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

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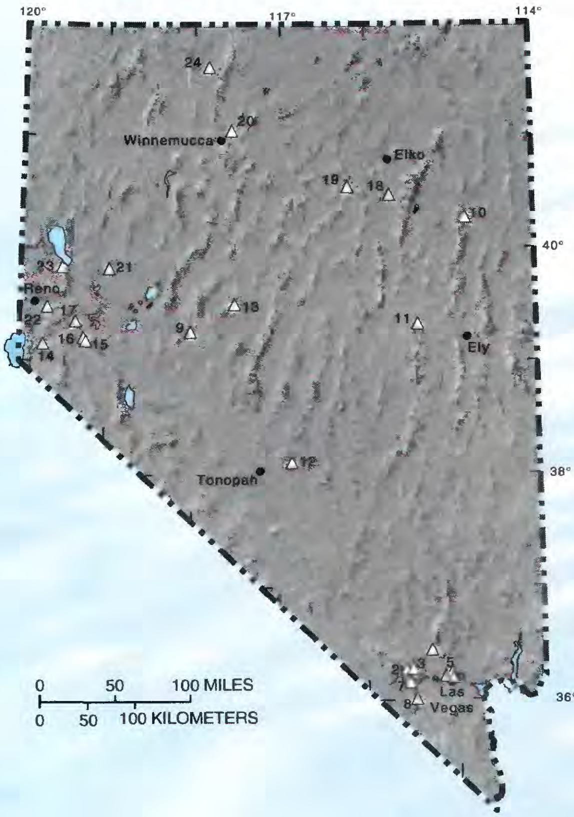

Figure 1. Crest-stage gage sites in the current network. *Gage-site numbers refer to table 1.*

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.

Table 1. Information for sites in the crest-stage gage network, Nevada

[Abbreviation: ft^3/s, cubic feet per second; NAFB, Nellis Air Force Base]

Site number (fig. 1)	Crest-stage gage		Water years of record through 1996	Largest recorded peak discharge		Estimated peak discharge[1] (ft^3/s)	
	Number	Name (and drainage area, in square miles)		Date	Magnitude (ft^3/s)	50-year peak	100-year peak
1	09419620	*Mormon Wells Wash near Las Vegas* (115)	1962-96	Aug. 1984	480	760	1,300
2	09419630	*Telephone Canyon near Charleston Park* (7.2)	1962-96	Dec. 6,1966	2,500	1,100	3,000
3	09419640	*Kyle Canyon near Charleston Park* (35.9)	1961-96	Dec. 6, 1966	1,660	450	930
4	09419650	*Las Vegas Wash at North Las Vegas* (720)	1963-78, 1982-96	July 3, 1975	12,000	6,900	11,000
5	09419660	*Las Vegas Wash tributary near NAFB* (18.1)	1961-84, 1986-96	Oct. 9, 1972	618	1,200	2,100
6	09419663	*Las Vegas Wash tributary south of NAFB* (1.2)	1963-81, 1983-96	Sept. 4, 1963	296	460	830
7	09419670	*Red Rock Wash near Blue Diamond* (about 8.1)	1962-96	Jan. 25, 1969	7,470	11,000	20,000
8	09419680	*Cottonwood Valley near Blue Diamond* (18.3)	1961-96	Jan. 25, 1969	1,100	1,600	4,600
9	10244360	*Dixie Valley tributary near Eastgate* (11)	1961-96	Aug. 1961	1,480	1,100	2,200
10	10245080	*Nelson Creek tributary near Currie* (0.7)	[2]1961-96	Aug. 1977	52	110	440
11	10245450	*Illipah Creek tributary near Hamilton* (about 5.5)	1962-87,1990-94	Aug. 9, 1993	1,120	680	1,300
12	10249180	*Saulsbury Wash near Tonopah* (56)	[2]1962-96	Mar. 27, 1969	340	490	810
13	10249417	*Smith Creek Valley tributary near Austin* (0.62)	[2]1968-96	June 1984	130	230	500
14	10311450	*Brunswick Canyon near New Empire* (12.7)	1966-78, 1980-96	Mar. 11, 1995	245	1,200	2,200
15	10312012	*Adrian Valley tributary near Wabuska* (5.75)	1968-81, 1987-96	July 1990	320	66	390
16	10312015	*Adrian Valley tributary near Weeks* (0.12)	1968-81, 1987-96	May 10, 1987	8.0	9	17
17	10312050	*Lahontan Reservoir tributary near Silver Springs* (4.39)	1962-78, 1981-96	Aug. 5, 1974	920	140	1,000
18	10319470	*Willow Creek tributary near Jiggs* (0.82)	1962-78, 1982-96	Mar. 1983	15	80	150
19	10322980	*Cole Creek near Palisade* (11.4)	1962-83, 1985-96	June 1983	1,090	390	630
20	10328240	*Humboldt River tributary near Bliss* (1.90)	1968-78, 1980-96	July 18, 1973	113	110	230
21	10336080	*Humboldt Slough tributary near Bradys Hot Springs* (11)	[2]1962-96	Aug. 1984	710	870	2,800
22	10350100	*Long Valley Creek near Lockwood* (about 90)	1956, 1967-1978, 1986,1995-96	Feb. 1986	5,400	10,000	13,000
23	10351850	*Pyramid Lake tributary near Nixon* (1.94)	[2]1968-96	Feb. 19, 1986	950	1,500	2,200
24	10353520	*Eagle Creek near Orovada* (3.44)	1962-78, 1981-96	June 1984	10	17	35

[1] Determined using guidelines of the Hydrology Committee (1981). The 100-year peak discharge is theoretical and, statistically, has a 1-percent chance of happening in any given year (Garcia, 1997). Likewise, the 50-year peak discharge has a 2-percent chance of happening in any given year.

[2] Includes periods of incomplete record.

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

Garcia, K.T., 1997, *January 1997 flooding in northern Nevada—Was this a "100-year" flood?*: U.S. Geological Survey Fact Sheet FS-077-97, 4 p.

Hydrology Committee, 1981, *Guidelines for determining flood flow frequency*: Washington, D.C., U.S. Water Resources Council, Bulletin 17B, 28 p., 14 app.

Reno Gazette-Journal, 1997, *Flood damage hits $1 billion mark*: Reno Gazette-Journal, May 30, 1997, p. 1A.

Thomas, B.E., Hjalmarson, H.W., and Waltemeyer, S.D., 1994, *Methods for estimating magnitude and frequency of floods in the southwestern United States*: U.S. Geological Survey Open-File Report 93-419, 211 p.

U.S. Geological Survey, 1997, *Water resources data, Nevada, water year 1996*: U.S. Geological Survey Water-Data Report NV-96-1, 611 p.

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