

SECTION C HYDROLOGY

INTRODUCTION

This section provides the available river peak flow data for the South Fork Big River (1961-1974), Navarro River (1951-1998) and Noyo River (1952-1998). Other than the few years of stream flow information on the South Fork Big River there is little information on peak storm events in Big River, thus the information from the Noyo River and the Navarro River is presented to give an indication of storm timing and magnitude. High river peak flow events are indicative of the largest storms, with large storms typically comes high erosion and sediment transport events.

The Big River WAU does not receive significant snow accumulations that could contribute to rain-on-snow events. Current research shows possible cumulative effects from increased peak flows from forest harvest in rain-on-snow dominated areas (Harr, 1981). However, in rain dominated areas increases in large stream peak flows (i.e. > 20 year event) from forest harvesting are not found (Ziemer, 1981; Wright et. al., 1990). The Big River WAU is a rain-dominated area in the temperate coastal zone of Northern California therefore analysis on peak flow hydrologic change was not done.

PEAK FLOWS

The peak flow information was taken from the United States Geological Survey (USGS) gage 11468070, South Fork Big River, from water years 1961-1974 (no data for 1971-1973). To estimate the recurrence interval of the flood events of the South Fork Big River the USGS annual peak flow series was used. An extreme value type I distribution (Gumbel, 1958) was fitted to the data. Table C-1 shows the estimated recurrence interval for peak discharges in the basin at that location.

Table C-1. Flood Recurrence for Peak Flows of the South Fork Big River, 1961-1974.

<u>Recurrence Interval (years)</u>	<u>Peak Flow (cfs)</u>
1.1	950
1.5	2300
2	3100
5	5060
10	6360
25	8000
50	9220

Figure C-1 shows the peak flow data for the South Fork Big River, Figure C-2 shows the Navarro River peak flows and Figure C-3 shows Noyo River peak flows. The flood of record for the South Fork Big River (1962-1974) is in the 1965 water year, specifically December 1964. This is in contrast to the Navarro and the Noyo River that has their floods of record the 1956 and 1974 water years respectively. Comparing the South Fork Big River peak flow data and the Navarro and Noyo River peak flow data shows that there is correlation with the annual events (Figures C-4 and C-5). Though not a direct correlation the relationship between South Fork Big River and the Navarro and Noyo peak flows suggests that large storms that effect Navarro or Noyo similarly effect Big River, thus for consideration of magnitude of past large storm events the Navarro and Noyo information is reasonable.

Figure C-1. South Fork Big River Annual Peak Flows, 1961-1974 Water Years

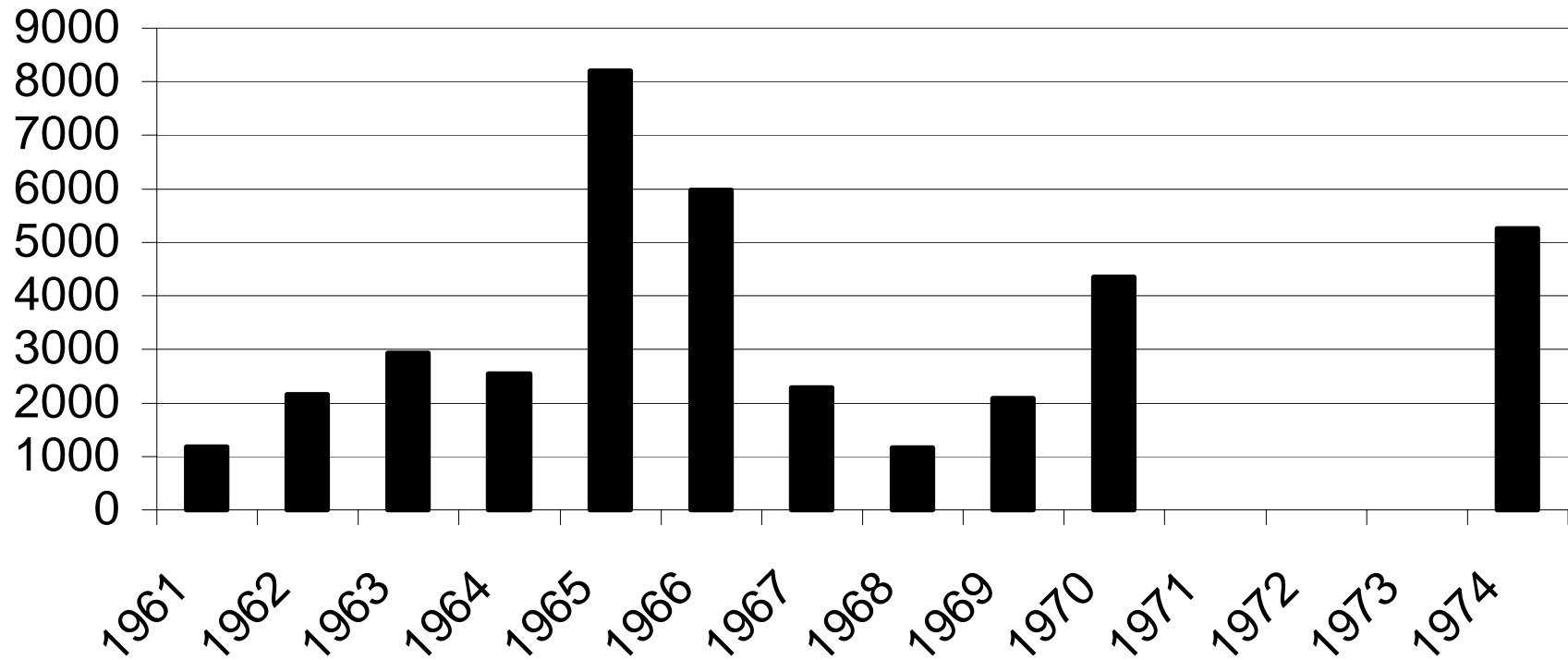


Figure C-2. High Peak Flows (above base flow) for Navarro River, 1951-1998

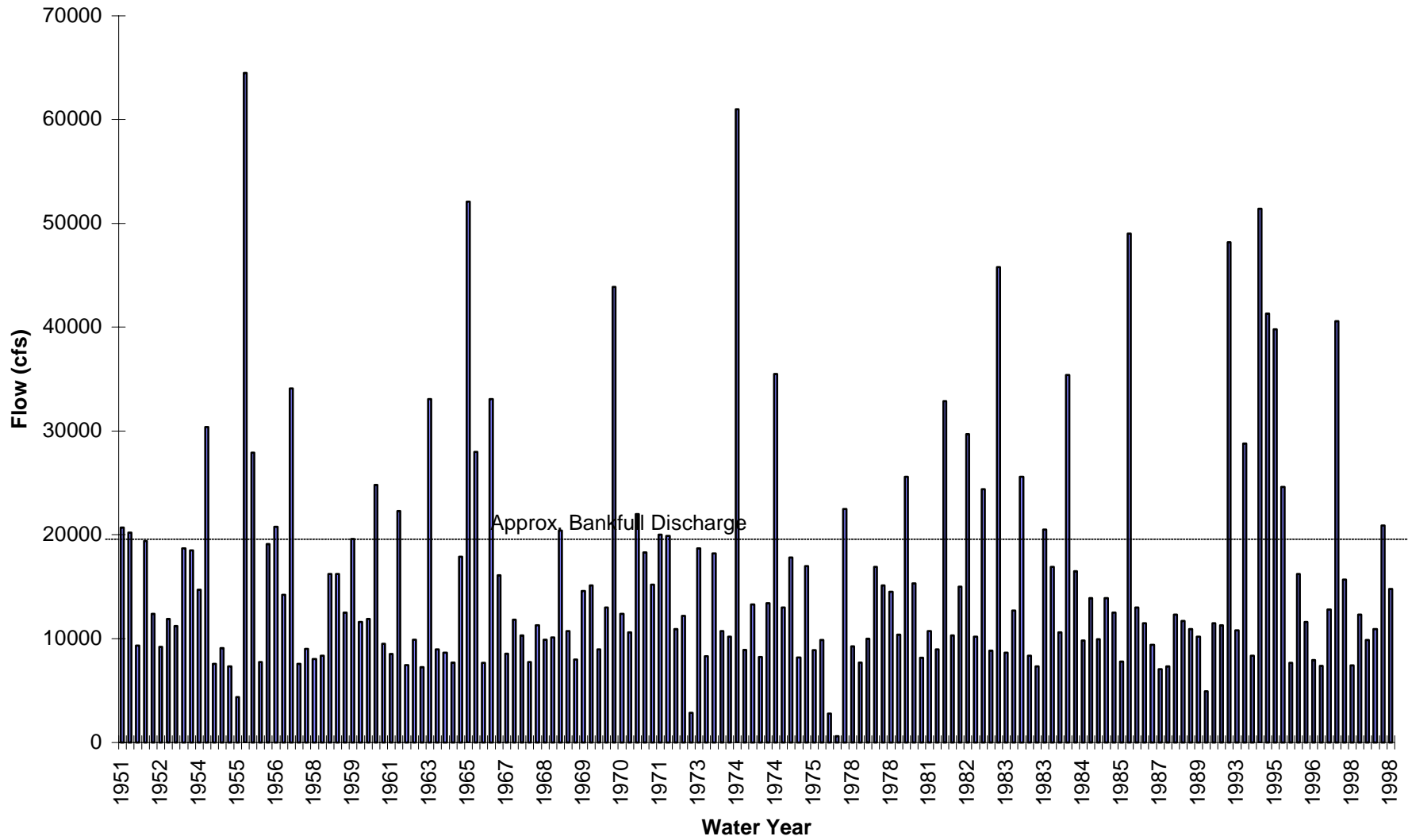


Figure C-3. High Peak Flows (above base flow) for Noyo River, 1952-1998

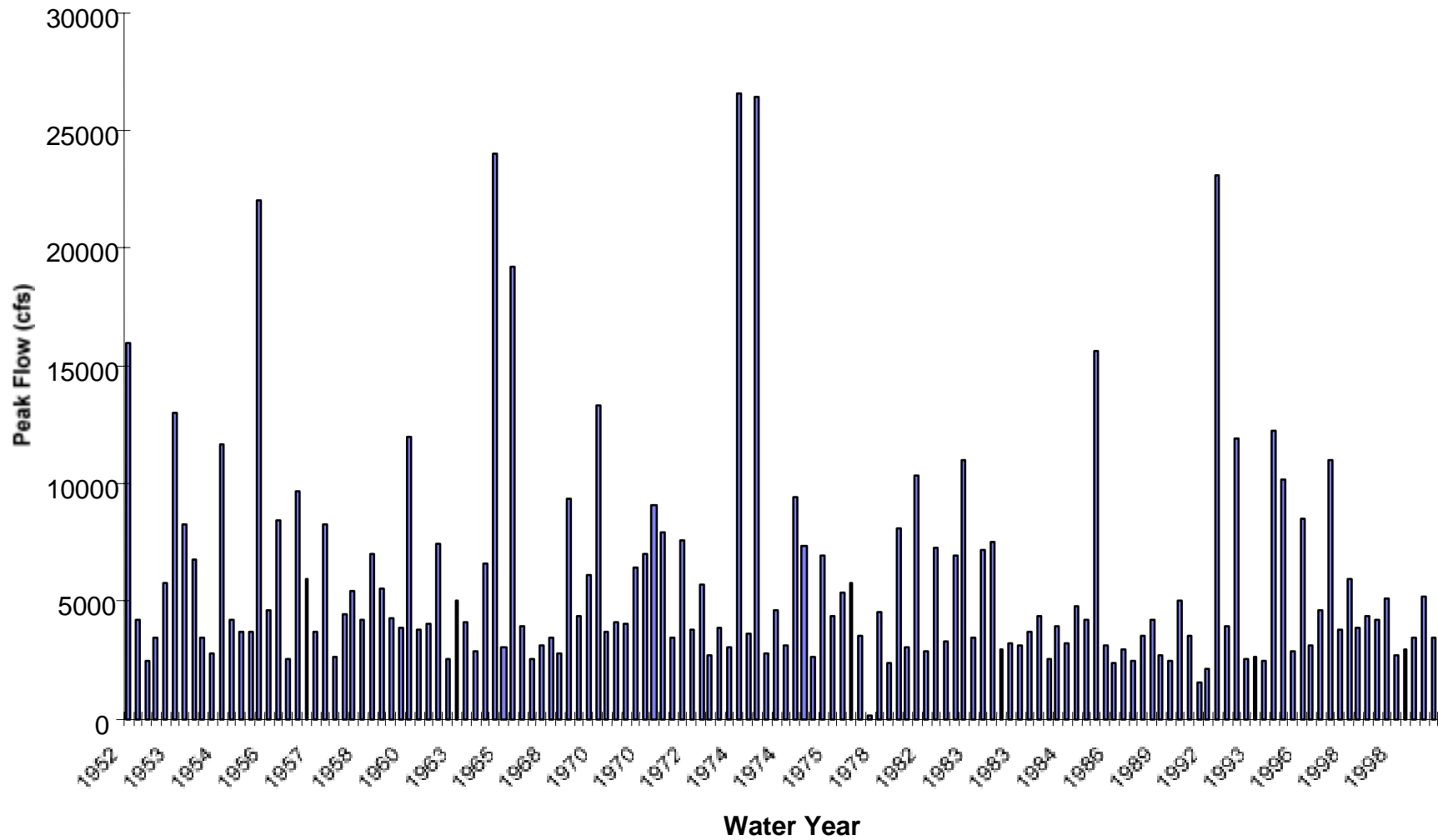


Figure C-4. Relationship of South Fork Big River and Navarro River Annual Peak Flows (1961-1974).

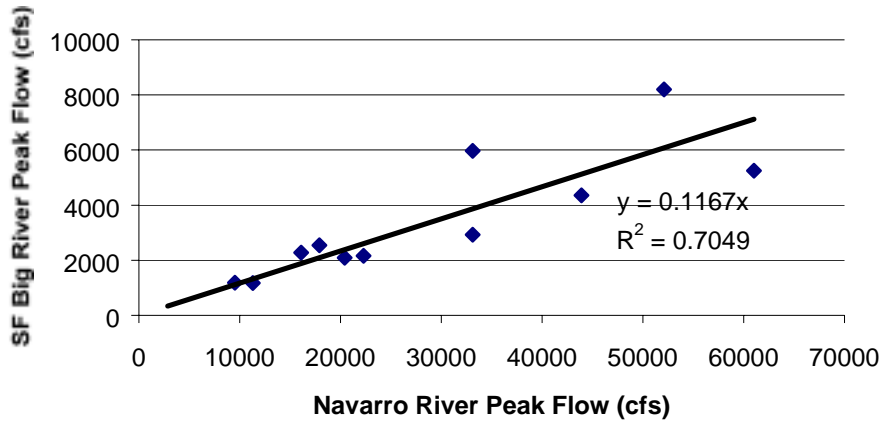
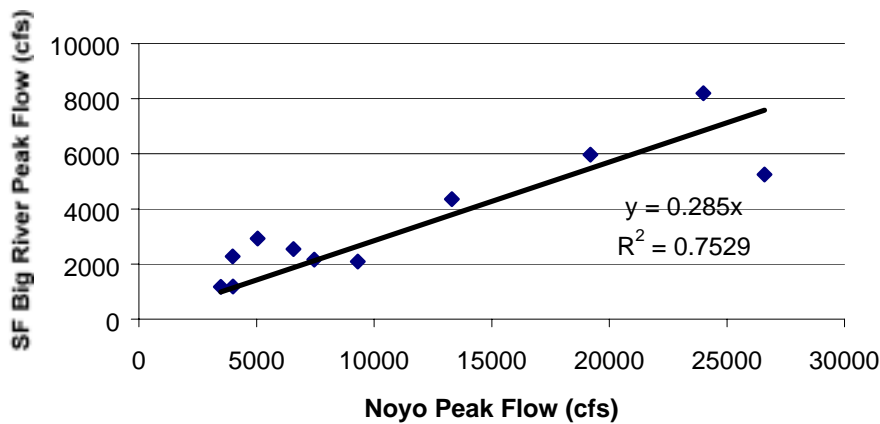


Figure C-5. Relationship of South Fork Big River and Noyo River Annual Peak Flows (1961-1974).



The data suggests that Big River has experienced many large storms. Using the peak flow data from the Noyo River, 1952-1998, the flood of record is 1974 (26,600 cfs) considered to be greater than a 50 year event for the Noyo River. In the last decade alone, in the Noyo River, there has been 1 storm around a 30-40 year recurrence (1993), 1 storm greater than a 5 year recurrence (1995) and 6 storms greater than bankfull discharge (approx. >1.5 yr. recurrence). Using the peak flow data from the Navarro River, 1952-1998, the flood of record is 1955 (64,500 cfs) considered to be greater than a 50 year event for the Navarro River. In the last decade the Navarro River has had 2 storms greater than a 10 year recurrence (1993 and 1995), 5 storms greater than a 5 year recurrence (1993, 1995(3) and 1998) and 8 storms greater than bankfull discharge (approx. >1.5 yr. recurrence). This indicates a high number of extreme storms occurring within the last decade. The high occurrence of these extreme storms in the last decade suggests

that the Big River WAU has been subjected to stressful hydrologic conditions, possibly creating a greater incidence of landslides, road failures or surface erosion.

Throughout the last 50 years in the Big River WAU (based on Navarro and Noyo data) there have been numerous large flood events. Using the streamflow data from the Navarro and Noyo Rivers for the last 50 years, there have been 4 events >20 year recurrence (1955, 1965, 1974, and 1993 water years) and an additional 4 events > 10 year recurrence (1970, 1982, 1986, and 1996 water years). These flood events have the capacity to re-shape river or stream channels and transport large sediment loads. The meteorological events that created these large floods also can be assumed to be a major contributor to the erosion and mass wasting delivered to the watercourses in the WAU.

LITERATURE CITED

Gumbel, E.J. 1958. Statistics of extremes. Columbia University Press, New York.

Harr, D. 1981. Some characteristics and consequences of snowmelt during rainfall in western Oregon. *Journal of Hydrology*, 53: 277-304.

Wright, K.A., K. Sendek, R. Rice, and R. Thomas. 1990. Logging effects on streamflow: storm runoff at Caspar Creek in northwestern California. *Water Resources Research*, 26(7) 1657-1667.

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