

FLOOD OF AUGUST 1967 AT
FAIRBANKS, ALASKA

The disastrous flood of August 12-20, 1967, on the Chena River at Fairbanks, Alaska, is described. The map and graphs show the results of analysis of data on the depth, extent, and recurrence interval of this flood. These data serve as a basis for making sound decisions concerning development of the flood plain.

A general rainstorm covering the Chena River basin and adjacent watersheds caused the August 1967 flood. Total precipitation during the period August 9-15 at Chena Hot Springs, 60 miles upstream from Fairbanks, was 6.93 inches. Storm runoff caused numerous slides on headwater hillsides, washed out roads and tree-covered river terraces, and covered the flood plain at Fairbanks with water up to 5 feet deep. About half of the 30,000 inhabitants in the Fairbanks area were evacuated, and five deaths were reported. Urban Fairbanks and nearby Fort Wainwright, both on the flood plain near the mouth of the Chena River, were damaged seriously. Final estimates of flood damage exceed \$170 million. The crest stage, 18.42 feet, at the U. S. Geological Survey stream-gaging station on the Chena River at Fairbanks was 2.7 feet higher than the previous maximum recorded stage which occurred May 21, 1948. The Chena River basin upstream from Fairbanks has its own built-in flood control. The present natural channel, old oxbows, and wide flood plains provide considerable upstream storage; therefore, the flood crest at Fairbanks was delayed and reduced. About half the rain fell on Saturday, August 12, but the crest at Fairbanks occurred on Tuesday, August 15.

The extent of inundation in the vicinity of Fairbanks is shown on the map. Runoff from the Chena River and adjacent streams caused a flood on the low flood plain along the lower Tanana River from above Fairbanks to the mouth. However, flow from the Tanana River did not contribute to flooding in the Chena River valley. Floodmark elevations throughout the Fairbanks area indicate a general downward slope from the Chena River to the Tanana River.

Acknowledgments.—This atlas was prepared under the direction of Harry Hulsing, Alaska district chief, Water Resources Division, U. S. Geological Survey, with technical assistance from Howard F. Matthai, hydraulic specialist.

The Corps of Engineers furnished flood-profile data and aerial photographs. The Bureau of Land Management and The Alaska Railroad also furnished photographs. Many residents of Fairbanks gave valuable information.

Basin description.—The Chena River is about 100 miles long and drains an area of 1,980 square miles. It rises about 80 miles east of Fairbanks at elevations ranging from 4,000 to 5,000 feet and flows generally west to the Tanana valley lowlands where it empties into the Tanana River about 7 miles southwest of Fairbanks. The principal tributaries are the North Fork Chena River and Little Chena River from the north and South Fork Chena River and Munson Creek from the south.

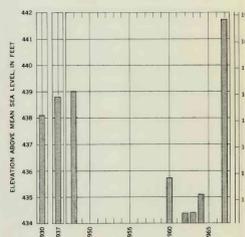


FIGURE 1.—Annual floods above gaging elevation, 1950-1967, 1948-67, Chena River at Fairbanks (Hall Street Bridge).

Flood heights.—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. Elevations in this report are in feet above mean sea level. Gage heights for the Chena River at Fairbanks, located at the Hall Street Bridge which is also known as the Wendell Street Bridge, can be converted to elevations above mean sea level by adding 422.92 feet.

The gage height and year of occurrence of the highest peak stage above 434-foot elevation at the gaging station, Chena River at Fairbanks, for the years 1950, 1957, and the period 1948-67, are shown in figure 1. All data have been adjusted to the present site and datum.

The stage hydrographs for the floods of May 1948 and August 1967 are shown in figure 2.

Flood-crest profiles.—The profiles of the flood crests of May 21, 1948, and August 15, 1967, are shown in figure 3. The base line to establish distances for the flood profile was arbitrarily drawn along Airport Way and projected southwestward from the airport and eastward from Cushman Street as shown on the map. Elevations of high-water marks left by the August 1967 flood have been plotted on the flood map and are the basis for the 1967 flood profile. The profile stationing for a specific point can be obtained from a projection perpendicular to the base line. The 1967 profile is applicable to both sides of the Chena River upstream from mile 9 and only to the south or left bank downstream from mile 9.

Profiles of floods are a reflection of the capacity of the main channel, the degree to which bridge openings are obstructed, and the extent of man's encroachment on the flood plain. The 1967 flood profile, figure 3, is smooth with only minor breaks in slope. This smooth profile indicates that bridges and other structures were not serious obstructions to the floodflow. About two-thirds of the peak discharge occurred over the flood plains rather than within the main channel. Figure 2 shows that the increase in discharge from 40,000 cfs to 74,400 cfs at the peak raised the stage less than a foot.

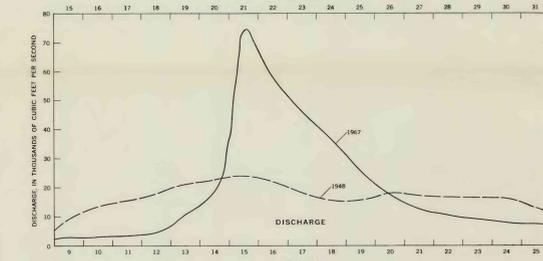
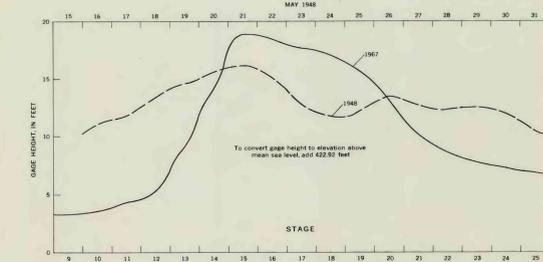


FIGURE 2.—Hydrographs of stage and discharge for floods of May 1948 and August 1967, Chena River at gaging station at Hall Street Bridge at Fairbanks, Alaska.

Depths of inundation can be estimated from the map by subtracting the ground elevation at a specific point from the water-surface elevation at the same point as indicated by the profiles in figure 3. Ground elevations can be estimated from contours on the map, although more accurate elevations can be obtained by leveling to nearby bench marks. The depth of inundation in 1967 at the site of most high-water marks is shown in blue numerals on the flood map.

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. The peak discharge of the Chena River on August 15, 1967, was 74,400 cfs. The discharge hydrograph for August 1967 is shown in figure 2.

Flood frequency.—Flood-frequency relations based upon discharge have been defined for the Fairbanks area (Berwick, and others, 1964). The relation between stage and frequency is dependent

on the relation between stage and discharge. Changes in the physical conditions of channels, flood plains, and structures constricting the stream will affect the stage-discharge relation. The frequency curve in figure 4 is based on channel conditions existing in 1967 and is limited to a recurrence interval of 50 years. Large errors may result if the flood-frequency curve is extrapolated beyond the limits shown.

Recurrence interval, as applied to flood events, is expressed in years and is the average interval of time within which a given flood will be equaled or exceeded once. 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 equaled or 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.

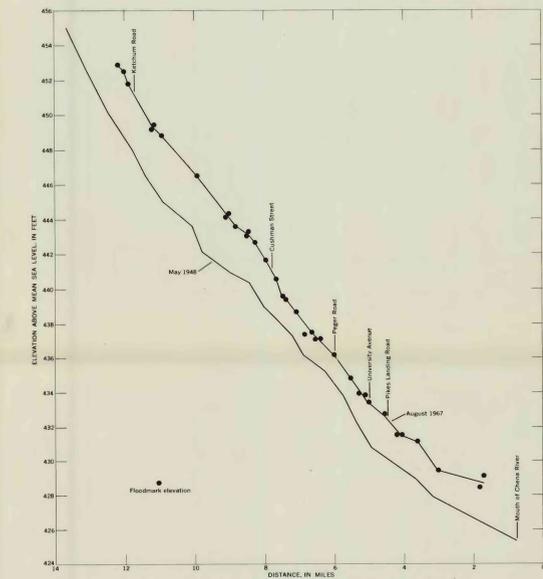


FIGURE 3.—Flood-crest profiles of Chena River at Fairbanks 1948 profile adapted from Corps of Engineers data.

The flood of August 1967 was so much greater than any previous flood event of record on the Chena River that a reliable determination of its frequency cannot be made. However, a rough concept of how rare the 1967 flood was can be seen from the fact that the peak discharge was 2.6 times the discharge of the 50-year flood at Fairbanks.

Additional data.—Additional information pertaining to floods and floodflow characteristics on the Chena River can be obtained at the offices of the U. S. Geological Survey in Anchorage and Fairbanks, Alaska, and from the following report:

Berwick, V. K., Childers, J. M., and Kuentzel, M. A., 1964, Magnitude and frequency of floods in Alaska, south of the Yukon River: U. S. Geol. Survey Circ. 493, 15 p.

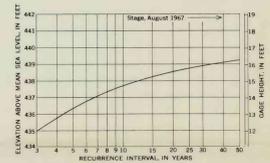
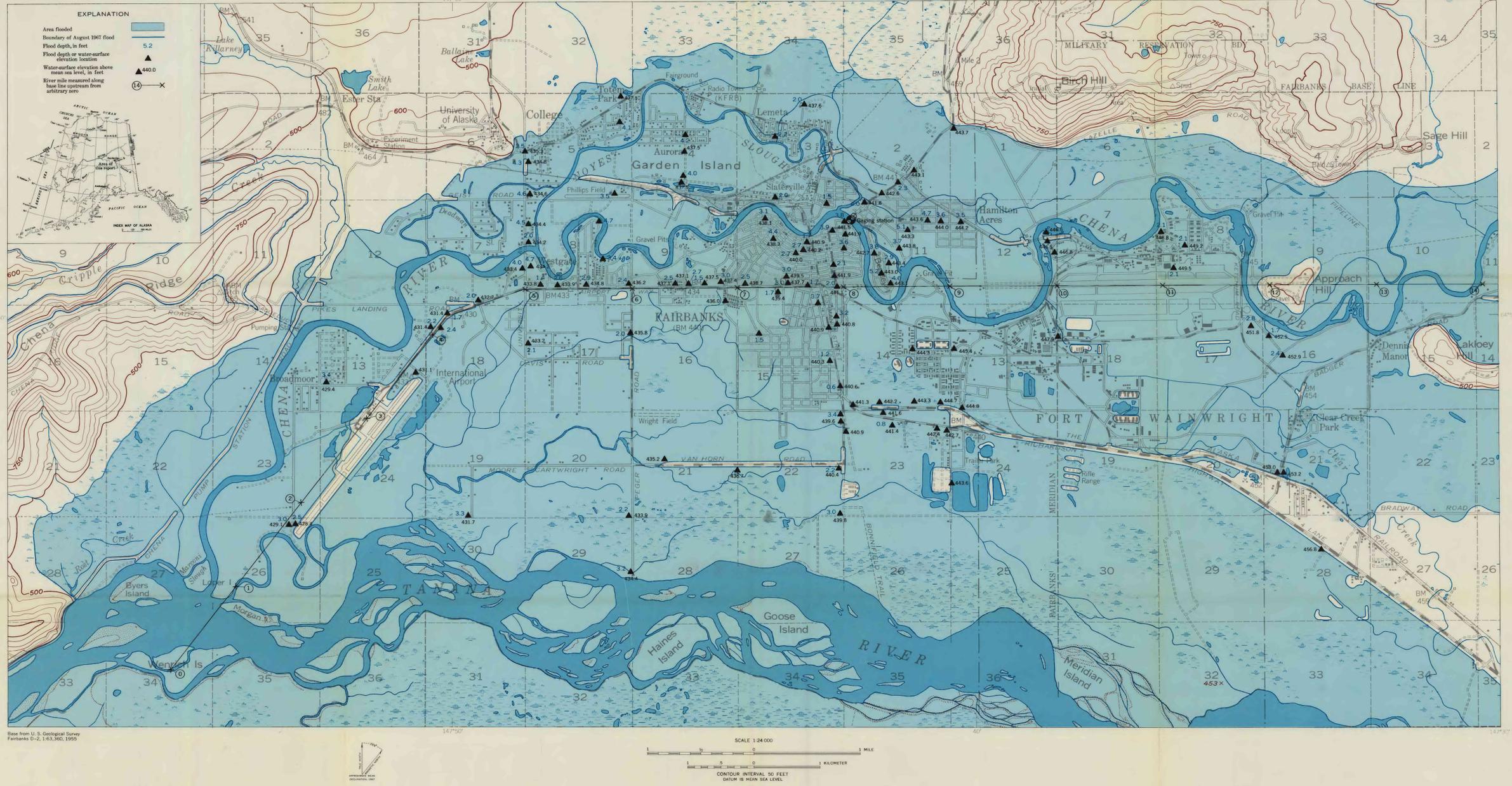
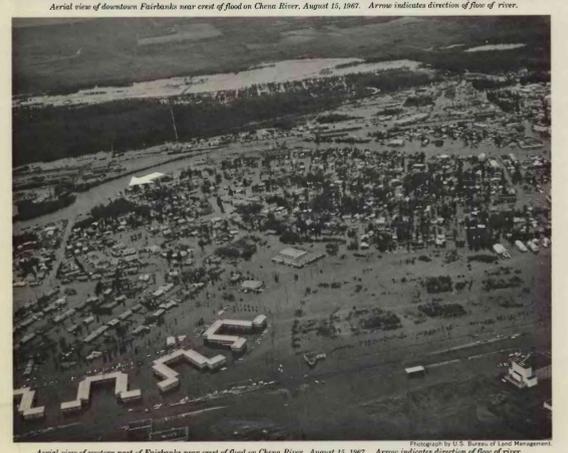


FIGURE 4.—Frequency of floods at gaging station on Chena River at Fairbanks, Alaska.



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By
Joseph M. Childers and James P. Meckel
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