Flood Investigations in Nevada: A Partnership of the USGS and Nevada Department of Transportation

Data collected during this cooperative program have included peak flows at more than 131 crest-stage gage sites for most of the past 35 years. This amounts to the equivalent of 2,300 years of data.

The Problem

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. The flood of January 1997 in western Nevada, alone, caused over $1 billion in estimated damages (Reno Gazette-Journal, May 30, 1997). Without competent flood-control structures and accurate flood forecasting, damages could have been greater. A long-term record of peak-flow data for streams in the area is essential for designing competent hydraulic structures and assessing flood-frequency intervals and magnitudes.

A Partnership

Recognizing the need for reliable information to estimate the frequency of flooding, the U.S. Geological Survey (USGS) and Nevada Department of Transportation (NDOT) began a cooperative program in 1961 to collect peak-flow data throughout Nevada.

Objectives for this partnership are to (1) assess the hydraulic and hydrologic characteristics of streams by collecting peak-flow data at gaged sites and at miscellaneous (ungaged) sites when substantial flooding occurs, (2) maintain and update a long-term data base of peak-flow data for use in flood-frequency analyses, and (3) document and prepare reports of floods.

The Program

Peak-flow data are collected annually from crest-stage gages at 24 sites throughout Nevada (fig. 1). In the past, as many as 100 gages have been in the network. A crest-stage gage is a permanent device that registers the peak stage of streamflow at that site in the interval between inspections of the gage. Crest-stage gages are visited at set frequencies throughout the year, and more often during periods of flooding, to obtain peak-flow data and to maintain equipment. During periods of isolated flooding, specific ungaged sites also are investigated to document peak discharges. Where no specific site information exists, measurements can be made with a current meter during flooding, or by using indirect measurements after the flood, to develop site-specific stage-discharge relations.

Peak-flow data are verified and entered into the USGS data base, and flood-frequency analyses are updated. Peak-flow data are collected at each site for at least 10-15 years to provide better estimates of flood frequency and magnitude. The flood-frequency characteristics for stations with at least 10 years of record are computed by fitting the logarithms of annual peaks to a Log Pearson Type-III frequency distribution. This technique follows guidelines recommended by the Hydrology Committee (1981) of the U.S. Water Resources Council.

Collected data are tabulated each water year and published in the annual water-data reports (for example, see U.S. Geological Survey, 1997).

The site numbers (fig. 1) and names of gages that compose the current crest-stage gage network, number of years of record, date and magnitude of the largest historical peak discharge, and estimated 50- and 100-year peak discharges are shown in table 1.

A long-term, peak-flow data base is used to refine estimates of flood frequency and develop regression equations. The equations are regional relations for estimating the magnitude and frequency of peak discharges on ungaged streams. The most recent flood-frequency regression equations (Thomas and others, 1994) for the State of Nevada use peak-flow data through 1986 and could be updated with the additional data collected since 1986 to detect any statistical changes in flood-frequency estimates using regression analysis.
Progress

Data collected during this cooperative program have included peak flows at more than 131 crest-stage gage sites over most of the past 35 years. The cumulative period of record is equivalent to about 2,300 years of data. Peak discharges also have been determined at 164 miscellaneous ungaged sites. Continued collection of streamflow data throughout the State during normal flows and major floods provides the hydraulic and hydrologic information necessary to determine reliable estimates of flood magnitude and frequency.

References Cited

