United States. Army. Corps of Engineers. Los Angeles District.

FLOOD PLAIN INFORMATION

RIO de FLAG AND SINCLAIR WASH

VICINITY OF FLAGSTAFF
COCONINO COUNTY, ARIZONA

PREPARED FOR
CITY OF FLAGSTAFF
BY
CORPS OF ENGINEERS, U.S. ARMY
LOS ANGELES DISTRICT, CALIFORNIA
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CONTENTS

PAST FLOODS

Summary of Historical Floods

Floods in Rio de Flag and Sinclair Wash in the vicinity of Flagstaff are known to have occurred as early as 1888. Other reported floods have occurred in 1896, 1903, 1916, 1920, 1923, 1937, 1938, 1950, 1963, 1966 and 1973. It would appear that in the past actual flood damage was slight, in monetary terms, and problems were more of an inconvenience nature.

Flood Records

Reliable estimates of peak discharges or volumes in Rio de Flag are virtually nonexistent. What information that is available is in the form of general descriptions from newspapers, recollections of city officials and long-time residents, and data obtained from AT&SF Railroad files. Table 4 indicates the years of known and possible floods, along with the estimated magnitude of their peaks. The magnitudes were estimated by interpreting the gathered information and comparisons with channel cross sections, or high water marks. Figure 11 depicts a flooded area map prepared by the City of Flagstaff in 1938.

TABLE 4

FLOODS OF RECORD
RIO DE FLAG AT SANTA FE AVENUE

Date		Range of Estimated Discharge (cfs)	Type of Precipitation
Month	Year		
September	1923	1,200	RF
November	1888	600 – 700	RF
July	1896	600 – 700	RF
April	1903	600 – 700	SM-RF
February	1920	600 – 700	RF
March	1938	600 – 700	SM-RF
January	1916	250 – 500	SM-RF
April	1937	250 – 500	SM
March	1950	250 – 500	SM-RF
August	1963	250 – 500	RF
March	1966	250 – 500	SM
April	1973	250 – 500	SM

RF – Rainfall
SM – Snowmelt

Flood Descriptions

The following is a list of descriptions of known floods that resulted from natural phenomena. The sources of these descriptions are based on newspaper accounts, railroad records, museum publications, U.S. Soil Conservation Service reports, and Flagstaff city officials.

FLOOD DESCRIPTIONS

Date	Description	Source*
November 1888	Flood was caused by intense rainfall of less than 1 day duration. It was during this flood that the "Bottomless Pits" opened up on the surface. Newspaper article in 1903 calls 1888 the largest flood to have occurred. Water extended from old Hotel Weatherford to the school (see figure 11) and was said to be deep enough to swim a horse. There may have been another flood, equally serious, in August 1888.	1, 2
July 1896	Following heavy rain of short duration, the river overflowed its banks in many places within the city limits, finding its old channel where the stream enters town. South of town, the flat areas were covered with water.	2
April 1903	Melting snow and falling rain caused the river to overflow its banks and take its former course through town. When the river reached its highest stage, that portion of town lying between Leroux and Sitgreaves Streets in the flat part of town just north of the railroad track was under 1 to 15 inches of water. The country south of the track and west of the stream was aflood. Since 1896, the river had had but little water flowing in it.	3
November 1905	No mention of flooding in November or any other time of the year. The month of November, however, was the wettest month on record to 1905. It rained 7.10 inches, which is 4.88 inches above average for the month of November. Weather Bureau records indicate 3.91 inches of rain fell between 11 November and 27 November.	3

FLOOD DESCRIPTIONS (Continued)

Date	Description	Source*
January 1916	Several days of snow and rain caused the river to run full, threatening to overflow in places. However, a freezing period retarded runoff from snowmelt enough to prevent damage. There never had been such a snowfall followed by steady rains, according to the oldest resident. The Weather Bureau measured 54 inches of snow in January, with an estimated 12 inches total water equivalent of snow and rainfall.	3
February 1920	A 3-day rain, falling on already saturated soil, resulted in flooding not equalled since 25 years before. The river overflowed its banks and converted the area south of town into a sizeable lake. In the "Bottomless Pits" area, water was said to be 30 feet deep, but this was probably an exaggeration. Railroad records give a high water elevation of 6761.9 feet, indicating a depth of about 19 feet. Flow in the "Pits" area was augmented by runoff from Slaughter House, Switzer, and several other smaller canyons. Runoff could have been greater had it not snowed in Fort Valley. Precipitation in the City of Flagstaff was reported to be 1.85 inches.	3, 5
September 1923	Nearly 3 days of hard rain caused the river to overflow its banks and flood more than a third of the city, forming a lake that covered almost all the southside and extended in an easterly direction for several miles. Railroad records give a higher water elevation in the "Bottomless Pits" area of 6,759 feet. Precipitation in the city of Flagstaff was reported to be 2.12 inches.	3, 5, 6
April 1937	The river, through town, was near or at channel capacity for several days because of melting snow. This was the first time since 1923 that floodwaters have flowed into the "Bottomless Pits." The water surface elevation in the "Pits" area is not known.	3

FLOOD DESCRIPTIONS (Continued)

Date	Description	Source*
March 1938	Continuous rain falling on melting snow forced the river far over its banks at some points, and floodwaters lapped the floor beams of several bridges. Much of the south side was under water.	3
March 1950	Rain and snowmelt caused the river to flow bank full from Park Lake to O'Leary Street. Little if any overflow.	4
August 1963	An intense thunderstorm occurred on 2 August dumping 1.71 inches on Flagstaff in 1 hour. One-half inch is said to have fallen in 5 minutes. Although the river was about 3 feet deep just north of the tracks and lacked some 2 feet of overflowing, serious local flooding occurred in the vicinity of Aspen and Beaver Streets.	3, 4
March 1966	Snowmelt flood. Elevation of highwater mark in "Bottomless Pits" area was 6,753 feet.	4, 5
April 1973	Snowmelt flood. The river flowed bank full for several days. No overflow. Highwater elevation of 6,751.4 was estimated by a consultant to the city. The U.S.G.S. measured a peak of 235 cfs at their staff gage north of town.	4

SOURCE:

1. "Flagstaff Whoa," G. Hochderffer, Museum of Northern Arizona, Flagstaff, Arizona, 1965.

2. "Coconino Weekly Sun."

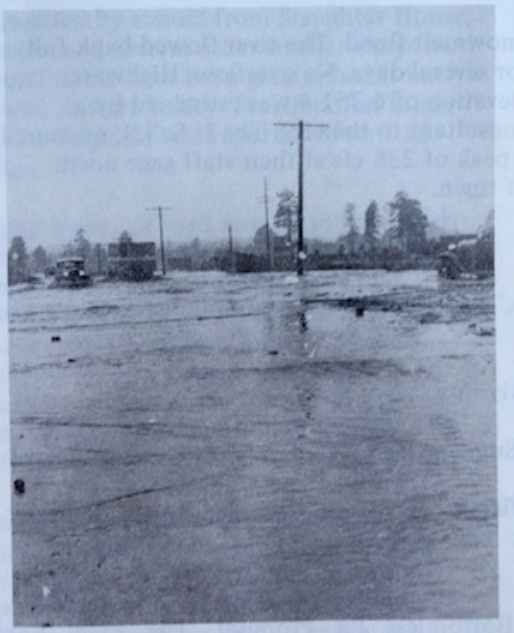
3. "The Coconino Sun."

4. Flagstaff city officials.

5. AT&SF records.

6. "Rio de Flag Bottomless Pit Proposal, The Final Engineering Report," Soil Conservation Service, Flagstaff Office, dated 18 December 1944.

Following are figures 12 through 19 which show the extent of the 1938 flood.



Figures 12 and 13 – These photos of the March 1938 flood show the extent of flooding, sedimentation, and difficulties of motor traffic, looking south from U.S. Highway 66.

Figures 14 and 15 – Residential areas of Flagstaff sustained damages in the 1938 flood, as shown in these photos looking south on Beaver Street at Clay Avenue. Water marks on several houses indicate that inundation at the peak of the flood was even more severe.

Figure 16 – Rio de Flag overtopped the Clay Avenue bridge in 1938 as this view looking south from the bridge depicts.

Figure 17 – 1938 floodwaters are still flowing channel deep in Rio de Flag in this picture, looking east in back of DuBeau's Motel Inn.

Figure 18 – The Mexican Catholic Church is seen amidst the subsiding floodwaters near Riordan Road, March 1938.

Figure 19 – Looking south toward the Arizona State Teacher's College, March 1938.