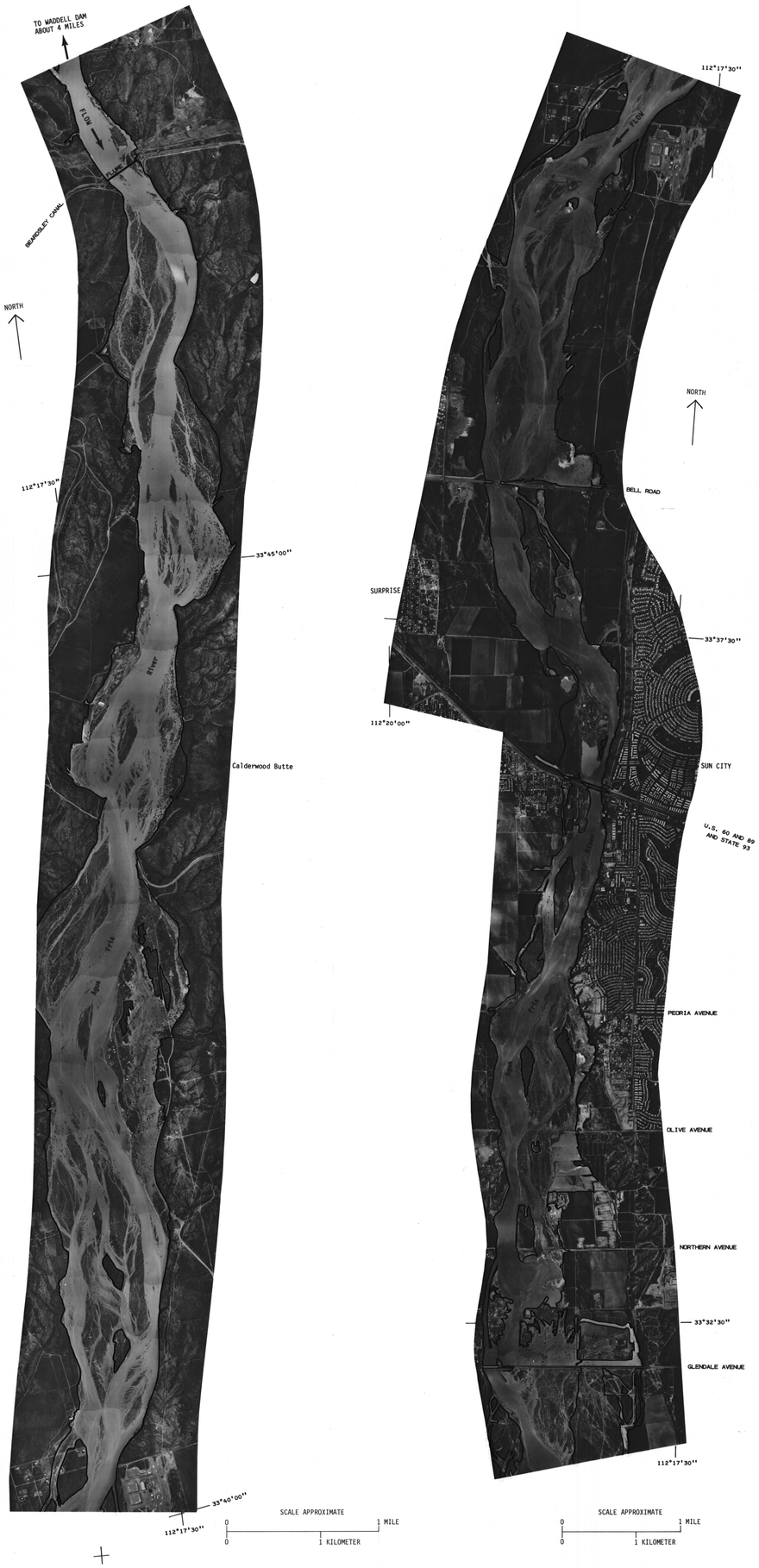

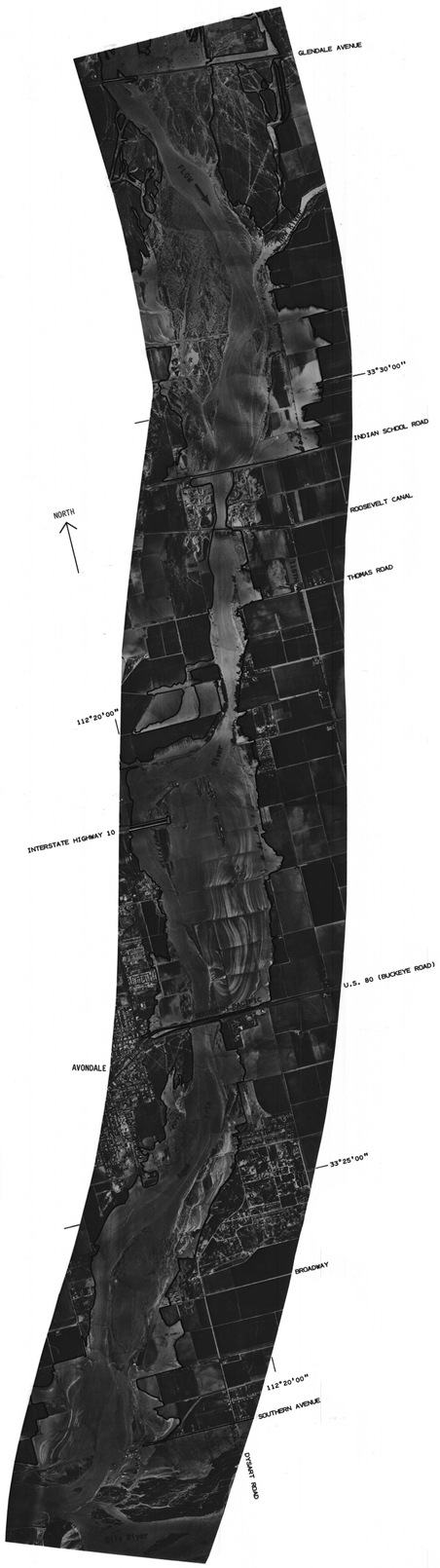

PHOTOMOSAIC BY U.S. GEOLOGICAL SURVEY.
AERIAL PHOTOGRAPHS BY ARIZONA DEPARTMENT
OF TRANSPORTATION, FEBRUARY 20, 1980

FLOOD OF FEBRUARY 1980 ALONG THE AGUA FRIA RIVER, MARICOPA COUNTY, ARIZONA

BY
B. W. THOMSEN

INTRODUCTION

The flood of February 20, 1980, along the Agua Fria River below Waddell Dam (fig. 1) was caused by heavy rains during February 13-20. The runoff filled Lake Pleasant and resulted in the largest releases from the reservoir since it was built in 1927. The maximum release was 66,600 ft^3/s between 1:30 and 4:30 a.m. on February 20, and the maximum inflow to the reservoir was about 73,300 ft^3/s (R. D. Yancy, Maricopa County Municipal Water Conservation District, written commun., 1980). The area inundated by the releases includes about 28 mi along the channel from the Beardsley Canal flume crossing 5 mi downstream from Waddell Dam to the mouth of the Agua Fria River. (See photomosaic.) The 5-mile reach from the flume to Waddell Dam is not shown on the photomosaic because the flow was generally confined to the main channel. Aerial photographs taken by the Arizona Department of Transportation about 9 a.m. on February 20—soon after the crest reached the mouth of the Agua Fria—were used to delineate the boundaries of the inundated area, and the boundaries were verified by field inspection. Several small high areas within the boundaries were not inundated, but they are shown as inundated areas on the photomosaic because they could not be identified during the field inspection.

FLOOD HISTORY

The maximum release of 66,600 ft^3/s from Lake Pleasant on February 20, 1980, was the largest since the dam was built in 1927. The previous maximum release was 59,900 ft^3/s on December 19, 1978. Although the flow from the 1980 release was greater than that in 1978, flood stages and extent of inundated area were greater in places in 1978 because of vegetation and other obstructions in the channel. The maximum inflow to the reservoir in 1978 was about 79,500 ft^3/s (R. D. Yancy, written commun., 1980). In addition to the releases on December 19, 1978, and February 20, 1980, flow was released from the reservoir in 1941, 1966, 1968, and spring 1978.

Records of stage and discharge for the Agua Fria River are available from 1910 but are intermittent and sketchy prior to 1933. The maximum discharge of about 105,000 ft^3/s occurred in January 1916 and November 1919 and is the greatest since 1889. Records indicate that 11 floods having discharges ranging from 25,000 to 80,000 ft^3/s occurred between 1889 and 1927 (U.S. Army Corps of Engineers, 1968).

FLOOD FREQUENCY

The flood-frequency curve (fig. 2) was developed using the regional regression equations of Roeske (1978). The flood-frequency curve applies only to flows into Lake Pleasant, and the probability of any given flow occurring when the lake is full is not considered.

The flood of 1980 into Lake Pleasant has a recurrence interval of about 47 years (fig. 2), whereas the maximum flood of record (1919) has a recurrence interval of about 100 years. A recurrence interval is the average interval of time, in years, in which a given discharge can be expected to be exceeded once as an annual maximum. For example, the 100-year flood has one chance in 100 (1-percent probability) of being exceeded in a given year, and the 20-year flood has one chance in 20 (5-percent probability) of being exceeded in a given year. The probability of a given flood occurring does not change with the occurrence of that flood; in other words, the fact that a major flood occurs does not reduce the probability of a similar or greater flood occurring the next year or even the next week.

REFERENCES CITED

Roeske, R. H., 1978, Methods for estimating the magnitude and frequency of floods in Arizona: Arizona Department of Transportation Report ADOT-RS-15(121), 82 p.

U.S. Army Corps of Engineers, 1968, Flood-plain information, Agua Fria River, Maricopa County, Arizona: U.S. Army Engineers District, Los Angeles, 31 p.

CONVERSION FACTORS

For readers who prefer to use metric units rather than inch-pound units, the conversion factors for the terms used in this report are listed below:

Multiply inch-pound unit	By	To obtain metric unit
mile (mi)	1.609	kilometer (km)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)

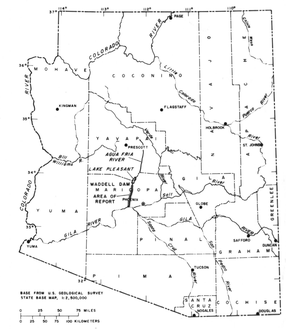

Figure 1.--Area of report (shaded).

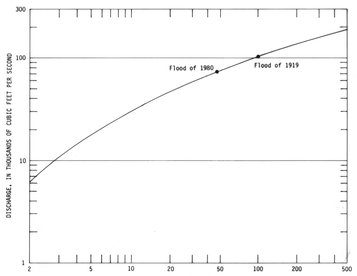

Figure 2.--Flood-frequency curve, Agua Fria River at Waddell Dam.

Figure 3.--Agua Fria River at Indian School Road.

EXPLANATION

APPROXIMATE AREA OF INUNDATION

Figure 4.--Flood plain of the Agua Fria River about 5 mi north of Bell Road.