 in several basins of the North Coastal Hydrographic Area and in the Sacramento Valley. Heavy property damage and some loss of life ensued and seven northern counties were declared disaster areas. (Figure 1). At the end of March 1974, these areas were again subjected to extensive flood damages. In addition to these two major events, many locations throughout the State felt the effects of a variety of storm-related events; earth slides, mud flows, wind damage, street flood, and road closures.

North Coastal Hydrographic Area

The North Coastal Hydrographic Area extends from the Russian River north to the California-Oregon border and includes all streams which drain to the west. The area varies in width from about 30 miles in the south to about 180 miles at the California-Oregon border. Most of the area lies below the 8,000-foot elevation.

Major rivers and tributaries in the area are the Smith, Klamath, Trinity, Mad, Eel, Van Duzen, and Russian Rivers and Redwood Creek. The smaller streams include the Elk, Mattole, Ten Mile, Noyo, Navarro, and Gualala Rivers.

The North Coastal Hydrographic Area is usually the first area hit by storms moving into California. Storms are more frequent and more intense in this area than in any of the other six major hydrographic areas of the State.

The area's annual precipitation averages are among the highest in the State, ranging from almost 30 inches in the Russian River Basin to more than 100 inches at some locations in the Smith River Basin. Almost 40 percent of the State's average annual runoff comes from this area. Snow levels during storms vary from less than 2,000 feet to 10,000 feet. Runoff from the warmer storms is almost immediate and sometimes devastating.

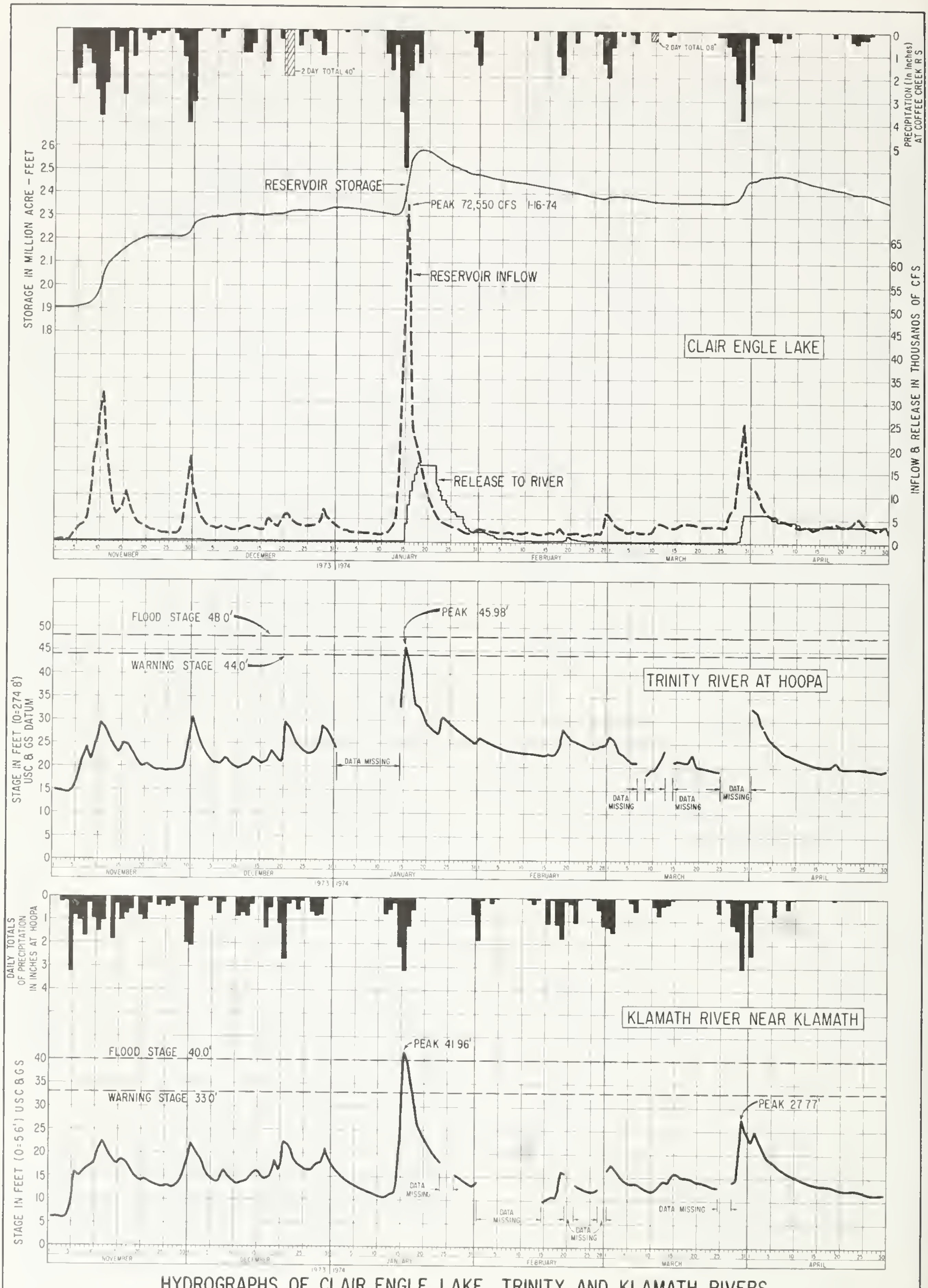
Three significant storm systems affected this area during the 1973-74 water year: November 3-17, January 11-19, and March 27-April 2. Although November storms produced the greatest amounts of rainfall, the January and March-April storms produced major flooding and other storm-related damage. Significant flood stages were produced in the Klamath, Eel, and Russian River Basins.

Klamath River Basin

The Klamath River Basin is the largest in the North Coastal Hydrographic Area, draining over 12,000 square miles of watershed. About one-third of this basin lies in Oregon. Its mountains rise to elevations of more than 8,000 feet and include the Marble Mountains and the Trinity Alps. Major tributaries to the Klamath River are the Salmon, Scott, Shasta, and Trinity Rivers. This basin is a prime recreation area with several reservoirs in both Oregon and California. The U. S. Bureau of Reclamation's Trinity and Lewiston multiple-purpose dams on the upper Trinity River in California provide the only significant upstream storage for flood control.

Average annual rainfall for this basin varies greatly from about 10 inches in the interior high deserts to more than 100 inches near the coast. Average

FIGURE 8



HYDROGRAPHS OF CLAIR ENGLE LAKE, TRINITY AND KLAMATH RIVERS annual snowfall varies from 12 inches at Big Bar Ranger Station to 10 feet in the Trinity Alps.

November 1974 was very wet in the Klamath River Basin, with some stations reporting almost three times the normal rainfall. However, the timing and distribution was such that the river remained well within its banks. Storm damage was mainly caused by slides on State highways and county roads. December precipitation was slightly above-normal, but no serious problems developed.

The January 11 through 19 storm system resulted in major flooding and heavy damage, particularly on the upper Klamath and upper Trinity Rivers and their tributaries, and at Klamath Glen near the mouth of the Klamath.

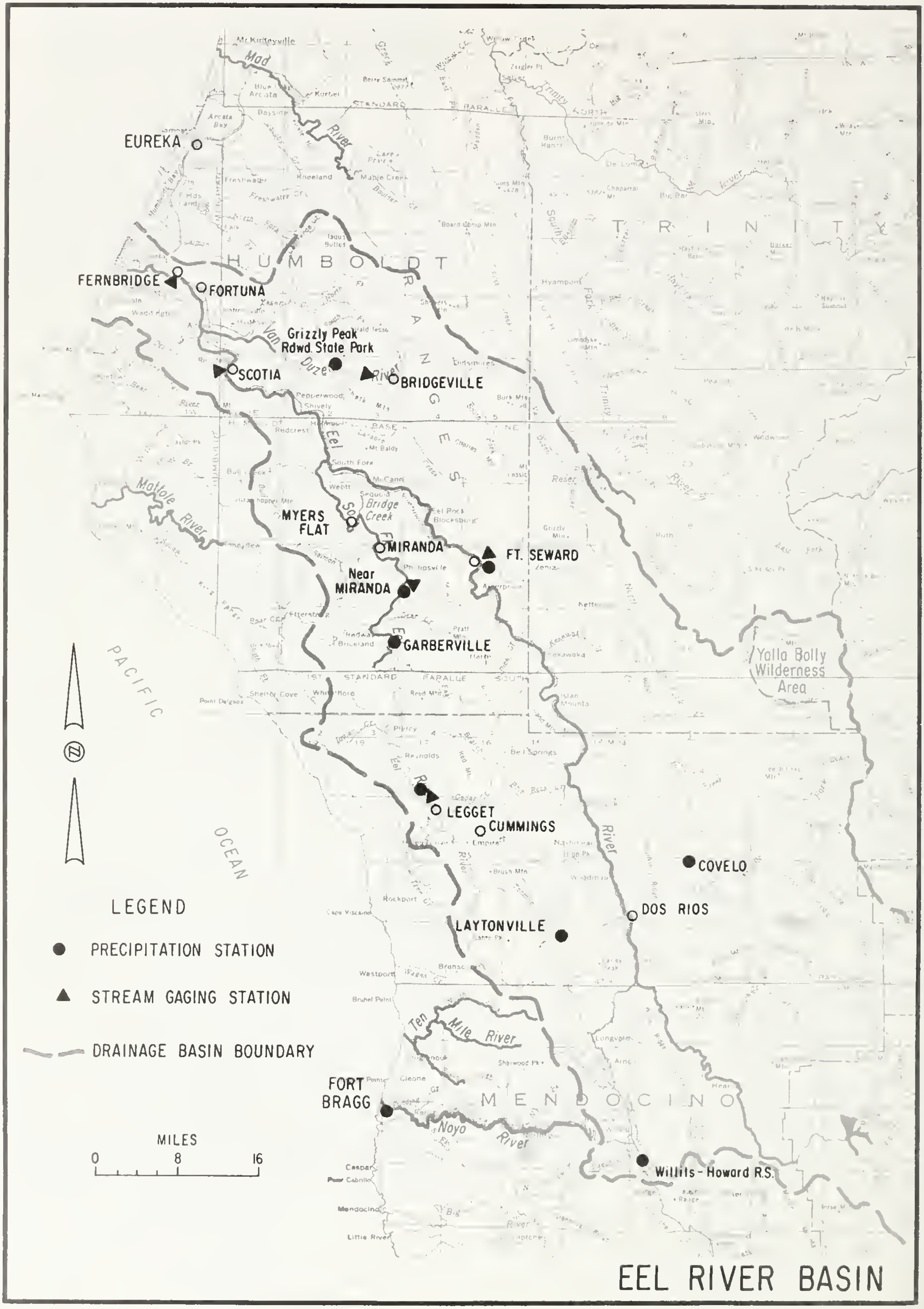
In the upper Klamath Basin, the Scott and Shasta Rivers flooded extensive areas of agricultural land, damaging irrigation and diversion structures and depositing silt and debris. Local streams caused flood damage in the cities of Yreka, Weed, and Fort Jones, principally to public facilities, but some homes and businesses were also affected.

Along the Klamath River upstream from the confluence with the Trinity River, numerous county roads and bridges were damaged, and State Highway 96 was flooded by water up to eight feet deep and damaged by slides and overflow from tributaries. Slides in the Somes Bar area were reported to be up to 35 feet deep and 100 feet long. Agricultural lands were covered with silt, gravel, and debris. The access road to the U. S. Forest Service's O'Neil Creek Campground was severely damaged, and a levee constructed by the U. S. Army Corps of Engineers at Seiad Valley was practically obliterated. The community of Happy Camp was isolated for several days, requiring airlift of food supplies. Rural families also were isolated for several days, but no serious problems were encountered. Bank erosion threatened riverfront homes near Orleans, but none were damaged. Klamath River near Seiad Valley crested only about 4.3 feet below the record December 1964 crest; at the Happy Camp staff gage the crest was 8 feet above flood stage and only about 5 feet below the record crest of December 1964. Further downstream at Orleans, the river crested just below flood stage and almost 16 feet below the December 1964 crest.

Below the junction with Trinity River, the Klamath River again exceeded flood stage. At the gaging station near Klamath, it crested 2 feet above flood stage but slightly more than 13 feet below the December 1964 crest. Some flood damage occurred near Terwer Creek and below U. S. Highway 101. Some low-lying trailer parks were evacuated and some small permanent park structures were flooded. Highway 101 north of the Klamath River was flooded and closed for about nine hours.

Intense rainfall in the upper Trinity River Basin during this storm caused sharp river rises with some local damage. Tributaries overtopped bridges and culverts, and numerous slides caused periodic road closures all along the river and its tributaries. East Weaver Creek caused major erosion to State Highway 299 about 5 miles east of Weaverville. Five families in Weaverville were evacuated and one home was damaged when this stream overtopped its banks. Twelve families were evacuated at Coffee Creek when a levee broke in two places, flooding a trailer park and damaging two homes. Hyampom and some rural areas were isolated for several days. Some evacuation was required in low-lying areas near the town of Willow Creek. Further downstream at Hoopa near its confluence with the Klamath River, the Trinity

FIGURE 9


EUREKA
FERNBRIDGE
FORTUNA
Grizzly Peak Rdwd. State Park
SCOTIA
BRIDGEVILLE
MYERS FLAT
MIRANDA
FT. SEWARD
Near MIRANDA
GARBERVILLE
LEGGET
CUMMINGS
COVELO
DOS RIOS
LAYTONVILLE
FORT BRAGG
Willits-Howard R.S.
HUMBOLDT
TRINITY
MENDOCINO
PACIFIC OCEAN
Yolla Bolly Wilderness Area
Mad River
Van Duzen River
Eel River
Mattole River
Ten Mile River
Noyo River
LEGEND
PRECIPITATION STATION
STREAM GAGING STATION
DRAINAGE BASIN BOUNDARY
MILES
0
8
16
EEL RIVER BASIN

River crested about 2 feet below flood stage and about 11 feet below the December 1964 crest.

The March-April storm caused no excessive rises on the Klamath or Trinity Rivers, and damage from this storm was limited to slides that caused temporary road closures.

Eel River Basin

The Eel River and its main tributary, the Van Duzen River, drain a 3,700-square-mile watershed. The terrain is characterized chiefly by heavily wooded, steep narrow canyons. Mountains on the perimeter of the basin rise to nearly 8,000 feet and include the Yolla Bolly-Middle Eel Wilderness Area. Small communities are situated throughout the region wherever the terrain permits. Several of California's redwood state parks are located here. About 80 miles of Highway 101 parallel the south fork and main stem of the Eel River. The route of the Northwestern Pacific Railroad follows the Eel from Fortuna to south of Dos Rios.

The Eel River delta, with its lush green pastures, is famous for its prize dairy herds. It is also the region the hardest hit by the Eel River floods. Average annual rainfall varies from about 40 inches near the coast to over 100 inches along portions of the coastal mountains.

Although the November 1973 rainfall was well above normal, no major flooding occurred on the Eel River. Some delta livestock had to be moved to higher ground on November 10 and again on November 30 when the Eel River rose above warning stage at Fernbridge. Above-normal rainfall caused some fluctuations in river stage in December, but the Eel remained below warning stage.

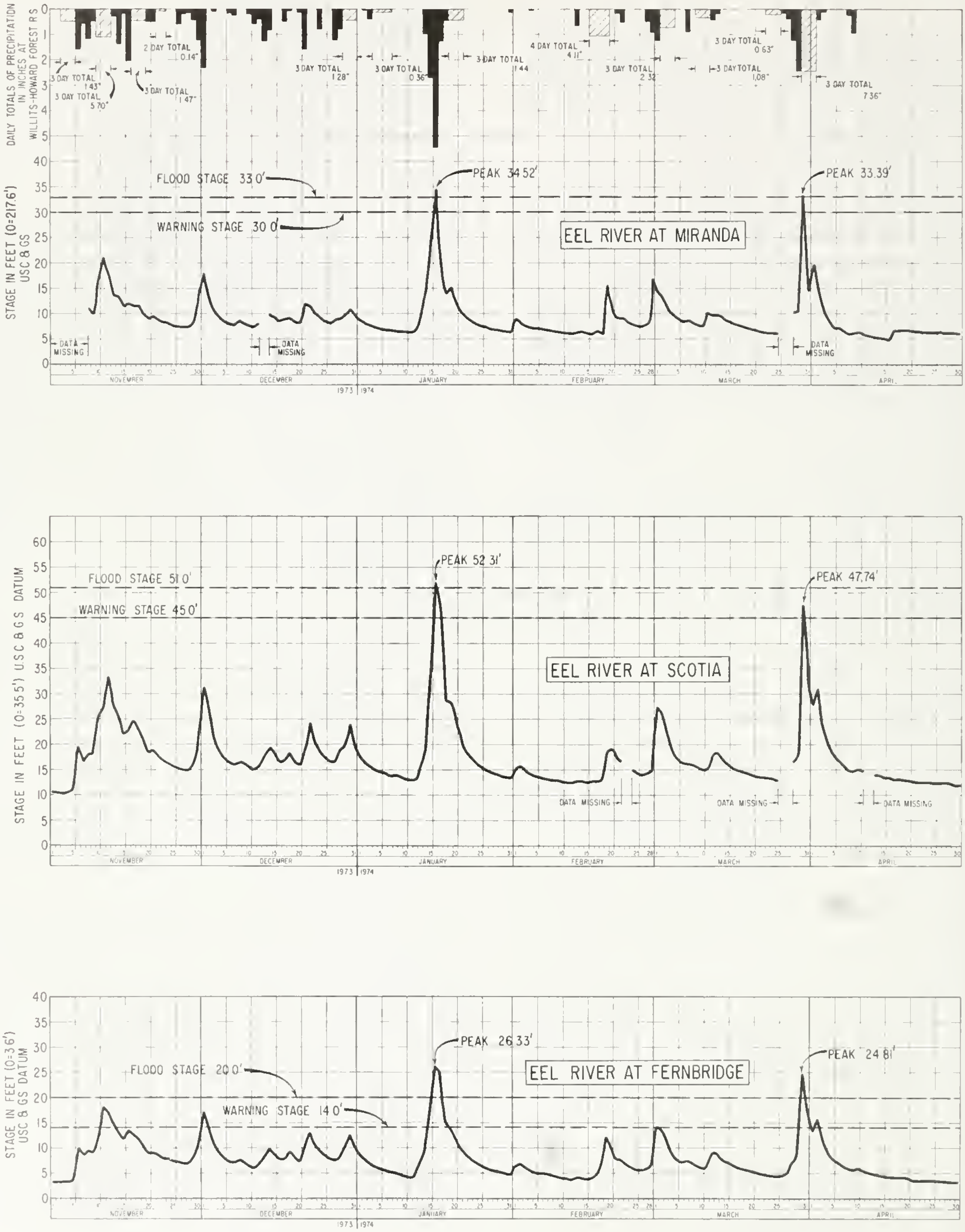
A major storm system began moving into the area on January 11, 1974, and intensified on January 14, 15, and 16. During this three-day period more than 9 inches of rain fell in the Willits area, more than 12 inches fell at Garberville, almost 7 inches fell at Covelo, and more than 8 inches fell at Grizzly Creek Redwoods State Park. These amounts of rain caused rapid rises and major flooding along the South Fork of the Eel River, along the main stem of the Eel below the North Fork, and along the Van Duzen River.

Public property suffered extensive damage from this January storm. Major damage to Highway 101 from Garberville to Cummings closed the route or limited traffic to one-way convoys for several days. County roads also were badly damaged; Humboldt County alone estimated repairs needed to open roads would cost $500,000 and permanent repairs would cost $2,000,000. The Northwestern Pacific Railroad was out of service for several days while slides were cleared and slipouts repaired. The U. S. Corps of Engineers estimated that repairs to Sandy Prairie Levee would cost about $40,000.

Impairment of private property was also extensive. Many mobile homes were saved by removal from low-lying areas but six were lost to the flood in the Myers Flat area. A number of families had to be evacuated from low-lying areas and several homes were damaged. On Bridge Creek near Myers Flat, two children were killed and a two-story home severely damaged when a log jam broke after temporarily blocking the stream.

In the Eel River delta at Fernbridge, the river crested more than 6 feet above flood stage. Flood warning provided by the State-Federal River Forecast system alerted ranchers in time to evacuate all threatened livestock in the area during this flood. Some 600 to 700 dairy cows were moved from the lowlands to the Humboldt County Fairgrounds where milking facilities are available. Another 10,000 head of livestock were moved to high ground elsewhere in the area for care and feeding. By way of contrast, an esti-

FIGURE 10

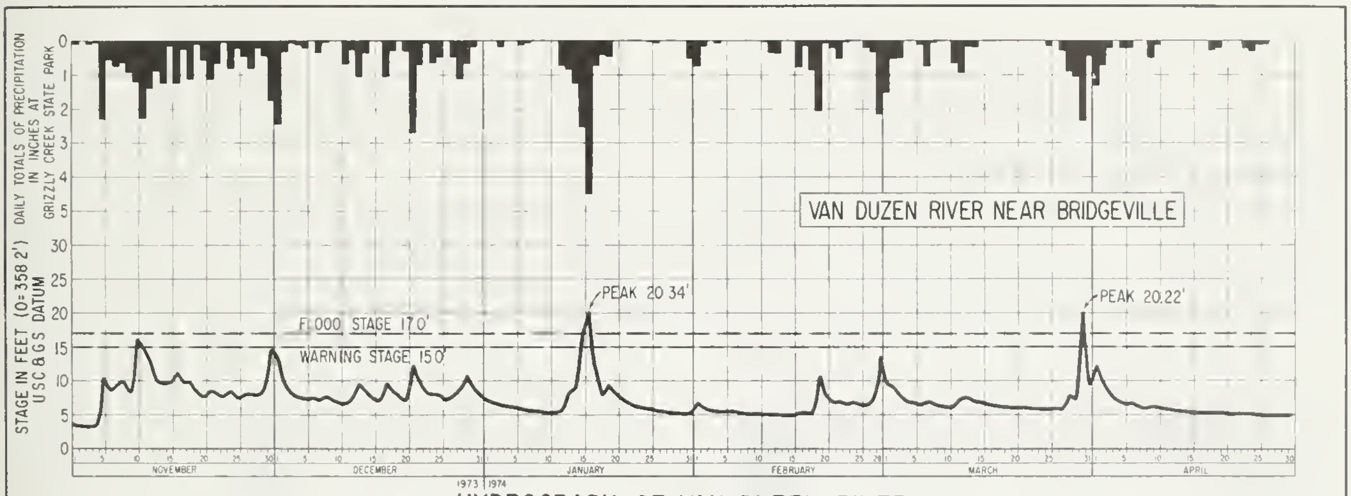


HYDROGRAPHS OF EEL RIVER

mated 3,600 head of cattle were lost during the 1964 flood. Nevertheless, the delta area was extensively damaged by deposition of silt and debris on pasture land, destruction of miles of fencing, and erosion of land. The flood almost claimed the lives of four delta ranchers when their pick-up truck was swept away by flood water pouring through a breached private levee.

Only minor river rises were experienced during February and most of March, until intense rains hit the basin early on March 29 and caused extremely rapid rises on the Eel and Van Duzen Rivers. Both rivers rose from low-flow stages to well above flood stage in less than 24 hours. Crests were slightly below the January crests but were reached in about half the time. The Eel River at Fernbridge crested only about $1\frac{1}{2}$ feet below the January flood crest. A few head of livestock were lost because the rapid rise occurred after dark. Many mobile homes were again moved to higher ground. Slides, bank erosion, silt and debris were widespread and, although the inundation was not as severe as in January, most of the repair and cleanup work following the January flood was lost.

FIGURE II



HYDROGRAPH OF VAN DUZEN RIVER

FIGURE 12

HYDROGRAPHS OF RUSSIAN RIVER

Russian River Basin

The Russian River and its numerous tributaries drain slightly less than 1,500 square miles of low but rugged Coast Range Mountains. Average annual rainfall varies considerably from about 20 inches in the Santa Rosa Plains to more than 80 inches at the higher elevations. Floods are almost normal annual occurrences and, because of the short-steep reaches of the major tributaries, tend to become sudden, rushing torrents. A measure of flood control is provided by Coyote Dam located on the East Fork of the Russian River near Ukiah; an additional flood control dam is under construction by the Corps of Engineers on Dry Creek, which is a major tributary entering the Russian River near Healdsburg. Flood damage consists primarily of flooded agricultural land in the several small valleys, and flooded summer homes along the lower reaches, especially in the Guerneville area.

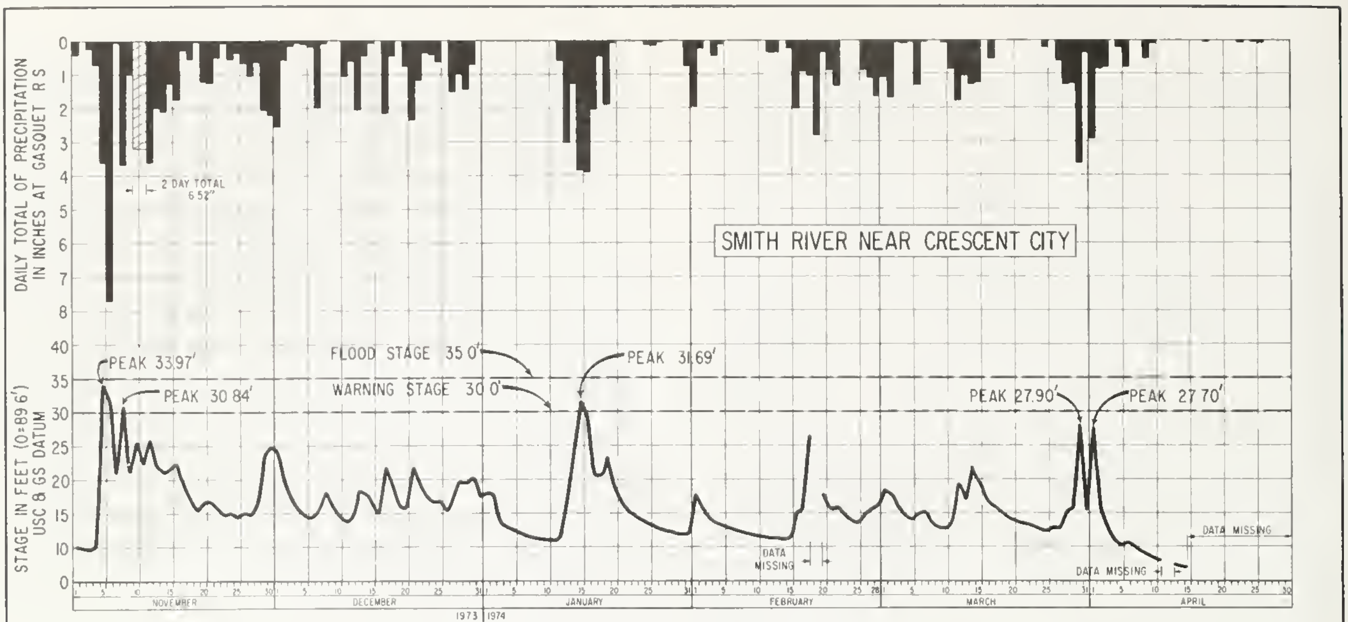
As with most of Northern California, the Russian River Basin began water year 1973-74 with a wet October (rainfall 150 to 200 percent of normal). Cazadero reported over 37 inches of rain in November alone. The river experienced several significant rises in November, but flood stage was not reached at any of the stations until the mid-January storm.

On January 12, the warm storm that plagued most of Northern California entered the Russian River Basin and poured increasingly larger amounts of rainfall on the area through January 16. Storm totals varied from 6.5 inches at Santa Rosa to 16.2 inches at Cazadero, with one-day amounts of over 5 inches. The runoff from this storm produced flood stages along the Russian River from Hopland to Guerneville. General inundation spread over the agricultural lands of Alexander Valley, Dry Creek Valley, and the Santa Rosa Plains, and flooding in the Santa Rosa Laguna approached the outskirts of Sebastapol. In the resort areas near Guerneville, at least 85 persons were reportedly evacuated along the river, which crested almost 9 feet above flood stage at Guerneville Bridge. In addition to flooding of riverside homes, cottages, and farmland, the mid-January storm also claimed the life of a Ukiah man who slipped into a deep storm drain. The storm also caused a slide that ruptured a gas main serving the upper valley from Hopland to Calpella, north of Ukiah.

An intense storm at the end of February again brought heavy rainfall to the basin and caused rapid rises in the streams. Venado reported 7.7 inches of rain in a 24-hour period, but the storm passed rapidly and the Russian River crested below flood stage at all stations.

Then on March 27, the second flood-producing storm entered the basin. Within a 4-day period Cazadero received over 11 inches of rain, Venado reported almost 10 inches, and Ukiah reported over 5 inches. The heaviest rainfall occurred March 29. The river rose rapidly, exceeding flood stage at Healdsburg by 2.0 feet and at Guerneville by 5.7 feet. Once again, fields and orchards near Geyserville and Healdsburg were flooded, 12 families near Guerneville temporarily left their homes, and a number of vehicles caught in lower areas were damaged. The river receded below flood stage by April 1 and did not reach flood stage again during the remainder of the season.

FIGURE 13



HYDROGRAPH OF SMITH RIVER

Roadway of State Highway 36 undercut by runoff near the community of Bridgeville, Humboldt County. (DWR Photo)

Other Basins

The persistent November rains brought nearly 46 inches of rain to Gasquet Ranger Station in the Smith River Basin, with one-day amounts of 7.7 inches on November 6 and 6.5 inches on November 11. This drenching caused numerous earth slides, with most of the damage occurring to the state and local road systems. The Smith River reached flood stage at Dr. Fine Bridge (Highway 101), but no major damage was reported.

The January storm uprooted trees and created earth slides and local flooding in many of the smaller basins. Some residents were evacuated near the mouth of the Mad River; the Noyo River washed out a bridge along the California Western Railroad, which suffered additional damage from slides and washouts along an 18-mile reach east of Fort Bragg; and flooding by the Garcia, Gualala, and Ten-Mile Rivers blocked roadways, including State Highway 1, in Mendocino County. The Mendocino County roadway system was particularly hard hit by the January storm and prompted a declaration of a state of emergency for that county.

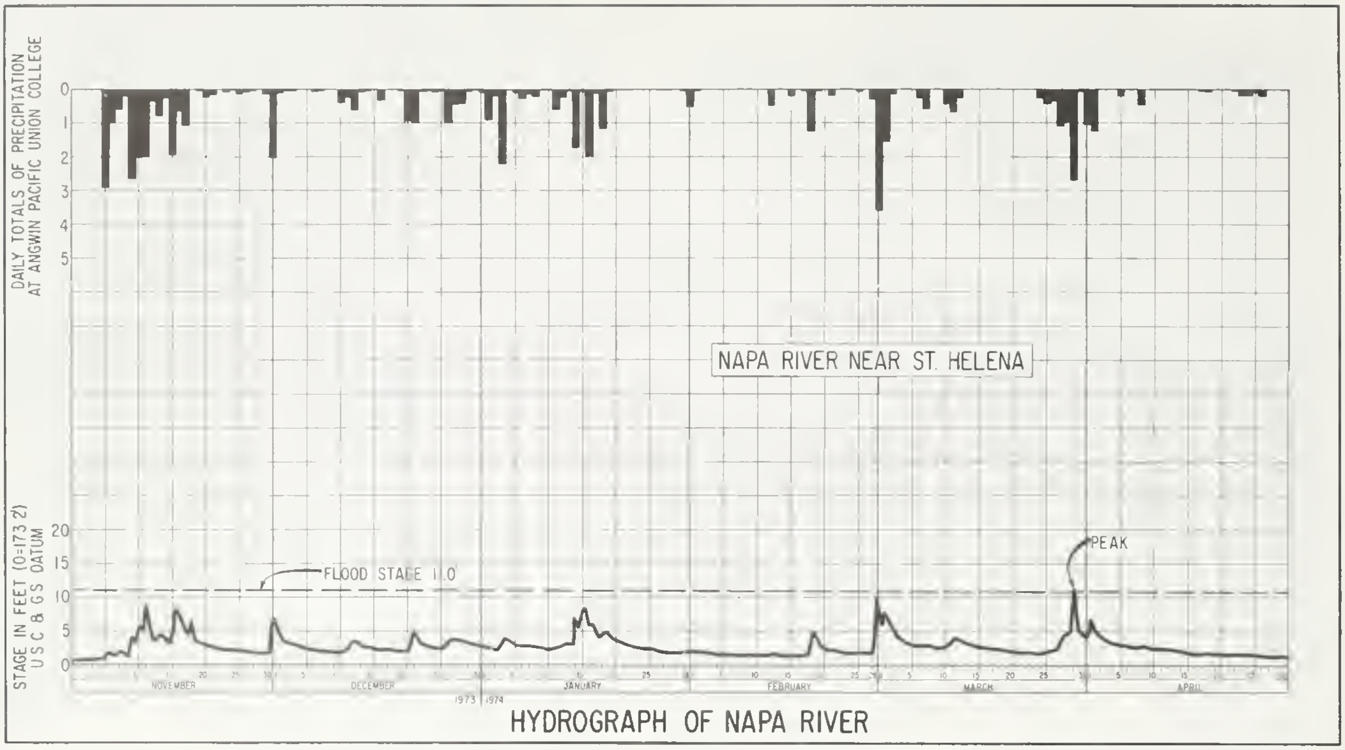
The March storm caused some local flooding along tributaries to Redwood Creek in Humboldt County, but the major damage appeared to be the washout of a diversion dam at Humboldt County's Prairie Creek Fish Hatchery, which also resulted in the loss of about 50,000 young king salmon from the rearing pond.

Washout at diversion dam on Lost Man Creek at Humboldt County fish hatchery. (DWR Photo)

Damage caused by high water at O'Neil Creek campground in Klamath River basin: eroded paving in roadway (upper left), a washed out creek bank (upper right), and culverts and abutment exposed when the roadway was destroyed (below). (DWR Photos)

(Above) Remains of a two-story house on Bridge Creek near Myers Flat, Humboldt County, which was swept from its foundation when an upstream log jam collapsed. (Below) View to the northwest of flooded farmlands surrounding the community of Port Kenyon near Ferndale in the Eel River delta. (DWR Photos)

FIGURE 14



One of numerous automobiles stranded by a heavy mud flow down Topanga Canyon Boulevard, Los Angeles County. (Photo by Santa Monica Evening Outlook)

San Francisco Hydrographic Area

The San Francisco Bay Hydrographic Area encompasses the area surrounding Suisun, San Pablo, and San Francisco Bays. Napa River is the major stream in this area; most of the streams drain small, highly urban basins.

November 1973 was particularly wet in this area: the San Francisco Airport climate station reported 6.4 inches of rainfall (500 percent of normal); the Kentfield station in Marin County reported 26.0 inches of rainfall (575 percent of normal), with 6.35 inches occurring within a 24-hour period on November 6.

Storm damages were principally confined to rock and mud slides in the urban hillsides surrounding the Bay. The months of December 1973 and January 1974 produced slightly less than normal rainfall in this area, but sporadic slides continued to plague homeowners.

The Napa River exceeded warning stages in January, and reached flood stage near St. Helena during the March-April storm. No significant flood damage was reported from either of these high stages.

South Coastal Hydrographic Area

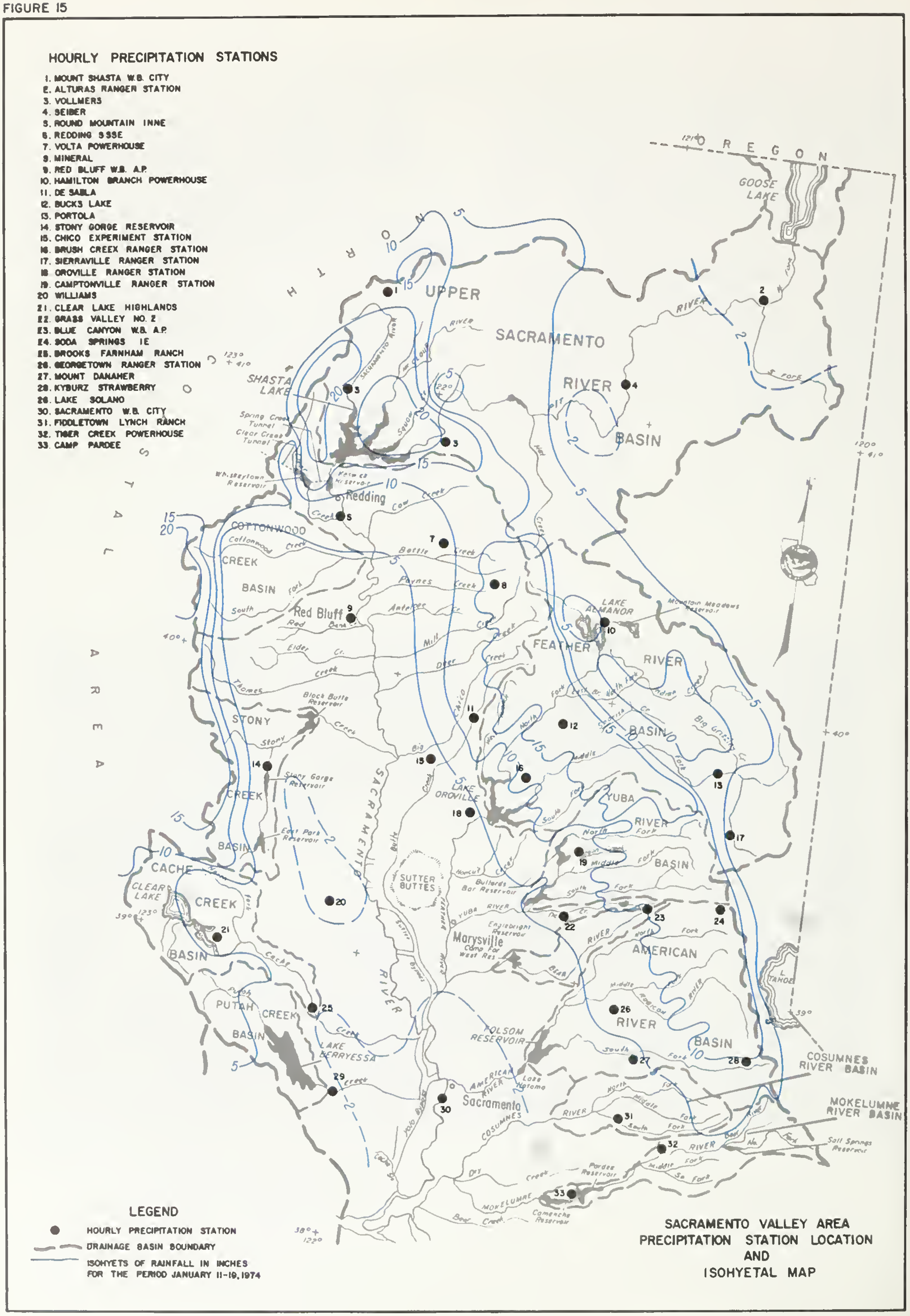
The South Coastal Hydrographic Area extends about 200 miles along the Pacific Ocean from near the Ventura-Santa Barbara Counties boundary to the California-Mexico boundary and includes the basins draining to the ocean between these boundaries. Precipitation is almost entirely confined to the winter months and is usually moderate in most of the area; however, intense rainfall often occurs in the mountains.

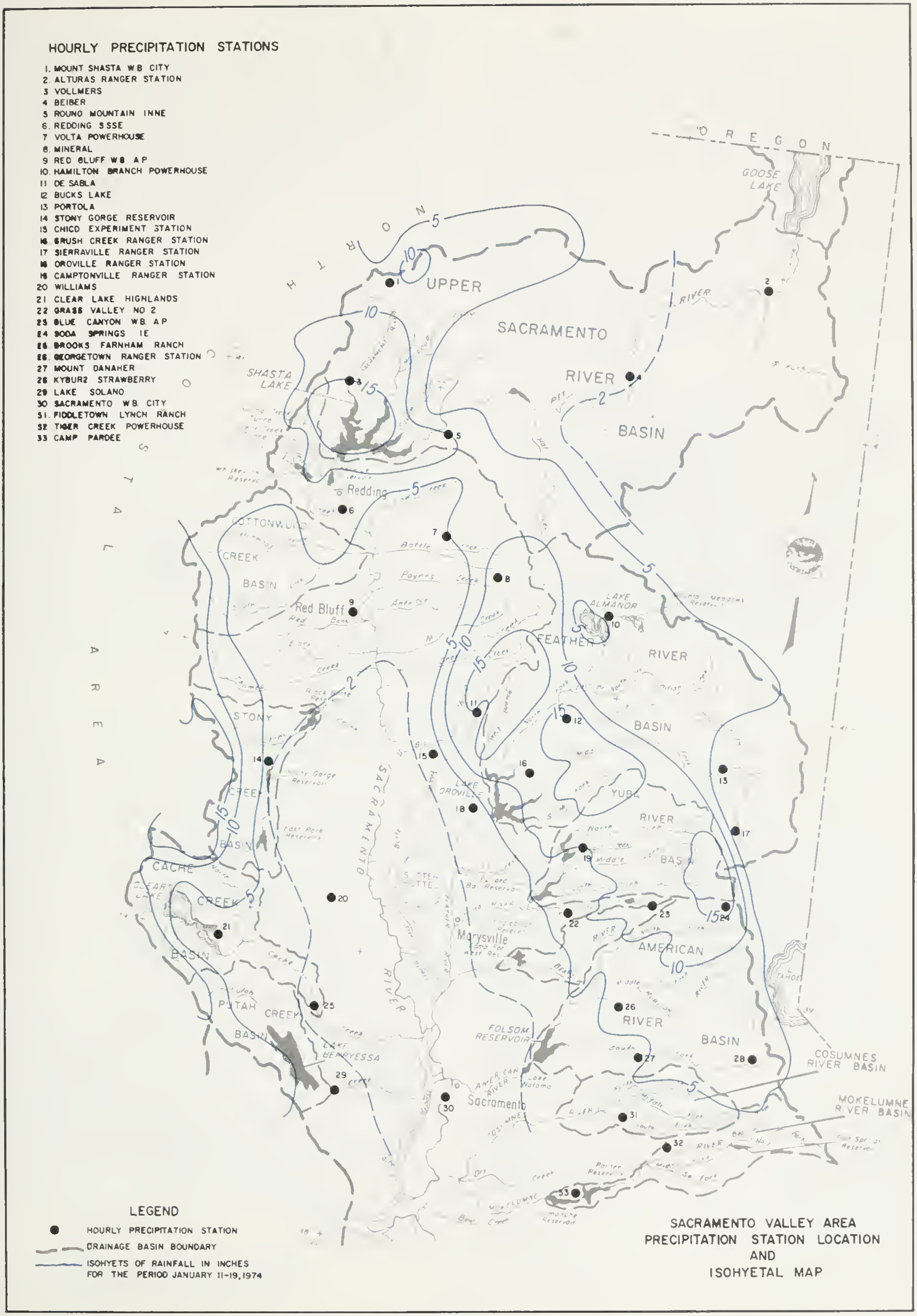
The 1973-74 water year produced below-normal rainfall for most of this area (Figure 2), although rainfall in November 1973 was about 155 percent of normal and in January 1974 it was more than 200 percent of normal. Most of the January rainfall occurred during the first week.

The cold storm of early January caused earth slides, local flooding, washouts, and mud flows that did extensive damage. Especially hard hit was the Topanga Canyon in Los Angeles County between Malibu Beach and Santa Monica, where brush fires in November 1973 destroyed the terrain's protective vegetation. A storm on December 1, 1973, produced more than two inches of rain in a 24-hour period, starting the first of a series of mud flows down Topanga Canyon Boulevard. The early January storm series dropped more than 10 inches of rain in three days at the Topanga Fire Patrol Station and Topanga Canyon Boulevard once again became a river of mud and water, as the flowing mud from the canyon slopes joined the overflowing Topanga Creek. Local authorities recommended evacuation of the occupants of more than 300 homes in the area; 50 to 75 motorists were reportedly stranded in the canyon.

The mid-January and the March-April storms that caused major flooding in Northern California produced only light rain in the South Coastal Area. No significant storm damage was reported in this area after the early-January cold storm finally subsided.

FIGURE 15


HOURLY PRECIPITATION STATIONS
1. MOUNT SHASTA W.B. CITY
2. ALTURAS RANGER STATION
3. VOLLMERS
4. SEIBER
5. ROUND MOUNTAIN 1NNE
6. REDDING 5SSE
7. VOLTA POWERHOUSE
8. MINERAL
9. RED BLUFF W.B. A.P.
10. HAMILTON BRANCH POWERHOUSE
11. DE SABLA
12. BUCKS LAKE
13. PORTOLA
14. STONY GORGE RESERVOIR
15. CHICO EXPERIMENT STATION
16. BRUSH CREEK RANGER STATION
17. SIERRAVILLE RANGER STATION
18. OROVILLE RANGER STATION
19. CAMPTONVILLE RANGER STATION
20. WILLIAMS
21. CLEAR LAKE HIGHLANDS
22. GRASS VALLEY NO. 2
23. BLUE CANYON W.B. A.P.
24. SODA SPRINGS 1E
25. BROOKS FARNHAM RANCH
26. GEORGETOWN RANGER STATION
27. MOUNT DANAHER
28. KYBURZ STRAWBERRY
29. LAKE SOLANO
30. SACRAMENTO W.B. CITY
31. FIDDLETOWN LYNCH RANCH
32. TIGER CREEK POWERHOUSE
33. CAMP PARDEE
LEGEND
HOURLY PRECIPITATION STATION
DRAINAGE BASIN BOUNDARY
ISOHYETS OF RAINFALL IN INCHES FOR THE PERIOD JANUARY 11-19, 1974
SACRAMENTO VALLEY AREA PRECIPITATION STATION LOCATION AND ISOHYETAL MAP



SACRAMENTO VALLEY AREA
PRECIPITATION STATION LOCATION
AND
ISOHYETAL MAP

FIGURE 17

SACRAMENTO VALLEY AREA
STREAM STATION LOCATION MAP

Central Valley Hydrographic Area

The Central Valley Hydrographic Area, approximately 500 miles long and 120 miles wide, stretches from Goose Lake near the Oregon border to the Tehachapi Mountains south of Bakersfield, and encompasses the watersheds of all rivers and streams draining the eastern slopes of the Coast Range and the western slopes of the Sierras.

The area's two major rivers, the Sacramento and the San Joaquin, drain the entire valley; all minor streams and rivers are tributary to either the Sacramento or the San Joaquin River, or drain into the Tulare Lake Basin south of Fresno.

More than 60 significant upstream reservoirs, with a combined storage capacity of over 22 million acre-feet, reduce winter flows in the valley streams below the dams.

Average annual precipitation, both snow and rain, in the Central Valley Hydrographic Area decreases progressively from a high of approximately 70 inches in the northern portions to less than 10 inches in the southern portions. As in the greater part of California, most of this precipitation results from a series of major storms that pass over the State during the winter. These storms have all the potential for creating flood-producing runoff to the Sacramento and San Joaquin Rivers. Fortunately, much of the precipitation typically falls as heavy winter snows in the Sierra Nevada where it is stored as snowpack until spring, thus delaying the potential runoff until less-usually stormy months.

In the Central Valley Hydrographic Area, the significant high water events produced by the three major storm periods of the 1973-74 season (November 3-17, January 11-19, and March 27-April 2), were mainly confined to the Sacramento River drainage basin. The most extensive damage occurred during the mid-January storm, and resulted in declarations of states of emergency for three north valley counties: Shasta, Tehama, and Glenn Counties.

Sacramento River Basin

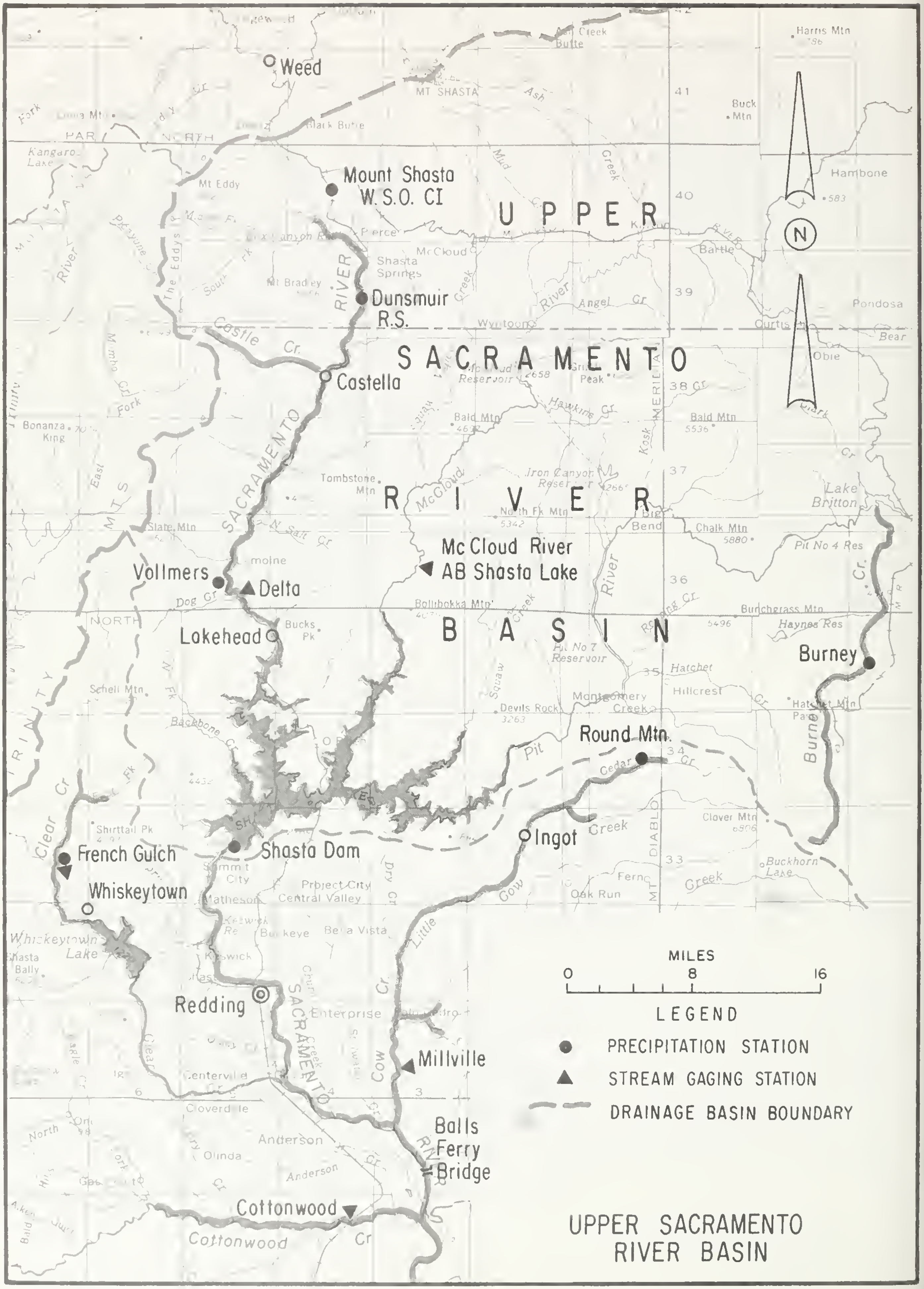
In the Sacramento Valley, the principal streams are the Sacramento River and its tributaries: the McCloud, Pit, Feather, Yuba, Bear, and American Rivers, which flow from the Sierra Nevada on the east, and the Cottonwood, Stony, Cache, and Putah Creeks, which drain from the coastal ranges on the west.

Four major multiple-purpose dams provide upstream storage for potential flood-producing runoff: These are Shasta Dam on the Sacramento River above the city of Redding, Oroville Dam on the Feather River above the city of Oroville, Bullards Bar Dam on the Yuba River above the city of Marysville, and Folsom Dam on the American River above the city of Sacramento. These four dams provide a total of over 10 million acre-feet of reservoir storage.

The Sacramento River Flood Control Project provides flood protection along the lower reaches of the Sacramento, Feather, and American Rivers. This project includes leveed channels, five overflow weirs and the Butte Basin Bypass, the Sutter Bypass, and the Yolo Bypass. Some additional flood protection is provided by minor, privately-owned levees upstream of the project levees.

The first high water for the 1973-74 water year developed by mid-November 1973. Warning stages were reached on the Sacramento River at Tehama Bridge,

FIGURE 18


UPPER SACRAMENTO RIVER BASIN
Weed
Mount Shasta W.S.O. CI
Dunsmuir R.S.
Castella
Vollmers
Delta
Mc Cloud River AB Shasta Lake
Lakehead
Burney
Round Mtn.
Ingot
Shasta Dam
French Gulch
Whiskeytown
Redding
Millville
Balls Ferry Bridge
Cottonwood
N
MILES
0
8
16
LEGEND
PRECIPITATION STATION
STREAM GAGING STATION
DRAINAGE BASIN BOUNDARY
UPPER SACRAMENTO
RIVER BASIN

Vina-Woodson Bridge, and at Ord Ferry, but no significant damage was reported. A long winter of extensive overflow to the bypass systems began before mid-November that inundated the rich agricultural lands and extensive game-bird hunting clubs. Tisdale Weir began overflowing into Sutter Bypass on November 12, and continued flowing for nearly three months--the longest period of continuous flow for that weir since the completion of Shasta Dam. The precipitation station at Vollmers reported measurable rainfall during all but three days of November for a total catch of 35.3 inches; Shasta Dam reported measurable rainfall for all but seven days of the month for a total catch of 27.6 inches. Inflow to Shasta Lake more than doubled the previous record for November; inflow to Folsom Lake was the second highest of record for November. The town of Dunsmuir above Shasta Lake reported flooding along Butterfly Avenue and South First Street--two names which were destined for headlines in January 1974.

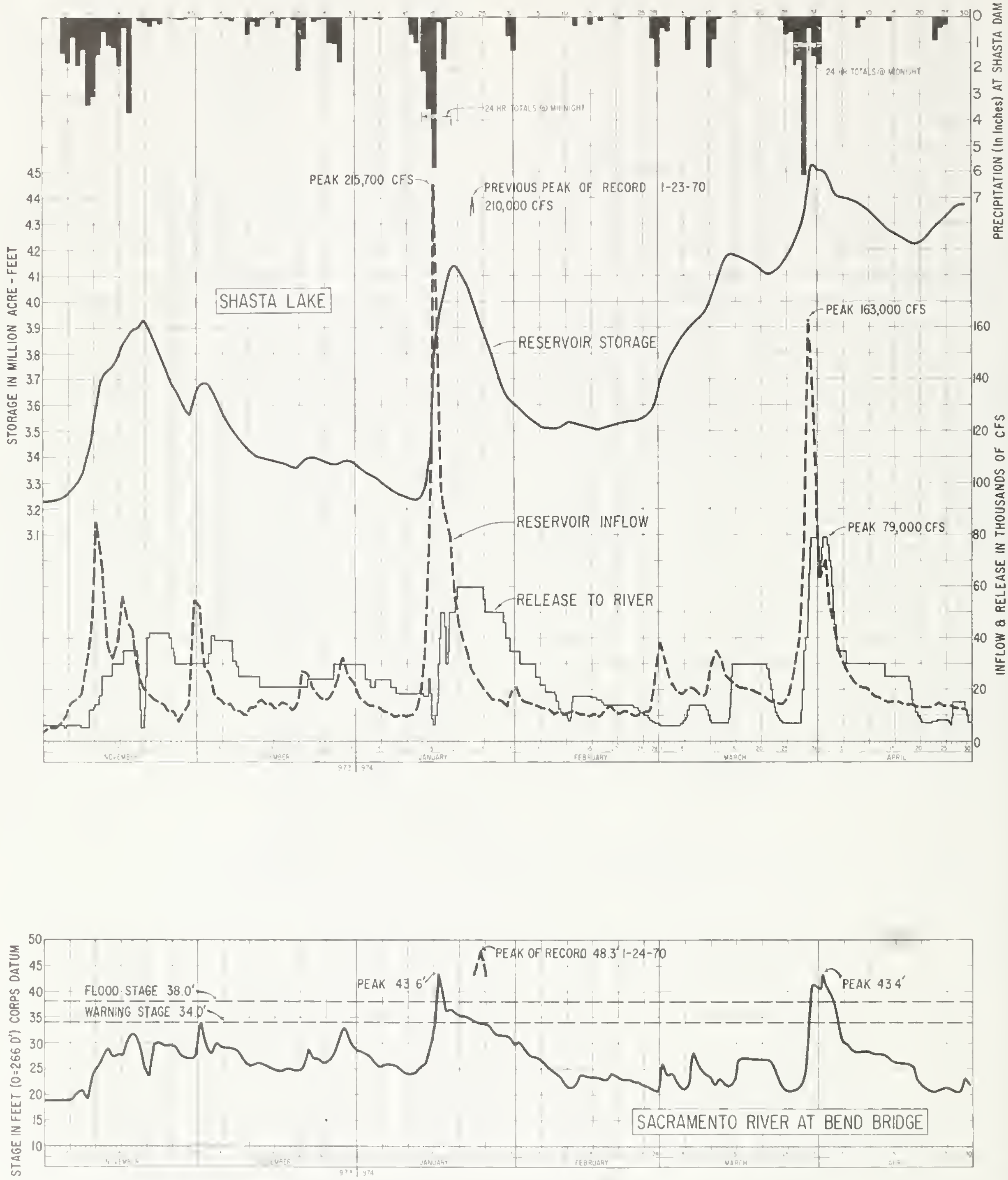
December 1973 produced just enough rainfall to keep soil conditions saturated with periodic rises in the river system. Then a cold storm on the first weekend of January 1974 left snow at low elevations throughout most of the State--including a heavy burden on the upper Sacramento basin slopes. Over 4 inches of snow were recorded on January 6 at Red Bluff, elevation 342 feet; during the four-day storm a total of more than 23 inches of snow was reported at stations below elevation 2500 feet.

Within a week of this cold storm, a massive warm tropical storm entered the Sacramento River Basin and remained stationary for almost three days. The snowline was very high, and the heavy rain falling on the snow burden left by the previous cold storm resulted in record runoff. Peak inflow to Shasta Lake established a new record of 215,000 cubic feet per second (cfs) on January 16; Clear Creek at French Gulch almost doubled the previous maximum flow of record; and Sacramento River at Delta (above Shasta Dam) more than doubled the previous maximum flow of record; McCloud River above Shasta Dam and Cottonwood Creek at Cottonwood set new maximum peaks of record. (See Appendix B.). Table 2 indicates the magnitude of this storm. Runoff from this storm resulted in extensive flooding along the main stem of the Sacramento River above and below Shasta Lake and along several upper valley tributaries.

TABLE 2: PRECIPITATION AT SELECTED STATIONS, UPPER SACRAMENTO RIVER BASIN, JANUARY 11-19, 1974
(In Inches)

Station	Elevation	1-Day Maximum	3-Day Maximum	Total
Burney	3127	3.45	6.45	9.01
Dunsmuir RS	2420	6.29	11.60	18.62
French Gulch	1120	3.50	5.35	7.92
Mt. Shasta	3544	5.07	10.03	12.29
Round Mountain	2100	4.55	10.44	18.61
Shasta Dam	1076	4.77	11.20	15.01
Follmers	1335	6.44	11.69	17.59

FIGURE 19



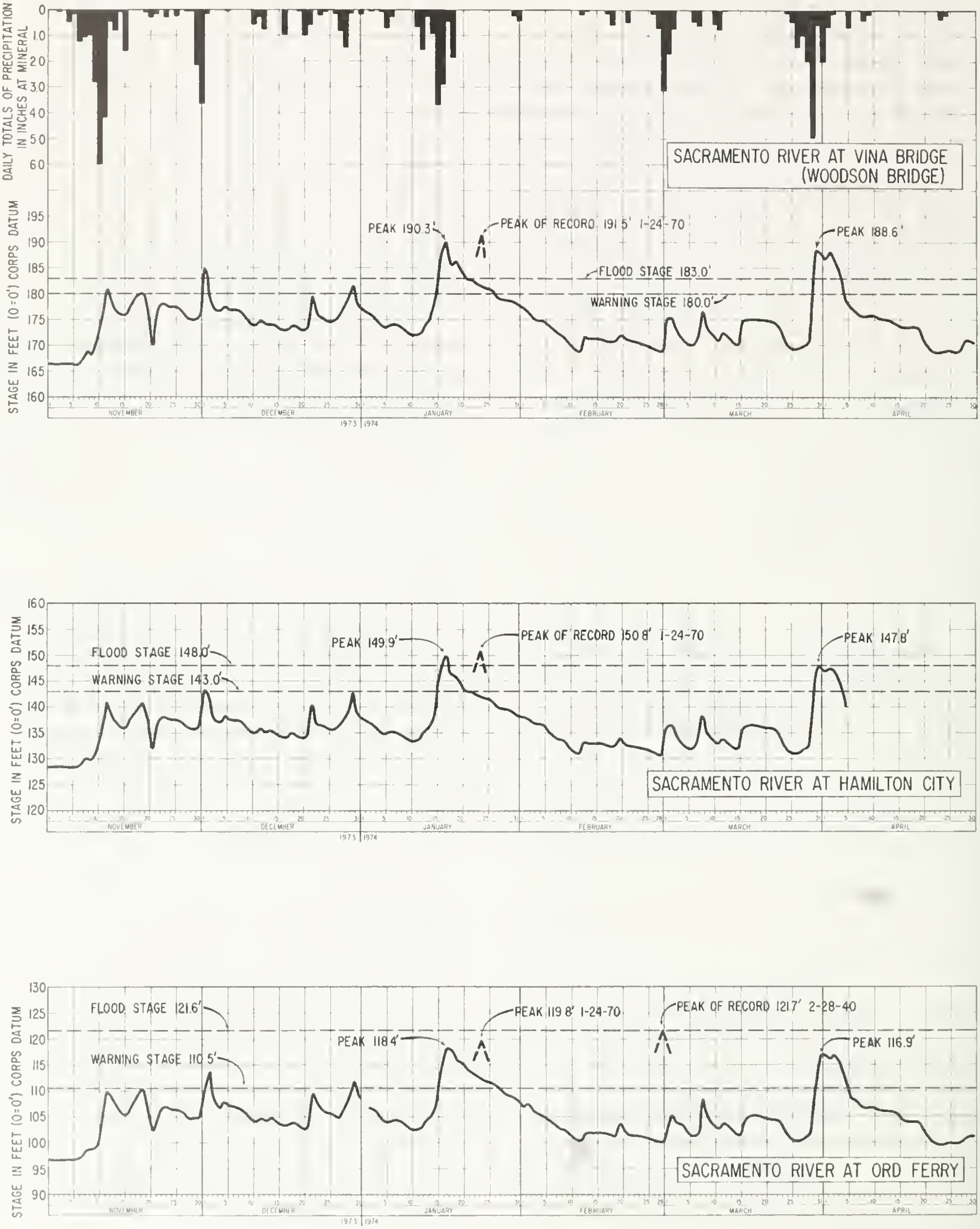
HYDROGRAPHS OF SHASTA LAKE AND SACRAMENTO RIVER

Upstream of Shasta Lake, the most extensive damage occurred along the 30-mile Sacramento River Canyon from Mount Shasta to Lakehead where the river and its numerous minor tributary streams swept away public and private bridges, flooded or isolated homes and communities, and washed away major sections of the Southern Pacific Railroad tracks and stranded north-and south-bound Amtrack Starlight trains in Redding and Klamath Falls. Along this reach, the town of Dunsmuir was hardest hit. Direct runoff from the surrounding slopes sent water, rocks, and debris surging through the community, flooding streets and basements, while the overbank torrent of the Sacramento River swept through the low-lying residential and business areas along the river. Near Castella, several homes were swept from their foundations and were destroyed or severely damaged. Homes along Butterfly Avenue in Dunsmuir were flooded with $4\frac{1}{2}$ feet of water, and several automobiles were reportedly swept into the river. No reported loss of life occurred in Dunsmuir or along the canyon, thanks to timely evacuations and the rescue of a young woman who was almost swept away while attempting to cross Butterfly Avenue. In addition to flood damage along the Sacramento River above Shasta Lake, other events in the upper Sacramento basin included flooding in the town of Burney by Burney Creek, flooding in the community of French Gulch by Clear Creek, and flooding along Cow Creek and its tributaries in the vicinity of the communities of Montgomery Creek, Round Mountain, and Ingot. Fifty homes were reportedly evacuated in Burney, and two in French Gulch; extensive sandbagging in both communities was sometimes unsuccessful in preventing the spread of flood water into homes and businesses. Public and private bridges and culverts were washed out and roadways were flooded, isolating many families in remote areas. No deaths were reported; but two people were seriously injured near Whiskeytown Lake when their car plunged into a 30-foot gap left by a washed out culvert. At least 15 to 20 private bridges were reportedly washed out or disabled in Shasta County.

To hold back the enormous upstream runoff, no water was released at Shasta Dam. Despite this, there was enough unregulated inflow to the Sacramento River below the dam to create flood stages from Redding to the project levees near Colusa--nearly equaling the record 1970 stages. One of the major contributors of this inflow was Cottonwood Creek, which enters the river near the town of Cottonwood. On January 16, peak flow in this stream reached 72,000 cfs and established a new record stage and flow. Extensive damage occurred at six large ranches along lower reaches of the stream as the record flows flooded homes and swept away buildings, soil, and orchards. Five persons had to be rescued by jet boat from a flooded ranch.

Along the Sacramento River below Redding, many mobile homes at riverbank recreational centers, such as Balls Ferry, Tehama Bridge, and Vina-Woodson Bridge, were moved to higher ground, or their occupants were evacuated along with those living in some permanent homes. Overbank flooding occurred in the Capay area north of Hamilton City, and five families were evacuated. A small levee broke near Hamilton City downstream of Highway 32 and flooded a portion of the low-lying residential area on the southeast side of town; 20 families were evacuated and 35 mobile homes were reportedly flooded. Emergency sandbagging prevented additional breaks in this levee and held another levee north of town. A rupture in a small levee south of Elder Creek sent flood water toward the town of Tehama. Water surrounded the town and left only one passable access road, but no significant damage was reported. Several minor levees along the east side of the river were overtopped or broken, adding to the overbank flood-

FIGURE 20



HYDROGRAPHS OF SACRAMENTO RIVER

ing of the east side from Vina to the Butte Basin. Backwater from the flooding of Butte Basin by the Moulton and Colusa Weirs was reported to extend to north of the Colusa-Gridley Road some 12 miles from the south end of the basin, allegedly creating additional spreading of the Butte Creek runoff and causing stages higher than the record 1970 flood.

As the flood flow entered the Sacramento River Flood Control Project, the four fixed crest weirs shunted the excess flow to the bypass system, and no flood stages were reached along the lower Sacramento River. The maximum stage reached at the "I" Street Bridge in Sacramento did not require the gates of the Sacramento Weir to be opened. However, on January 21, a large wooden fender of the "I" Street Bridge broke free and damaged one marina and threatened several others as it swept downstream. In the bypass system, the only significant damage occurred when the stage in the Yolo Bypass at Lisbon exceeded 18 feet on January 18, and 21 feet on January 20 signalling the overtopping of the levees protecting Little Holland and Liberty Island near the downstream end of the Bypass. These levees were breached at several locations, and the rich agricultural islands were completely inundated.

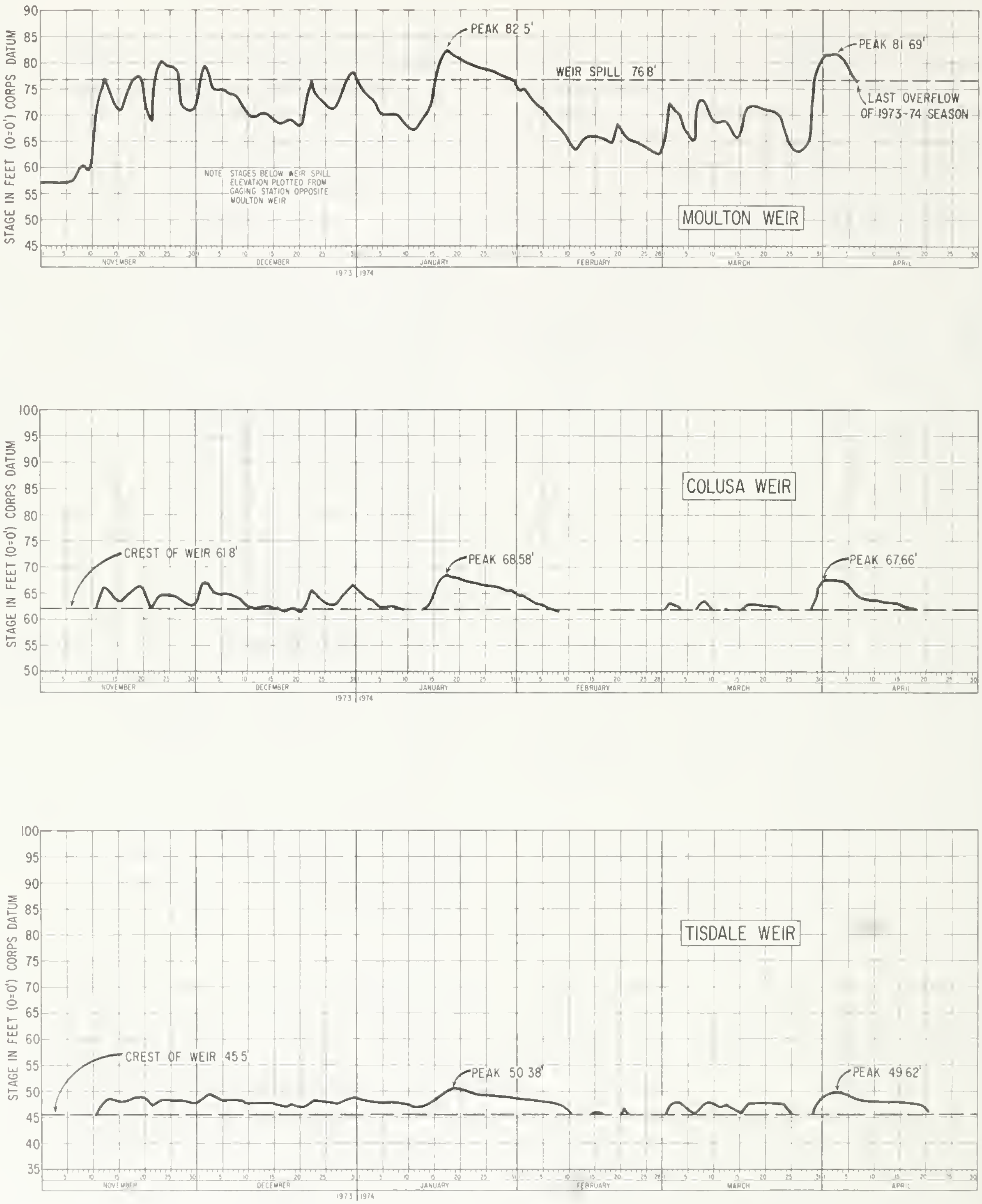
In the delta area of the Sacramento River, high flows combined with exceptionally high tides (caused by a rare alignment of the sun and moon on January 7) created extremely hazardous conditions for several days for many of the delta islands. Extra topping on low portions of levees, and the lack of strong winds prevented any overtopping or failures.

On the western slopes of the Sacramento drainage basin, the Clear Lake area in Lake County also experienced record runoff from the warm mid-January storm. Scotts Creek near Lakeport set a new record stage of 13.38 feet, exceeding the previous record of January 1970 by more than a foot. The high flow broke through private levees in Scotts Valley, destroyed a home and other buildings, and caused severe flood damage to another home and to orchards and county roads. Kelsey and Adobe Creeks also established new records, but no major flood damage was reported. Lake County declared a local state of disaster, but the State did not follow suit.

Following the devastation on January 11-19, the basin had a relatively dry February that permitted release of the extensive accumulation of January runoff impounded by the major reservoirs. A vigorous storm on February 28 caused rapidly rising stages in the upper Sacramento streams--but the storm moved rapidly through the basin and no major flooding occurred. The first three weeks of March produced a succession of well-spaced showers and receding river stages. Then in the late hours of March 28 a strong front brought heavy rains that fell nearly uninterruptedly into the early hours of March 30. A second storm front arrived on March 31 and the rainfall lasted through April 1. Rainfall amounts of 8.9 inches in 24 hours, nearly 12 inches in 48 hours, and storm totals approaching 20 inches were reported in various locations in the upper Sacramento River drainage basin. These back-to-back storms produced the second major flood in the Sacramento Valley for this season.

Runoff from this March-April storm produced a peak inflow to Shasta Lake of 164,000 cfs--the highest of record for so late in the season--and brought the lake level to within 10 inches of the top of the spillway flashboard gates. In the Sacramento Canyon, the streets of the town of Dunsmuir were again flowing from local runoff; the Sacramento River again threatened to top its banks but it peaked just below flood stage. Castle Creek again threatened the town of Castella, but

FIGURE 21



OVERFLOW TO BUTTE BASIN AND SUTTER BYPASS local efforts prevented a recurrence of the January washout which sent flood water through the community. Major slides and washouts north of Lakehead again blocked the major north-south railway line, but--as with private property in the Sacramento Canyon--damage was not as extensive as in January.

Below Shasta Dam, however, the unseasonable March 28-April 1 storm produced flood stages from Redding to Ord Ferry comparable to, and in some cases exceeding, the January flood, and created a public reaction which may lead to a reevaluation of the operation of Shasta Dam. Heavy inflow to Shasta Lake made it necessary to increase releases to 79,000 cubic feet per second--the maximum permitted under current flood control regulations. River stages produced by these releases, combined with downstream inflow, allegedly caused bank erosion and subsequent loss of land in Tehama and Glenn Counties and flooding of riverbank homes in the Redding and Anderson areas. At least one mobile home in the Balls Ferry area was completely destroyed. The loss of one life was attributed to the flood when an automobile was caught in the swollen river in Butte County.

Agricultural damage, both direct and indirect, caused by this late-season flood was also extensive. Direct damage consisted of washed-out private levees, damaged orchards, and eroded land. One large ranch reported loss of 25,000 newly planted trees; another ranch reported 12-foot potholes had been formed in an orchard and and a new $10,000 irrigation system totally lost. Flooding of agricultural lands so late in the season also caused indirect damage: standing water on orchard lands in the spring is detrimental to crops and endangers the life of the trees; prolonged inundation of bypass areas prevents timely planting of annual crops.

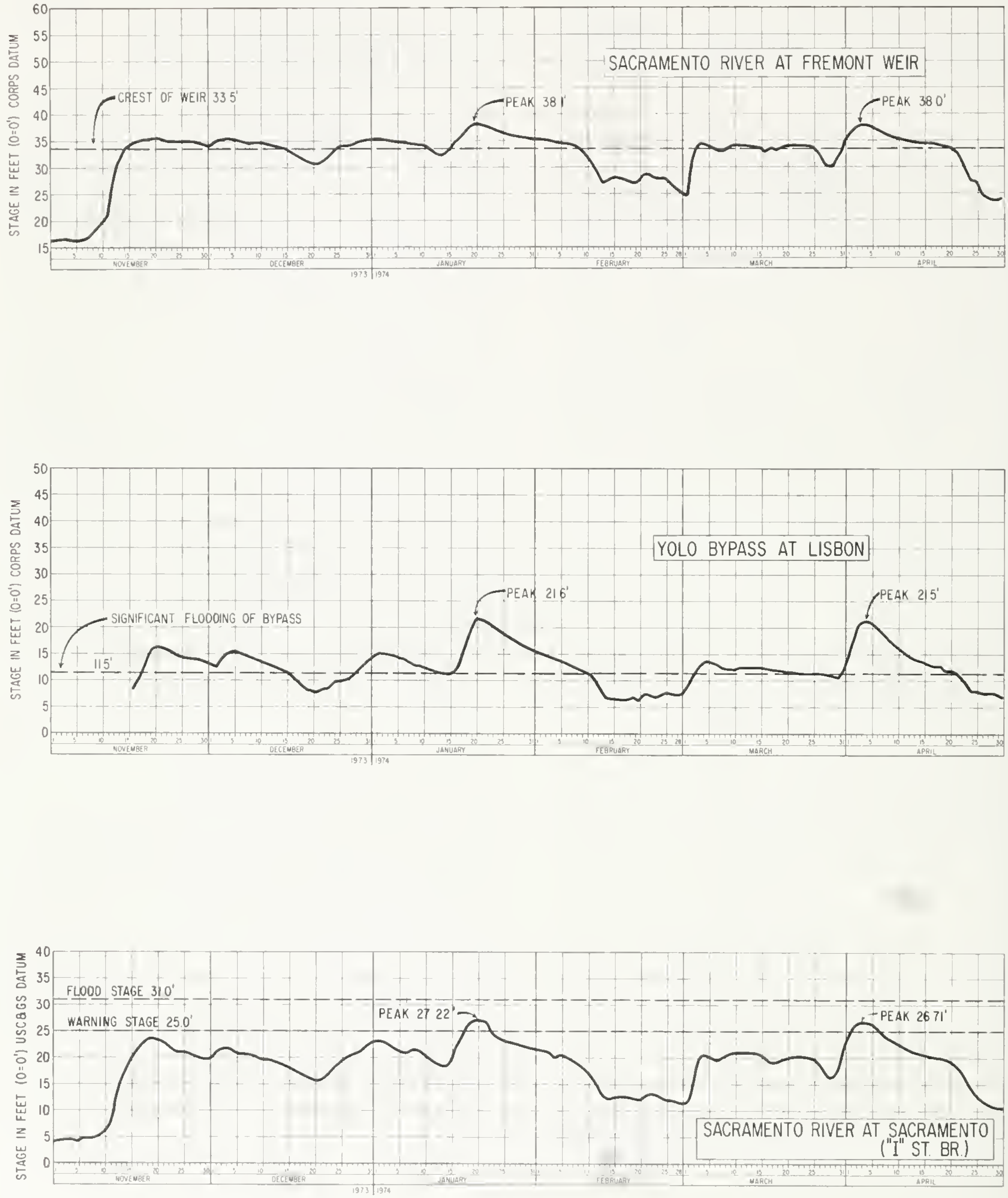
Overflow into bypasses following the March-April storm extended through the third week of April. In the Yolo Bypass, the expensive levee repairs to Little Holland and Liberty Islands were again washed out and the islands were again inundated.

The March-April storm was the last of the major damaging storms of the season for the Sacramento Valley. By April 5, records, some of which began before 1900, in the upper Sacramento River had been broken by rainfall at Mount Shasta, McCloud, Dunsmuir, and Castle Crags stations, which had received 57.5 inches, 67.5 inches, 98.5 inches and 134.9 inches, respectively. The remainder of April also produced above-normal precipitation in the mountains, but most of it was retained as snow above the 6,000-foot elevation. By May 1, runoff in valley streams had reached more than 200 percent of normal for the season, a figure that is projected as the largest runoff of record for the Sacramento River. Although extensive flood damage occurred both above and below Shasta Dam, the Sacramento River Flood Control Project conducted the record runoff through its system from Ord Ferry to the Delta without failure and with only a few reported cases of significant erosion.

San Joaquin Valley Streams

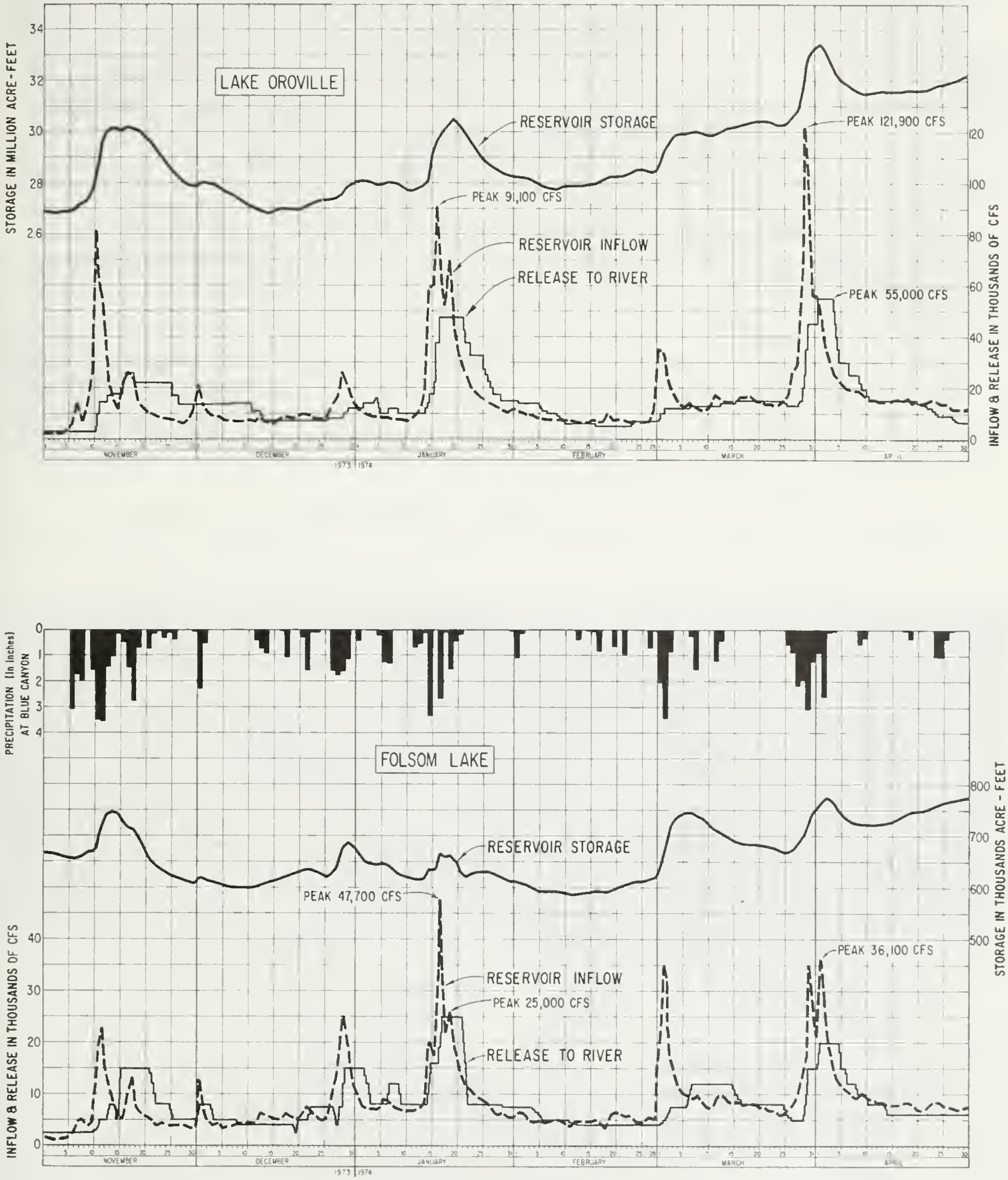
No significantly high stages were produced on any major San Joaquin Valley stream by these storms; however, an intense but short-duration storm at the end of February did produce a new peak of record on the South Fork of the Calaveras River near San Andreas. It also caused local flash flooding in portions of San Joaquin Valley as far south as Bakersfield where, for example, Poso Creek left its banks and caused limited agricultural flood damage.

FIGURE 22



HYDROGRAPHS OF YOLO BYPASS AND SACRAMENTO RIVER

FIGURE 23



HYDROGRAPHS OF LAKE OROVILLE AND FOLSOM LAKE

Flooding near Dunsmuir along the upper Sacramento River engulfed houses, . . .

. . . caused power failures, and destroyed roads and bridges. (DWR Photos)

APPENDIX A

Sacramento River Crest
and
Weir Overflow Records

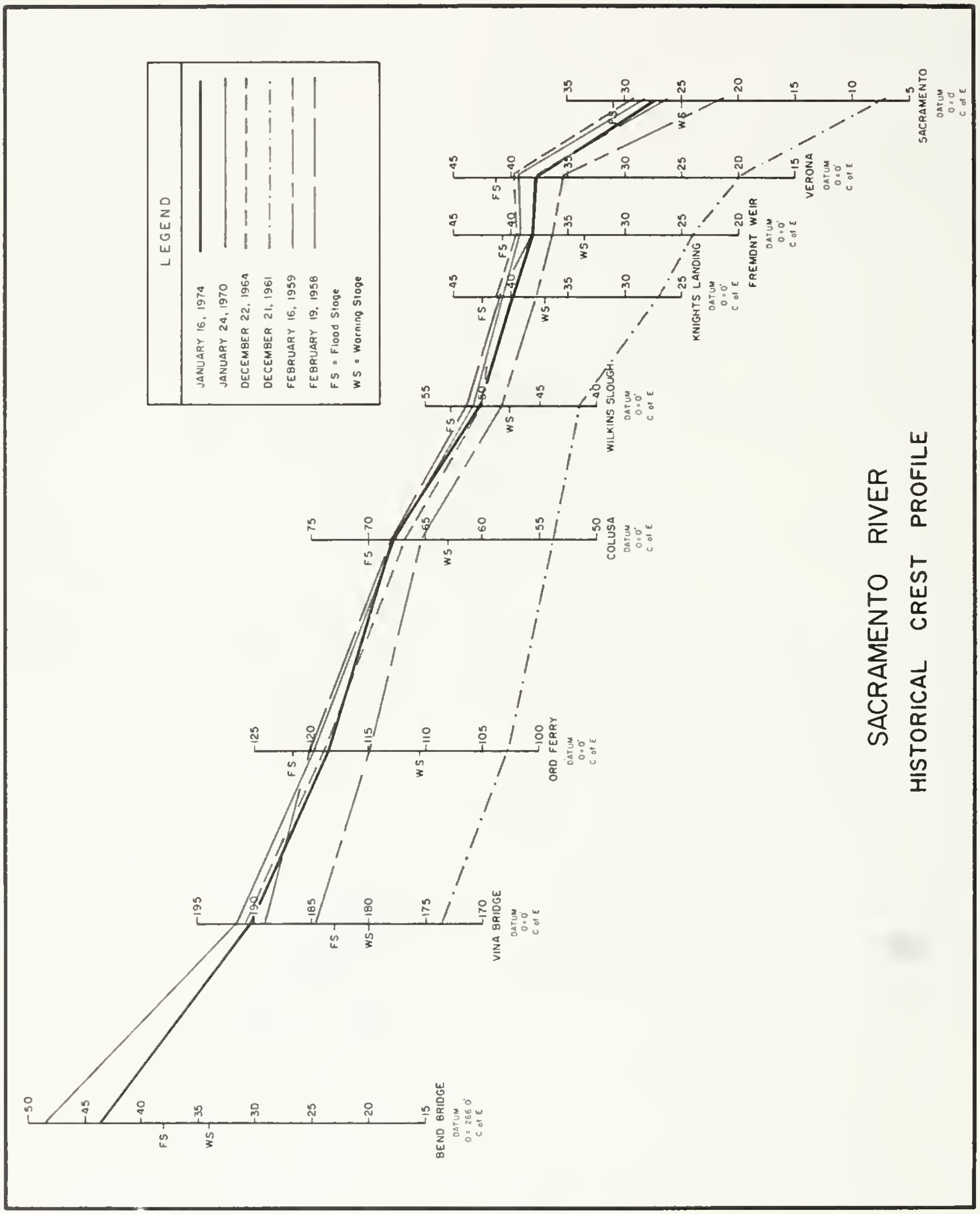
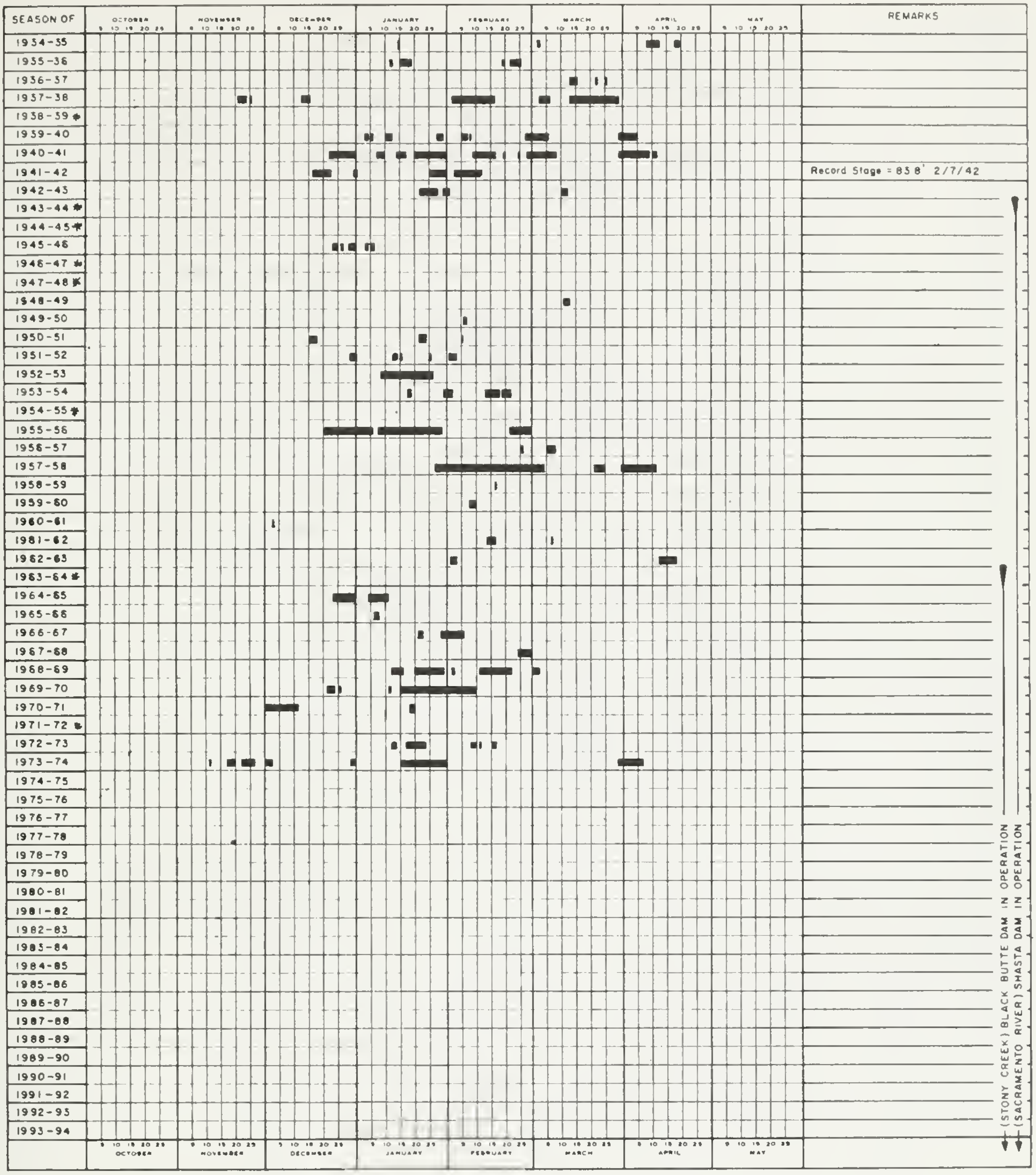

SACRAMENTO RIVER
HISTORICAL CREST PROFILE
LEGEND
JANUARY 16, 1974
JANUARY 24, 1970
DECEMBER 22, 1964
DECEMBER 21, 1961
FEBRUARY 16, 1959
FEBRUARY 19, 1958
FS = Flood Stage
WS = Warning Stage
BEND BRIDGE
VINA BRIDGE
ORD FERRY
COLUSA
WILKINS SLOUGH
KNIGHTS LANDING
FREMONT WEIR
VERONA
SACRAMENTO

FIGURE A-2

PERIOD OF RECORD OF OVERFLOW OF THE MOULTON WEIR



NOTE:

Data compiled from records of D.W.R. stream gaging station "Sacramento River at Moulton Weir"

Datum: 0=0' U.S.E.D.

Period of record: 1935 to present

Crest elevation = 76.75 feet

LEGEND

▬ Designates periods of flow over weir

* Designates season of no flow

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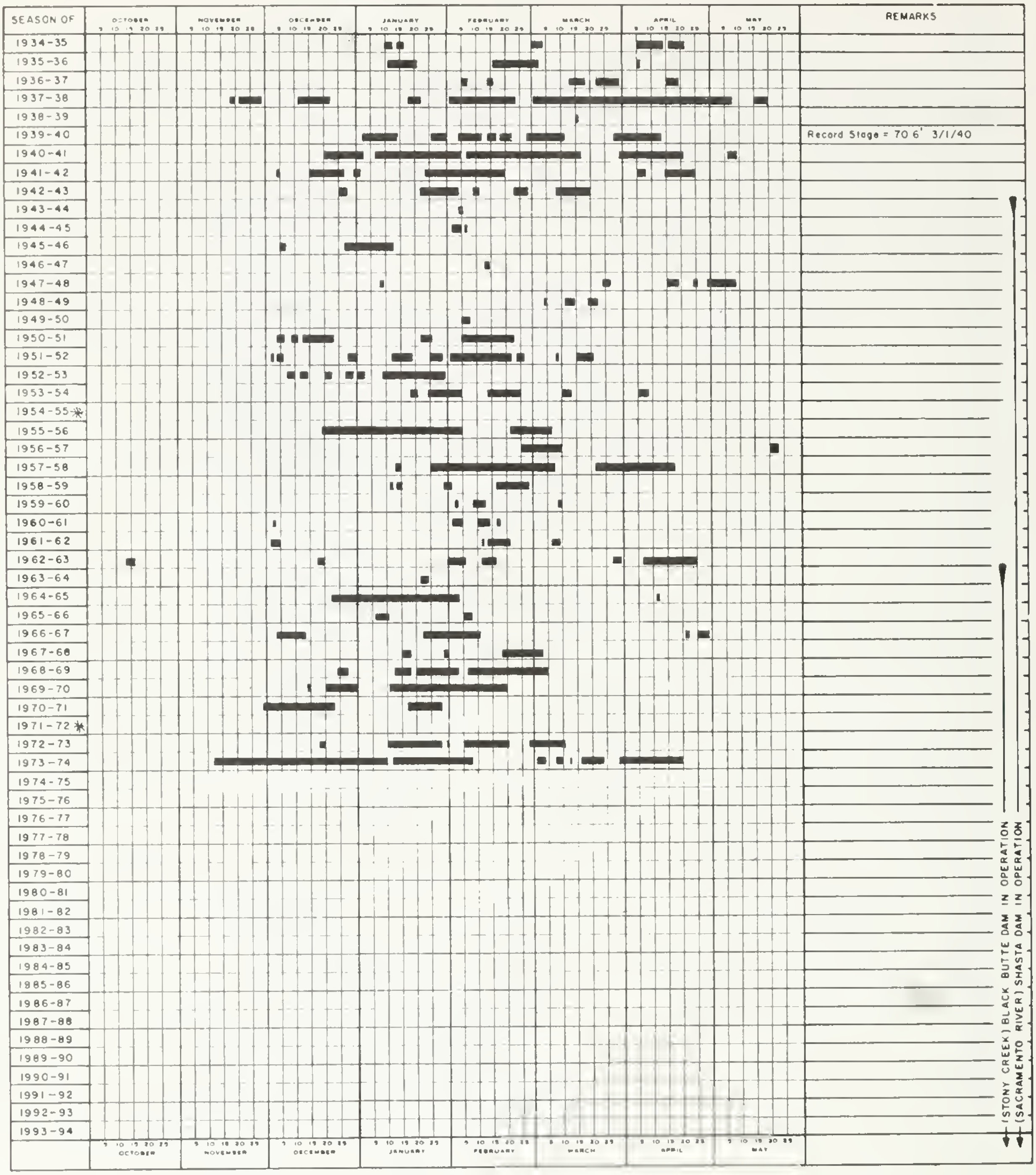
FIGURE A-3

PERIOD OF RECORD OF OVERFLOW OF THE COLUSA WEIR



NOTE:

Data compiled from records of D.W.R. stream gaging station "Sacramento River at Colusa Weir"

Datum: 0=0' U.S.E.D.

Period of record 1935 to present

Crest elevation = 61.80 feet

LEGEND

▬ Designates periods of flow over weir

* Designates season of no flow

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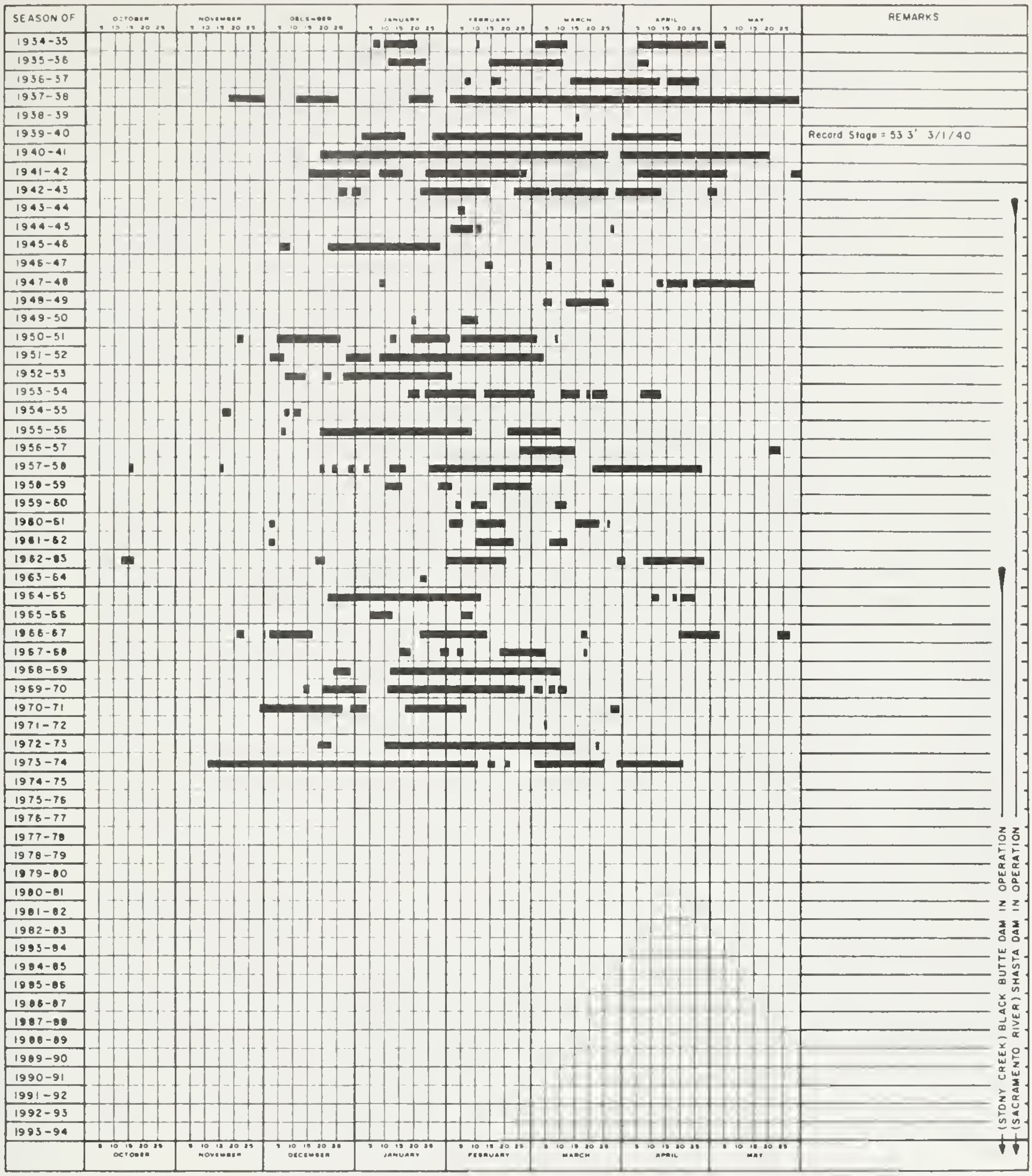
PERIOD OF RECORD OF OVERFLOW OF THE TISDALE WEIR



NOTE:

Data compiled from records of D.W.R. stream gaging station "Sacramento River at Tisdale Weir"

Datum: 0=0' U.S.E.D.

Period of record: 1935 to present

Crest elevation = 45.45 feet

LEGEND

▬ Designates periods of flow over weir

* Designates season of no flow

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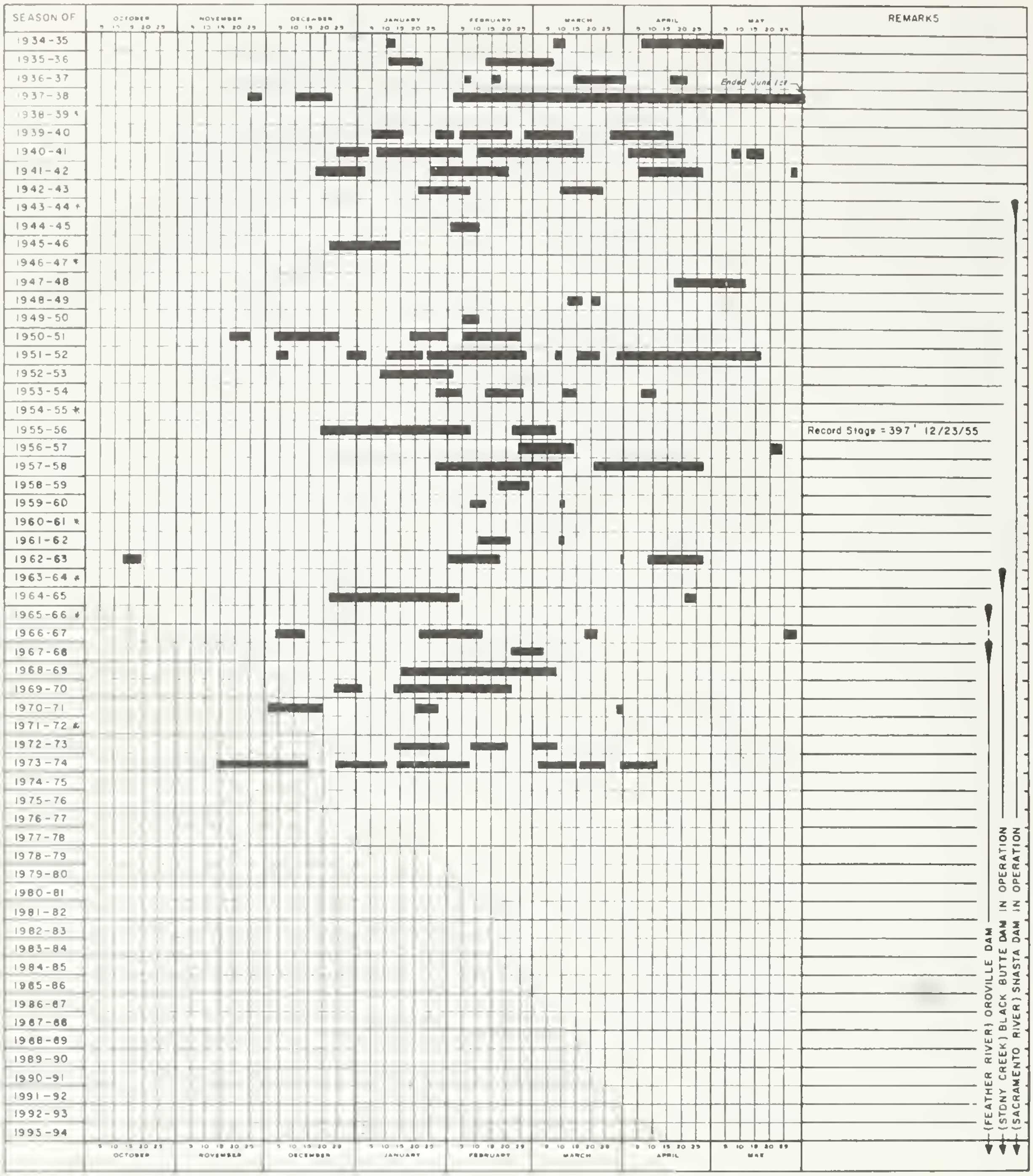
FIGURE A-5

PERIOD OF RECORD OF OVERFLOW OF THE FREMONT WEIR



NOTE:
Data compiled from records of D.W.R. stream gaging station "Sacramento River at Fremont Weir, West End"
Datum: 0 = 0' U.S.E.D.
Period of record: 1934 to present
Crest elevation = 33.50 feet

LEGEND
Designates periods of flow over weir
Designates season of no flow

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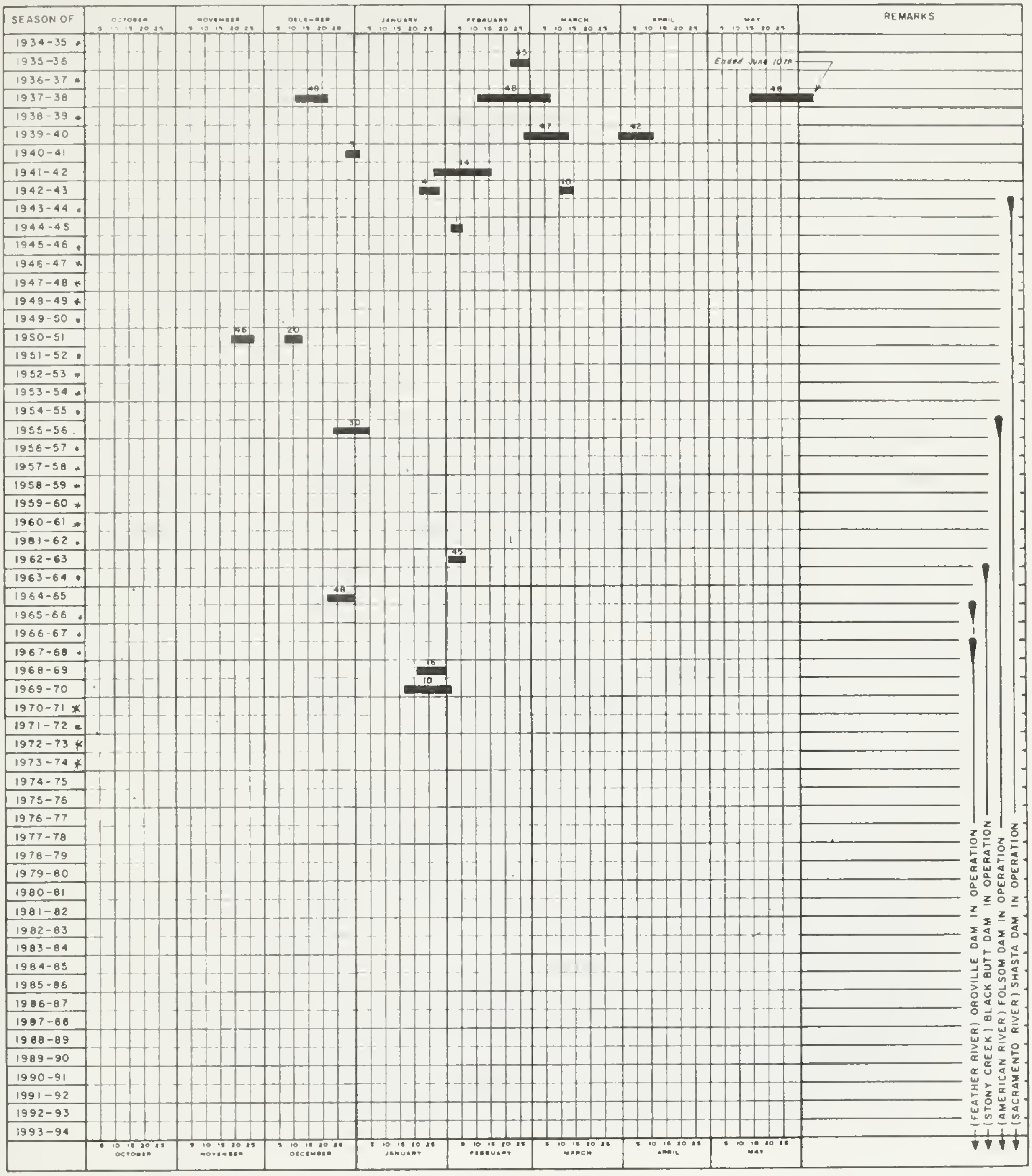
Revised 6/74

PERIOD OF RECORD OF OVERFLOW OF THE SACRAMENTO WEIR



NOTE:

Data compiled from records of D.W.R. stream gaging station "Sacramento Weir Spill to Yolo Bypass, near Sacramento

Datum: 0=0' U.S.E.D.

Period of record: 1926 to present

Crest elevation = 24.75 feet

Elevation of top of gates = 31.0 feet

LEGEND

5 — Designates periods of flow over weir and total number of gates opened

* — Designates season of no flow

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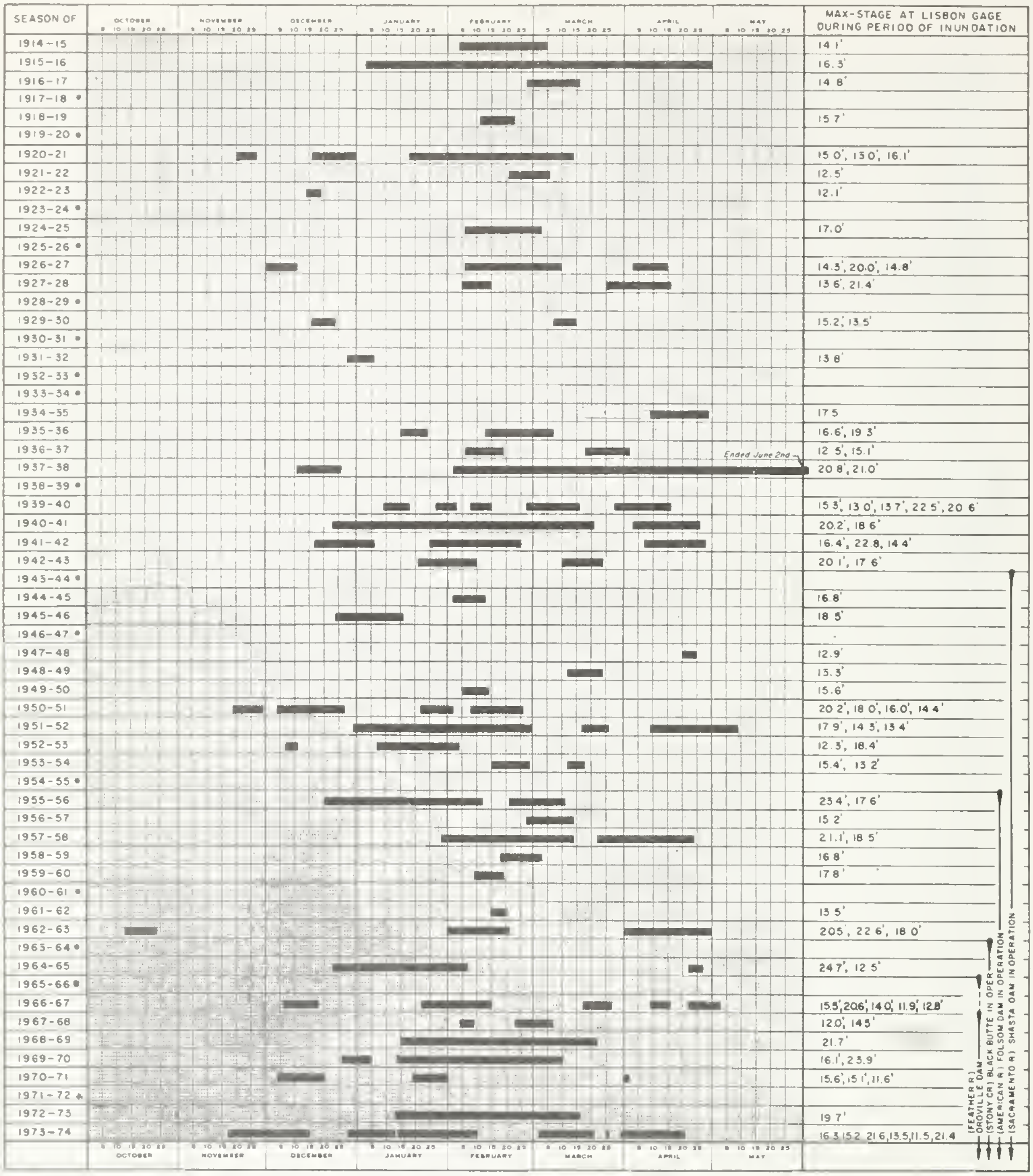
DEPARTMENT OF WATER RESOURCES

FIGURE A-7

PERIOD OF RECORD OF INUNDATION OF THE YOLO BYPASS



NOTE:

Data compiled from records of DWR stream gaging station "Yolo Bypass near Lisbon."

Datum: 0=U.S.E.D. Datum

Period of Record 1914 to Present

Assumed overflow of Bypass at stage above 11.5' on the Lisbon gage

LEGEND

▬ Designates period of inundation of Bypass.

• Designates season Bypass not inundated

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APPENDIX B

Peak Flows and Stages
at
Selected Streams and Stations in California

INTRODUCTION

Appendix B presents data for selected stations on representative streams of the major hydrographic areas of California (Figure 1). The data are obtained from USGS Surface Water Records, Department of Water Resources Bulletin No. 130, and U. S. Department of Commerce, NOAA, National Weather Service, Daily River Stage publications. Current water year data are preliminary and are subject to revision.

Stations are listed in a downstream direction along the main stream and tributaries. Stations on tributaries are listed between main stream stations in the order in which the tributaries enter the main stream.

LEGEND

USGS	United States Geological Survey
USBR	United States Bureau of Reclamation
NOAA	National Weather Service (National Oceanic and Atmospheric Admin.)
USCE	United States Corps of Engineers
DWR	Department of Water Resources
PG&E	Pacific Gas and Electric Company
A	From flood marks
B	Discharge over weir or spillway
C	Site or datum then in use
D	Discharge not determined, affected by backwater or'tide
E	Estimated
F	From DWR telemetering log
G	Preliminary
H	Includes flow through power plant
I	Due to failure of partially completed dam
J	Gage height revised
K	Flow through power plant not included
L	Discharge at latitude of gaging station site
M	Prior to construction of upstream dam
N	Includes flow through fish hatchery but not upstream diversion to Thermalito Afterbay
P	Observed
Q	Estimated peak inflow to partially completed Oroville Reservoir
R	Regulated stage and flow
S	Revised to current datum
T	Datum of gage is 0=0 USED
U	Crest stage partial recorder
N/A	Not available at report time
[*]	Peak of record established current year

STREAM AND STATION	DRAINAGE AREA IN SQ MILES	PERIOD OF RECORD	SOURCE OF RECORD	PREVIOUS MAXIMUM OF RECORD: DATE	PREVIOUS MAXIMUM OF RECORD: STAGE IN FEET	PREVIOUS MAXIMUM OF RECORD: DISCHARGE IN CFS	1973-1974 WATER YEAR: DATE	1973-1974 WATER YEAR: STAGE IN FEET	1973-1974 WATER YEAR: DISCHARGE IN CFS
NORTH COASTAL AREA									
SMITH RIVER BASIN									
SMITH RIVER NEAR CRESCENT CITY	609	1931-	USGS	12-22-64	48.5	228,000	1-15-74	31.69	88,800
KLAMATH RIVER BASIN									
SHASTA RIVER NEAR YREKA	793	1933-41 1944-	USGS	12-22-64 12-22-64	12.9 13.9(A)	21,500	1-16-74	10.10	7,260
SCOTT RIVER NEAR FORT JONES	653	1941-	USGS	12-22-64	25.3(AC)	54,600	1-16-74	23.67	36,000
KLAMATH RIVER NEAR SEIAD VALLEY	6980	1912-25 1951-	USGS	12-23-64	33.8(A)	165,000	1-16-74	28.10	113,000
SALMON RIVER AT SOMESBAR	751	1911-15 1927-	USGS	12-22-64	46.6(A)	133,000	1-16-74	26.73	63,600
KLAMATH RIVER AT ORLEANS	8475	1927-	USGS	12-22-64	76.5(AC)	307,000	1-16-74	37.24	278,000(E)
TRINITY RIVER ABOVE COFFEE CREEK NEAR TRINITY CENTER	149	1957-	USGS	12-22-64 12-22-64	12.3 13.4(A)	20,800 - -	1-16-74	12.97	26,600 •
TRINITY RIVER AT LEWISTON	728	1911-	USGS	12-22-55	27.3(AC)	71,600	1-18-74	10.41	14,200
NORTH FORK TRINITY RIVER AT HELENA	151	1911-13 1957-	USGS-DWR	12-22-64	27.9(A)	35,800	1-16-74	22.59	20,000
TRINITY RIVER NEAR BURNT RANCH	1439	1931-40 1956-	USGS	12-22-55	43.2(A)	172,000	1-16-74	27.72	67,600
HAYFORK CREEK NEAR HYAMPOM	378	1953-	USGS	12-22-64	19.1	28,800	1-16-74	20.23	34,200 •
WILLOW CREEK NEAR WILLOW CREEK	41	1959-	USGS	12-22-64	20.6(A)	17,000	4 -1-74	8.48	4,400
TRINITY RIVER AT HOOPA	2865	1911-14 1916-18 1931-	USGS	12-22-64	40.3(AC)	231,000	1-16-74	45.98	146,000
KLAMATH RIVER NEAR KLAMATH	12100	1910-26 1950-	USGS	12-23-64	55.3(A)	557,000	1-16-74	41.96	439,000
REDWOOD CREEK BASIN									
REDWOOD CREEK AT ORICK	278	1911-13 1953-	USGS	12-22-64	24.0(A)	50,500	4 -1-74	17.47	27,100
LITTLE RIVER BASIN									
LITTLE RIVER NEAR TRINIDAD	44	1955-	USGS	1-22-72 1-17-53	14.08 15.7(A)	9,720 - -	4 -1-74	11.49	7,530
MAD RIVER BASIN									
MAD RIVER NEAR FOREST GLEN	143	1953-	USGS	12-22-55	24.5(A)	39,200	1-16-74	13.91	15,500
MAD RIVER NEAR ARCATA	485	1910-13 1950-	USGS	12-22-55	29.8	77,800	1-16-74	20.18	41,300
EEL RIVER BASIN									
EEL RIVER BELOW SCOTT DAM NEAR POTTER VALLEY	290	1922-	USGS	12-22-64	24.2(A)	56,300	1-16-74	14.31	12,230
EEL RIVER AT VAN ARSDALE DAM NEAR POTTER VALLEY	349	1909-	USGS	12-22-64	33.9(A)	64,100	1-16-74	19.27	17,700
OUTLET CREEK NEAR LONGVALE	161	1956-	USGS	12-22-64	30.6(A)	77,900	1-16-74	20.20	34,890
BLACK BUTTE RIVER NEAR COVELO	162	1951-	USGS	12-22-64 12-11-37	26.4(A) 36.2(AC)	29,000 - -	1-16-74	22.42	20,000
NORTH FORK EEL RIVER NEAR MINA	248	1953-	USGS	12-22-64	33.6(A)	133,000	1-16-74	26.91	89,000

STREAM AND STATION	DRAINAGE AREA IN SQ MILES	PERIOD OF RECORD	SOURCE OF RECORD	PREVIOUS MAXIMUM OF RECORD DATE	PREVIOUS MAXIMUM OF RECORD STAGE IN FEET	PREVIOUS MAXIMUM OF RECORD DISCHARGE IN CFS	1973-1974 WATER YEAR DATE	1973-1974 WATER YEAR STAGE IN FEET	1973-1974 WATER YEAR DISCHARGE IN CFS
NORTH COASTAL AREA (CONTINUED)									
EEL RIVER BASIN (CONTINUED)									
EEL RIVER AT FORT SEWARD	2107	1955-	USGS	12-22-64	87.2(AC)	561,000	1-16-74	56.75	281,000
TENMILE CREEK NEAR LAYTONVILLE	50	1957-	USGS	12-22-55	22.9(A)	16,300	3-29-74	16.76	10,500
SOUTH FORK EEL RIVER NEAR MIRANDA	537	1939-	USGS	12-22-64	46.0(A)	199,000	1-16-74	34.52	122,000
BULL CREEK NEAR WEOTT	28	1960-	USGS	12-22-64	20.6(AC)	6,520	1-16-74	13.1(A)	4,500(E)
EEL RIVER AT SCOTIA	3113	1910-	USGS	12-23-64	72.0(A)	752,000	1-16-74	52.31	387,000
VAN DUZEN RIVER NEAR BRIDGEVILLE	222	1950-	USGS	12-22-64	24.0(A)	48,700	1-16-74	20.34	34,500
MATTOLE RIVER BASIN									
MATTOLE RIVER NEAR PETROLIA	240	1911-13 1915-	USGS	12-22-55	29.6(C)	90,400	1-16-74	23.89	62,100
NOYO RIVER BASIN									
NOYO RIVER NEAR FORT BRAGG	106	1951-	USGS	12-22-64	26.3	24,000	3-30-74	27.19	26,700*
NAVARRO RIVER BASIN									
NAVARRO RIVER NEAR NAVARRO	303	1950-	USGS	12-22-55	40.6(C)	64,500	1-16-74	39.13	61,000(E)
RUSSIAN RIVER BASIN									
RUSSIAN RIVER NEAR UKIAH	100	1911-13 1952-	USGS	12-21-55	21.0	18,900	1-16-74	22.78	14,700 *
EAST FORK RUSSIAN RIVER NEAR CALPELLA	92	1941-	USGS	12-22-64	20.2	18,700	1-16-74	21.04*	12,200
RUSSIAN RIVER NEAR HOPLAND	362	1939-	USGS	12-22-55 12- -37	27.0 30.0(A)	45,000 - -	1-16-74	25.50	50,600
RUSSIAN RIVER NEAR CLOVERDALE	503	1951-	USGS	12-22-64	31.6(C)	55,200	1-16-74	26.50	54,000
RUSSIAN RIVER NEAR HEALDSBURG	793	1939-	USGS	12-23-64 12- -37	27.0 30.8(A)	71,300 - -	1-16-74	24.60	64,500
DRY CREEK NEAR CLOVERDALE	88	1941-	USGS	12-22-64	18.1	18,100	1-16-74	16.71	15,700
DRY CREEK NEAR GEYSERVILLE	162	1959-	USGS	1-31-63	17.5	32,400	1-16-74	17.37	31,500
RUSSIAN RIVER NEAR GUERNEVILLE (SUMMERHOME)	1340	1939-	USGS	12-23-64 12-23-55	49.6(A) 49.7(A)	93,400 - -	1-17-74	44.11	73,300
SAN FRANCISCO BAY AREA									
WALKER CREEK BASIN									
WALKER CREEK NEAR TOMALES	37	1959-	USGS	1-16-73	22.[illegible]	6,600	4 -1-74	18.21	4,010
CORTE MADERA CREEK BASIN									
CORTE MADERA CREEK AT ROSS	18	1951-	USGS	12-22-55	17.5	3,620	3-30-74	13.06	2,060
NOVATO CREEK BASIN									
NOVATO CREEK NEAR NOVATO	18	1946-	USGS	1-14-70	11.0	2,000	4 -1-74	7.06	760

STREAM AND STATION	DRAINAGE AREA IN SQ MILES	PERIOD OF RECORD	SOURCE OF RECORD	PREVIOUS MAXIMUM OF RECORD			1973-1974 WATER YEAR		
				DATE	STAGE IN FEET	DISCHARGE IN CFS	DATE	STAGE IN FEET	DISCHARGE IN CFS
SAN FRANCISCO BAY AREA (CONTINUED)									
SONOMA CREEK BASIN									
SONOMA CREEK AT AGUA CALIENTE	58	1955-	USGS	12-22-55	17.1(C)	8,880	3-30-74	10.49	3,710
NAPA RIVER BASIN									
NAPA RIVER NEAR ST. HELENA	81	1929-32 1939-	USGS	12-22-55	16.2	12,600	3-30-74	11.65	6,680
NAPA RIVER NEAR NAPA	218	1929-32 1959-	USGS	1-31-63	27.6	16,900	3-30-74	18.19	9,650
REDWOOD CREEK NEAR NAPA	10	1958-73	USGS	1- 5-65	10.4	1,450	STATION DISCONTINUED		
PACHECO CREEK BASIN									
SAN RAMON CREEK AT SAN RAMON	6	1952-	USGS	10-13-62	17.0	1,600	11-30-73	4.71	360
SAN LORENZO CREEK BASIN									
SAN LORENZO CREEK AT HAYWARD	38	1939-40 1946-	USGS	10-13-62 12-22-55	19.7(A) 20.8(A)	7,460 - -	4 -1-74	14.16	3,500(R)
ALAMEDA CREEK BASIN									
ARROYO MOCHO NEAR PLEASANTON	141	1962-	USGS	2- 1-63 1-18-73	8.60(C) 12.4	1,760 1,700	12-27-73	11.07	920
ARROYO VALLE NEAR LIVERMORE	147	1912-30 1957-	USGS	12-23-55	13.9(A)	18,200	4-10-74	3.76	270
ARROYO VALLE AT PLEASANTON	171	1957-	USGS	4- 3-58	25.4	11,300	4 -9-74	9.24	260
ALAMEDA CREEK NEAR NILES	633	1891-	USGS	12-23-55	14.9	29,000	4 -1-74	8.59	6,660(R)
PATTERSON CREEK AT UNION CITY	--	1958-	USGS	2- 1-63	20.4(A)	10,500	11 -6-73	14.35	5,360
ALAMEDA CREEK AT UNION CITY	653	1958-73	USGS	2- 1-63	19.3(A)	1,770	STATION DISCONTINUED		
COYOTE CREEK BASIN									
COYOTE CREEK NEAR MADRONE	196	1902-12 1916-	USGS	3- 7-11	- -	25,000	4 -2-74	4.71	990
UPPER PENITENCIA CREEK AT SAN JOSE	22	1961-	USGS	1-21-67	6.2	15,000	4 -1-74	5.32	650(E)
GUADALUPE RIVER BASIN									
GUADALUPE RIVER AT SAN JOSE	144	1929-	USGS	4- 2-58	16.6	9,150	11-30-73	6.73	3,200(R)
SARATOGA CREEK AT SARATOGA	9	1933-	USGS	12-22-55	6.4(C)	2,730	3 -1-74	4.58	380
MATADERO CREEK BASIN									
MATADERO CREEK AT PALO ALTO	7	1952-	USGS	2-27-73	5.5	1,100	1 -3-74	3.97	570
SAN FRANCISQUITO CREEK BASIN									
SAN FRANCISQUITO CREEK AT STANFORD UNIVERSITY	38	1930-41 1950-	USGS	12-22-55	13.6	5,560	4 -1-74	7.65	3,400

STREAM AND STATION	DRAINAGE AREA IN SQ MILES	PERIOD OF RECORD	SOURCE OF RECORD	PREVIOUS MAXIMUM OF RECORD			1973-1974 WATER YEAR		
				DATE	STAGE IN FEET	DISCHARGE IN CFS	DATE	STAGE IN FEET	DISCHARGE IN CFS
CENTRAL COASTAL AREA									
REDWOOD CREEK BASIN									
REDWOOD CREEK AT REDWOOD CITY	2	1959-	USGS	1-31-63	9.4	644	12 -1-73	6.22	310
PESCADERO CREEK BASIN									
PESCADERO CREEK NEAR PESCADERO	46	1951-	USGS	12-23-55	21.3	9,420	4 -1-74	9.68	2,390
SAN LORENZO RIVER BASIN									
SAN LORENZO RIVER AT BIG TREES	111	1936-	USGS	12-23-55	22.6	30,400	3-28-74	11.80	4,220
SOQUEL CREEK BASIN									
SOQUEL CREEK AT SOQUEL	40	1951-	USGS	12-23-55	22.3	15,800	1-17-74	8.31	1,840
PAJARO RIVER BASIN									
BODFISH CREEK NEAR GILROY	7	1959-	USGS	1-31-63	8.3	1,240	3 -1-74	6.6	520
TRES PINOS CREEK NEAR TRES PINOS	206	1939-	USGS	4- 4-41	7.8	8,060	1 -7-74	7.20	1,710
SAN BENITO RIVER NEAR HOLLISTER	586	1949-	USGS	4- 3-58	16.3	11,600	1 -7-74	9.69	2,490
PAJARO RIVER AT CHITTENDEN	1186	1939-	USGS	12-24-55 4- 3-58	32.5 33.1	24,000	3 -3-74	13.07	6,480
CORRALITOS CREEK AT FREEDOM	28	1956-	USGS	12-22-55	15.6(A)	3,620	3 -1-74	8.03	1,310
SALINAS RIVER BASIN									
SALINAS RIVER NEAR POZO	70	1942-	USGS	1-25-69 1-25-69	13.9(C) 15.5(A)	18,600	1 -7-74	11.95	280
SALINAS RIVER ABOVE PILITAS CREEK NEAR SANTA MARGARITA	114	1942-	USGS	1-25-69	14.9	16,600	3 -3-74	2.56	540
JACK CREEK NEAR TEMPLETON	25	1949-	USGS	2-24-69	11.3	8,160	3 -2-74	6.75	1,700
ESTRELLA RIVER NEAR ESTRELLA	922	1954-	USGS	2-24-69	10.4(A)	32,500	1 -8-74	3.32	
NACIMIENTO RIVER BELOW SAPQUE CREEK NEAR BRYSON	156	1971-	USGS	1-16-73	23.0	24,000	3 -1-74	20.58	17,140
SALINAS RIVER NEAR BRADLEY	2535	1948-	USGS	2-24-69	20.3(A)	117,000	1 -7-74	9.77	9,610
ARROYO SECO NEAR SOLEDAD	244	1901-	USGS	4- 3-58	16.4	28,300	3 -1-74	9.45	6,100
SALINAS RIVER NEAR SPRECKELS	4156	1900-01 1929-	USGS	2-26-69 1-16-52	26.5(C) 26.9(AC)	83,100 - -	1 -9-74	12.70	8,730
CARMEL RIVER BASIN									
CARMEL RIVER AT ROBLES DEL RIO	193	1957-	USGS	4- 2-58 12-23-55	10.5 11.7(A)	7,100 6,930	3 -2-74	8.14	2,130
BIG SUR RIVER BASIN									
BIG SUR RIVER NEAR BIG SUR	47	1950-	USGS	4- 2-58	11.6	5,680	3 -2-74	7.56	2,150

STREAM AND STATION	DRAINAGE AREA IN SQ MILES	PERIOD OF RECORD	SOURCE OF RECORD	PREVIOUS MAXIMUM OF RECORD: DATE	STAGE IN FEET	DISCHARGE IN CFS	1973-1974 WATER YEAR: DATE	STAGE IN FEET	DISCHARGE IN CFS
CENTRAL COASTAL AREA (CONTINUED)									
ARRUYO DE LA CRUZ BASIN									
ARROYO DE LA CRUZ NEAR SAN SIMEON	41	1950-	USGS	12- 6-66	15.3	35,200	3 -1-74	7.95	4,570
SANTA ROSA CREEK BASIN									
SANTA ROSA CREEK NEAR CAMBRIA	13	1957-	USGS	1-25-69 12- -55	12.0 15.2(A)	3,350 - -	STATION DISCONTINUED		
SANTA MARIA RIVER BASIN									
SISQUOC RIVER NEAR GAREY	471	1940-	USGS	1-25-69	13.0	24,500	1 -7-74	5.96	960
SANTA MARIA RIVER AT GUADALUPE	1741	1940-	USGS	1-16-52	8.2(C)	32,800	1 -7-74	5.75	130(R)
SANTA YNEZ RIVER BASIN									
SANTA YNEZ RIVER BELOW GIBRALTAR DAM NEAR SANTA BARBARA	216	1920-	USGS	1-25-69	25.8	54,200	1 -9-74	11.49	2,100
SANTA CRUZ CREEK NEAR SANTA YNEZ	74	1941-	USGS	2-24-69	14.5(A)	7,050	1 -7-74	9.44	900
SAN JOSE CREEK BASIN									
SAN JOSE CREEK NEAR GOLETA	6	1941-	USGS	1-25-69 1-21-43	10.1 12.7	2,000 - -	1 -7-74	6.88	680
ATASCADERO CREEK BASIN									
ATASCADERO CREEK NEAR GOLETA	19	1941-	USGS	1-25-69	13.0	5,230	1 -7-74	8.95	1,300
CARPINTERIA CREEK BASIN									
CARPINTERIA CREEK NEAR CARPINTERIA	13	1941-	USGS	12-27-71	14.1(A)	8,880	1 -7-74	3.52	560
SOUTH COASTAL AREA									
VENTURA CREEK BASIN									
MATILIJA CREEK AT MATILIJA HOT SPRINGS	55	1927-	USGS	1-25-69	16.5	20,000	1 -9-74	4.26	460
VENTURA RIVER NEAR MEINERS OAKS	76	1959-	USGS	1-25-69	- -	28,000(E)	11-17-73	3.69	160(E)
COYOTE CREEK NEAR OAK VIEW	13	1958-	USGS	1-25-69	12.0	8,000	1 -7-74	7.28	790
VENTURA RIVER NEAR VENTURA	188	1911-14 1929-	USGS	1-25-69	24.3(A)	58,000	1 -7-74	8.59	2,640
SANTA CLARA RIVER BASIN									
SAN CLARA RIVER AT LOS ANGELES-VENTURA CO. LINE	644	1952-	USGS	1-25-69	19.0	68,800	1 -7-74	6.16	8,400(E)
PIRU CREEK ABOVE LAKE PIRU	372	1955-	USGS	2-25-69	18.6(A)	31,200	1 -7-74	4.15	2,250
SESPE CREEK NEAR FILLMORE	251	1911-13 1927-	USGS	1-25-69 2-25-69	20.8 25.0(A)	60,000 - -	1 -7-74	15.62	6,860
SANTA PAULA CREEK NEAR SANTA PAULA	40	1927-	USGS	2-25-69	15.2(A)	21,000	1 -6-74	8.09	570
MALIBU CREEK BASIN									
MALIBU CREEK AT CRATER CAMP NEAR CALABASAS	105	1931-	USGS	1-25-69	21.4	33,800	1 -7-74	10.10	5,160
BALLONA CREEK BASIN									
BALLONA CREEK NEAR CULVER CITY	90	1928-	USGS	11-21-67	14.9	32,500	1 -6-74	8.65	1,160

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SOUTH COASTAL AREA (CONTINUED)									
LOS ANGELES RIVER BASIN									
LOS ANGELES RIVER AT SEPULVEDA DAM	158	1929-	USGS	1-25-69	11.4	13,800	1 -7-74	9.06	9,890
LOS ANGELES RIVER AT LOS ANGELES	514	1929-	USGS	3- 2-38	- -	67,000	1 -7-74	8.39	24,540
RIO HONDO NEAR DOWNEY	143	1928-	USGS	1-25-69	15.2	46,900	1 -7-74	7.01	11,710
SANTA ANA RIVER BASIN									
SANTA ANA RIVER NEAR MENTONE	209	1896-	USGS	3- 2-38	14.3(C)	52,300	1 -7-74	3.18	280
SAN GABRIEL RIVER BELOW SANTA FE DAM NEAR BALDWIN PARK	236	1942-	USGS	1-26-69	22.2	30,900	1 -9-74	10.65	100
SANTA ANA RIVER AT 'E' ST NEAR SAN BERNARDINO	532	1939-54 1966-	USGS	2-25-69	16.5	28,000	1 -7-74	4.33	4,020(E)
MILL CREEK NEAR YUCAIPA	42	1919-38 1947-	USGS	1-25-69	16.8(A)	35,400	3 -2-74	8.64	110
LYTLE CREEK NEAR FONTANA	46	1918-	USGS	1-25-69	15.0(A)	35,900	1 -7-74	5.48	320
CAJON CREEK BELOW LONE PINE CREEK	56	1971-	USGS	12-25-71	10.6	900	1 -7-74	11.38	650
SANTA ANA RIVER AT M.W.D. CROSSING	854	1970-	SGS	12-29-70	10.9	5,300	1 -4-74	10.30	3,300(E)
SAN JACINTO RIVER NEAR SAN JACINTO	141	1920-	USGS	2-16-27	- -	45,000	4 -2-74	10.72	290
SANTIAGO CREEK AT MODJESKA	13	1961-	USGS	2-25-69	6.2	6,520	1 -8-74	5.92	540
SANTIAGO CREEK AT SANTA ANA	95	1928-	USGS	2-25-69 1-16-52	9.1(C) 9.8	6,600 - -	1 -7-74	5.84	900
SAN JUAN CREEK BASIN									
SAN JUAN CREEK NEAR SAN JUAN CAPISTRANO	106	1928-	USGS	2-25-69	5.6(AC)	22,400	1 -8-74	3.29	200
SANTA MARGARITA RIVER BASIN									
SANTA MARGARITA RIVER NEAR TEMECULA	588	1923-	USGS	2-16-27	14.6(C)	25,000	1 -8-74	6.22	1,660
SANTA MARGARITA RIVER AT YSIDORA	739	1923-	USGS	2-16-27	18.0(C)	33,600	1 -8-74	11.98	1,240
SAN LUIS REY RIVER BASIN									
SAN LUIS REY RIVER AT MONSERATE NARROWS NR PALA	373	1935-41 1946-	USGS	2- 7-37	8.7(C)	- -	1 -8-74	4.18	20
SAN LUIS REY RIVER NEAR BONSALL	512	1916-18 1929-	USGS	3- 3-38	16.0	18,100	1 -8-74	9.71	1,200
SAN DIEGUITO RIVER BASIN									
SANTA YSABEL CREEK NEAR RAMONA	112	1912-23 1943-	USGS	1-27-16	14.0(C)	28,400	1 -8-74	3.88	260
SANTA YSABEL CREEK NEAR SAN PASQUAL	128	1905-12 1947-	USGS	3-24-06	6.3(C)	8,000	1 -8-74	3.65	300(R)
SAN DIEGO RIVER BASIN									
SAN DIEGO RIVER NEAR SANTEE	377	1912-	USGS	1-27-16	25.1(C)	70,200	1 -8-74	5.92	780
SWEETWATER RIVER BASIN									
SWEETWATER RIVER NEAR DESCANSO	46	1905-27 1956-	USGS	2-16-27	13.2(AC)	11,200	1 -8-74	4.08	40
TIJUANA RIVER BASIN									
TIJUANA RIVER NEAR DULZURA	481	1936-	USGS	2- 7-37	8.5	4,700	1 -8-74	3.10	10

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CENTRAL VALLEY AREA

SACRAMENTO RIVER BASIN

STREAM AND STATION	DRAINAGE AREA IN SQ MILES	PERIOD OF RECORD	SOURCE OF RECORD	DATE	STAGE IN FEET	DISCHARGE IN CFS	DATE	STAGE IN FEET	DISCHARGE IN CFS
SACRAMENTO RIVER AT DELTA	425	1944-	USGS	12-22-64	20.1	38,800	1-16-74	27.23	68,000 *
PIT RIVER NEAR BIEBER	2475	1904-31 1951-	USGS	3-19-07	16.7	33,800	1-20-74	10.24	9,980
PIT RIVER BELOW PIT NO.4 DAM	4647	1922-	USGS	1-25-70	18.1	32,500(E)	1-19-74	13.16	14,500
MCCLOUD RIVER ABOVE SHASTA LAKE	604	1945-	USGS	12-22-55	28.2	45,200	1-16-74	28.34	47,000(E*)
SACRAMENTO RIVER AT KESWICK	6468	1938-	USGS-DWR	2-23-40	47.2(C)	186,000	4 -1-74	31.92	81,400
CLEAR CREEK AT FRENCH GULCH	115	1950-	USGS	12-22-64	13.7	7,600	1-16-74	15.05	14,600 *
CLEAR CREEK NEAR IGO	228	1940-	USGS	12-21-55	13.8	24,500	1-16-74	8.30	6,700
COW CREEK NEAR MILLVILLE	425	1949-	USGS	12-27-51	21.6	45,200	1-15-74	17.80	40,000(E)
COTTONWOOD CREEK NEAR COTTONWOOD	922	1940-	USGS	12-22-64	19.6	60,000	1-16-74	20.30	72,000 *
BATTLE CREEK BELOW COLEMAN FISH HATCHERY NEAR COTTONWOOD	358	1961-	USGS	12-11-37	15.8(AC)	35,000	1-16-74	11.62	15,000
SACRAMENTO RIVER AT BEND BRIDGE	--	1960-	DWR	1-24-70	48.3	158,000	1-16-74	43.6	127,400
PAYNES CREEK NEAR RED BLUFF	93	1949-	USGS	12- 1-61	11.3	10,600	1-16-74	9.58	6,620(U)
RED BANK CREEK NEAR RED BLUFF	94	1948-	DWR	1- 5-65	10.1	9,730	1-16-74	9.52	6,600
ANTELOPE CREEK NEAR RED BLUFF	123	1940-	USGS	1-23-70	18.0	17,200	N/A	14.79	8,640
ELDER CREEK NEAR PASKENTA	93	1948-	USGS	2-24-58	13.9(C)	11,700	1-16-74	11.14	8,700
MILL CREEK NEAR LOS MOLINOS	131	1909-13 1928-	USGS	12-11-37	23.4(A)	36,400	1-16-74	12.04	10,200
THOMES CREEK AT PASKENTA	194	1920-	USGS-DWR	12-22-64	15.3	37,800	1-16-74	13.75	30,000
DEER CREEK NEAR VINA	208	1911-15 1920-	USGS-DWR	12-10-37	19.2(A)	23,800	1-16-74	12.55(A)	10,400
SACRAMENTO RIVER AT VINA BRIDGE	--	1945-	DWR	1-24-70 1-24-70	191.5(T) - -	171,000 228,000(L)	1-16-74	190.36	159,200
SACRAMENTO RIVER AT HAMILTON CITY (BEFORE SHASTA DAM)	--	1927-43	DWR	12-11-37	150.7(CT	350,000(EL			
SACRAMENTO RIVER AT HAMILTON CITY (AFTER SHASTA DAM)	--	1944-	DWR	1-24-70	150.8(T)	156,000	1-17-74	149.88	161,900
BIG CHICO CREEK NEAR CHICO	72	1930-	USGS	1- 5-65	15.4	9,580	3-29-74	13.02	7,120
STONY CREEK NEAR FRUTO	598	1901-12 1960-	USGS	12-23-64	15.9	40,200	1-16-74	14.54	36,500
STONY CREEK NEAR HAMILTON CITY	777	1940-	USGS	2-25-58	18.3	39,900	1-17-74	13.00	13,000
SACRAMENTO RIVER AT ORD FERRY (BEFORE SHASTA DAM)	--	1921-43	DWR	2-28-40	121.7(T)	370,000(EL			
SACRAMENTO RIVER AT ORD FERRY (AFTER SHASTA DAM)	--	1944-	DWR	1-24-70	119.8(T)	265,000(EL	1-17-74	118.43	121,600(E)
SACRAMENTO RIVER AT BUTTE CITY (BEFORE SHASTA DAM)	--	1921-43	USGS-DWR	2- 7-42	96.9	170,000			

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CENTRAL VALLEY AREA (CONTINUED)									
SACRAMENTO RIVER BASIN (CONTINUED)									
SACRAMENTO RIVER AT BUTTE CITY (AFTER SHASTA DAM)	--	1944-	USGS-DWR	2-20-58 1-24-70	96.7 - -	160,000 225,000(L)	1-18-74	94.56	136,000
MOULTON WEIR SPILL TO BUTTE BASIN	--	1935-	DWR	1-25-70 2- 7-42	83.6 83.8	36,400(B) - -	1-18-74	82.54	26,800
COLUSA WEIR SPILL TO BUTTE BASIN	--	1935-	DWR	3- 1-40	70.6	86,000(B)	1-18-74	68.58	60,600
SACRAMENTO RIVER AT COLUSA	12110	1940-	USGS-DWR	2- 8-42	69.2	49,000	1-18-74	67.68	49,300 •
COLUSA BASIN DRAIN AT HIGHWAY 20	--	1924-	DWR	2-21-58	51.9	25,400(E)	1-19-74	47.02	2,150
BUTTE CREEK NEAR CHICO	147	1930-	USGS	12-22-64	14.1	21,200	3-30-74	11.76	12,600
BUTTE SLOUGH NEAR MERIDIAN	--	1968-	DWR	1-26-70	61.5(E)	152,000(E)	1-19-74	60.12	113,200
TISDALE WEIR SPILL TO SUTTER BYPASS	--	1940-	DWR	3- 1-40	53.3	25,700(B)	1-19-74	50.38	18,700
SACRAMENTO RIVER BELOW WILKINS SLOUGH	12926	1938-	USGS	1-26-70 3- 1-40	50.7 52.8	29,300 - -	1-19-74	50.08	29,400 •
SACRAMENTO RIVER AT KNIGHTS LANDING	14541	1921-39 1940-	USGS-DWR	1-26-70 2- 8-42	40.9 41.8(D)	30,800 - -	1-20-74	39.93	29,600
MIDDLE FORK FEATHER RIVER NEAR CLIO	686	1925-	USGS	2- 1-63	16.2	14,500	4 -1-74	11.27	4,070
MIDDLE FORK FEATHER RIVER NEAR MERRIMAC	1062	1951-	USGS	12-22-64	26.5(A)	86,200	3-30-74	17.19(A)	27,000(E)
NORTH FORK FEATHER RIVER NEAR PRATTVILLE	493	1905-	USGS	3-19-07	16.2(C)	10,000	2 -1-74	5.87	1,470(R)
BUTT CREEK BELOW ALMADOR-BUTT CREEK TUNNEL NEAR PRATTVILLE	69	1936-59 1964-	USGS	12-23-64	5.9	3,830	5 -1-74	2.10	520(R)
INDIAN CREEK NEAR CRESCENT MILLS	739	1906-18 1930-	USGS	3-19-07	20.2(C)	25,000	3-30-74	13.46	11,800
SPANISH CREEK ABOVE BLACKHAWK CREEK AT KEDDIE	184	1933-	USGS	12-22-64	13.5	15,400	3-30-74	11.37	11,000
NORTH FORK FEATHER RIVER AT PULGA	1953	1910-	USGS	12-22-64	35.8	73,000(H)	3-30-74	27.81	42,700
WEST BRANCH FEATHER RIVER NEAR PARADISE	110	1957-	USGS-DWR	12-22-64	26.2(A)	26,300	3-30-74	18.17	13,000
FEATHER RIVER AT OROVILLE (BEFORE OROVILLE DAM)	3624	1894-67	USGS-DWR NOAA	3-19-07 12-22-64	28.2 - -	230,000(CP 252,000(Q)			
FEATHER RIVER AT OROVILLE (AFTER OROVILLE DAM)	3624	1967-	USGS-DWR	1-25-70	15.3	56,300(N)	4 -4-74	11.75	37,800(N)
THERMALITO AFTERBAY RELEASE TO FEATHER RIVER NEAR OROVILLE	--	1967-	USGS-DWR	1-28-70	23.3	21,600	4 -5-74	9.13(J)	18,950
FEATHER RIVER NEAR GRIDLEY (BEFORE OROVILLE DAM)	3676	1929-67	USGS-DWR	12-23-55	102.2(T)	- -			
FEATHER RIVER NEAR GRIDLEY (AFTER OROVILLE DAM)	3676	1967-	USGS-DWR	1-27-70	92.8(T)	72,900	4-14-74	89.96	55,300
SOUTH HONCUT CREEK NEAR BANGOR	31	1950-	USGS	12-26-64	19.3	17,600	3-30-74	7.77	2,010

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CENTRAL VALLEY AREA (CONTINUED)									
SACRAMENTO RIVER BASIN (CONTINUED)									
FEATHER RIVER AT YUBA CITY	3974	1943-	USGS-DWR	12-23-64 12-24-55	76.4 82.4	172,000 - -	4 -2-74	63.40	- -(D)
NORTH YUBA RIVER BELOW GOODYEARS BAR	250	1930-	USGS	2- 1-63	23.8(A)	40,000	11-12-73	13.51	12,000
NORTH YUBA RIVER BELOW NEW BULLARDS BAR DAM	490	1940-	USGS	1-22-70 12-22-64	35.3 40.5(E)	56,200 91,600(M)	4 -1-74	24.45	25,600
SOUTH YUBA RIVER NEAR CISCO	52	1942-	USGS	1-31-63	20.6(A)	18,400	11-12-73	11.07	5,280
SOUTH YUBA RIVER AT JONES BAR NEAR GRASS VALLEY	308	1940-48 1959-	USGS	12-22-64	25.0(A)	53,600	3-30-74	12.67	8,240
YUBA RIVER BELOW ENGLEBRIGHT DAM	1108	1941-	USGS	12-22-64	564.1(C)	171,000(K)	4 -1-74	21.68	35,100
DEER CREEK NEAR SMARTVILLE	85	1935-	USGS	10-13-62	13.8	11,600	3 -2-74	10.11	5,820
YUBA RIVER NEAR MARYSVILLE	1339	1940-	USGS	12-22-64	90.2	180,000	3 -2-74	72.20	27,900
BEAR RIVER NEAR WHEATLAND	292	1928-	USGS	12-22-55 11-21-50	19.3(C) 20.8(C)	33,000 - -	3 -2-74	15.18	13,600
FEATHER RIVER AT NICOLAUS	5920	1943-	USGS-DWR	12-23-55	51.6	357,000	4 -2-74	45.26	111,000
FREMONT WEIR (WEST END) SPILL TO YOLO BYPASS	--	1934-	DWR	12-23-55	39.7	294,000(B)	1-20-74	38.10	159,600
SACRAMENTO RIVER AT VERONA	21257	1929-	USGS-DWR	3- 1-40	41.2	79,200	1-20-74	37.90	74,900
SACRAMENTO WEIR SPILL TO YOLO BYPASS NEAR SACRAMENTO	--	1926-	USGS-DWR	3-26-28 12-23-55	32.8 33.0	118,000(BE - -			NO FLOW
NORTH FORK AMERICAN RIVER AT NORTH FORK DAM	342	1941-	USGS	12-23-64	11.9	65,400	11-12-73	6.07	16,200
RUBICON RIVER NEAR FORESTHILL	315	1958-	USGS	12-23-64	55.4(AI)	- -	1-17-74	11.44	5,200
MIDDLE FORK AMERICAN RIVER NEAR FORESTHILL	524	1958-	USGS	12-23-64	69.0(AI)	310,000(I)	1-17-74	14.10	16,500
MIDDLE FORK AMERICAN RIVER NEAR AUBURN	614	1911-	USGS	12-23-64	60.4(AI)	253,000(I)	1-17-74	18.50	17,300
SOUTH FORK AMERICAN RIVER NEAR CAMINO	493	1922-	USGS	12-23-55	32.6(A)	49,800	12-30-73	11.82	2,480(R)
SOUTH FORK AMERICAN RIVER NEAR LOTUS	673	1951-	USGS	12-23-55	21.4	71,800	3 -1-74	11.64	14,000(R)
AMERICAN RIVER AT FAIR OAKS (BEFORE FOLSOM DAM)	1888	1904-55	USGS	11-21-50	31.9(C)	180,000			
AMERICAN RIVER AT FAIR OAKS (AFTER FOLSOM DAM)	1888	1955-	USGS	12-23-64	21.6	115,000	1-17-74	14.46	27,600
SACRAMENTO RIVER AT SACRAMENTO	23530	1879-	USGS-DWR NOAA	11-21-50	30.1(C)	104,000	1-21-74	27.18	95,000
SACRAMENTO RIVER AT WALNUT GROVE	--	1929-	DWR	12-25-64	12.2	- -	1-20-74	11.49	- -(D)
ADOBE CREEK NEAR KELSEYVILLE	6	1954-	USGS	12-22-64	9.1	1,500	1-16-74	8.92	1,550 *
KELSEY CREEK NEAR KELSEYVILLE	37	1946-	USGS	12-21-55	12.8	6,800	1-16-74	13.04*	8,400
CACHE CREEK NEAR LOWER LAKE	528	1944-	USGS	2-24-58	9.4	8,000	1-17-74	8.11	5,320

STREAM AND STATION	DRAINAGE AREA IN SQ MILES	PERIOD OF RECORD	SOURCE OF RECORD	PREVIOUS MAXIMUM OF RECORD: DATE	PREVIOUS MAXIMUM OF RECORD: STAGE IN FEET	PREVIOUS MAXIMUM OF RECORD: DISCHARGE IN CFS	1973-1974 WATER YEAR: DATE	1973-1974 WATER YEAR: STAGE IN FEET	1973-1974 WATER YEAR: DISCHARGE IN CFS
CENTRAL VALLEY AREA (CONTINUED)									
SACRAMENTO RIVER BASIN (CONTINUED)									
NORTH FORK CACHE CREEK NEAR LOWER LAKE	197	1930-	USGS	12-11-37	14.0(A)	20,300	1-16-74	10.79	13,890
CACHE CREEK ABOVE RUMSEY	955	1960-	USGS-DWR	1- 5-65	21.4(A)	59,000		NO	RECORD
CACHE CREEK NEAR CAPAY	1044	1942-	USGS	2-24-58	20.9	51,600	1-16-74	16.80	28,300
CACHE CREEK AT YOLO	1139	1903-	USGS	2-25-58 3-10-04	85.4 88.4(P)	41,400 - -	1-17-74	76.53	25,100
YOLO BYPASS NEAR WOODLAND	--	1939-	USGS-DWR	2- 8-42	32.0	272,000	1-20-74	29.32	159,000
PUTAH CREEK NEAR WINTERS	574	1930-	USGS-DWR	2-27-40	30.5	81,000	3-30-74	15.48	7,700
YOLO BYPASS NEAR LISBON	--	1914-	DWR	12-25-64	24.7	350,000(E)	1-20-74	21.6	- -(D)
SACRAMENTO RIVER AT RIO VISTA	--	1906-	DWR	12-26-55	10.2	- -(D)	1 -8-74	8.51	- -(D)
SAN JOAQUIN RIVER BASIN									
WILLOW CREEK AT MOUTH NEAR AUBERRY	130	1952-	USGS	12-23-55	28.5(A)	15,700	4 -1-74	13.15	3,160
SAN JOAQUIN RIVER BELOW KERCHOFF POWERHOUSE NEAR PRATHER	1481	1942-	USGS-	12-23-55	51.0(A)	92,200	4 -2-74	25.6	15,900(K)
SAN JOAQUIN RIVER BELOW FRIANT	1676	1907-	USGS	12-11-37 6- 6-69	23.8(CM) 11.7	77,200(M) 12,400	1-22-74	4.66	1,380(K)
SAN JOAQUIN RIVER NEAR MENDOTA	4310	1939-	USBR-DWR	6- 1-52 6-20-41	- - 13.8(C)	8,840 11,740(M)	3 -7-74	3.46	330
FRESNO RIVER NEAR KNOWLES	133	1911-13 1915-	USGS	12-23-55	11.5	13,300	4 -2-74	6.11	3,190
FRESNO RIVER NEAR DAULTON	258	1941-	USGS	12-23-55	12.6	17,500	4 -2-74	14.61	8,620
CHOWCHILLA RIVER BELOW RAYNOR CREEK NEAR RAYMOND	254	1972-	USGS	2-11-73	9.9	11,100	4 -2-74	9.84	10,600
EASTSIDE BYPASS NEAR EL NIDO	--	1964-	DWR	2-25-69	17.6	21,700	4 -3-74	14.24	3,250
SAN JOAQUIN RIVER AT FREMONT FORD BRIDGE	7615	1937-	DWR	2-26-69	68.1	9,180	4 -5-74	63.14	2,430
MERCED RIVER AT POHONO BRIDGE NEAR YOSEMITE	321	1916-	USGS	12-23-55	21.5(A)	23,400	11-12-73	8.83	4,750
SOUTH FORK MERCED RIVER NEAR EL PORTAL	241	1950-	USGS	12-23-55	18.7	46,500	11-12-73	9.26	2,690
MERCED RIVER NEAR BRICEBURG	691	1965-	USGS	12- 6-66	17.8	21,500	11-12-73	10.87	8,100
MERCED RIVER NEAR STEVINSON	1273	1940-	USGS	12- 5-50	73.8	13,600	1 -8-74	63.29	2,280
SAN JOAQUIN RIVER NEAR NEWMAN	9520	1912-	USGS-DWR	2-26-69	65.9(A)	34,700(L)	1-10-74	55.69	3,780
ORESTIMBA CREEK NEAR NEWMAN	134	1932-	USGS	4- 2-58	6.6(C)	10,200	3 -3-74	5.98	920
SOUTH FORK TUOLUMNE RIVER NEAR OAKLAND RECREATION CAMP	87	1923-	USGS	12-23-55	10.9(A)	11,900	3 -2-74	5.67	1,220
MIDDLE TUOLUMNE RIVER AT OAKLAND RECREATION CAMP	74	1916-	USGS	12-23-55	11.8(A)	4,920	3 -2-74	5.57	760
TUOLUMNE RIVER AT MODESTO	1884	1940-	USGS-DWR	12- 9-50	69.2	57,000	1 -8-74	44.90	3,470

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CENTRAL VALLEY AREA (CONTINUED)									
SAN JOAQUIN RIVER BASIN (CONTINUED)									
SOUTH FORK STANISLAUS RIVER NEAR LONG BARN	67	1937-	USGS	11-21-50	9.3	4,900	5-19-74	5.86	1,370(R)
STANISLAUS RIVER AT ORANGE BLOSSOM BRIDGE	--	1928-39 1940-	DWR	12-23-55	31.8	62,000	4 -1-74	11.58	5,640
STANISLAUS RIVER AT RIPON	1075	1940-	USGS-DWR	12-24-55 2-12-38	63.3 64.4(A)	62,500 - -	4 -3-74	52.73	4,900
SAN JOAQUIN RIVER NEAR VERNALIS	13540	1922-	USGS-DWR	12- 9-50 1-27-69	32.8(C) 34.6	79,000 52,600	1-27-74	19.16	9,810
DUCK CREEK NEAR STOCKTON	--	1950-	DWR	1-16-73	6.5	780	12-27-73	5.87	580
SOUTH FORK CALAVERAS RIVER NEAR SAN ANDREAS	118	1950-	USGS	12-23-55	10.3	17,600	3 -1-74	11.41*	17,200(E)
MORMON SLOUGH AT BELLOTA	--	1948-	DWR	4- 2-58	20.7	15,400(E)	1 -6-74	8.73	3,080
STOCKTON DIVERTING CANAL AT STOCKTON	--	1944-	DWR	4- 4-58	17.1(E)	11,400(E)	1 -6-74	10.01	2,910
CALAVERAS RIVER NEAR STOCKTON	--	1958-	DWR	1- 6-65	12.6	760(E)	3 -2-74	4.44	70
BEAR CREEK NEAR LOCKEFORD	48	1930-	USGS	4- 3-58	15.1	2,930	12-28-73	12.40	560
COLE CREEK NEAR SALT SPRINGS DAM	20	1927-42 1943-	USGS	12-23-64	10.2	6,140	12-17-73	14.80	580
SOUTH FORK MOKELUMNE RIVER NEAR WEST POINT	75	1933-	USGS	12-23-55	14.8(AC)	6,920	3 -2-74	8.32	2,710
MOKELUMNE RIVER NEAR MOKELUMNE HILL	544	1901-	USGS	12- 3-50	18.5	33,700	3 -2-74	8.75	7,440
MOKELUMNE RIVER AT WOODBRIDGE	661	1924-	USGS	11-22-50	29.6	27,000	11-20-73	19.20	3,270
MOKELUMNE RIVER NR THORNTON(BENSON FERRY)	2045	1911-	DWR-NOAA	12-24-55	18.0(C)	- -(D)	3 -3-74	9.43	- -(D)
DRY CREEK NEAR GALT	329	1926-33 1944-	USGS-DWR	4- 3-58	15.3	24,000	1 -7-74	13.96	4,400
NORTH FORK COSUMNES RIVER NEAR EL DORADO	205	1911-41 1948-	USGS	12-23-55	14.8	15,800	3 -2-74	8.13	3,500
SOUTH FORK COSUMNES RIVER NEAR RIVER PINES	64	1957-	USGS	2- 1-63	10.9	5,540	3 -2-74	5.38	1,790
COSUMNES RIVER AT MICHIGAN BAR	536	1907-	USGS-DWR	12-23-55 3- -07	14.6 16.3(A)	42,000 - -	3 -2-74	8.07	8,980
COSUMNES RIVER AT MCCONNELL	724	1941-	USGS	12-23-55	46.3	54,000	3 -3-74	43.52	9,650
TULARE LAKE BASIN									
TULE RIVER NEAR SPRINGVILLE	247	1957-	USGS	12- 6-66	19.7(AC)	49,600	4 -2-74	8.77	6,460(L)
TULE RIVER BELOW SUCCESS DAM	393	1953-	USGS	12-23-55 11-19-50	21.7(C) 26.0(AC)	27,000 32,000(M)	2 -1-74	6.14	580(R)
KAWEAH RIVER AT THREE RIVERS	418	1958-	USGS	12- 5-66 12- 5-66	16.7 19.0(A)	73,000 - -	4 -2-74	8.41	6,330
KINGS RIVER BELOW NORTH FORK	1342	1951-	USGS	12-23-55	23.1	85,200	3 -2-74	8.50	7,640(R)
BUENA VISTA LAKE BASIN									
KERN RIVER AT KERNVILLE	1009	1905-12 1953-	USGS	12- 6-66	19.3(A)	74,000	4 -2-74	8.51	5,680

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NORTHERN LAHONTAN AREA									
HONEY LAKE BASIN									
WILLOW CREEK NEAR SUSANVILLE	90	1950-	USGS	2- 1-63	5.6	820	3 -2-74	4.20	290
SUSAN RIVER AT SUSANVILLE	184	1917-21 1950-	USGS	12-22-64	7.3	5,100	4 -1-74	6.69	3,200(E)
PYRAMID AND WINNEMUCCA LAKES BASIN									
LITTLE TRUCKEE RIVER ABOVE BOCA RESERVOIR NEAR BOCA	146	1903-10 1939-	USGS	2- 1-63	9.0	13,300	4 -1-74	2.75	1,120(R)
TRUCKEE RIVER AT FARAD	932	1899-	USGS	11-21-50	14.5(A)	17,500	4 -3-74	6.22	3,300(R)
CARSON RIVER BASIN									
EAST FORK CARSON RIVER BELOW MARKLEEVILLE CREEK	276	1960-	USGS	1-31-63	10.2	15,100	5-27-74	5.85	2,920
WEST FORK CARSON RIVER AT WOODFORDS	66	1900-07 1938-	USGS	2- 1-63	9.0	4,890	5-27-74	3.60	710(E)
WALKER LAKE BASIN									
WEST WALKER RIVER BELOW LITTLE WALKER RIVER NEAR COLEVILLE	180	1938-	USGS	11-20-50	8.1	6,220	6 -7-74	5.00	2,080
EAST WALKER RIVER NEAR BRIDGEPORT	359	1911-14 1921-	USGS	6-19-63	4.6	1,390	6-15-74	3.03	610(R)
SOUTHERN LAHONTAN AREA									
MOJAVE RIVER BASIN									
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE	514	1899-06 1930-	USGS	3- 2-38	23.7	70,600	1 -7-74	3.19	120
MOJAVE RIVER AT BARSTOW	1290	1930-	USGS	3- 3-38	8.6	64,300	1 -7-74		5(E)
MOJAVE RIVER AT AFTON	2120	1929-32 1952-	USGS	1-26-69	10.4	18,000	3 -8-74	3.57	50

APPENDIX C

Weather Patterns

APPENDIX C

Weather Patterns

LONG WAVES AND SHORT WAVES

All weather takes place in the troposphere, the zone of the atmosphere lying closest to the earth's surface whose thickness may range from 5 miles at the poles to 10 miles at the equator. Atmospheric wind currents in the troposphere form the waves whose flow patterns are translated by meteorologists into contour lines on upper-level pressure charts. The larger waves are referred to as long, or major, waves in the westerlies. The smaller waves, called short waves, are usually associated with individual cyclones.

TROUGHS AND RIDGES

The pattern of waves includes troughs and ridges. Where the contour lines bulge southward, this is referred to as a trough; where the contours bulge northward, this is known as a ridge. If the constant pressure chart is visualized as a topographic chart, the troughs become valleys and the ridges become like mountain ranges.

JET STREAM

From four to seven major waves circle the northern hemisphere. Through their flow pattern threads a discontinuous zone or band of strong winds known collectively as the jet stream. Its core lies about 30,000 feet above sea level. When associated with major troughs or confluent patterns, the jet stream appears strong and well formed in certain sectors of the hemisphere.

Atmospheric pressure is measured in millibars, which are units of atmospheric pressure. One millibar is equivalent to 0.03 inches of mercury. One type of upper-level pressure chart used frequently is the 500-millibar charts, which shows pressure surface contours at about the 18,000-foot level (about) 5,000 meters) in the middle of the troposphere.

500-MILLIBAR CHART

With the 500-millibar flow are associated the low- and high-pressure centers and fronts that appear on surface weather maps. These are moved by and interact with the upper-level pattern of troughs and ridges. At times the deepening of a particular cyclone can bring about a marked change in the upper-level flow patterns, perhaps readjusting the number and placement of the long waves. At other times an entire chain of cyclones can be associated with one long wave.

LOW AND HIGH PRESSURE CENTERS

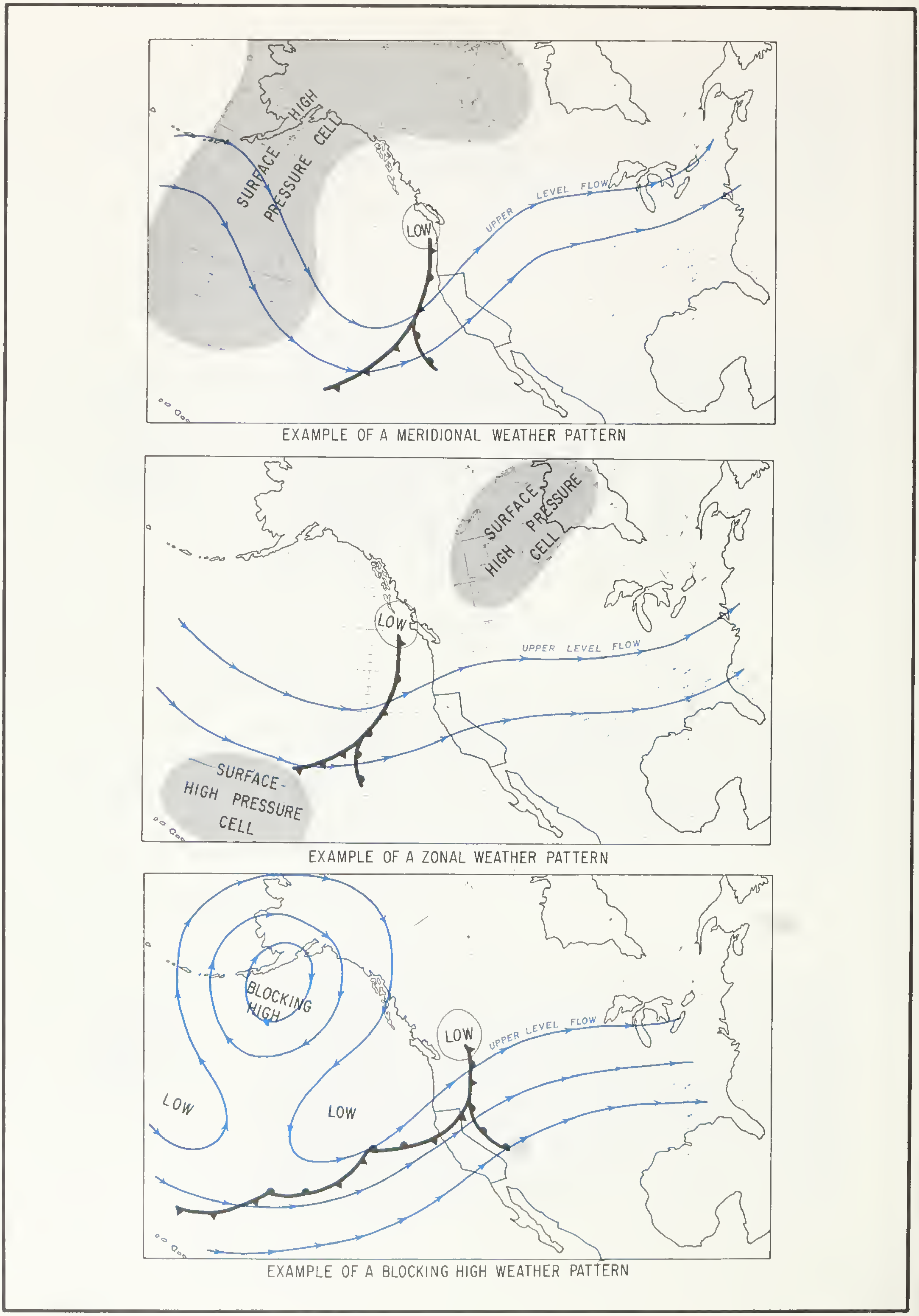
Cyclonic activity is shown on surface weather maps in the form of low-pressure centers with their attendant fronts. Cyclogenesis is the formation of a new cyclone, or low-pressure center, which has a counter-clockwise wind circulation around the lowest pressure.

CYCLOGENESIS

The cyclone incorporates both cold and warm fronts into what is referred to as an open wave cyclone. As the low pressure at the apex of the cold and warm fronts deepens, the cold front begins to overtake the warm front and force the latter to ride aloft along the cold front surface. This process is called occlusion, and the occluded front is shown on surface weather maps along with the cold and warm fronts and stationary fronts. Many open wave cyclones which form west of the International Date Line go through the occlusion process by the time they appear at the Pacific Coast.

FRONTS AND OCCLUSION

FIGURE C-1



EXAMPLE OF A MERIDIONAL WEATHER PATTERN

EXAMPLE OF A ZONAL WEATHER PATTERN

EXAMPLE OF A BLOCKING HIGH WEATHER PATTERN

At times the 500-millibar flow shows strongly a type of pattern called meridional or low index. The amplitude of waves in such patterns is large, and strong interchange takes place between polar air masses that penetrate to low latitudes in the major troughs and tropical air masses carried in the ridges to northern latitudes.

MERIDIONAL PATTERN

At other times the weather systems move rapidly from west to east and the flow of the 500-millibar level is zonal, or high index, with troughs and ridges having little amplitude. Under these circumstances, polar air masses are generally confined to northern latitudes behind the polar front and intrude only slightly into southern latitudes. The jet stream can be very strong and continuous in the zonal flow patterns.

ZONAL PATTERN

At times the trough-and-ridge flow pattern at 500-mb warps itself into what is termed a "blocking pattern". A ridge of large amplitude at the 500-mb surface level will develop closed contours at the northern extremity of the ridge. These contours delineate a "blocking high", a name derived from their action as obstructions to the normal meandering of the westerly flow aloft. The blocking highs usually develop at high latitudes, 50° to 65° north, but may sometimes form south of 50°N as well. Blocking highs bring about significant weather anomalies. They contain islands of warm air aloft (such as at the 500-mb level), which diverts the upstream storm tracks to move either north around the high or break through south of the high, thus diverting the storm tracks from their normal paths. Flow patterns associated with floods in California frequently involve blocking highs in the Pacific area, most freqnetly in the Bering Sea area. A block in this location creates a low-pressure area, or trough or low pressure, in the Gulf of Alaska (this implies low levels of the 500-mb surface. The block feeds cold air into the low, while a westerly current of air to the south of the block transports a warm air mass into confluence with the polar air mass into confluence with the polar air mass streaming into the Gulf.

BLOCKING-HIGH PATTERN