Flood Profiles in the Calapooya Creek Basin, Oregon

By John Friday

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JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

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COVER PHOTOGRAPH: View of Calapooya Creek when looking downstream from the bridge on Highway 99 in Oakland.

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ILLUSTRATIONS

TABLES

Available separately

Map panels 1-7. Orthophoto map panels showing location of cross sections, 100-year flood boundaries, selected 100-year flood elevations, and designated floodway

CONVERSION TABLE

[For the use of those readers who might prefer to use metric rather than inch-pound units]

MULTIPLY	BY	TO OBTAIN
Inch (in.)	25.4	Millimeter (mm)
Foot (ft)	0.3048	Meter (m)
Mile (mi)	1.609	Kilometer (km)
Square mile (mi^2)	2.59	Square kilometer (km^2)
Cubic foot per second (ft^3/s)	0.0283	Cubic meter per second (m^3/s)

NOTE

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called mean sea level.

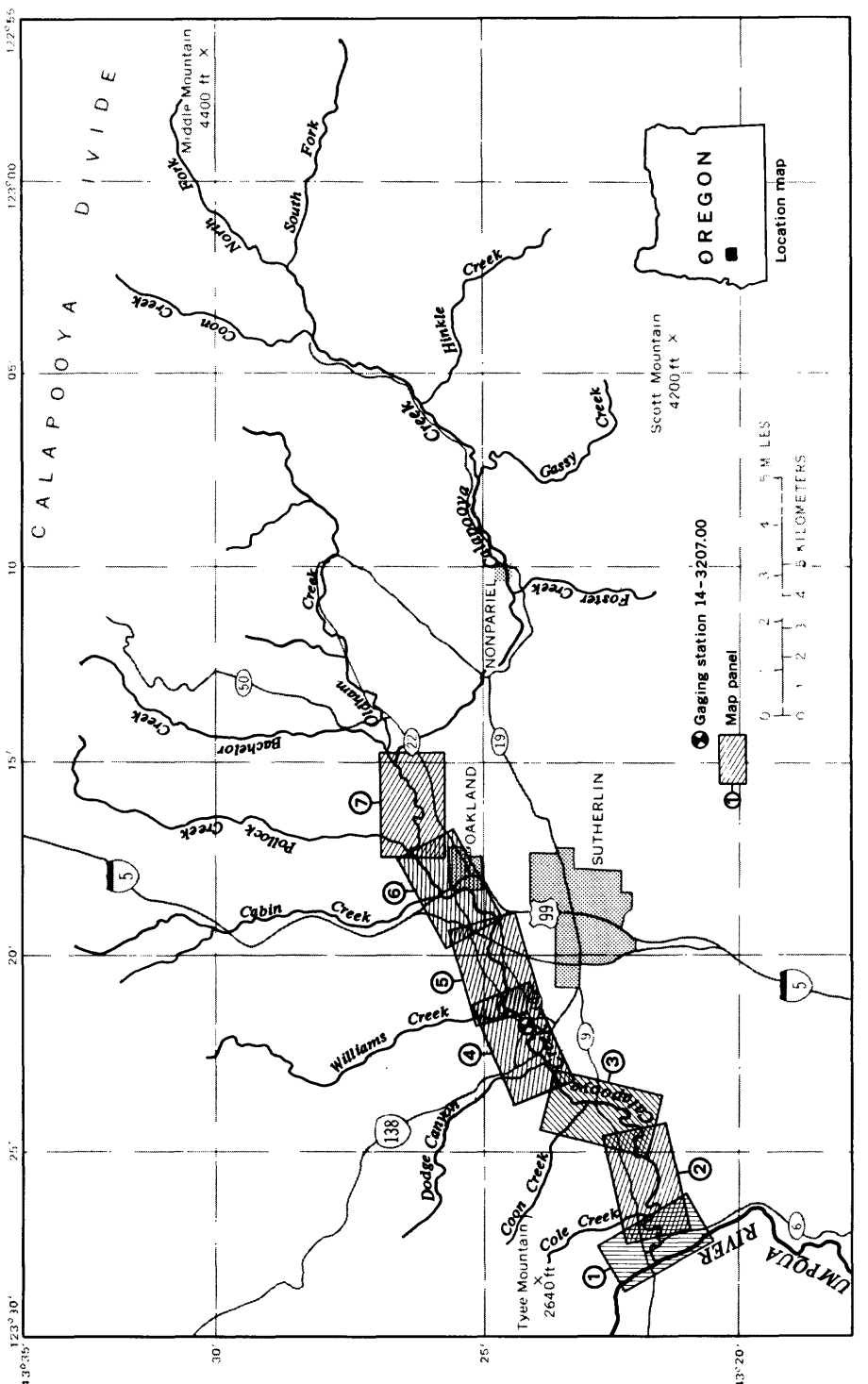

FIGURE 1. — Index map showing position of map panels.

FLOOD PROFILES IN THE CALAPOOYA CREEK BASIN, OREGON

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ABSTRACT

Water-surface profiles were computed for a 19.4-mile reach of Calapooya Creek in Douglas County, Oreg. The data will enable the county to evaluate flood hazards in the flood-prone areas in the reach. Profiles for floods having recurrence intervals of 2, 10, 50, 100, and 500 years are shown in graphic and tabular form. A floodway, allowing encroachment of the 100-year flood, was designed with a maximum 1.0-foot surcharge limitation. A profile for a flood that occurred in November 1961 is also presented. All data were derived from a digital computer model developed for the study.

INTRODUCTION

This study was made at the request of the Douglas County Water Resources Survey. The flood-profile data will enable the county to evaluate the flood hazards in the lower reaches of Calapooya Creek. A knowledge of these elevations and their related flood boundaries is essential for administering land-use measures in the flood plains. A well-managed flood plain can reduce the risk of losses of life and property by controlling the location of future developments in flood-prone areas.

Wherever possible, this study has been made compatible with a Flood Insurance Study (FIS) completed for the unincorporated areas of Douglas County (U.S. Federal Emergency Management Agency, 1978). In that study, data for Calapooya Creek were derived by approximate methods, based in part on flood elevations computed in an earlier profile study of the Umpqua River (Oster, 1972). The data presented herein supersede the approximate study and follows a format suitable for a subsequent Flood Insurance Study should the need arise.

SCOPE OF STUDY

The study reach extends from the mouth of Calapooya Creek to a point 639 ft upstream from Oldham Creek (river mile 19.4). See figure 1. Water-surface elevations were computed for floods that would occur on the average of once every 2, 10, 50, 100, and 500 years; a profile documenting a flood that occurred in November 1961 was also a requirement of this study. A floodway analysis was made to determine the areas that must be kept free from encroachment in order to pass the 100-year flood without exceeding a specified 1.0-foot surcharge.

The accuracy limit of all profile elevations is $\pm$0.5 ft; all elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

Boundaries of the 100-year flood and the designated floodway are shown on orthophoto maps furnished by Douglas County (published separately). Also shown are elevations for the 100-year flood at selected locations. The relative position of the seven map panels are shown on the vicinity map in figure 1.

BASIN CHARACTERISTICS

Calapooya Creek is a tributary of the Umpqua River and it originates at the Calapooya Divide, a mountain range dividing the Willamette and Umpqua River basins in western Oregon. The stream flows westerly in deep canyons until it reaches Oldham Creek at the upstream end of the study area. No major tributaries enter the creek from the south downstream from that point. The main channel is entrenched in fertile alluvial valleys. The streambanks are covered with dense brush and trees and the flood plains are undulating pasture and farmlands interspersed with thickets of deciduous brush and trees.

Elevations range from 353 ft at the bridge deck on County Road 6 near the mouth, to 4,400 ft at Middle Mountain, the highest peak in the basin. The steep terrain in the upper basin is heavily forested, but clearcut areas with dense brush are numerous. The relief in the lower basin is more subdued; vegetation consists of coniferous and deciduous trees, brush, and grasslands.

The hydrologic soil group throughout the basin is in the Steiwer-Sutherlin Association and is classified as Group C (U.S. Soil Conservation Service, 1968). Such soil has a slow infiltration rate when thoroughly wetted, and surface runoff is high.

The only incorporated area in the 247-square-mile basin is the community of Oakland which has a population of 890 (see Oregon Blue Book, 1981-1982, State of Oregon, 1981). The stream flows through the western edge of the city, but the business district and suburban areas are located well above the flood plain.

FLOOD HISTORY

Flooding is a common occurrence in the Calapooya Creek basin. High-intensity winter rainstorms result from the passage of Pacific storm fronts that move quickly through the area. Flows in excess of 20,000 ft^3/s will inundate the flood plains because the channel gradient is very low.

The highest peak flow recorded at a gaging station located at the covered bridge on County Road 10 (station 14-3207.00) occurred in November 1961. The discharge of 26,600 ft^3/s, with an estimated recurrence interval of about 15 years, caused flooding in many areas throughout the basin. Population densities at the time were light, and flood damage is unknown.

The most extensive flooding occurred in December 1964 when backwater from the Umpqua River extended 3.4 mi up the Calapooya Creek channel. The recurrence interval for the Umpqua flood is estimated to be about 100 years. The concordant flow in Calapooya Creek (peaking 5 hours earlier) was 21,000 ft^3/s, an 8-year flood. Estimated flood damage totaling $183,000 involved 27 homes and included extensive siltation of agricultural lands (U.S. Army Corps of Engineers, 1966a).

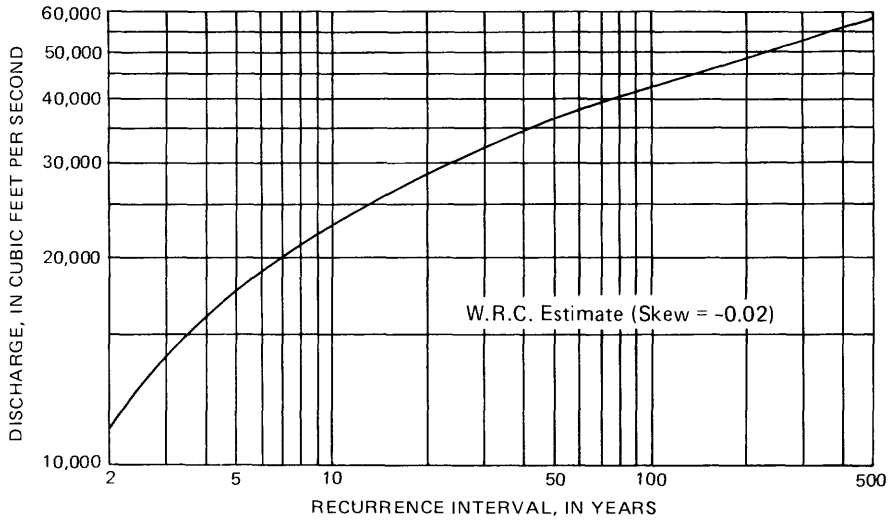

FIGURE 2. – Flood-frequency curve for gaging station 14-3207.00, Calapooya Creek near Oakland, Oreg. (1956-80).

ANALYTICAL TECHNIQUES

Hydrology

To determine the flood hazards in the study reach, it was necessary to estimate the magnitude of floods that would be equaled or exceeded on the average of once every 2, 10, 50, 100, and 500 years. The reciprocal of each of these recurrence intervals indicates the exceedance probability of the event (expressed as a percent chance of their occurring in any given year). For example, a 50-year flood would have a 2 percent chance of being equaled or exceeded during the year (1/50=0.02).

In 1977, the U.S. Water Resources Council (WRC) established guidelines to be used for estimating such floods whenever 10 or more years of recorded peak-flow data were available. Station 14-3207.00, Calapooya Creek near Oakland, Oreg., with 24 years of peak data, was therefore used in the recommended log-Pearson Type III probability distribution with a generalized skew coefficient determined from WRC Bulletin 17-A. No outliers were detected, and the resultant discharges were not adjusted for expected probability. The WRC frequency curve is shown in figure 2.

Peak discharges at selected points in the study reach are shown in table 1. Each of the design discharges at the gaging station was adjusted for tributary inflow by using the transfer formula:

$$Q_u = Q_g (A_u / A_g)^a$$

where

Q_u = unknown discharge at the tributary, in ft^3/s

Q_g = discharge at the gaging station, in ft^3/s

A_u = drainage area at the tributary, in mi^2

A_g = drainage area at the gaging station, in mi^2, and

a = variable exponent derived by regression analysis and presented in the western Oregon flood-frequency report (Harris and others, 1979).

Table 1. – Summary of discharge used to estimate flood-profile elevations

Location	Drainage area (mi^2)	Peak discharge, in cubic feet per second					
		2-year flood	10-year flood	50-year flood	100-year flood	500-year flood	1961 flood
At confluence with Umpqua River	247	12,600	26,400	41,400	48,500	67,000	30,700
Downstream from Dodge Canyon	224	11,600	24,300	37,900	44,400	61,300	28,200
At gaging station 14-3207.00	210	11,000	22,900	35,800	41,900	57,800	26,600
Upstream from Williams Creek	193	10,200	21,300	33,200	38,800	53,500	24,700
Upstream from Cabin Creek	162	8,800	18,200	28,300	33,200	45,600	21,200
Downstream from Oldham Creek	144	7,950	16,400	25,400	29,800	41,000	19,100

The transfer formula is normally limited to drainage areas that are within 5 to 25 percent of that at the gaging station. The extreme upper reach of Calapooya Creek slightly exceeds this limitation, but to attain consistency in flow distribution, the transfer formula was used throughout the reach.

Hydraulics

Water-surface elevations were computed at all cross sections by using the USGS computer program E-431 (Shearman, 1976). The program used in the digital model computes energy losses between sections, using conservation-of-energy equations (step-backwater analysis). The hydraulic model requires measurements of channel cross sections, bridge and dam geometries, and an evaluation of the roughness of the main channel and flood plains. Cross-section definition and bridge geometries were furnished by Douglas County. The location of each of the 111 sections is shown on the seven orthophoto maps also provided by the county.

Cross sections 1 to 8 are on the Umpqua River flood plain. Initial elevations for the 2- and 10-year floods were considered to be unaffected by backwater and were derived using a slope-conveyance study at section 1. Initial elevations for each of the higher floods were determined at section 8 and represent concurrent flooding of the Umpqua River. The water-surface elevations for cross sections 1 to 8 represent the energy slope of the Umpqua River as computed in the Douglas County Flood Insurance Study (see U.S. Federal Emergency Management Agency, 1978).

When the Umpqua River is high, flow can enter the Calapooya Creek flood plain via two swales in the pasture between County Road 6 and the river. When the Umpqua River is low, flows in the swales reverse direction, allowing a part of the Calapooya flow to bypass sections 1 to 6. Because the floodway analysis involves a 100-year flood event unaffected by backwater, it was necessary to determine the extent of bypass flow before a valid initial elevation could be computed at section 8. A composite stage-discharge relation combining culvert and road overflow could not be made because the downstream channel slope would not support a critical-depth condition. It was therefore necessary to establish a stage-discharge relation at the outlet of each culvert, using a profile-convergence study at sections 301 through 305 as described by Bailey and Ray (1966). A trial-and-error solution was then made in which an assumed discharge at the mouth, plus the bypass flow, equaled the desired flow at section 8.

A similar bypass-flow situation occurred at the railroad-bridge embankment in north Oakland. Profile elevations at cross sections 79 to 82 are based on only that part of the total flow passing through the bridge opening (see map panel 6).

The roughness coefficients (Manning's "n" values) were assigned to segments of each cross section and applied to the reach of channel extending halfway to the next nearest section. Coefficients ranged from 0.035 to 0.050 in the main channel and from 0.032 to 0.080 in the flood plains. An exception to this range in values occurred when cross sections were necessarily extended up the channel of a tributary (see sections 43 and 44, map panel 4). Unrealistically high coefficients (0.150) were assigned to reduce the conveyance in those areas having adverse flow directions.

Friction losses are, in part, a function of the distance between cross sections (subreaches) as measured along the center line of the channel. When extensive bank overflow occurs at a sharply meandering channel, it is necessary to adjust this distance to better represent the effective subreach length. The adjustment is made by computing a weighted value based on the straight-line distance between the centroids of the conveyance of the flood plain(s) and the actual distance and conveyance of the main channel. Conveyance is a term used to indicate the ability of the channel to transmit flows. The distances shown in the tables and figures of this report apply to the main channel even though adjusted values were used in the model.

The profile elevations at each cross section are shown in table 2; a plot of the profiles is shown in figures 5-16.

FLOODWAY ANALYSIS

Encroachment on flood plains causes an increase in flood elevations, thereby increasing the flood hazard in areas upstream from the encroachment. Flood-plain management involves weighing the benefits from potential development against the increase in flood hazards. To assist planners in this phase of flood-plain management, a floodway analysis was made that presented an allowable encroachment of the 100-year flood that would not cause more than a 1.0-foot increase in water-surface elevations (surcharge)in the main channel.

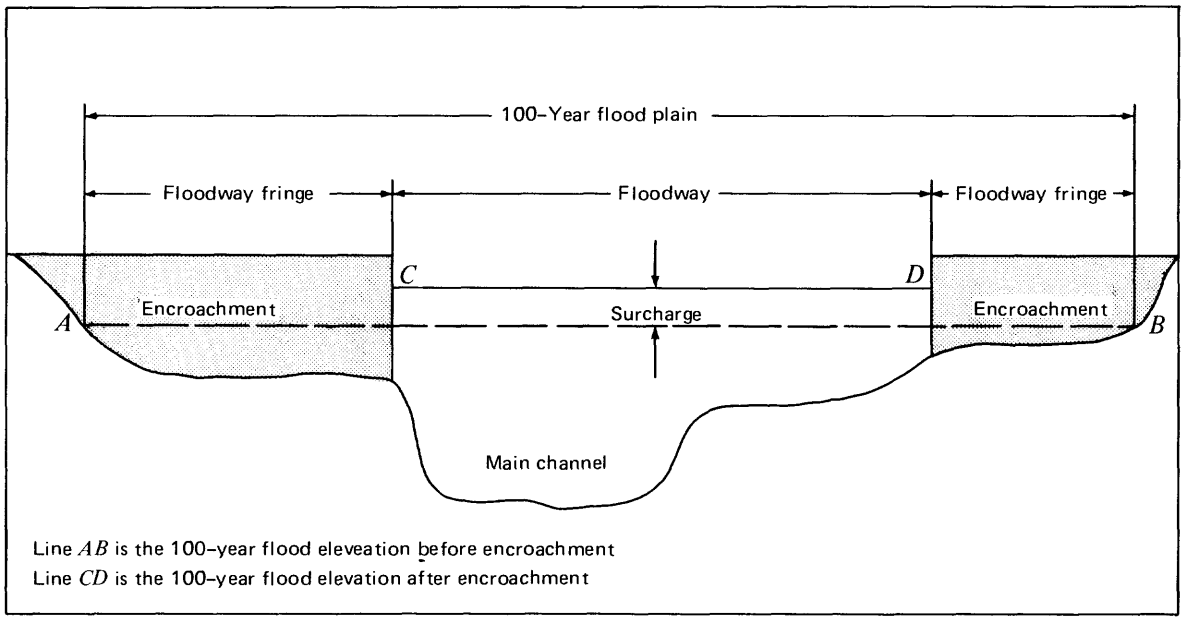

FIGURE 3. – Schematic floodway cross section.

FLOODWAY ANALYSIS – Continued

A floodway is that part of a stream that must be kept free from encroachment in order to pass a 100-year flood without exceeding the specified surcharge. Ideally, a floodway should be designed based on an equal reduction of conveyance from the flood plains on each side of the stream. However, this is not possible where peak flows are totally contained by one of the banks. Also, a floodway based solely on a desired surcharge often results in unrealistic and unmanageable boundaries. In such cases, uniformity of floodway widths becomes an equally important factor.

The area between the floodway and the boundary of the 100-year flood is termed "the floodway fringe." This is the part of the flood plain that could be completely obstructed without causing an excessive surcharge. Figure 3 shows the relationship between the floodway and the floodway fringe.

The floodway on Calapooya Creek began at cross-section 8 because it was necessary to merge the floodway boundaries with those already established in the Douglas County FIS. Some modification in the location of the Umpqua River boundaries was necessary, but any change in published surcharges and related data is minimal. The location of the floodway is shown on map panels 1 to 7; the results of the encroachment of each cross section are shown in table 3.

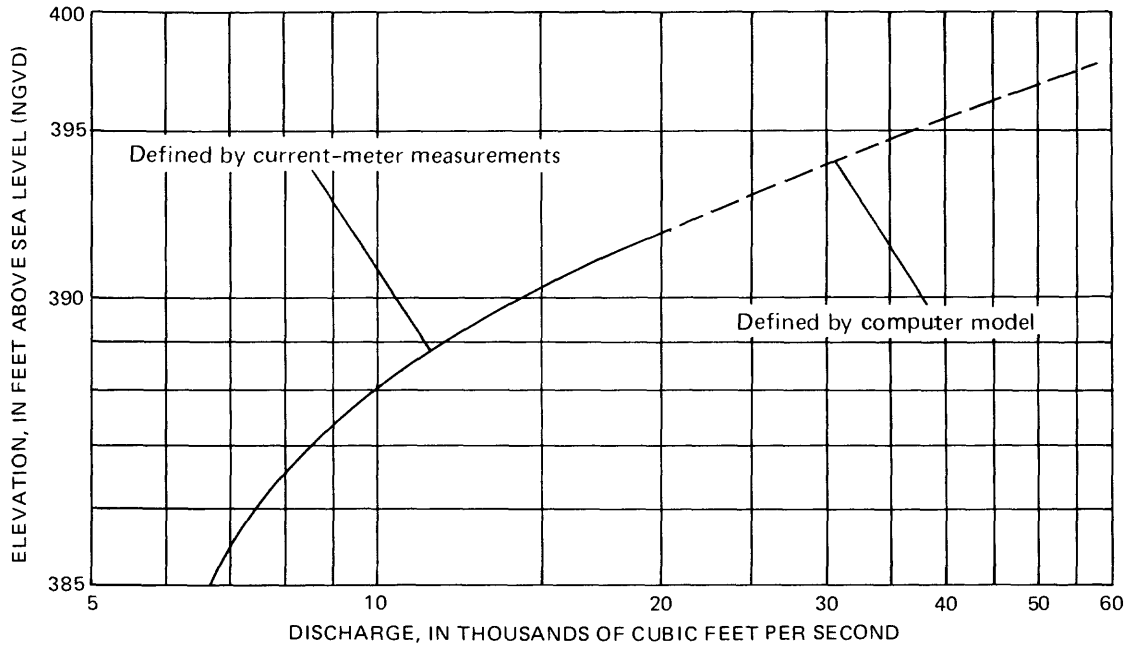

FIGURE 4. – State-discharge relation for gaging station 14-3207.00, Calapooya Creek near Oakland, Oreg. (1956-80).

MODEL VERIFICATION

Many high-water marks were documented following the flood of December 1964. The discharge of 21,000 ft^3/s has an 8-year recurrence interval, and the computed 10-year profile elevations agreed well with many marks. Some marks could not be used because they reflected backwater from debris obstructions; others were questionable because of their uncertain location.

An indirect measurement of peak flow was made at the bridge on Highway 138 following the flood of December 1955. The computed discharge of 20,300 ft^3/s was used to define the upper limit of a stage-discharge relation at the gaging station 0.9 mi upstream. The stage-discharge relation developed at cross section 45 in the computer model agreed within 0.1 ft of the headwater elevation and discharge for that flood.

The simulated profile for the flood of November 1961 is based on a discharge of 26,600 ft^3/s, a 15-year flood. The computed elevation at cross section 49 was 0.4 ft higher than the recorded elevation at the gage which is located in a draw-down area behind a bridge pier.

The stage-discharge relation at the gaging station is shown in figure 4. Current-meter measurements have indicated that a progressive scouring of the control has occurred since the station was established in 1956. The stage of the 2-year flood is questionable because there are no recent measurements to indicate that this scouring trend is continuing. The computer model provided a reasonable extension of the rating curve and is believed to be well within the accuracy limits required in this study.

There are no flood-control structures or levees in the basin. All the data presented in this report are based on field conditions that existed when the aerial photographs were taken (Nov. 5, 1980). The study presents unobstructed flow conditions, although debris problems have occurred in the past. Changes in drainage structures and channel alinements or the addition of levees could alter the profile elevations presented herein.

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Table 2.--Calapooya Creek profile elevations

Cross Section		Elevation, in feet above sea level (NGVD)					
Number	Distance [1]	2-year flood	10-year flood	50-year flood	100-year flood	500-year flood	1961 flood [2]
1	415	335.7	342.0	352.8	354.8	359.9	344.2
2	1,397	336.2	343.1	353.0	355.1	359.9	345.3
3	2,041	336.4	343.4	353.1	355.3	359.9	345.6
--	2,128	County Road No. 6		--	--	--	--
4	2,387	336.8	343.9	355.9	356.4	360.5	346.0
5	2,785	337.0	344.6	356.0	356.5	360.6	346.6
6	3,502	338.5	346.8	356.2	356.6	360.6	348.2
7	5,211	341.6	348.3	356.3	356.8	360.7	349.6
8	5,838	342.5	348.8	356.4	356.9	360.7	350.0
9	6,895	345.1	351.1	356.6	357.2	360.8	352.0
10	10,143	350.6	353.2	357.0	357.6	361.0	353.8
11	11,318	351.5	354.2	357.2	357.8	361.1	354.7
--	12,090	Cole Creek		--	--	--	--
12	12,290	352.3	355.7	357.8	358.3	361.3	356.4
13	13,701	353.6	357.6	359.2	359.7	362.0	358.2
14	15,792	354.2	358.1	359.8	360.4	362.5	358.7
15	16,851	354.6	358.6	360.4	361.1	363.1	359.2
16	18,137	355.8	360.0	361.8	362.4	364.2	360.6
17	19,268	356.6	361.5	363.8	364.6	366.1	362.3
18	20,630	357.8	363.7	366.0	366.6	367.8	364.8
19	21,575	358.8	365.1	367.3	367.8	369.0	366.1
20	22,730	359.9	366.2	368.2	368.7	369.9	367.0
21	24,578	361.3	367.2	369.0	369.5	370.7	367.9
22	25,492	362.0	368.0	369.6	370.2	371.3	368.6
23	26,113	362.7	368.7	370.2	370.7	371.8	369.2
24	27,552	364.4	369.7	371.3	371.8	373.0	370.3
25	28,831	366.2	370.7	372.2	372.8	373.9	371.2
26	30,056	367.0	371.6	373.1	373.6	374.8	372.1
27	31,961	368.0	372.1	373.6	374.2	375.4	372.6
28	33,273	368.5	372.6	374.2	374.7	376.0	373.1
29	34,045	368.8	372.9	374.5	375.1	376.4	373.4
30	34,854	368.9	373.1	374.8	375.4	376.8	373.6
31	35,733	369.7	373.6	375.4	376.1	377.6	374.2
32	36,597	370.8	374.3	376.2	376.9	378.5	374.9
--	36,698	County Road No. 9		--	--	--	--
33	37,041	371.7	376.2	378.0	378.7	380.6	376.8
34	37,414	372.1	376.5	378.4	379.1	380.9	377.2

[1] Measured in feet upstream from confluence with Umpqua River.

[2] November 23, 1961.

Table 2.--Calapooya Creek profile elevations--Continued

Cross Section		Elevation, in feet above sea level (NGVD)					
Number	Distance [1]	2-year flood	10-year flood	50-year flood	100-year flood	500-year flood	1961 flood [2]
--	37,860	Coon Creek		--	--	--	--
35	38,306	373.3	377.4	379.2	379.9	381.7	378.0
36	39,122	373.9	378.3	380.2	380.9	382.6	378.9
37	39,896	374.6	379.3	381.4	382.2	384.1	380.0
38	40,829	375.4	380.7	383.0	383.7	385.5	381.5
39	41,710	376.6	382.2	384.5	385.3	387.1	383.0
40	42,577	377.9	383.1	385.4	386.2	388.0	383.9
41	43,530	379.4	384.5	386.8	387.6	389.4	385.3
42	44,955	381.3	385.9	388.0	388.9	390.7	386.6
--	45,430	Dodge Canyon		--	--	--	--
43	47,857	382.2	386.5	388.7	389.6	391.5	387.2
44	48,117	382.3	386.6	388.8	389.7	391.6	387.3
--	48,261	State Highway No. 138		--	--	--	--
45	48,565	382.5	387.1	390.0	390.9	392.6	388.1
46	50,011	383.2	387.6	390.4	391.3	393.0	388.5
47	51,109	384.0	388.4	391.0	391.9	393.6	389.2
48	52,842	387.1	391.9	394.6	395.4	397.3	392.9
49	53,208	388.1	392.3	394.9	395.7	397.6	393.2
--	53,262	County Road No.10 and gaging station 14-3207.00 (14 feet downstream)					--
50	53,472	388.6	393.0	395.7	396.5	398.3	394.0
51	54,386	389.1	393.5	396.3	397.2	399.0	394.5
52	55,406	390.3	394.4	397.1	397.9	399.7	395.3
53	56,524	392.0	395.7	398.0	398.8	400.6	396.5
54	57,711	392.6	396.4	398.6	399.3	401.1	396.9
--	58,020	Williams Creek		--	--	--	--
55	59,582	393.6	397.4	399.5	400.2	401.8	398.1
56	60,804	394.8	398.4	400.2	400.8	402.4	399.0
57	61,850	395.6	399.4	401.0	401.6	403.0	399.9
58	62,869	397.1	401.6	403.0	403.4	404.6	402.1
59	63,879	398.4	403.6	405.4	406.0	407.4	404.2
60	64,941	399.4	404.8	407.0	407.7	409.1	405.6
61	66,225	401.0	405.8	407.9	408.6	410.1	406.5
62	67,111	401.8	406.3	408.5	409.3	410.9	407.0
63	67,668	402.0	406.4	408.6	409.4	411.0	407.1
64	68,217	402.4	406.6	408.9	409.7	411.4	407.4
--	68,383	Interstate Highway I-5		--	--	--	--
65	68,768	403.2	408.2	411.5	412.8	416.1	409.3
66	69,446	404.4	408.8	411.9	413.2	416.3	409.8

1/ Measured in feet upstream from confluence with Umpqua River.

2/ November 23, 1961.

Table 2.--Calapooya Creek profile elevations--Continued

Cross Section		Elevation, in feet above sea level (NGVD)					
Number	Distance [1]	2-year flood	10-year flood	50-year flood	100-year flood	500-year flood	1961 flood [2]
67	70,351	407.6	410.6	412.8	413.9	416.8	411.2
68	71,270	408.6	411.3	413.4	414.4	417.2	411.9
69	71,885	409.0	411.8	413.7	414.7	417.4	412.3
70	73,017	410.1	412.8	414.6	415.5	417.9	413.4
71	73,887	410.6	413.4	415.2	416.1	418.3	414.0
72	74,973	411.9	415.2	417.2	418.0	420.0	415.8
73	76,082	412.9	416.8	419.2	420.1	422.2	417.6
74	76,705	413.1	417.0	419.5	420.4	422.5	417.8
75	77,730	413.8	417.5	419.9	420.8	422.9	418.2
76	78,403	414.4	418.0	420.3	421.2	423.3	418.7
--	78,483	U.S. Highway No. 99		--	--	--	--
77	78,617	415.4	418.8	421.0	421.7	423.4	419.5
78	79,298	416.9	421.3	424.6	425.9	429.0	422.4
79	80,007	417.4	421.9	425.1	426.4	429.4	422.8
80	80,254	417.4	421.8	425.1	426.4	429.4	422.8
81	80,608	418.6	423.3	426.0	427.1	429.8	424.2
--	80,708	Cabin Creek		--	--	--	--
82	80,867	419.5	424.2	427.2	428.1	430.4	425.1
--	80,913	Southern Pacific Railroad		--	--	--	--
83	81,024	419.8	424.6	427.7	428.8	431.3	425.6
84	81,115	419.8	424.6	427.7	428.8	431.3	425.6
85	81,769	420.0	424.7	427.8	428.9	431.3	425.7
86	82,664	421.1	425.0	427.9	429.0	431.4	425.9
87	83,371	421.6	425.4	428.1	429.2	431.6	426.2
88	84,058	423.4	427.0	429.2	430.2	432.3	427.7
89	84,764	424.9	428.6	430.6	431.6	433.6	429.3
90	85,475	425.5	429.2	431.4	432.4	434.5	430.0
91	86,226	426.1	430.2	432.6	433.6	435.1	431.0
92	86,884	426.5	430.6	433.1	434.2	436.5	431.5
93	87,571	427.2	431.4	434.2	435.4	437.9	432.4
--	87,590	Pollock Creek		--	--	--	--
94	88,232	427.8	432.0	434.7	435.8	438.4	432.9
95	89,691	429.4	433.3	436.2	437.3	440.0	434.3
96	90,320	429.6	433.5	436.3	437.5	440.1	434.4
97	91,158	430.8	434.9	437.4	438.5	440.8	435.7
98	92,031	432.3	436.4	439.1	440.0	441.7	437.3
99	93,210	434.1	438.0	440.6	441.4	443.0	438.9
100	94,290	435.3	438.9	441.6	442.4	444.2	439.8

1/ Measured in feet upstream from confluence with Umpqua River.

2/ November 23, 1961.

Table 2.--Calapooya Creek profile elevations--Continued

Cross Section		Elevation, in feet above sea level (NGVD)					
Number	Distance [1]	2-year flood	10-year flood	50-year flood	100-year flood	500-year flood	1961 flood [2]
101	95,062	437.4	440.4	443.0	443.8	445.9	441.2
102	95,892	440.4	443.6	446.0	446.8	448.4	444.4
103	96,411	441.4	444.8	447.0	447.7	449.2	445.6
104	97,130	442.2	446.2	448.4	449.1	450.3	447.1
105	97,882	442.9	446.9	449.3	450.1	451.6	447.8
106	98,800	444.9	449.0	451.9	452.8	454.5	450.0
107	99,508	446.0	450.0	452.9	453.8	455.6	451.0
108	100,255	448.4	452.1	454.8	455.9	458.0	453.0
109	100,958	451.9	455.4	457.4	458.3	460.6	456.0
110	101,559	453.3	456.8	458.7	459.5	461.5	457.4
--	101,909	Oldham Creek		--	--	--	--
111	102,548	454.9	458.1	460.2	461.0	462.8	458.8

1/ Measured in feet upstream from confluence with Umpqua River.

2/ November 23, 1961.

Table 3.--Calapooya Creek floodway data

Cross section		Floodway				Elevation, in feet above sea level (NGVD)				Map
Number	Distance[1]	Boundary[2]		Section area (ft^2)	Mean velocity (ft/s)	Regulatory	Without floodway	With floodway	Increase	Panel
		Left bank	Right bank							
1	415	--	--	--	--	354.8	--	--	--	1
2	1,397	--	--	--	--	355.1	--	--	--	1
3	2,041	--	--	--	--	355.3	--	--	--	1
-	2,128	County Road No. 6		--	--	--	--	--	--	1
4	2,387	--	--	--	--	356.4	--	--	--	1
5	2,785	--	--	--	--	356.5	--	--	--	1
6	3,502	--	--	--	--	356.6	--	--	--	1
7	5,211	--	--	--	--	356.8	--	--	--	1
8	5,838	690	2,340	9,530	4.87	356.9	353.2	353.2	0.0	1
9	6,895	1,550	3,500	13,440	3.45	357.2	354.4	354.5	0.1	1
10	10,143	1,790	4,440	14,230	3.26	357.6	355.7	355.8	0.1	1
11	11,318	1,860	3,950	8,120	5.71	357.8	356.3	356.6	0.3	2
--	12,090	Cole Creek		--	--	--	--	--	--	2
12	12,290	1,410	3,000	7,840	5.92	358.3	357.7	358.2	0.5	2
13	13,701	920	2,700	14,500	3.20	359.7	359.6	360.4	0.8	2
14	15,792	1,090	2,840	13,620	3.41	360.4	360.3	361.1	0.8	2
15	16,851	750	2,260	10,030	4.63	361.1	361.0	361.7	0.7	2
16	18,137	620	1,880	7,340	6.32	362.4	362.4	363.2	0.8	2
17	19,268	30	1,650	9,150	5.07	364.6	364.6	365.2	0.6	2
18	20,630	60	1,290	8,540	5.43	366.6	366.6	367.1	0.5	2
19	21,575	430	2,000	10,280	4.51	367.8	367.8	368.3	0.5	2
20	22,730	1,320	3,220	10,830	4.29	368.7	368.7	369.2	0.5	2
21	24,578	1,860	3,720	10,860	4.27	369.5	369.5	370.3	0.8	2
22	25,492	1,880	3,670	10,500	4.42	370.2	370.2	371.1	0.9	2
23	26,113	1,030	2,870	11,130	4.17	370.7	370.7	371.7	1.0	2
24	27,552	1,010	3,060	13,520	3.43	371.8	371.8	372.8	1.0	2
25	28,831	1,190	3,320	13,510	3.43	372.8	372.8	373.7	0.9	3

1/ Measured in feet upstream from confluence with Umpqua River
2/ Measured in feet from initial point on left bank (looking downstream)

Table 3.--Calapooya Creek floodway data--Continued

Cross section		Floodway				Elevation, in feet above sea level (NGVD)				Map
Number	Distance[1/]	Boundary[2/]		Section area (ft^2)	Mean velocity (ft/s)	Regulatory	Without floodway	With floodway	Increase	Panel
		Left bank	Right bank							
26	30,056	1,230	3,660	16,450	2.82	373.6	373.6	374.6	1.0	3
27	31,961	1,120	3,550	20,560	2.26	374.2	374.2	375.2	1.0	3
28	33,273	1,830	3,730	14,920	3.11	374.7	374.7	375.7	1.0	3
29	34,045	1,760	3,220	19,830	2.34	375.1	375.1	376.0	0.9	3
30	34,854	1,550	2,980	13,360	3.47	375.4	375.4	376.3	0.9	3
31	35,733	420	2,120	13,470	3.44	376.1	376.1	376.9	0.8	3
32	36,597	30	1,400	10,080	4.61	376.9	376.9	377.8	0.9	3
--	36,698	County Road No. 9			--	--	--	--	--	3
33	37,041	600	1,930	10,410	4.46	378.7	378.7	379.1	0.4	3
34	37,414	790	2,040	10,120	4.58	379.1	379.1	379.5	0.4	3
--	37,860	Coon Creek		--	--	--	--	--	--	3
35	38,306	590	1,680	7,760	5.98	379.9	379.9	380.4	0.5	3
36	39,122	40	1,090	8,330	5.57	380.9	380.9	381.6	0.7	3
37	39,896	550	1,470	7,280	6.38	382.2	382.2	382.7	0.5	3
38	40,829	500	1,250	6,590	7.04	383.7	383.7	384.1	0.4	3
39	41,710	220	970	7,580	6.12	385.3	385.3	385.9	0.6	4
40	42,577	100	820	7,720	6.01	386.2	386.2	386.9	0.7	4
41	43,530	0	950	8,670	5.35	387.6	387.6	388.4	0.8	4
42	44,955	20	1,100	12,390	3.74	388.9	388.9	389.8	0.9	4
--	45,430	Dodge Canyon		--	--	--	--	--	--	4
43	47,857	50	1,490	18,000	2.33	389.6	389.6	390.6	1.0	4
44	48,117	190	1,710	16,760	2.50	389.7	389.7	390.7	1.0	4
--	48,261	State Highway No. 138			--	--	--	--	--	4
45	48,565	180	1,900	17,570	2.38	390.9	390.9	391.6	0.7	4
46	50,011	520	2,260	15,830	2.65	391.3	391.3	392.0	0.7	4
47	51,109	270	1,440	7,170	5.85	391.9	391.9	392.5	0.6	4
48	52,842	10	840	8,940	4.69	395.4	395.4	395.6	0.2	4
49	53,208	150	980	8,750	4.79	395.7	395.7	395.9	0.2	4

1/ Measured in feet upstream from confluence with Umpqua River
2/ Measured in feet from initial point on left bank (looking downstream)

Table 3.--Calapooya Creek floodway data--Continued

Cross section		Floodway				Elevation, in feet above sea level (NGVD)				Map
Number	Distance[1/]	Boundary[2/]		Section area (ft^2)	Mean velocity (ft/s)	Regulatory	Without floodway	With floodway	Increase	Panel
		Left bank	Right bank							
--	53,262	County Road No. 10 and gaging station 14-3207.00 (14 feet downstream)				--	--	--	--	4
50	53,472	110	910	10,330	4.06	396.5	396.5	397.2	0.7	4
51	54,386	740	1,580	9,610	4.36	397.2	397.2	397.8	0.6	4
52	55,406	690	1,700	9,350	4.48	397.9	397.9	398.5	0.6	4
53	56,524	960	2,800	14,130	2.96	398.8	398.8	399.5	0.7	4
54	57,711	1,000	3,160	16,530	2.18	399.3	399.3	400.1	0.8	4
--	58,020	Williams Creek		--	--	--	--	--	--	4
55	59,582	940	2,780	12,350	2.92	400.2	400.2	400.9	0.7	5
56	60,804	480	1,990	12,420	2.90	400.8	400.8	401.6	0.8	5
57	61,850	110	1,400	7,700	4.68	401.6	401.6	402.4	0.8	5
58	62,869	50	940	5,030	7.16	403.4	403.4	404.1	0.7	5
59	63,879	20	450	4,860	7.41	406.0	406.0	406.5	0.5	5
60	64,941	10	650	7,740	4.65	407.7	407.7	408.4	0.7	5
61	66,225	210	1,270	9,620	3.74	408.6	408.6	409.6	1.0	5
62	67,111	210	1,110	11,620	3.10	409.3	409.3	410.1	0.8	5
63	67,668	180	1,000	8,570	4.20	409.4	409.4	410.3	0.9	5
64	68,217	40	640	6,730	5.35	409.7	409.7	410.6	0.9	5
--	68,383	Interstate Highway I-5		--	--	--	--	--	--	5
65	68,768	410	1,060	7,380	4.88	412.8	412.8	412.8	0.0	5
66	69,446	370	1,150	6,940	5.19	413.2	413.2	413.4	0.2	5
67	70,351	30	1,210	10,740	3.35	413.9	413.9	414.6	0.7	5
68	71,270	70	1,430	11,900	3.03	414.4	414.4	415.2	0.8	5
69	71,885	200	1,330	9,295	3.87	414.7	414.7	415.5	0.8	5
70	73,017	820	1,700	8,480	4.25	415.5	415.5	416.3	0.8	5
71	73,887	1,550	2,310	6,540	5.50	416.1	416.1	417.1	1.0	6
72	74,973	1,390	2,120	5,500	6.54	418.0	418.0	418.6	0.6	6
73	76,082	1,320	2,070	10,860	3.32	420.1	420.1	420.8	0.7	6

1/ Measured in feet upstream from confluence with Umpqua River
2/ Measured in feet from initial point on left bank (looking downstream)

Table 3.--Calapooya Creek floodway data--Continued

Cross section		Floodway				Elevation, in feet above sea level (NGVD)				Map
Number	Distance[1]	Boundary[2]		Section area (ft^2)	Mean velocity (ft/s)	Regulatory	Without floodway	With floodway	Increase	Panel
		Left bank	Right bank							
74	76,705	550	1,550	9,560	3.77	420.4	420.4	421.1	0.7	6
75	77,730	280	1,260	10,030	3.59	420.8	420.8	421.7	0.9	6
76	78,403	80	510	4,000	8.99	421.2	421.2	422.0	0.8	6
--	78,483	U.S. Highway No. 99		--	--	--	--	--	--	6
77	78,617	70	340	3,070	11.72	421.7	421.7	422.4	0.7	6
78	79,298	210	620	6,420	5.60	425.9	425.9	426.2	0.3	6
79	80,007	0	420	6,320	5.69	426.4	426.4	427.1	0.7	6
80	80,254	0	370	4,390	8.20	426.4	426.4	427.2	0.8	6
81	80,608	0	340	4,200	7.51	427.1	427.1	427.9	0.8	6
--	80,708	Cabin Creek		--	--	--	--	--	--	6
82	80,867	1,030	1,860	11,120	2.83	428.1	428.1	429.1	1.0	6
--	80,913	Southern Pacific Railroad		--	--	--	--	--	--	6
83	81,024	1,210	2,300	13,860	2.60	428.8	428.8	429.3	0.5	6
84	81,115	1,080	2,200	14,180	2.54	428.8	428.8	429.3	0.5	6
85	81,769	50	1,210	12,280	2.93	428.9	428.9	429.4	0.5	6
86	82,664	20	860	10,050	3.14	429.0	429.0	429.8	0.8	6
87	83,371	30	740	6,240	5.05	429.2	429.2	430.1	0.9	6
88	84,058	30	630	5,180	6.08	430.2	430.2	430.9	0.7	6
89	84,764	10	500	5,390	5.84	431.6	431.6	432.5	0.9	6
90	85,475	60	430	4,320	7.30	432.4	432.4	433.3	0.9	6
91	86,226	40	380	5,030	6.26	433.6	433.6	434.5	0.9	6
92	86,884	80	380	4,180	7.54	434.2	434.2	435.0	0.8	6
93	87,571	160	800	7,750	4.07	435.4	435.4	436.2	0.8	6
--	87,590	Pollock Creek		--	--	--	--	--	--	6
94	88,232	100	480	4,870	6.46	435.8	435.8	436.6	0.8	6
95	89,691	650	1,520	9.980	3.15	437.3	437.3	438.1	0.8	6
96	90,320	840	1,800	7,120	4.42	437.5	437.5	438.2	0.7	7
97	91,158	920	1,730	5,450	5.78	438.5	438.5	439.2	0.7	7

1/ Measured in feet upstream from confluence with Umpqua River
2/ Measured in feet from initial point on left bank (looking downstream)

Table 3.--Calapooya Creek floodway data--Continued

Cross section		Floodway				Elevation, in feet above sea level (NGVD)				Map
Number	Distance[1]	Boundary[2]		Section area (ft^2)	Mean velocity (ft/s)	Regulatory	Without floodway	With floodway	Increase	Panel
		Left bank	Right bank							
98	92,031	1,540	2,110	5,310	5.94	440.0	440.0	440.6	0.6	7
99	93,210	850	1,560	7,710	4.09	441.4	441.4	442.2	0.8	7
100	94,290	790	1,410	6,200	5.08	442.4	442.4	443.2	0.8	7
101	95,062	1,240	1,890	4,900	6.43	443.8	443.8	444.8	1.0	7
102	95,892	1,480	2,120	4,310	7.30	446.8	446.8	447.5	0.7	7
103	96,411	1,070	1,860	5,010	6.28	447.7	447.7	448.7	1.0	7
104	97,130	910	1,900	7,450	4.23	449.1	449.1	450.1	1.0	7
105	97,882	450	1,270	4,180	7.53	450.1	450.1	450.8	0.7	7
106	98,800	600	990	4,730	6.66	452.8	452.8	453.1	0.3	7
107	99,508	1,170	1,480	3,980	7.92	453.8	453.8	454.2	0.4	7
108	100,255	480	840	3,450	9.13	455.9	455.9	456.2	0.3	7
109	100,958	410	950	4,790	6.58	458.3	458.3	459.3	1.0	7
110	101,559	450	1,140	5,520	5.71	459.5	459.5	460.5	1.0	7
--	101,909	Oldham Creek		--	--	--	--	--	--	7
111	102,548	670	1,830	11,010	2.86	461.0	461.0	462.0	1.0	7

1/ Measured in feet upstream from confluence with Umpqua River
2/ Measured in feet from initial point on left bank (looking downstream)

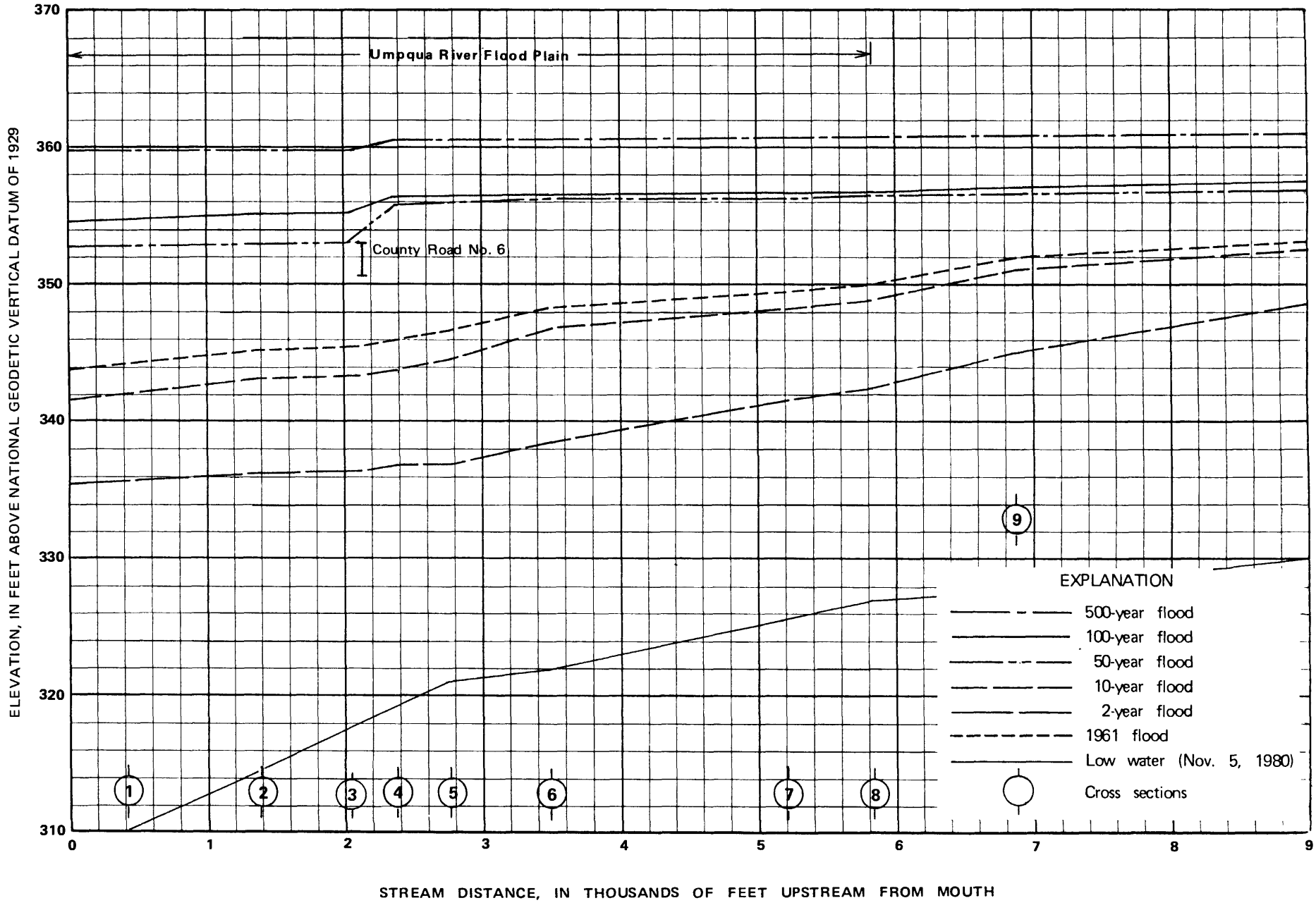

Figure 5. – Profiles of Calapooya Creek.

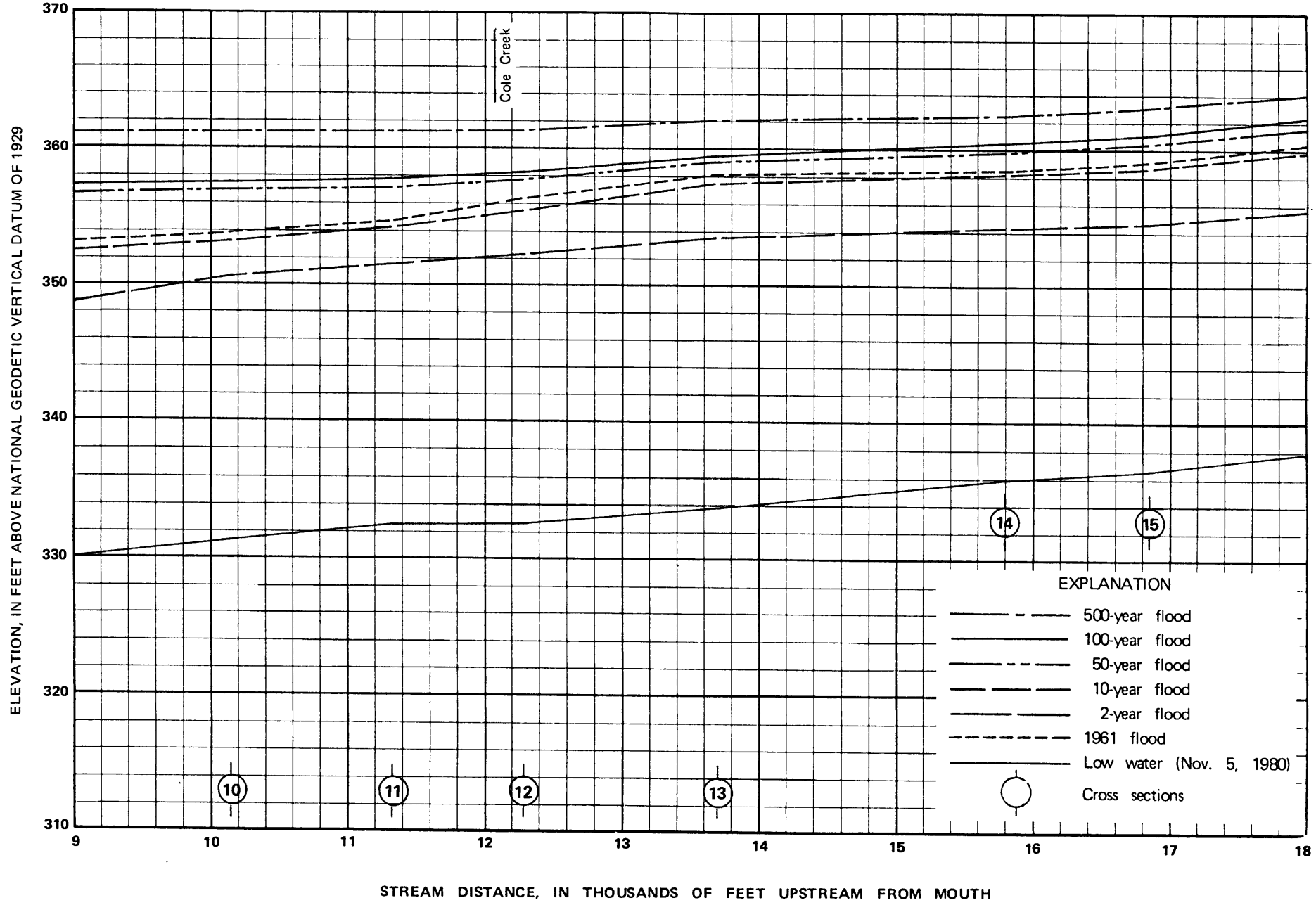

Figure 6. – Profiles of Calapooya Creek.

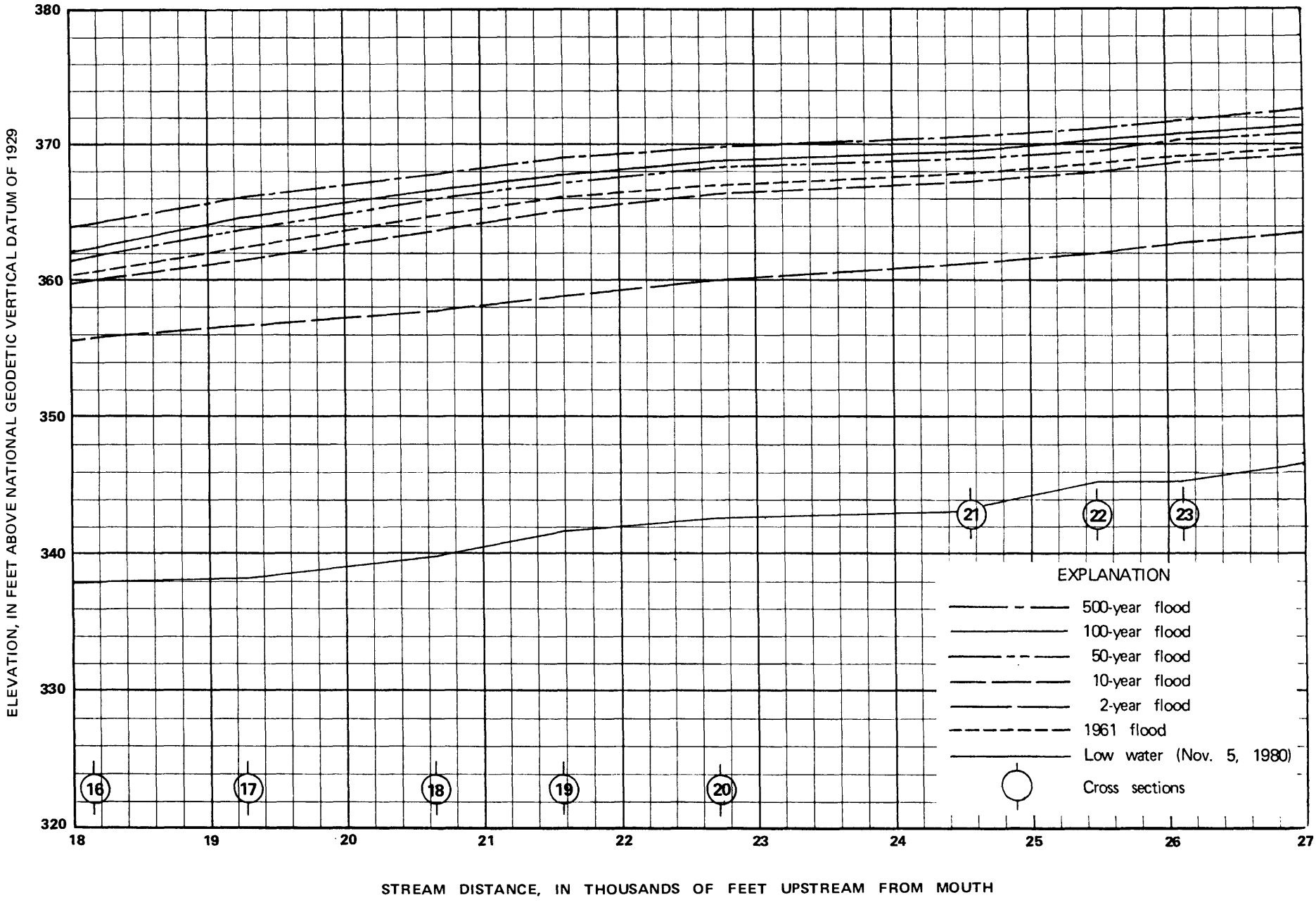

Figure 7. – Profiles of Calapooya Creek.

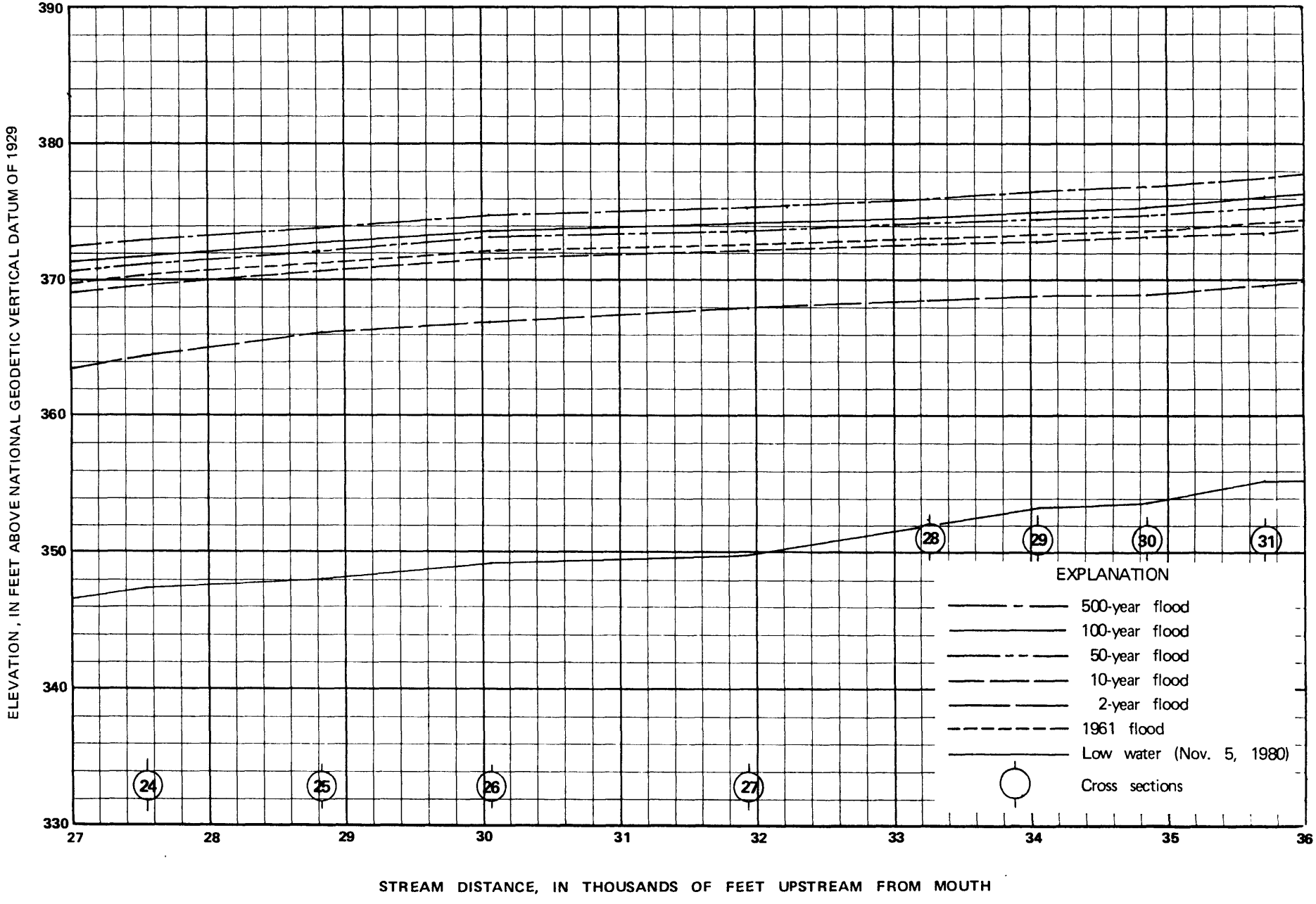

Figure 8. – Profiles of Calapooya Creek.

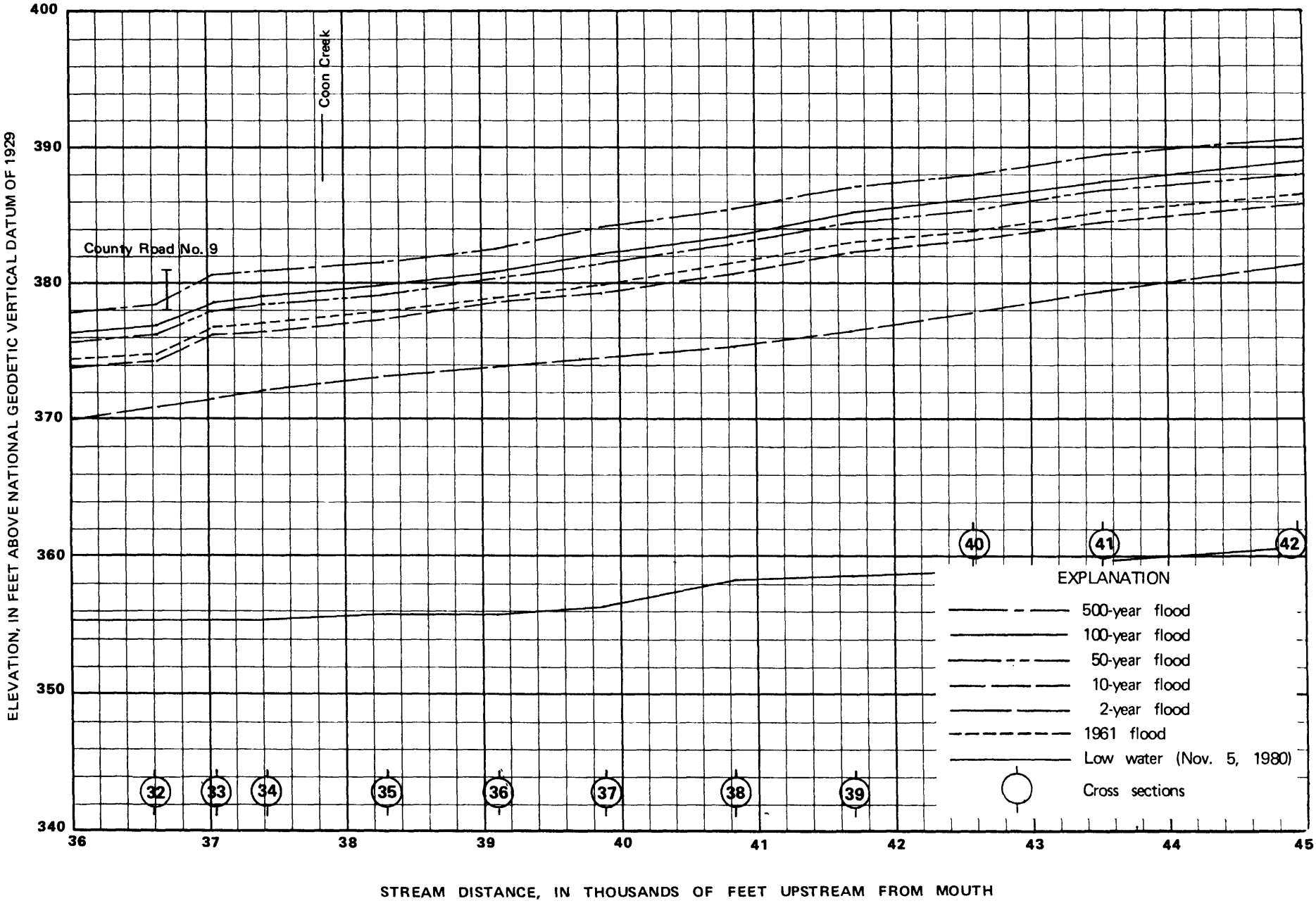

Figure 9. – Profiles of Calapooya Creek.

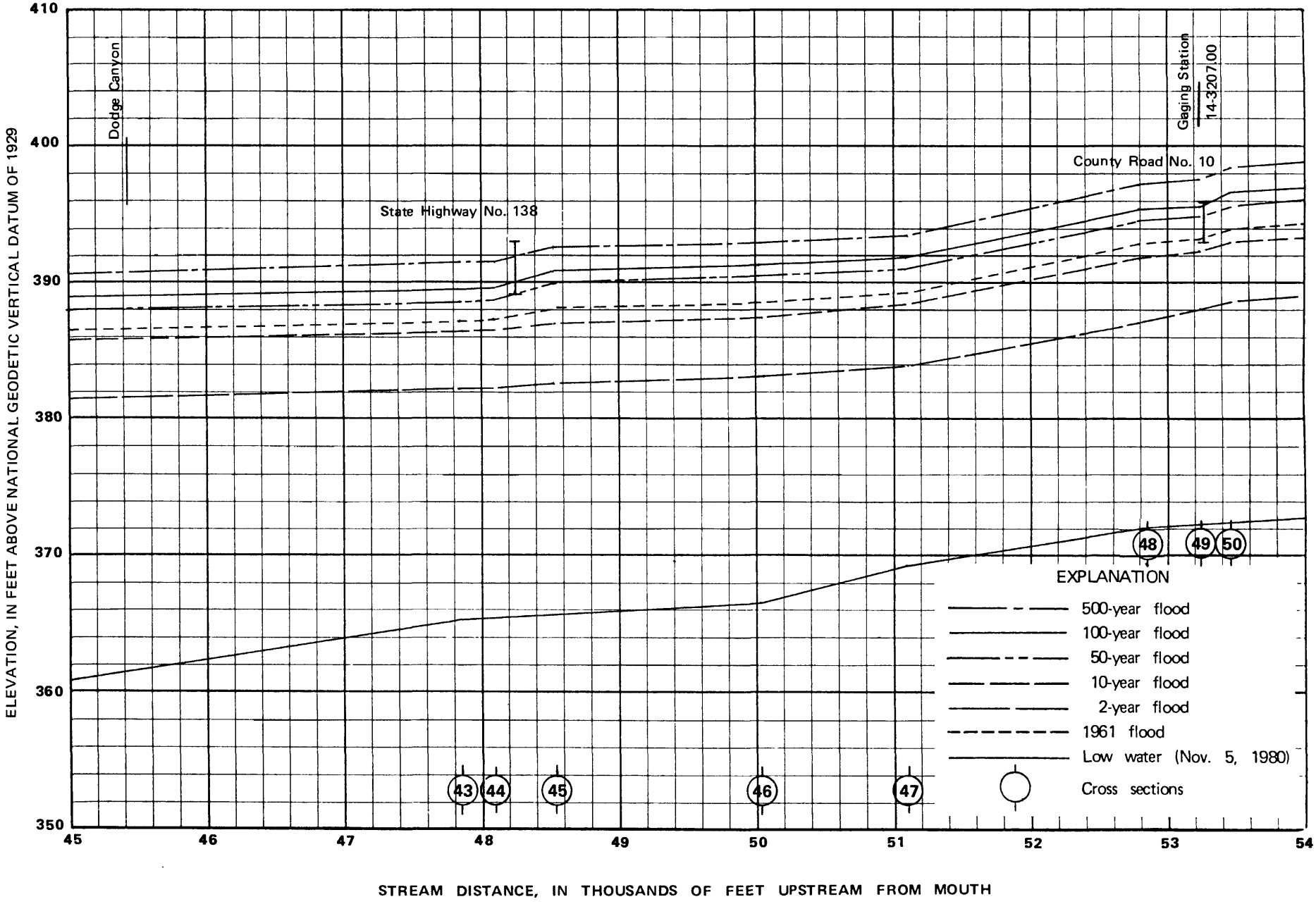

Figure 10. – Profiles of Calapooya Creek.

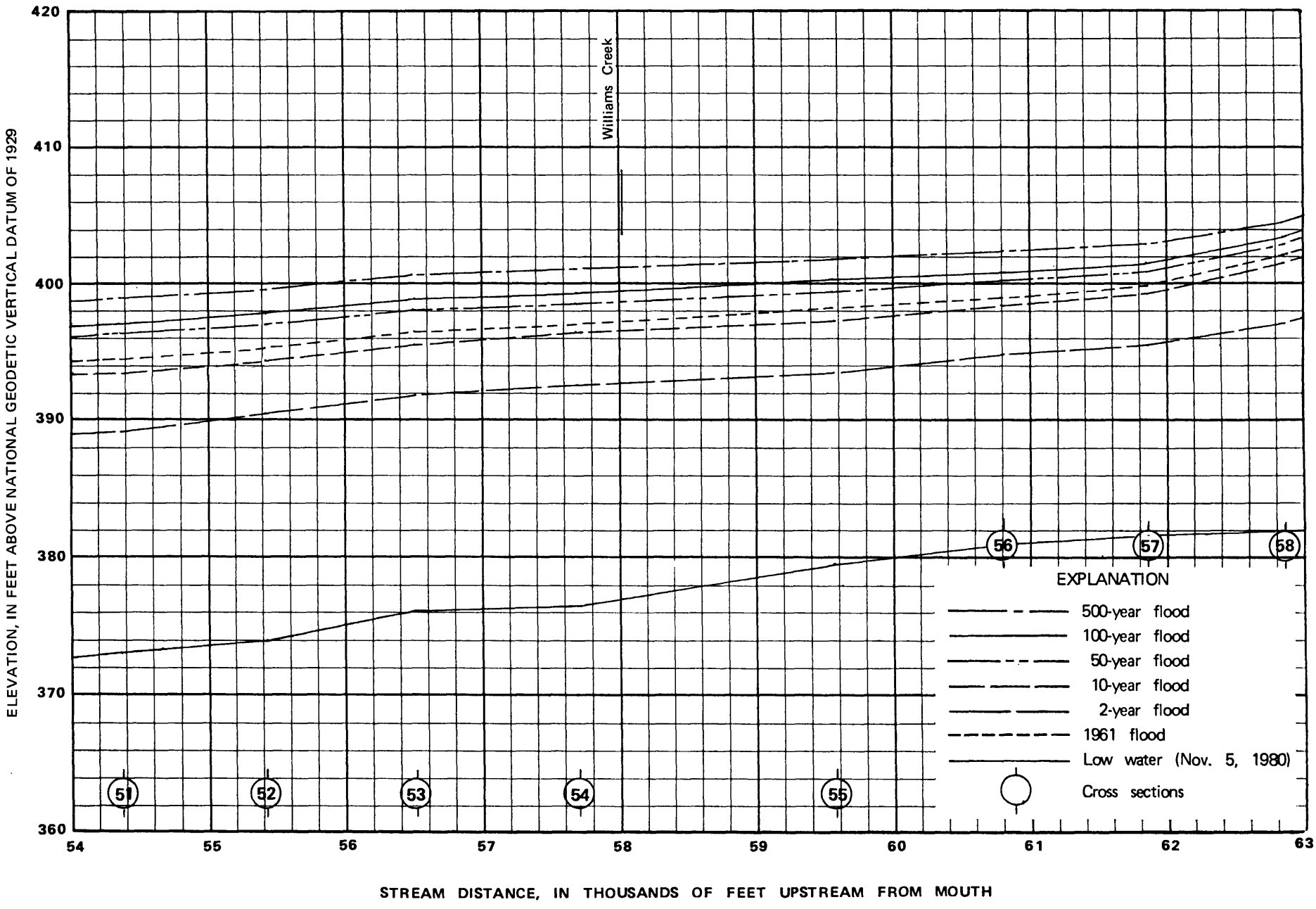

Figure 11. – Profiles of Calapooya Creek.

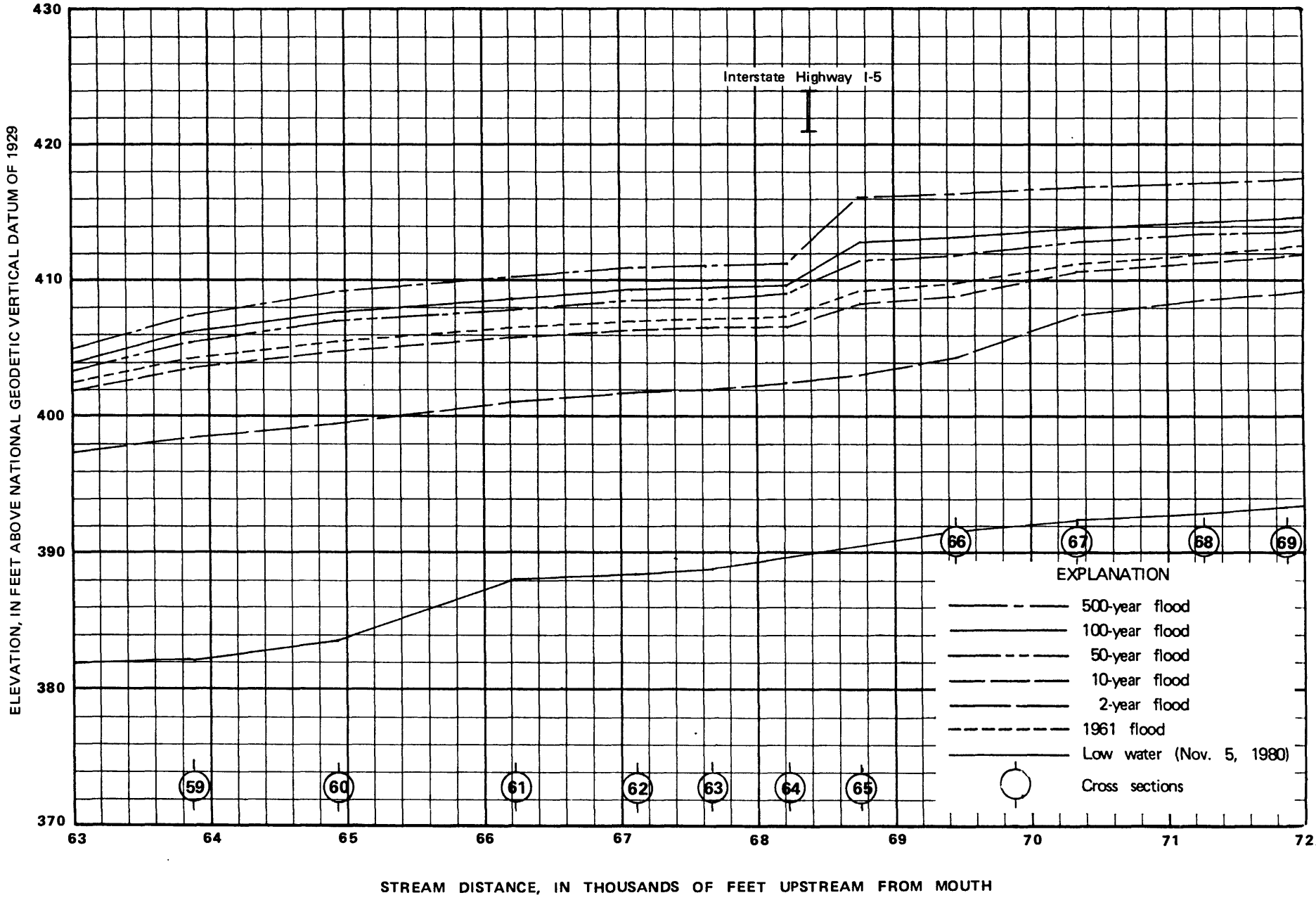

Figure 12. – Profiles of Calapooya Creek.

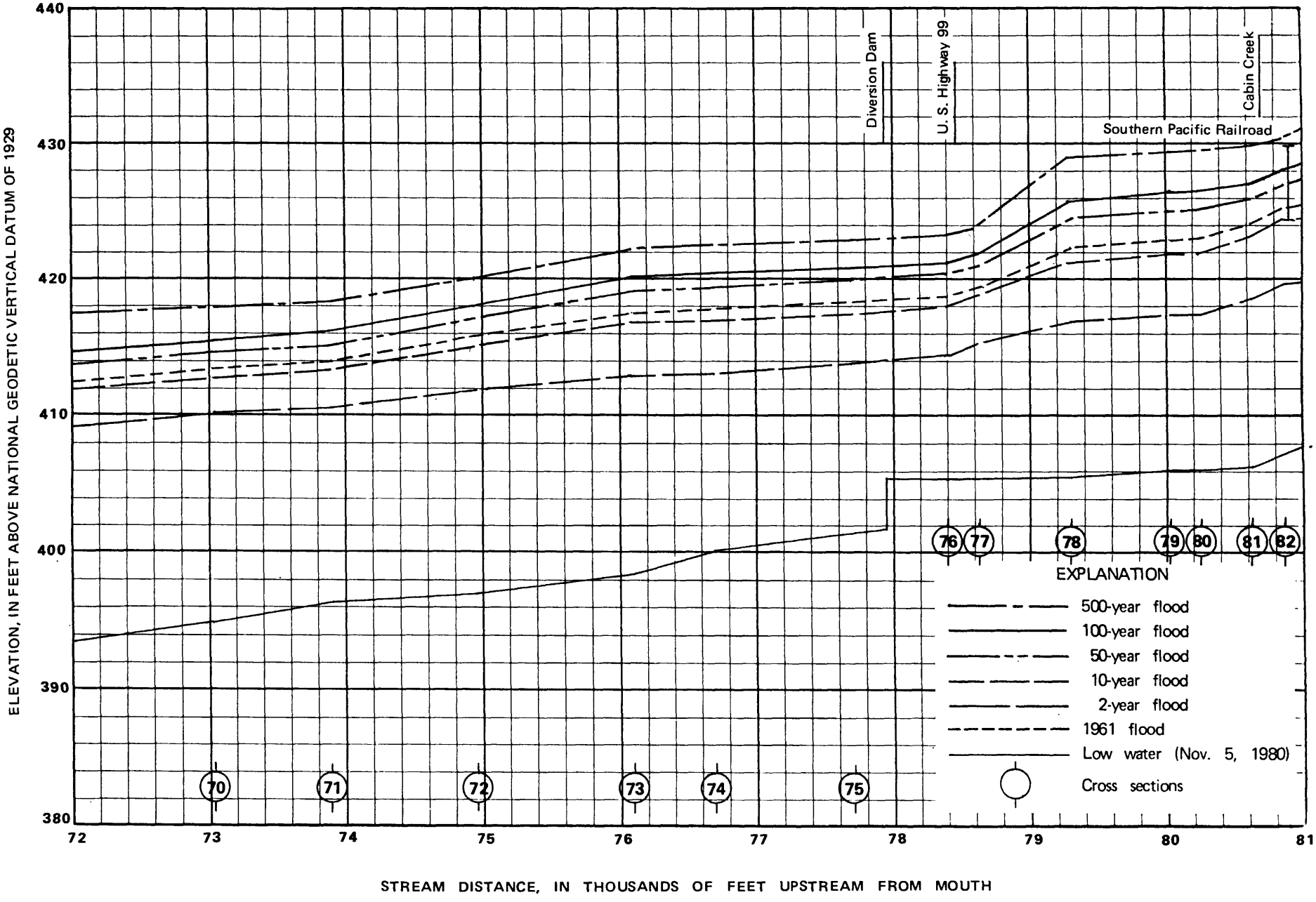

Figure 13. – Profiles of Calapooya Creek.

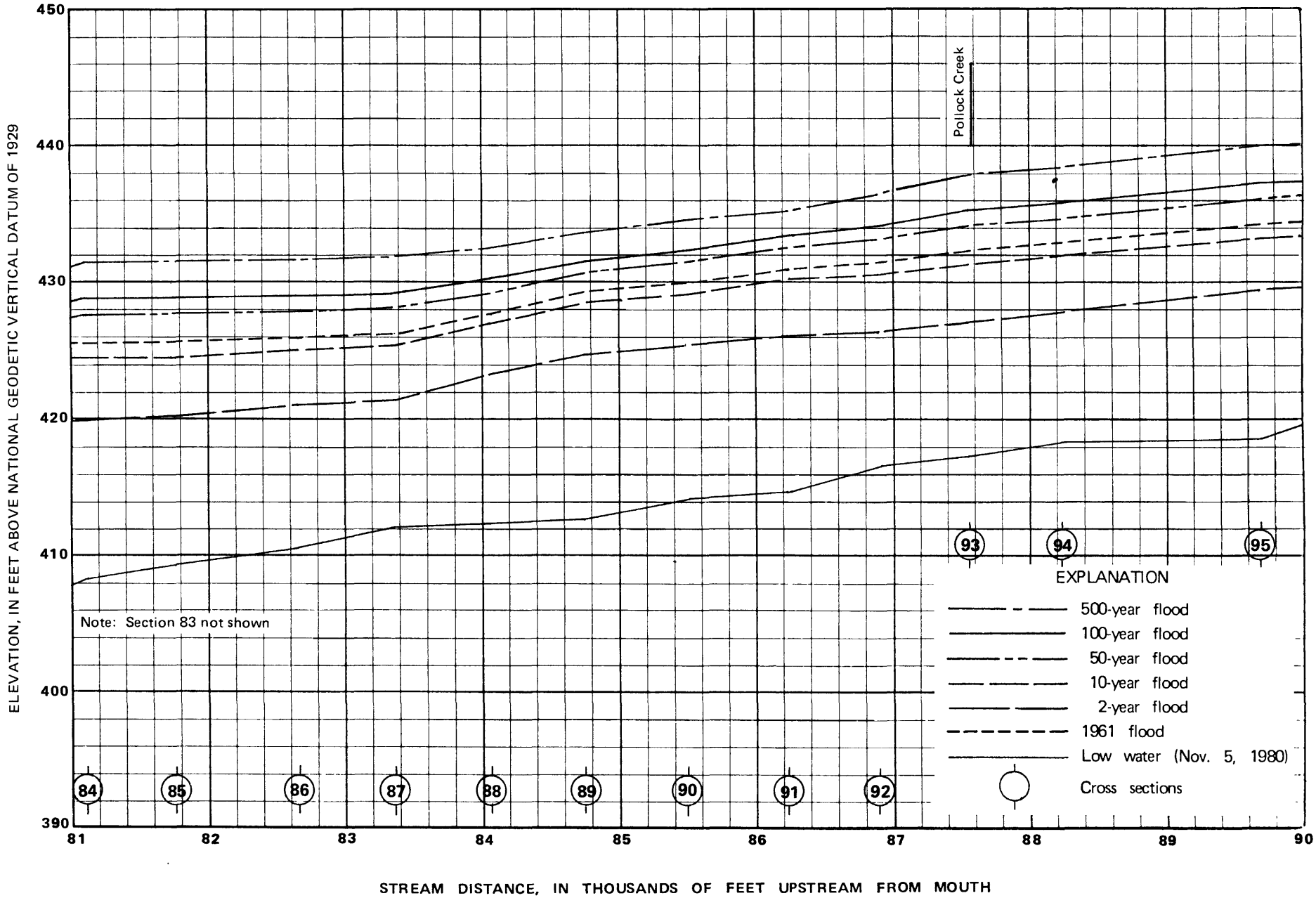

Figure 14. – Profiles of Calapooya Creek.

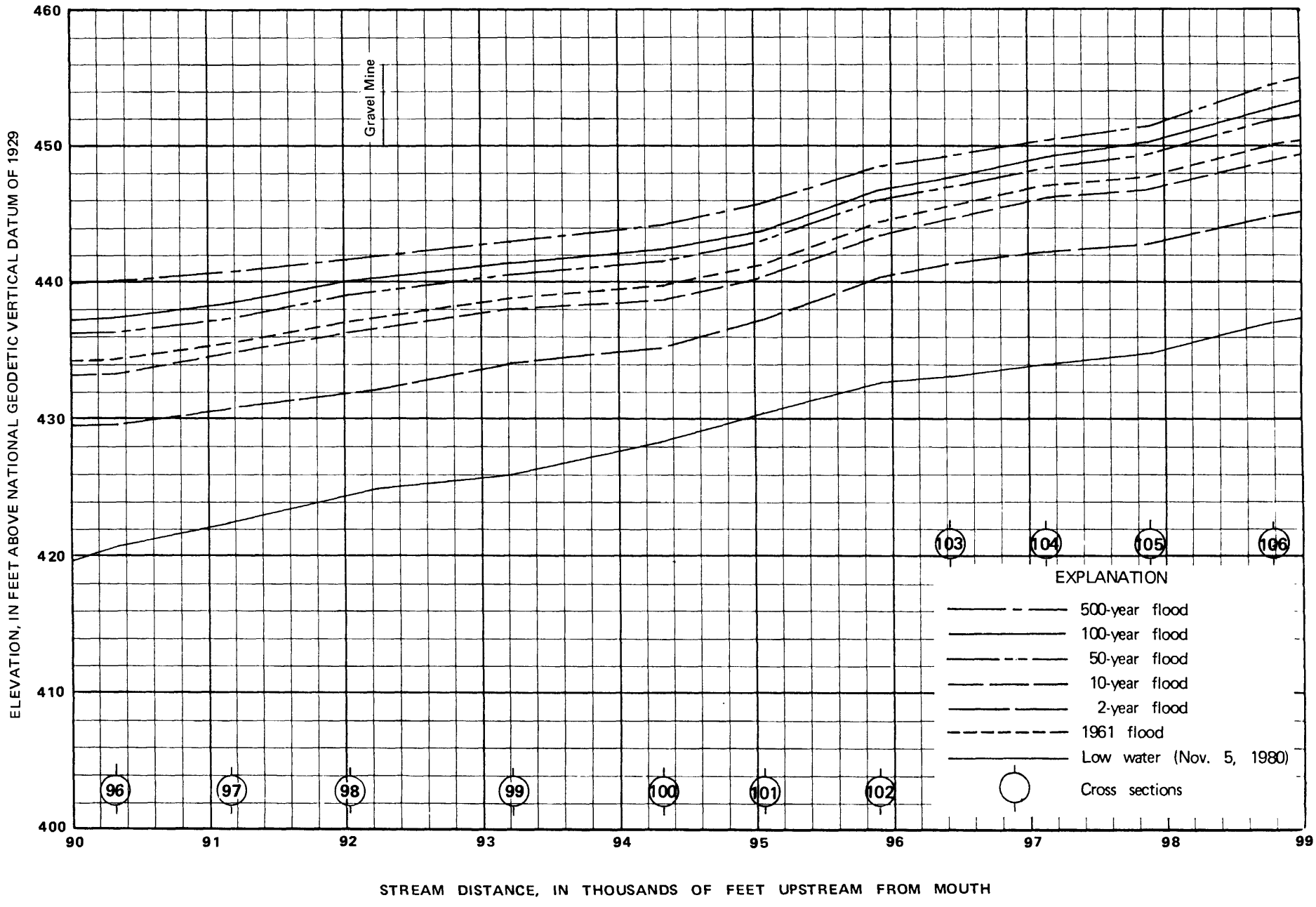

Figure 15. – Profiles of Calapooya Creek.

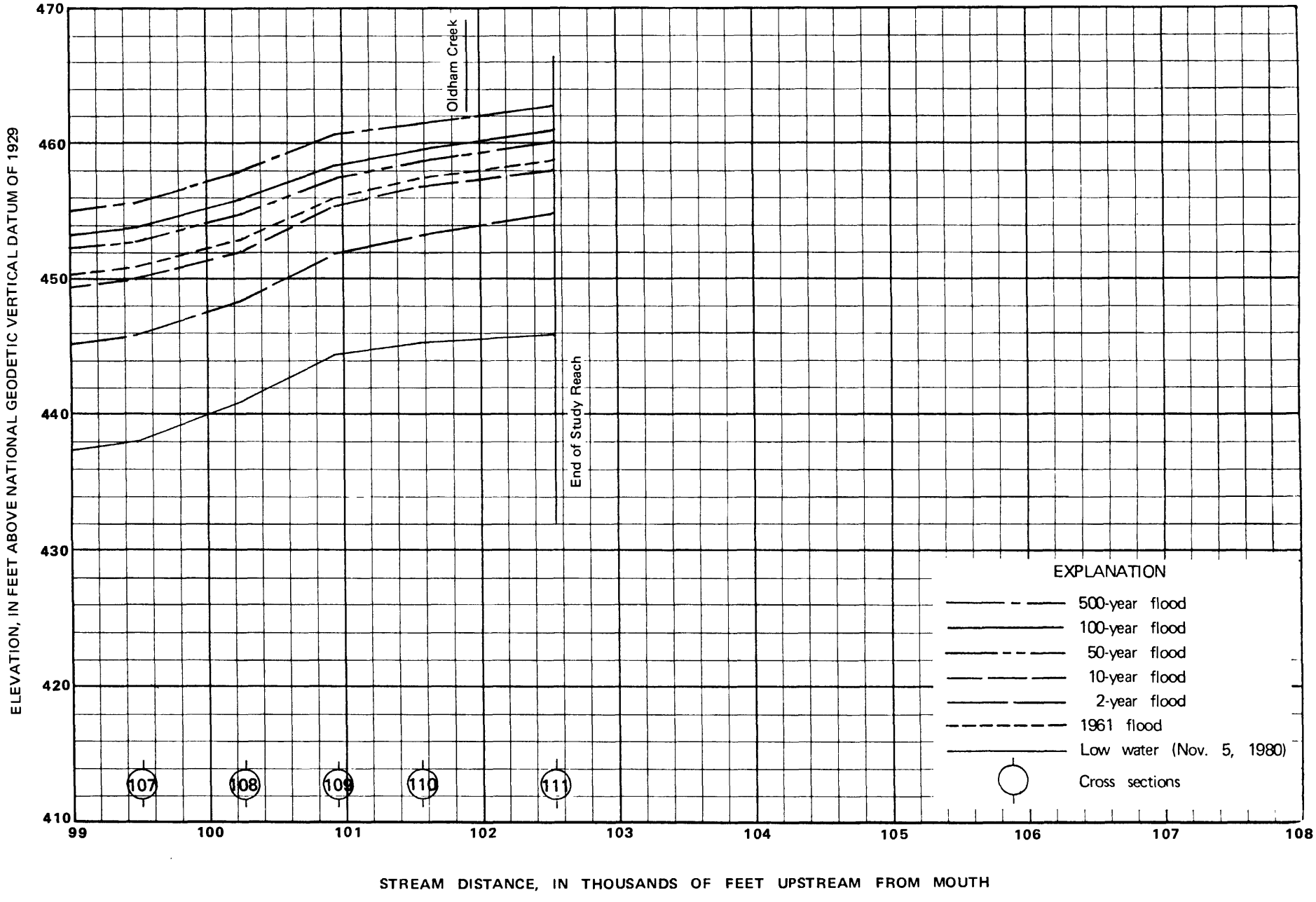

Figure 16. – Profiles of Calapooya Creek.

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