

PHOTOGRAPH BY DES MOINES REGISTER AND TRIBUNE
AERIAL VIEW OF DES MOINES IOWA
JUNE 26, 1947

FLOODS ON DES MOINES RIVER, RACCOON RIVER, WALNUT CREEK,
AND FOURMILE CREEK AT DES MOINES, IOWA, IN 1947, 1954, AND 1960

The approximate areas inundated in the vicinity of Des Moines, Iowa, by the Des Moines River during the floods of June 26, 1947, and June 24, 1954; by the Raccoon River during the floods of June 13, 1947, and April 2, 1960; by Walnut Creek during the flood of June 13, 1947; and by Fourmile Creek during the floods of June 13, 1947, and by Fourmile Creek during the floods of June 13, 1947, and June 24, 1954, are delineated on a topographic map base.

The flood of June 1954 on the Des Moines River was the highest since at least 1851 in the reach upstream from the Center Street dam, but the flood of May 31, 1960, was the highest in the reach downstream from the Scott Street dam (below the mouth of Raccoon River). Floods in 1951 and 1957 are reported to have been lower than the flood of 1903.

Streets, railroads, commercial and urban developments, land fills, and levees, constructed since 1903, have encroached upon the flood plain, and have thereby affected the relation between flood height and rate of flow. A flood equal to that of 1903 would be higher now, than formerly, because of the present conditions of flood-plain encroachment. Along the Des Moines River below the mouth of Raccoon River, the flood of June 1954 reached a higher stage than the flood of June 1947, although the maximum discharge was 13 percent less in 1954. Protective works built after the flood of June 1947 prevented the occurrence of extensive damage by the higher flood of June 24, 1954, on the Des Moines River above the mouth of Raccoon River.

Greater floods are possible but no attempt has been made to show their probable overflow limits. Flood crests on the Des Moines River and Raccoon River, comparable to those of June 1954 and June 1947 respectively, arriving simultaneously at the mouth of the Raccoon River, would produce a higher stage on the Des Moines River below Center Street dam than any flood previously recorded. Protective works can reduce the frequency of flooding but will not necessarily eliminate future flooding. New highways and other cultural changes may influence the inundation pattern of future 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 or stages at gaging stations in Des Moines, Iowa, can be converted to elevations above mean sea level by adding the gage height to the appropriate datum of gage shown in the table below. Flood stage at a gaging station is the flood height at which a river begins to threaten or cause damage. Flood stages established by the U.S. Weather Bureau at gaging stations in Des Moines, Iowa, are also shown in the table. Elevations shown are in feet above mean sea level, datum of 1929.

Gaging station	Datum of gage above mean sea level (feet)	Flood stage	Gage height above datum (feet)
Des Moines River at Des Moines, Iowa (Second Avenue bridge)	778.7	796.7	23.0
Des Moines River below Raccoon River at Des Moines, Iowa (Scott Street bridge)	778.7	—	—
Raccoon River at Des Moines, Iowa (Waterworks gage at Southwest Eighteenth Street bridge)	680.6	702.6	112.0

Gage height and year of each annual flood (greatest flood each year) that exceeded elevation 792 feet at the Waterworks gage at the Southwest Eighteenth Street bridge on Raccoon River at Des Moines, are shown in figure 1. The 792-foot elevation, which corresponds to a gage height of 111.4 feet, was exceeded 13 times in 47 years of record (fig. 1). Although floods above elevation 792 feet occurred on the average of about 3 times per decade, none were experienced in some decades, whereas 10 occurred during the period 1944-53. The erratic frequency of floods is evident.

Flood frequency.—Frequency of flooding is derived from the records of floods at the following gaging stations in Des Moines, combined with a regional flood-frequency relation for streams in southwestern Iowa: U.S. Geological Survey gaging stations on the Des Moines River at Des Moines (Second Avenue bridge) and below Raccoon River at Des Moines (Scott Street bridge, above dam); and the City of Des Moines gaging station on the Raccoon River at the Des Moines Waterworks gage (Southwest Eighteenth Street bridge).

A flood-frequency relation based on the combined data of a group of gaging stations in a region, is considered statistically more reliable than a flood-frequency relation developed from data for a single gaging station. Large errors may result if the flood-frequency curves are extrapolated beyond the limits shown.

Recurrence intervals.—As applied to flood events, recurrence interval is the number of years, on the average, within which a given flood height will be equalled or exceeded once. It is inversely related to the chance of a specific flood being equalled or exceeded in any one year. Thus a 25-year flood would have 1 chance in 25 of being equalled or exceeded in any one year or a 100-year flood would have 1 chance in 100 of being equalled or exceeded in any one year.

The general relationship between recurrence interval and flood height at three gaging stations in Des Moines is shown graphically in figure 2 and is tabulated below:

Recurrence interval (years)	Des Moines River at Des Moines (Second Avenue bridge)	Des Moines River below Raccoon River at Des Moines (Scott Street bridge, above dam)	Raccoon River at Des Moines (Waterworks gage, Southwest Eighteenth Street bridge)
50	799.4	794.9	—
25	797.9	792.5	801.0
10	796.0	790.3	797.5
5	795.0	789.4	795.9

The abrupt changes in the profile, shown at some street locations and dams, indicate the difference in water-surface elevations at the upstream and downstream sides of the structures. Base lines for the profiles are located along the main channels. River miles above the mouth of the Des Moines River, used for the profile in figure 3, are also marked along the streams on the flood-inundation map.

Depth of flooding at any point can be estimated by subtracting the ground elevations (shown by contours on the map) from the water-surface elevation indicated by the profile in figure 3.

Additional data.—Other information pertaining to floods at Des Moines, Iowa, may be obtained at the office of the U.S. Geological Survey, 508 Hydraulics Laboratory, Iowa City, Iowa, and from the following published reports:

Schubel, H. H., 1935, Iowa floods, magnitude and frequency: Iowa Highway Research Board Bull. 1, 171 p.

U.S. Geological Survey, 1950, Floods of June 1954 in Iowa: U.S. Geol. Survey Water-Supply Paper, 1970-A, 106 p.

Cooperation and acknowledgment.—Flood-height record for Raccoon River at the Waterworks gaging station, floodmark elevations for floods of 1903, 1947, and 1954, and boundary information for floods of 1947 and 1954 were furnished by the City Engineer of Des Moines, Iowa.

Additional flood-boundary information was furnished by Wolz Studios, Inc., and by the Iowa Power and Light Company.

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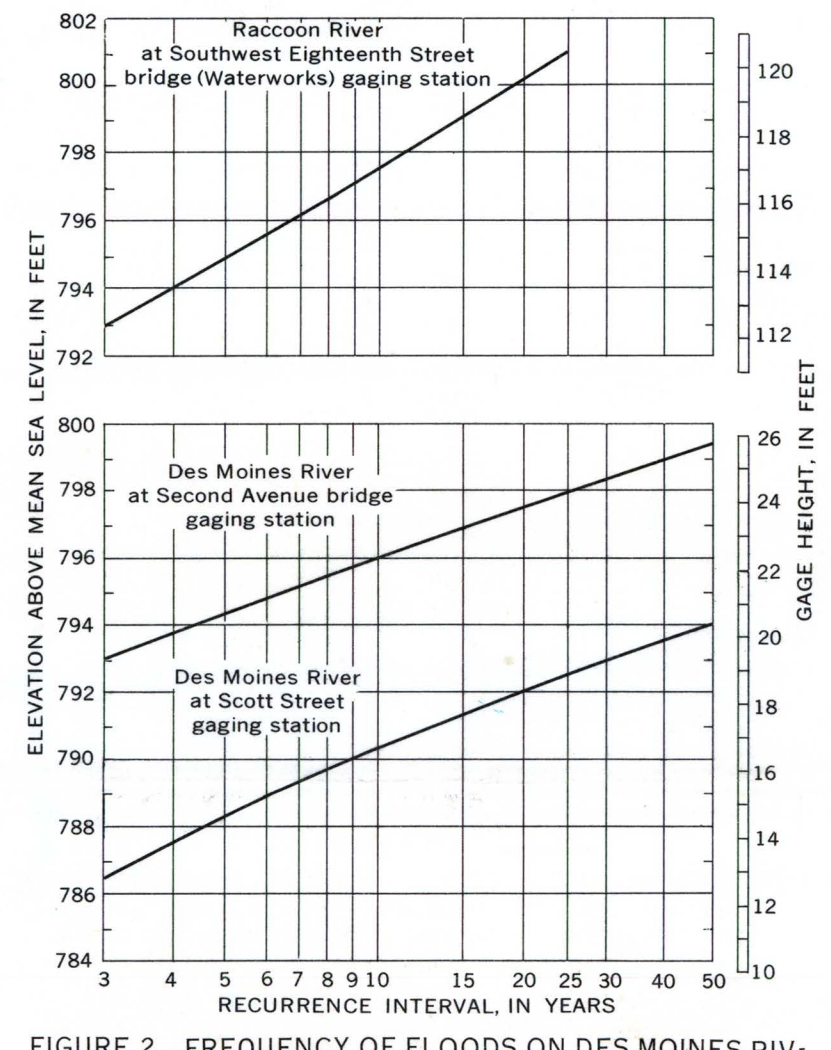


FIGURE 1.—ANNUAL FLOODS ABOVE ELEVATION 792 FEET, 1903-1950, WATERWORKS GAGE AT SOUTHWEST EIGHTEENTH STREET BRIDGE ON RACCOON RIVER AT DES MOINES

FIGURE 2.—FREQUENCY OF FLOODS ON DES MOINES RIVER AND RACCOON RIVER AT DES MOINES

Flood-frequency relationships for Walnut Creek and Fourmile Creek are not shown.

It is emphasized that recurrence intervals are average figures—the average number of years that will elapse between occurrences of floods that equal or exceed a certain flood height. Thus on Des Moines River, a flood that reaches 797.9-foot elevation at Second Avenue is said to have a 25-year recurrence interval. However, because of the erratic nature of flood occurrences, the 797.9-foot elevation may not be reached in any one 25-year period, or it may be reached more than once.

Flood profiles.—Profiles of the water surface along the Des Moines River for the floods of May 1903, June 1947, June 1954, and April 1960, and along the Raccoon River for the floods of June 13, 1947, June 26, 1947, and April 1960, are shown in figure 3. Profiles of floods corresponding to other flood heights can be plotted on this diagram generally parallel to those shown, except in the vicinity of the mouth of Raccoon River, where the Des Moines River and Raccoon River are each affected by variable amounts of backwater from the other river, at times.

The abrupt changes in the profile, shown at some street locations and dams, indicate the difference in water-surface elevations at the upstream and downstream sides of the structures. Base lines for the profiles are located along the main channels. River miles above the mouth of the Des Moines River, used for the profile in figure 3, are also marked along the streams on the flood-inundation map.

Depth of flooding at any point can be estimated by subtracting the ground elevations (shown by contours on the map) from the water-surface elevation indicated by the profile in figure 3.

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By
R. E. Myers
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