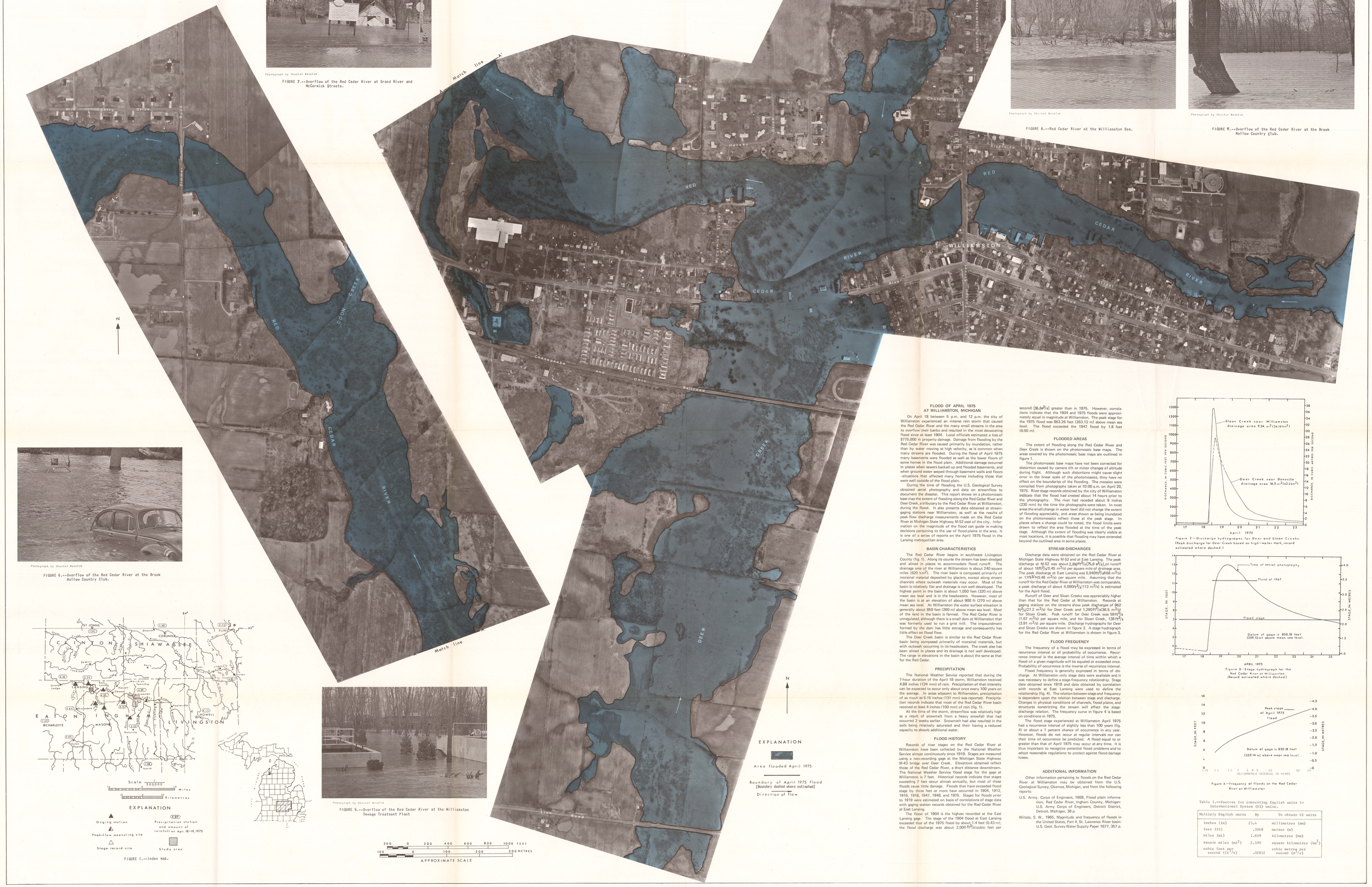

Photograph by Chester Neoluk

FIGURE 7.--Overflow of the Red Cedar River at Grand River and McCormick Streets.

Photograph by Chester Neoluk

FIGURE 8.--Red Cedar River at the Williamston Dam.

Photograph by Chester Neoluk

FIGURE 9.--Overflow of the Red Cedar River at the Brook Hollow Country Club.

Photograph by Chester Neoluk

FIGURE 6.--Overflow of the Red Cedar River at the Brook Hollow Country Club.

FIGURE 1.--Index map.

Photograph by Chester Neoluk

FIGURE 5.--Overflow of the Red Cedar River at the Williamston Sewage Treatment Plant

EXPLANATION

Area flooded April 1975

Boundary of April 1975 flood (Boundary dashed where estimated)

Direction of flow

200 0 200 400 600 800 1000 FEET

100 0 100 200 300 METRES

APPROXIMATE SCALE

FLOOD OF APRIL 1975 AT WILLIAMSTON, MICHIGAN

By

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1975

FLOOD OF APRIL 1975 AT WILLIAMSTON, MICHIGAN

On April 18 between 5 p.m. and 12 p.m. the city of Williamston experienced an intense rain storm that caused the Red Cedar River and the many small streams in the area to overflow their banks and resulted in the most devastating flood since at least 1904. Local officials estimated a loss of $775,000 in property damage. Damage from flooding by the Red Cedar River was caused primarily by inundation, rather than by water moving at high velocity, as is common when many streams are flooded. During the flood of April 1975 many basements were flooded as well as the lower floors of some homes in the flood plain. Additional damage occurred in places when sewers backed up and flooded basements, and when ground water seeped through basement walls and floors --situations that affected many homes including those that were well outside of the flood plain.

During the time of flooding the U.S. Geological Survey obtained aerial photography and data on streamflow to document the disaster. This report shows on a photomosaic base map the extent of flooding along the Red Cedar River and Deer Creek, a tributary to the Red Cedar River at Williamston, during the flood. It also presents data obtained at stream-gaging stations near Williamston, as well as the results of peak-flow discharge measurements made on the Red Cedar River at Michigan State Highway M-52 east of the city. Information on the magnitude of the flood can guide in making decisions pertaining to the use of flood-plains in the area. It is one of a series of reports on the April 1975 flood in the Lansing metropolitan area.

BASIN CHARACTERISTICS

The Red Cedar River begins in southwest Livingston County (fig. 1). Along its course the stream has been dredged and alined in places to accommodate flood runoff. The drainage area of the river at Williamston is about 240 square miles (620 km^2). The river basin is composed primarily of morainal material deposited by glaciers, except along stream channels where outwash materials may occur. Most of the basin is relatively flat and drainage is not well developed. The highest point in the basin is about 1,050 feet (320 m) above mean sea level and is in the headwaters. However, most of the basin is at an elevation of about 900 ft (270 m) above mean sea level. At Williamston the water surface elevation is generally about 850 feet (260 m) above mean sea level. Most of the land in the basin is farmed. The Red Cedar River is unregulated, although there is a small dam at Williamston that was formerly used to run a grist mill. The impoundment formed by the dam has little storage and consequently has little effect on flood flow.

The Deer Creek basin is similar to the Red Cedar River basin being composed primarily of morainal materials, but with outwash occurring in its headwaters. The creek also has been alined in places and its drainage is not well developed. The range in elevations in the basin is about the same as that for the Red Cedar.

PRECIPITATION

The National Weather Service reported that during the 7-hour duration of the April 18 storm, Williamston received 4.89 inches (124 mm) of rain. Precipitation of that intensity can be expected to occur only about once every 100 years on the average. In areas adjacent to Williamston, precipitation of as much as 5.15 inches (131 mm) was reported. Precipitation records indicate that most of the Red Cedar River basin received at least 4 inches (100 mm) of rain (fig. 1).

At the time of the storm, streamflow was relatively high as a result of snowmelt from a heavy snowfall that had occurred 2 weeks earlier. Snowmelt had also resulted in the soils being relatively saturated and their having a reduced capacity to absorb additional water.

FLOOD HISTORY

Records of river stages on the Red Cedar River at Williamston have been collected by the National Weather Service almost continuously since 1919. Stages are measured using a non-recording gage at the Michigan State Highway M-43 bridge over Deer Creek. Elevations obtained reflect those of the Red Cedar River, a short distance downstream. The National Weather Service flood stage for the gage at Williamston is 7 feet. Historical records indicate that stages exceeding 7 feet occur almost annually, but most of these floods cause little damage. Floods that have exceeded flood stage by three feet or more have occurred in 1904, 1912, 1916, 1918, 1947, 1948, and 1975. Stages for floods prior to 1919 were estimated on basis of correlations of stage data with gaging station records obtained for the Red Cedar River at East Lansing.

The flood of 1904 is the highest recorded at the East Lansing gage. The stage of the 1904 flood at East Lansing exceeded that of the 1975 flood by about 1.4 feet (0.43 m); the flood discharge was about 2,000 ft^3/s (cubic feet per second) (56.6 m^3/s) greater than in 1975. However, correlations indicate that the 1904 and 1975 floods were approximately equal in magnitude at Williamston. The peak stage for the 1975 flood was 863.26 feet (263.12 m) above mean sea level. The flood exceeded the 1947 flood by 1.8 feet (0.55 m).

FLOODED AREAS

The extent of flooding along the Red Cedar River and Deer Creek is shown on the photomosaic base maps. The areas covered by the photomosaic base maps are outlined in figure 1.

The photomosaic base maps have not been corrected for distortion caused by camera tilt or minor changes of altitude during flight. Although such distortions might cause slight error in the linear scale of the photomosaics, they have no effect on the boundaries of the flooding. The mosaics were compiled from photographs taken at 10:00 a.m. on April 20, 1975. River stage records obtained by the city of Williamston indicate that the flood had crested about 14 hours prior to the photography. The river had receded about 9 inches (230 mm) by the time the photographs were taken. In most areas the small change in water level did not change the extent of flooding appreciably, and areas shown as being inundated on the photomosaics reflect those at the peak stage. In places where a change could be noted, the flood limits were drawn to reflect the area flooded at the time of the peak stage. Although the extent of flooding was clearly visible at most locations, it is possible that flooding may have extended beyond the outlined area in some places.

STREAM DISCHARGES

Discharge data were obtained on the Red Cedar River at Michigan State Highway M-52 and at East Lansing. The peak discharge at M-52 was about 2,620 ft^3/s (74.2 m^3/s), or runoff of about 10 $ft^3/s/0.45$ m^3/s) per square mile of drainage area. The peak discharge at East Lansing was 5,940 ft^3/s (168 m^3/s) or 17 ft^3/s (0.48 m^3/s) per square mile. Assuming that the runoff for the Red Cedar River at Williamston was comparable, a peak discharge of about 4,000 ft^3/s (113 m^3/s) is estimated for the April flood.

Runoff of Deer and Sloan Creeks was appreciably higher than that for the Red Cedar at Williamston. Records at gaging stations on the streams show peak discharges of 962 ft^3/s (27.2 m^3/s) for Deer Creek and 1,290 ft^3/s (36.5 m^3/s) for Sloan Creek. Peak runoff for Deer Creek was 59 ft^3/s (1.67 m^3/s) per square mile, and for Sloan Creek, 136 ft^3/s (3.91 m^3/s) per square mile. Discharge hydrographs for Deer and Sloan Creeks are shown in figure 2. A stage hydrograph for the Red Cedar River at Williamston is shown in figure 3.

FLOOD FREQUENCY

The frequency of a flood may be expressed in terms of recurrence interval or of probability of occurrence. Recurrence interval is the average interval of time within which a flood of a given magnitude will be equaled or exceeded once. Probability of occurrence is the inverse of recurrence interval.

Flood frequency is generally expressed in terms of discharge. At Williamston only stage data were available and it was necessary to define a stage-frequency relationship. Stage data obtained since 1919 and data obtained by correlation with records at East Lansing were used to define the relationship (fig. 4). The relation between stage and frequency is dependent upon the relation between stage and discharge. Changes in 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 conditions in 1975.

The flood stage experienced at Williamston April 1975 had a recurrence interval of slightly less than 100 years (fig. 4) or about a 1 percent chance of occurrence in any year. However, floods do not occur at regular intervals nor can their time of occurrence be predicted. A flood equal to or greater than that of April 1975 may occur at any time. It is thus important to recognize potential flood problems and to adopt reasonable regulations to protect against flood-damage losses.

ADDITIONAL INFORMATION

Other information pertaining to floods on the Red Cedar River at Williamston may be obtained from the U.S. Geological Survey, Okemos, Michigan, and from the following reports:

U.S. Army, Corps of Engineers, 1968, Flood plain information, Red Cedar River, Ingham County, Michigan: U.S. Army Corps of Engineers, Detroit District, Detroit, Michigan, 38 p.

Wiitala, S. W., 1965, Magnitude and frequency of floods in the United States, Part 4, St. Lawrence River basin: U.S. Geol. Survey Water-Supply Paper 1677, 357 p.

Figure 2—Discharge hydrographs for Deer and Sloan Creeks. (Peak discharge for Deer Creek based on high-water mark, record estimated where dashed.)

Figure 3.--Stage hydrograph for the Red Cedar River at Williamston. (Record estimated where dashed.)

Figure 4.--Frequency of floods on the Red Cedar River at Williamston

Table 1.--Factors for converting English units to International System (SI) units.

Multiply English units	By	To obtain SI units
inches (in)	25.4	millimetres (mm)
feet (ft)	.3048	metres (m)
miles (mi)	1.609	kilometres (km)
square miles (mi^2)	2.590	square kilometres (km^2)
cubic feet per second (ft^3/s)	.02832	cubic metres per second (m^3/s)