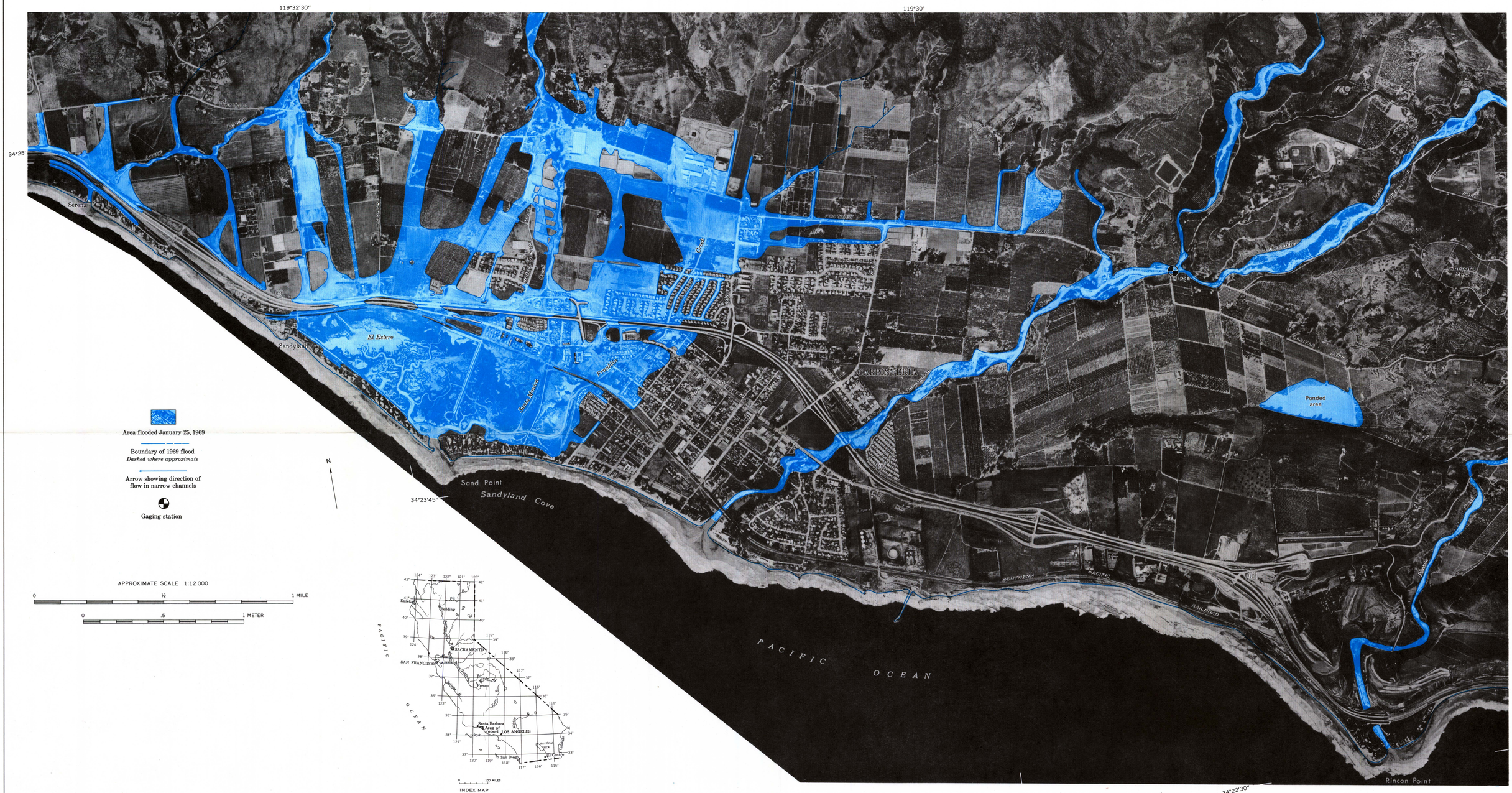
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

HYDROLOGIC INVESTIGATIONS
ATLAS HA-422



FLOOD OF JANUARY 1969 NEAR CARPINTERIA, CALIFORNIA

Disastrous floods occurred in Carpinteria and vicinity on January 25, 1969, as a result of heavy storms. The approximate areas inundated by overflows from Arroyo Paredon and from Santa Monica, Franklin, Carpinteria, Gobernador and Rincon Creeks are described in this atlas. The inundation map and graphs show the results of analyses of data on the extent and frequency of the floods. These data provide a basis for making decisions concerning development of the flood-prone areas.

The Carpinteria area is located along the narrow coastal plain between the Santa Ynez Mountains and the Santa Barbara Channel, 10 miles east of Santa Barbara. Streams in the area drain the south-facing slopes of the mountains. The basins are small and the channels are short and steep. Carpinteria Creek, drainage area, 14.9 square miles, is the largest basin in the area covered by the atlas.

Three storms during the period January 18–26 caused heavy precipitation in the Carpinteria area. The total precipitation during the storm period ranged from about 12 inches in the lowlands near the coast to more than 44 inches in the mountains north of Carpinteria. The resulting floodflows washed out roads, bridges, and culverts. Tremendous quantities of sediment and other debris were transported. The obstruction of culvert and bridge openings by debris caused backwater and widespread overflow, and sediment deposition was heavy in the inundated areas (fig. 1). Flood damage of nearly $4 million in the Carpinteria area was estimated by the Santa Barbara County Flood Control and Water Conservation District and other local agencies. The crest stage of 14.9 feet on January 25, 1969, in Carpinteria Creek at the gaging station near Carpinteria (11–1195) was 5.1 feet higher than the previous maximum recorded stage which occurred on January 15, 1952, and the peak discharge of 4,560 cubic feet per second (cfs) was 1.7 times that of December 6, 1966, the previous maximum in the period of record 1941–69.

FIGURE 1.—*Channel obstruction and overflow at Foothill Road bridge on Santa Monica Creek north of Carpinteria, January 25, 1969. Photograph courtesy of California Department of Conservation, Division of Soil Conservation.*

FIGURE 2.—*Housing development at Carpinteria inundated by overflows from Santa Monica and Franklin Creeks, January 25, 1969. Photograph courtesy of California Department of Conservation, Division of Soil Conservation.*

The extent of inundation in the vicinity of Carpinteria is shown on an aerial photomosaic base that represents a land area of about 12 square miles extending nearly 6 miles along the coast. The boundaries of flooding were identified on aerial photographs taken January 26, 1969, and from field inspection. The coalescence of overflows from Arroyo Paredon and from Santa Monica and Franklin Creeks resulted in inundation of areas between these streams (fig. 2). The extent of the inundation delineated reflects the conditions existing at the time of the flood. Changes in waterway openings at bridges and culverts, channel conditions, extent and condition of vegetative cover and foliage in the upland and foothill areas, and urbanization may significantly affect the areas inundated by future floods.

Acknowledgments.—This atlas was prepared under the general direction of R. Stanley Lord, district chief in charge of water resources investigations in California, and under the immediate supervision of James L. Cook, chief of the Garden Grove subdistrict. Technical assistance was provided by Howard F. Matthai, hydraulic specialist, and Arvi O. Waananen, hydrologist. The atlas is one of four prepared to describe the floods of January 1969 in selected areas in southern California as part of the U.S. Geological Survey program to document information in areas inundated by major floods.

Flood height.—The height of a flood at a gaging station is usually stated in terms of the gage height or stage, which is the elevation of the water surface above a selected datum plane. Gage heights at the gaging station on Carpinteria Creek near Carpinteria, at the bridge on State Highway 150, 1.8 miles northeast of Carpinteria, may be converted to approximate elevations above mean sea level by adding 121 feet. The drainage area above the gage is 13.1 square miles.

Flood discharge.—Discharge is the rate at which water flows, expressed as volume per unit time, usually cubic feet per second (cfs). Peak discharge is the maximum value of the discharge attained during a flood, and generally occurs at the time of the maximum height (stage) of the flood.

The discharge and year of occurrence of annual floods (highest peak discharge in each calendar year) exceeding 1,000 cfs at the gaging station on Carpinteria Creek near Carpinteria (11–1195) during the period 1941–69 are shown in figure 3. Not shown are secondary peaks greater than 1,000 cfs which occurred in 1952 and 1969. The 12 peaks with flows greater than 1,000 cfs occurred in only 9 of the 29 years of record, and 3 occurred in January 1969. During a year in which an outstanding flood occurs, a separate major flood is not an uncommon event. Such a flood occurred in 1969 when the peak discharge on February 25 was 3,600 cfs, the second highest in the period of record through February 1969.

The peak discharge of 4,560 cfs January 25, 1969, in Carpinteria Creek near Carpinteria reflects the intensity of the runoff from most of this basin. Runoff in the smaller stream basins west of Carpinteria Creek may have been comparable, although debris basins, drainage obstructions, and overbank storage in these basins, and infiltration into the coarse alluvial fans in the area may have effected some reductions in the peak flows.

High flows in streams in the Carpinteria area during major floods generally are of short duration, but may occur at intervals of a few days or weeks. Floodflows in Carpinteria Creek near Carpinteria in 1969, for example, exceeded 2,720 cfs (equivalent to the previous maximum flow) for only 4 hours on January 25 and again for a short time on February 25. Flows exceeded 1,000 cfs on January 19, 21, and 24–26, and on February 25.

Flood frequency.—Frequency of flooding at the gaging station on Carpinteria Creek near Carpinteria has been derived from a statistical evaluation of annual flood peaks. The relation between recurrence interval and discharge is shown in figure 4. The curve is limited to a recurrence interval of 100 years. Large errors may result if the frequency curve is extrapolated beyond the limit shown.

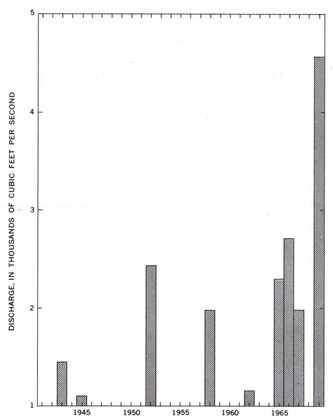


FIGURE 3.—*Annual floods greater than 1,000 cfs, 1941–69, Carpinteria Creek near Carpinteria.*

The relation between stage and frequency usually is comparable to that between the associated discharge and frequency. Changes in the physical condition of the channels, flood plains, or structures constricting the streams, however, may affect the stage-discharge and stage-frequency relations.

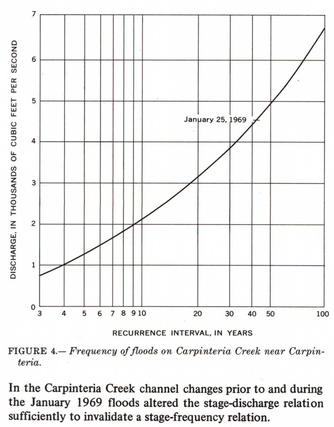


FIGURE 4.—*Frequency of floods on Carpinteria Creek near Carpinteria.*

In the Carpinteria Creek channel changes prior to and during the January 1969 floods altered the stage-discharge relation sufficiently to invalidate a stage-frequency relation.

The recurrence interval, in relation to flood events, is the average interval of time within which a given flood will be exceeded once. Flood frequency can also be stated as a probability, which is virtually the reciprocal of the recurrence interval for floods greater than the 10-year flood. Thus, a 50-year flood would have 1 chance in 50, or a 2-percent chance, of being exceeded in any given year. Because the 50-year flood can occur in any year or even in successive years, any inference that such a flood will occur only once during a 50-year period or at regular intervals would be misleading.

Flood depths.—The principal flooding in January 1969 occurred along stream and drainage channels and in some off-channel backwater areas. Water spilled from overtopped stream banks and moved overland in thin sheet flow, in individual rivulets or gullies, or as braided flow. The depths of the overland flows ranged from a few inches to about 3 feet. In some areas of local inundation and backwater in the lower reaches of the stream basins the flood depths exceeded 3 feet.

The flood of January 1969 has a recurrence interval of about 42 years, as indicated by the flood-frequency curve of figure 4. It was probably the highest flood in the Carpinteria area since the floods of January 1914, which were more severe than those in 1969 in coastal basins in southeastern Santa Barbara County.

Additional data.—Other information pertaining to floods in the Carpinteria area can be obtained at the office of the U.S. Geological Survey, 855 Oak Grove Avenue, Menlo Park, Calif. 94025, and from the following reports:

Waananen, A.O., 1969, Floods of January and February 1969 in central and southern California: U.S. Geol. Survey open-file rept., 233 p.

Young, L.E., and Cruff, R.W., 1967, Magnitude and frequency of floods in the United States, Part 11, Pacific slope basins in California, Volume 1, Coastal Basins south of the Klamath River basin and Central Valley drainage from the west: U.S. Geol. Survey Water-Supply Paper 1685, 272 p.

Photomosaic by Mark Hurd Aerial Surveys, Inc., Goleta, California, 1969

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