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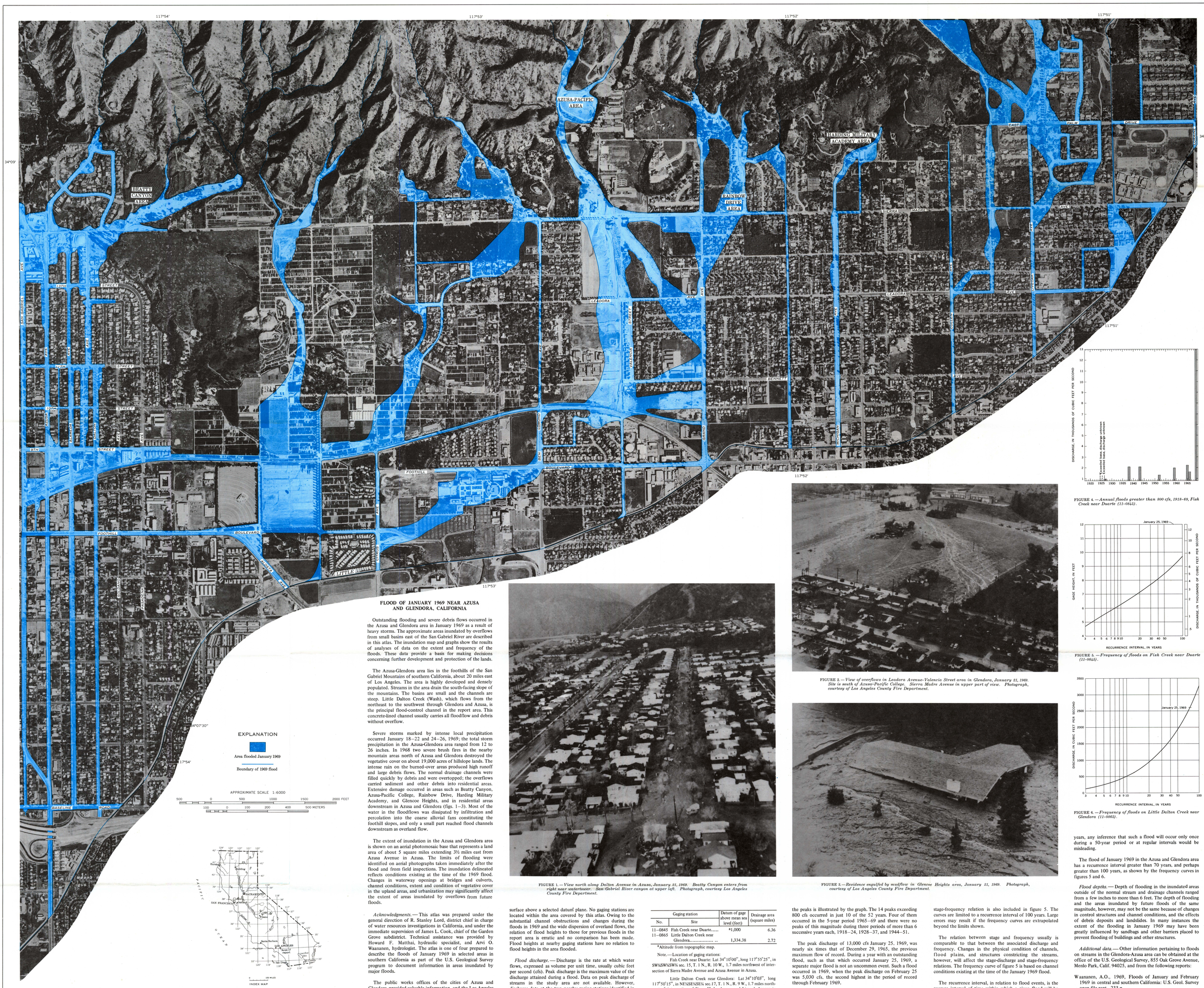

FLOOD OF JANUARY 1969 NEAR AZUSA AND GLENDORA, CALIFORNIA

Outstanding flooding and severe debris flows occurred in the Azusa and Glendora area in January 1969 as a result of heavy storms. The approximate areas inundated by overflows from small basins east of the San Gabriel River 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 further development and protection of the lands.

The Azusa-Glendora area lies in the foothills of the San Gabriel Mountains of southern California, about 20 miles east of Los Angeles. The area is highly developed and densely populated. Streams in the area drain the south-facing slope of the mountains. The basins are small and the channels are steep. Little Dalton Creek (Wash), which flows from the northeast to the southwest through Glendora and Azusa, is the principal flood-control channel in the report area. This concrete-lined channel usually carries all floodflow and debris without overflow.

Severe storms marked by intense local precipitation occurred January 18–22 and 24–26, 1969; the total storm precipitation in the Azusa-Glendora area ranged from 12 to 26 inches. In 1968 two severe brush fires in the nearby mountain areas north of Azusa and Glendora destroyed the vegetative cover on about 19,000 acres of hillslope lands. The intense rain on the burned-over areas produced high runoff and large debris flows. The normal drainage channels were filled quickly by debris and were overtopped; the overflows carried sediment and other debris into residential areas. Extensive damage occurred in areas such as Beatty Canyon, Azusa-Pacific College, Rainbow Drive, Harding Military Academy, and Glencoe Heights, and in residential areas downstream in Azusa and Glendora (figs. 1–3). Most of the water in the floodflows was dissipated by infiltration and percolation into the coarse alluvial fans constituting the foothill slopes, and only a small part reached flood channels downstream as overland flow.

The extent of inundation in the Azusa and Glendora area is shown on an aerial photomosaic base that represents a land area of about 5 square miles extending 3½ miles east from Azusa Avenue in Azusa. The limits of flooding were identified on aerial photographs taken immediately after the flood and from field inspections. The inundation delineated reflects conditions existing at the time of the 1969 flood. Changes in waterway openings at bridges and culverts, channel conditions, extent and condition of vegetative cover in the upland areas, and urbanization may significantly affect the extent of areas inundated by overflows from 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.

The public works offices of the cities of Azusa and Glendora provided valuable information, and the Los Angeles County Fire Department furnished aerial photographs that were helpful in the study.

Flood heights.—The height of a flood usually is referenced to a gaging station and is stated in terms of the gage height or stage, which is the elevation of the water surface above a selected datum plane. No gaging stations are located within the area covered by this atlas. Owing to the substantial channel obstructions and changes during the floods in 1969 and the wide dispersion of overland flows, the relation of flood heights to those for previous floods in the report area is erratic and no comparison has been made. Flood heights at nearby gaging stations have no relation to flood heights in the area flooded.

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. Data on peak discharge of streams in the study area are not available. However, discharge data at the two nearby gaging stations identified in the following table are indicative of the magnitude and frequency of the floodflows.

Gaging station		Datum of gage above mean sea level (feet)	Drainage area (square miles)
No.	Site		
11–0845	Fish Creek near Duarte.....	[1]1,000	6.36
11–0865	Little Dalton Creek near Glendora.....	1,334.38	2.72

[1]Altitude from topographic map.

Note.—Location of gaging stations:

Fish Creek near Duarte: Lat 34°10'00", long 117°55'25", in SW¼SW¼SW¼ sec. 15, T. 1 N., R. 10 W., 1.7 miles northwest of intersection of Sierra Madre Avenue and Azusa Avenue in Azusa.

Little Dalton Creek near Glendora: Lat 34°10'03", long 117°50'15", in NE¼SE¼SE¼ sec.17, T. 1 N., R. 9 W., 1.7 miles northeast of intersection of Sierra Madre Avenue and Liveoak Avenue in Glendora.

The discharge and year of annual floods (highest peak discharge in each calendar year) exceeding 800 cfs at the gaging station on Fish Creek near Duarte (11–0845) during the period 1918–69 are shown in figure 4. Not shown are secondary peaks greater than 800 cfs which occurred in 1926, 1938, 1959, and 1965. The erratic time distribution of the peaks is illustrated by the graph. The 14 peaks exceeding 800 cfs occurred in just 10 of the 52 years. Four of them occurred in the 5-year period 1965–69 and there were no peaks of this magnitude during three periods of more than 6 successive years each, 1918–24, 1928–37, and 1944–51.

FIGURE 1.—*View north along Dalton Avenue in Azusa, January 21, 1969. Beatty Canyon enters from right near watertower. San Gabriel River canyon at upper left. Photograph, courtesy Los Angeles County Fire Department.*

FIGURE 2.—*View of overflows in Leadora Avenue-Valencia Street area in Glendora, January 21, 1969. Site is south of Azusa-Pacific College. Sierra Madre Avenue in upper part of view. Photograph, courtesy of Los Angeles County Fire Department.*

FIGURE 3.—*Residence engulfed by mudflow in Glencoe Heights area, January 21, 1969. Photograph, courtesy of Los Angeles County Fire Department.*

FIGURE 4.—*Annual floods greater than 800 cfs, 1918–69, Fish Creek near Duarte (11–0845).*

FIGURE 5.—*Frequency of floods on Fish Creek near Duarte (11–0845).*

FIGURE 6.—*Frequency of floods on Little Dalton Creek near Glendora (11–0865).*

The relation between stage and frequency usually is comparable to that between the associated discharge and frequency. Changes in the physical condition of channels, flood plains, and structures constricting the streams, however, will affect the stage-discharge and stage-frequency relations. The frequency curve of figure 5 is based on channel conditions existing at the time of the January 1969 flood.

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 one 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.

The flood of January 1969 in the Azusa and Glendora area has a recurrence interval greater than 70 years, and perhaps greater than 100 years, as shown by the frequency curves in figures 5 and 6.

Flood depths.— Depth of flooding in the inundated areas outside of the normal stream and drainage channels ranged from a few inches to more than 6 feet. The depth of flooding and the areas inundated by future floods of the same magnitude, however, may not be the same because of changes in control structures and channel conditions, and the effects of debris deposits and landslides. In many instances the extent of the flooding in January 1969 may have been greatly influenced by sandbags and other barriers placed to prevent flooding of buildings and other structures.

Additional data.— Other information pertaining to floods on streams in the Glendora-Azusa 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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