Fact Sheet

United States Geological Survey
Northern California Storms and Floods of January 1995

The USGS provides maps, reports, and information to help others meet their needs to manage, develop, and protect America's water, energy, mineral, and land resources. We help find natural resources needed to build tomorrow, and supply scientific understanding needed to help minimize or mitigate the effects of natural hazards and environmental damage caused by human activities. The results of our efforts touch the daily lives of almost every American.

Introduction

"El Nino" is back, this time bringing with it disastrous rainstorms throughout California. The warm Pacific current spawned an unusual series of storms from January 5 through 26, 1995, that caused heavy, prolonged, and, in some cases, unprecedented precipitation across California. This series of storms resulted in widespread minor to record-breaking floods from Santa Barbara to the Oregon border. Several stream-gaging stations used to measure the water levels in streams and rivers recorded the largest peaks in the history of their operation.

The Storms

Before the January storms, rainfall was near normal across northern California. Precipitation data from the National Weather Service and the California Department of Water Resources were used to determine the intensity and duration of the January storms. The most intense storms occurred during the week of January 8 and produced an average 13 inches of precipitation over most of northern California. Precipitation amounts of as much as 24 inches were recorded for the week. Maximum 1-day rainfall data are compared with the theoretical 100-year, 24-hour, precipitation (table 1), which has a 1 in 100 chance of being exceeded in any given year. Rainfall amounts were greatest in Humboldt, Lake, Mendocino, Napa, Sacramento, Shasta, Sonoma, and Trinity Counties.

The Floods

Flooding was significant throughout northern California from January 9 through 14. Selected stream-gaging stations that had record peak streamflows and flood recurrence intervals are shown in figure 1. The highest peak flows in the region occurred from January 8 through 10 (fig. 2).

Table 1. Precipitation at selected sites in northern California, January 9–14, 1995

Rain-gage site	24-hour precipitation	100-year, 24-hour, precipitation[1]	Storm total, Jan. 9–14
Carmel..............	7.5	5	--
Cloverdale.........	4.9	9	16.5
Eureka..............	1.97	6.5	6.75
Folsom	5.85	5	9.11
Jackson.............	3.31	6.5	6.32
Mt. Shasta	5.9	10	14.85
Placerville	4.13	7	7.25
Roseville	7.75	4.5	11.05
Ruth..................	4.37	10	20.86
Sacramento	4.45	4	6.57
Santa Rosa	2.8	6	8.8
Soquel	4.5	10	12
Ukiah................	3.84	7	12.47

[1] Miller and others, 1973

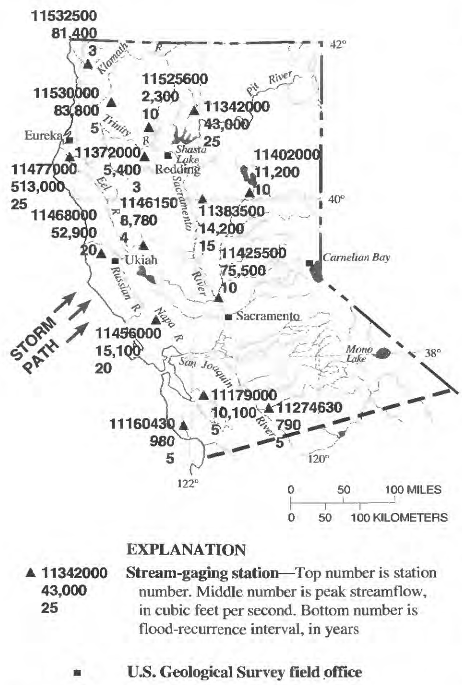

Figure 1. Location of selected stream-gaging stations in northern California showing peak streamflows and recurrence intervals for January 1995 floods.

Flooding in small basins was unusually rapid because of the high-intensity, short-duration microbursts of rainfall. Small streams, rather than the large rivers, caused most of the damage in the Central Valley. The Sacramento area was hard hit, especially the communities of Roseville and Rio Linda. Flooding along large rivers in the Central Valley was controlled by diversions and flood-control reservoirs that had large storage capacities available. Small streams and rivers in the coastal areas also caused widespread flooding.

More than 10 years of drought and low streamflows resulted in the accumulation of dense riparian vegetation in most stream channels. Flooding along the Russian River was due, in part, to the accumulation of vegetation and debris that had reduced the capacity of the stream channel. This reduced capacity resulted in higher water levels with less streamflow. For example, the water level at the stream-gaging station on the Russian River near Guerneville nearly reached the record high, but the streamflow was significantly less than that during a flood in 1986.

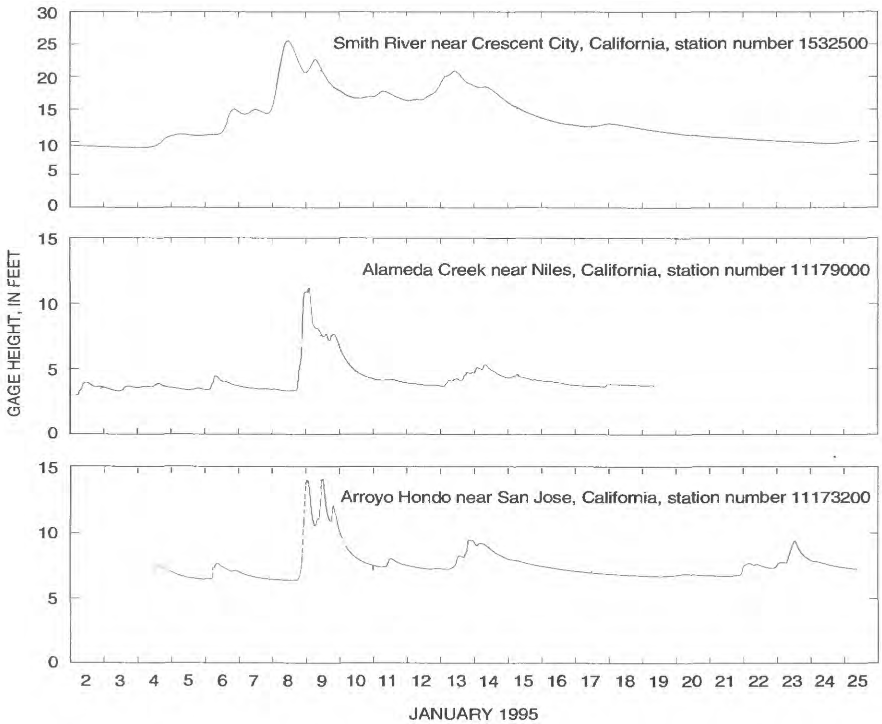

Figure 2. Gage heights for selected stream-gaging stations during January 1995.

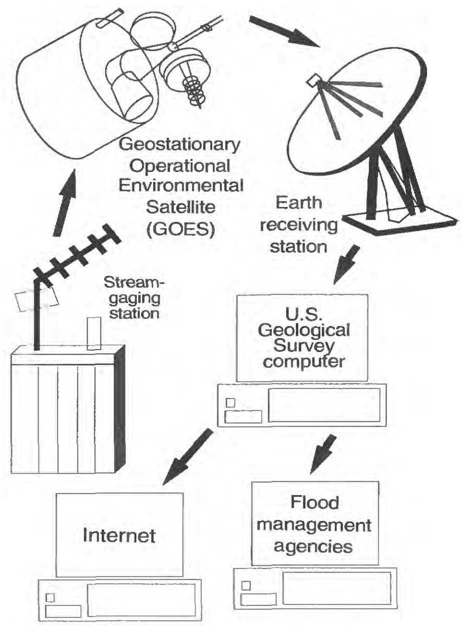

Figure 3. The transmission, processing, and distribution of streamflow data using satellite and computer technology.

The Response

Personnel of the U.S. Geological Survey (USGS) made 300 flood measurements of streamflow and more than 400 visits to stream-gaging stations during the January 1995 floods. These measurements provided the crucial information needed to determine peak discharges. Accurate recording of peak discharges at long-term stream-gaging stations are essential for computations of flood frequency and magnitude. This information is used by Federal, State, and local officials to prepare for and minimize damages from future floods.

Most measurements of water levels in streams are automated. In recent years, information compilation has been improved by use of Electronic Data Collection Platforms (DCP's). These platforms use automated earth-satellite telemetry for the immediate transmission of data from remote sites (fig. 3). Cellular telephones and modems also are being used to obtain timely information, but not all stream-gaging stations are equipped with this instrumentation. Currently (1995), 40 additional DCP's are being installed within California as part of the USGS and Department of Water Resources cooperative stream-gaging program.

During the recent floods, the USGS was able to rapidly compile and disseminate near-realtime information for many of its gaging stations by using the telephone and computer networks. Also beginning this year, the USGS has begun making data available on the Internet through the California District "Home Page" at http://s101dcascr.wr.usgs.gov to provide the public and interested agencies with immediate access to flood data and other hydrologic data. During January 1995, most of this data was made available within hours of a flood peak.

Reference

Miller, J.F., Frederick, R.H., and Tracey, R.J., 1973 [1974], California, v. 11 *of* Precipitation-frequency atlas of the Western United States: U.S. Department of Commerce, National Oceanic and Atmospheric Administration Atlas 2, 71 p.

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Additional earth science information can be found by accessing the USGS "Home Page" on the World Wide Web at "http://www.usgs.gov" or by calling 1-800-H20-9000 (1-800-426-9000).

For more information on all USGS reports and products (including maps, images, and computerized data), call 1-800-USA-MAPS.

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