

## Section C HYDROLOGY

### INTRODUCTION

This section provides the available river peak flow data for the Navarro River. The peak flow data is used to show the magnitude of storm events and when they occurred. High river peak flow events are indicative of the largest storms, with large storms typically comes high erosion and sediment transport events.

The Navarro WAU does not receive any 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 peak flows (i.e. > 20 year event) from forest harvesting are not found (Ziemer, 1981; Wright et. al., 1990). The Navarro WAU is a rain-dominated area in the temperate coastal zone of Northern California therefore analysis on peak flow hydrologic change was not conducted.

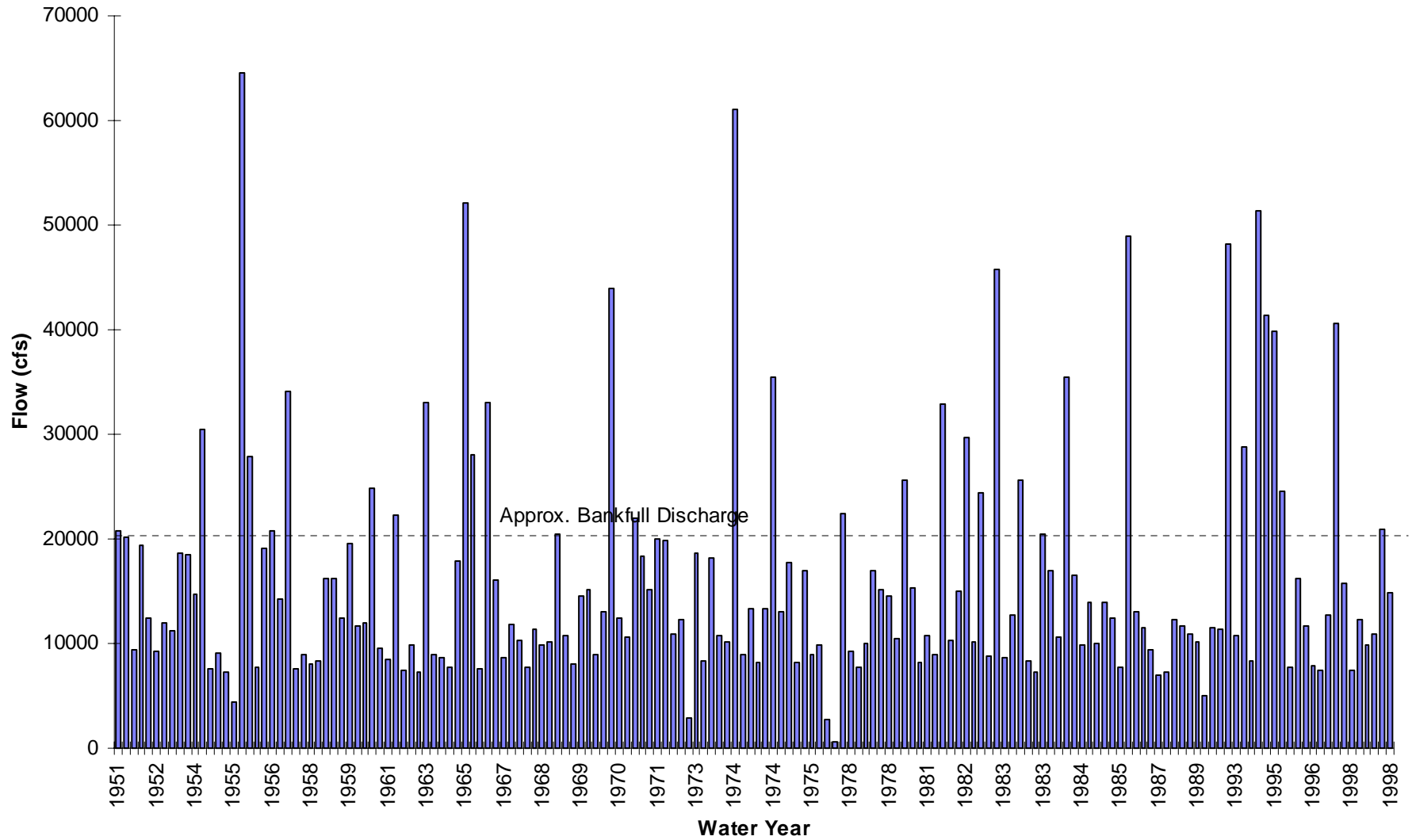
### Peak Flows

The peak flow information was taken from the United States Geological Survey (USGS) gage 11468000, Navarro River near the ocean, from water years 1952-1998. All peak flows greater than base flow (7000 cfs) are shown over the period of record (Figure C-1). To estimate the recurrence interval of the flood events of the Navarro 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.

Table C-1. Flood Recurrence for Peak Flows of the Navarro River, 1952-1998.

<u>Recurrence Interval (years)</u>	<u>Peak Discharge (cfs)</u>
2	20430
5	34500
10	43800
25	55560
50	64300
100	72950

**Figure C-1. High Peak Flows (above base flow) for Navarro River, 1951-1998**



Using the peak flow record from 1952-1998, the flood of record is 1955 (64,500 cfs) considered to be greater than a 50 year event for the Navarro River (Table C-1). In the last decade alone there has been 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. >1.5-2.0 year 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 Navarro WAU has been subjected to stressful hydrologic conditions, possibly creating a greater incidence of landslides, road failures or surface erosion than previous decades.

Throughout the last 50 years in the Navarro WAU there have been numerous large flood events (Figure C-1). 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 Navarro WAU.

#### **LITERATURE CITED**

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