UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

FLOODS IN COLDWATER CREEK, WATKINS CREEK, AND RIVER DES PERES BASINS, ST. LOUIS COUNTY, MISSOURI

Prepared in cooperation with
The Metropolitan St. Louis Sewer District
1971

Open-file report
by
Leland D. Hauth and
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INTRODUCTION

The rapid urbanization of St. Louis presents problems in the social and economic development of flood plains within the area. The U.S. Geological Survey in cooperation with the Metropolitan St. Louis Sewer District is conducting a study of the hydrology of four major drainage basins within the area of responsibility of the Sewer District. The basins within or draining into the area are Coldwater Creek, Maline Creek, Watkins Creek, and River des Peres. The River des Peres basin was divided into sub-basins: Deer Creek, Upper River des Peres, and Gravois Creek.

This interim report is part of a series of open-file reports presenting stage and inundation data of historic floods (primarily the 1957 flood) and recent floods experienced since the project basins were instrumented. Basins considered in this report are Coldwater Creek, Watkins Creek, Upper River des Peres, and Deer Creek. These data can be useful in studies leading to optimum control of floods in each basin. Other useful hydrologic data such as flood discharges and frequencies are being gathered, but were not available for this report.

The flood situation in Maline Creek basin and Gravois Creek basin was described by Spencer and Hauth (1968) and Hauth and Spencer (1969). Areas covered by those reports are shown in figure 1. Maps showing the locations of the drainage basins (Coldwater Creek, Watkins Creek, Upper River des Peres, and Deer Creek) considered in this report are shown in figures 2-4.

COOPERATION AND ACKNOWLEDGMENT

The preparation of this report is a part of the cooperative flood-mapping program of the Metropolitan St. Louis Sewer District, Peter F. Mattei, executive director, and the Missouri district of the Water Resources Division, U.S. Geological Survey, Anthony Homyk, district chief. The Metropolitan St. Louis Sewer District provided various maps, bench-mark elevations, printing services, and precipitation records.

FLOOD INFORMATION

Information regarding floods that have occurred within the project basins was obtained by interviewing local residents in each basin who witnessed flooding, by locating floodmarks, and from stream gages. Most residents interviewed indicated that the June 1957 flood was the most severe they had seen. To verify flood elevations obtained by interview, more than one person or family was interviewed where possible.

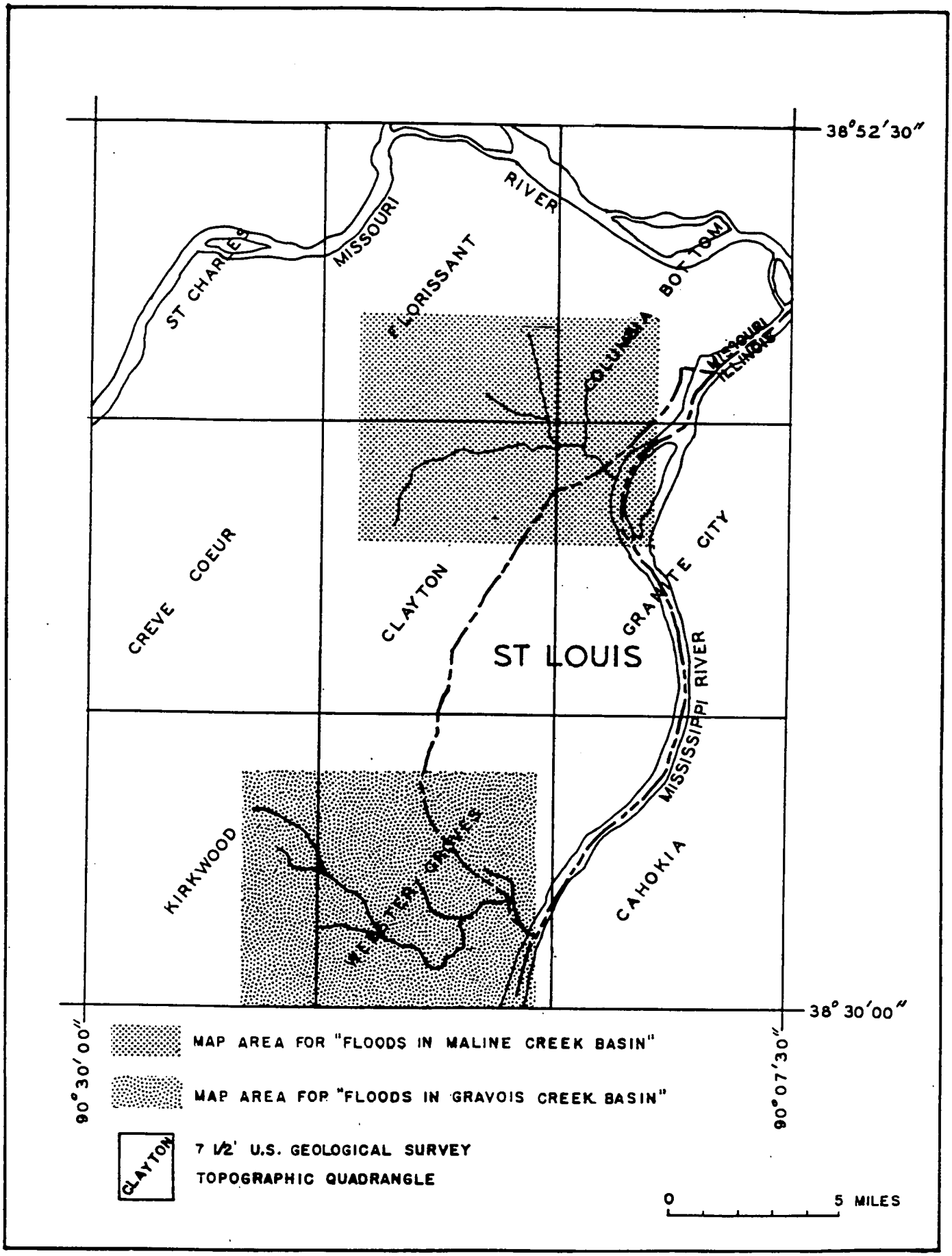

Figure 1.--Index map of the St. Louis area showing location of composite flood-inundation maps of Maline Creek and Gravois Creek.

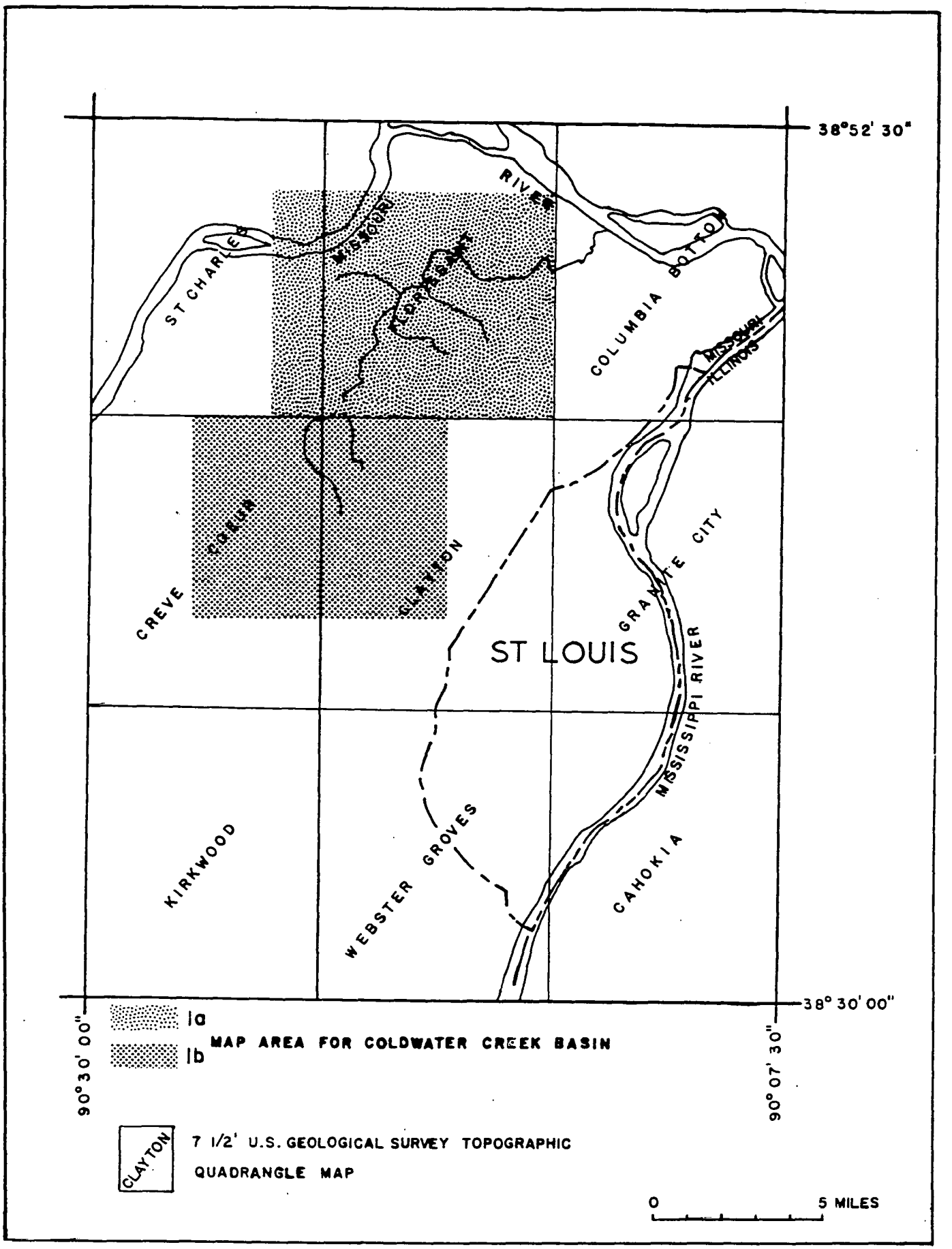

Figure 2.—Index map of the St. Louis area showing location of composite flood-inundation maps of Coldwater Creek.

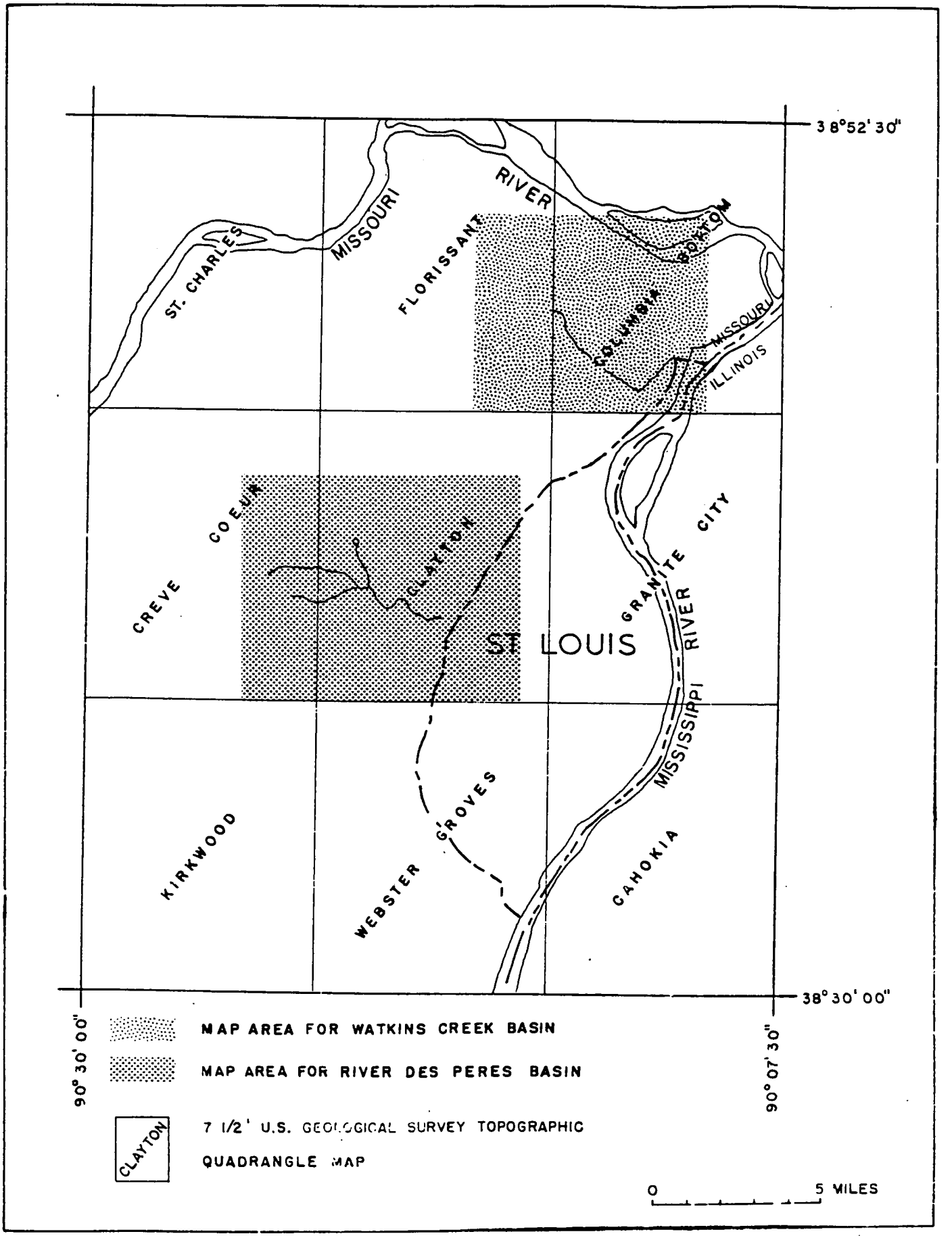

Figure 3.--Index map of the St. Louis area showing location of composite flood-inundation maps of Watkins Creek and River des Peres.

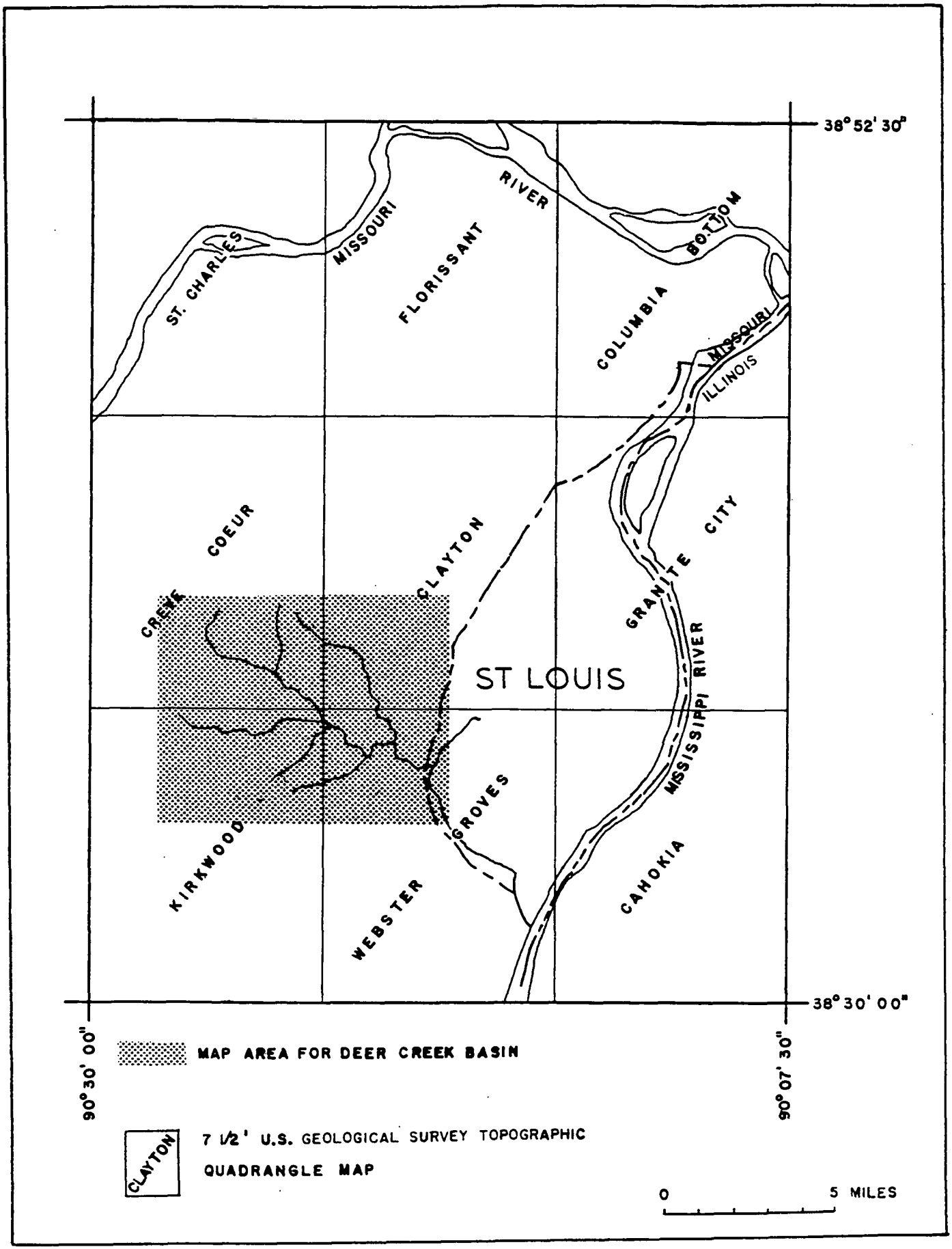

Figure 4.--Index map of the St. Louis area showing location of composite flood-inundation map of Deer Creek.

The 1957 flood was caused by a storm which was the most intense in a narrow strip from Pacific, Mo., to Belleville, Ill. The maximum total rainfall for the storm was 16.54 inches in 9 1/2 hours, measured 8 miles south of East St. Louis, Ill. Figure 5 shows the distribution of total rainfall for the storm period, June 14-15, 1957. Total rainfall in the west and northwest St. Louis area varied from 4 to 10 inches, equaling and in some areas exceeding the 50-year 24-hour rainfall of 6.5 inches as extrapolated from U.S. Weather Bureau (1961) records. Rainfall recorded at the U.S. National Weather Service Station at Lambert Field in western St. Louis was 8.54 inches and was the maximum of record for a 12-hour period at that station.

Since instrumentation of the project area, some recorded stages have equaled or exceeded the magnitude of the 1957 flood. Because Midwestern thunderstorms are sometimes isolated locally and of high intensity, every storm is not of general significance but many cause flooding in only a single basin or part of a large basin.

Data for the flood of April 23, 1970, were recorded at nearly all crest-stage gages. This flood was one of the highest recorded since installation of the crest-stage gages in July 1967 and resulted from about 2.5 inches of rain in a 9-hour period. A maximum intensity of 1.2 inches in a 1-hour period was recorded at Lambert Field during the storm.

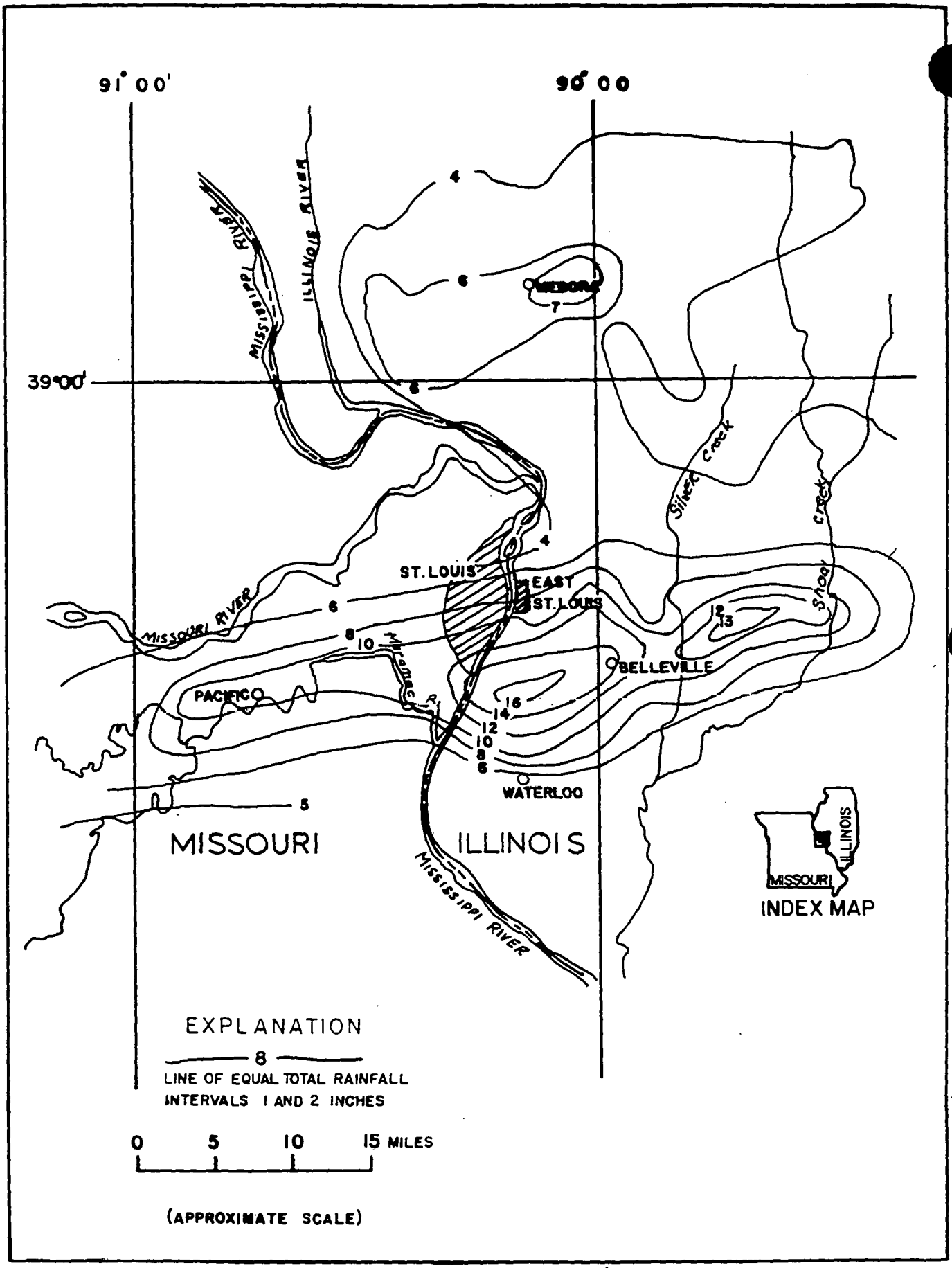

Figure 5.--Total rainfall for storm of June 14-15, 1957

The magnitude of flooding varied over the area as a result of variations in the storm and in the timing of the contributions from the tributaries.

Data for the June 23, 1970, flood were also recorded on all crest-stage gages. This flood was greater than the April 1970 flood in the upper reaches of the River des Peres basin above Pennsylvania Avenue. Residents along the River des Peres above Grant Road indicated that the flood of June 1970 equaled the June 1957 historical flood. The flood resulted from a storm of only 1.3 inches that followed several days of precipitation of nearly 0.5 inch per day.

FLOOD ELEVATIONS

The stage gages were established at selected locations within each basin, and flood data collected at these gages are gage heights, or the level of the water surface, measured in feet above some arbitrary datum. The gage data, as well as data obtained from interviews, were referenced to mean sea level from bench marks established in the basin by the Metropolitan St. Louis Sewer District.

Tables 1-4 present lists of gaging stations on each major stream and its tributaries. The flood elevation recorded at the gages during recent flooding and the flood elevation obtained by interviews for the June 14-15, 1957, flood are tabulated along with river mileage. Information on the

Table 1.--Gage locations and flood elevations in feet above mean sea level for floods in Coldwater Creek basin

Gage location	Station number	Drainage area (sq mi)	River mile	Flood recorded Apr. 23, 1970	Flood of June 1957 based on interview
Coldwater Creek at:					
Midland Boulevard---	6-9361.20	-	18.47	588.71	590.9
Pasteur Avenue------	6-9361.23	-	18.19	579.80	582.5
Baltimore Avenue----	6-9361.23	-	18.16	579.55	581.0
Breckenridge Avenue	6-9361.25	-	17.95	573.03	574.3
Marvin Avenue ------	6-9361.28	-	17.83	570.68	570.4
Calvert Avenue------	6-9361.29	-	17.70	568.30	568.9
Dix Avenue ---------	6-9361.30	-	17.63	567.13	568.8
Edmundson Avenue----	6-9361.31	-	17.55	*	568.4
St. Charles Rock Road	6-9361.32	-	17.45	559.80	564.5
Lynn Town Court-----	6-9361.35	2.71	17.02	553.91	556.5
Isolda Avenue-------	6-9361.40	-	16.95	550.32	553.5
Geraldine Avenue----	6-9361.45	-	16.75	545.46	551.3
Wright Road---------	6-9361.47	-	16.46	543.80	548.3
Ashby Road----------	6-9361.65	-	15.85	542.49	542.0
Airport Road--------	6-9361.85	7.47	15.32	536.68	536.1
Brown Road----------	6-9362.35	12.34	13.44	519.98	522.0
Dunn Road ----------	6-9362.70	-	11.86	512.28	515.4
St. Denis Street----	6-9363.00	-	9.90	501.06	510.8
Lindbergh Boulevard	6-9363.80	24.42	9.80	+	504.4
New Halls Ferry Road	6-9364.40	-	7.50	*	494.8
Mo. State Highway 140	6-9364.50	-	6.37	*	493.0

Table 1.--Gage locations and flood elevations in feet above mean sea level for floods in Coldwater Creek basin--continued

Gage location	Station number	Drainage area (sq mi)	River mile	Flood recorded Apr. 23, 1970	Flood of June 1957 based on interview
Coldwater Creek at: (continued)					
Old Halls Ferry Road	6-9364.60	38.91	5.55	480.12	486.6
Old Jamestown Road--	6-9364.80	-	3.67	470.98	478.2
U.S. Highway 67-----	6-9365.00	43.40	1.74	456.06	460.5
Coldwater Creek tributary at mile 16.42 at:					
Shamrock Lane-------	-	-	0.66	+	562.8
St. Charles Rock Road	-	-	0.36	+	554.2
Fountain Creek at:					
Derhake Road--------	-	-	2.18	+	546.4
Old Florissant Road--	-	-	1.95	+	535.2
New Florissant Road--	6-9363.20	-	1.52	516.09	523.8
Graham Road --------	6-9363.30	-	0.82	509.80	515.3
St. Denis Street----	6-9363.38	-	0.06	500.75	510.8
Coldwater Creek tributary at mile 9.68 at:					
Shackleford Road ---	-	-	1.41	+	540.9
Patterson Road------	6-9363.50	-	0.13	501.94	504.1
Paddock Creek at:					
Parker Road --------	6-9363.70	-	1.77	519.27	526.0
Paddock Drive ------	-	-	0.89	+	510.6
Lindbergh Boulevard	6-9363.80	2.64	0.60	496.67	509.0

+ Gaging station not established * Gage did not record

Table 2.--Gage locations and flood elevations in feet above mean sea level for floods in Watkins Creek basin

Gage location	Station number	Drainage area (sq mi)	River	Flood recorded Apr. 23, 1970	Flood of June 1957 based on interview
Watkins Creek at:					
U.S. Highway 67-----	7-0019.00	-	4.65	500.45	506.9
Claudine Drive------	7-0019.10	-	4.35	496.6	500.6
Bellefontaine Road--	7-0019.50	2.94	3.39	470.97	476.3
Belgrove Drive------	7-0019.60	-	2.73	462.70	470.5
Lilac Avenue--------	7-0019.70	-	2.35	454.18	460.5
Dunn Road----------	7-0019.90	-	1.08	430.65	434.2
Coal Bank Road------	7-0020.00	6.17	0.69	421.86	425.6
Columbia Bottom Road	-	-	0.38	+	418.6

+ Gaging station not established

Table 3.--Gage locations and flood elevations in feet above mean sea level for floods in River des Peres basin above Pennsylvania Avenue

Gage location	Station number	Drainage area (sq mi)	River mile	Flood recorded June 24, 1970	Flood of June 1957 based on interview
River des Peres at:					
Dielman Road------	7-0100.05	-	4.34	588.43	588.4
Woodson Road------	7-0100.08	-	3.26	549.03	549.0
Kempland Place----	7-0100.09	-	3.13	545.53	545.5
Appleton Drive----		-	2.93	542.25	542.2
Grant Drive-------	7-0100.10	-	2.73	538.94	538.9
82nd Boulevard----	7-0100.11	-	2.48	531.97	536.5
Hafner Place------	7-0100.16	5.64	2.32	530.72	532.2
Olive Boulevard---	7-0100.19	-	2.08	525.77	531.64
Groby Road ------	7-0100.20	-	1.90	*	527.4
North and South Boulevard.	7-0100.21	-	1.55	520.97	523.7
Hanley Road-------	7-0100.22	-	1.30	514.61	517.5
Shaftsebury Avenue	7-0100.23	-	1.20	513.01	516.0
Midland Boulevard	7-0100.24	-	0.80	508.40	512.6
Purdue Avenue-----	7-0100.25	-	0.64	507.53	511.93
Pennsylvania Avenue	7-0100.26	9.65	0.0		503.0
River des Peres tributary at mile 3.41 at:					
Price Road--------	7-0100.07	-	0.40	561.96	564.7
River des Peres tributary at mile 2.38 at:					
Price Road--------	7-0100.13	-	1.29	585.37	586.1
McKnight Road-----	-	-	0.59	549.63	552.8

* Gage did not record.

Table 4.--Gage locations and flood elevations in feet above mean sea level for floods in Deer Creek basin

Gage location	Station number	Drainage area (sq mi)	River mile	Flood recorded Apr. 23, 1970	Flood of June 1957 based on interview
Deer Creek at:					
Spoede Road-------	7-0100.38	-	8.02	525.69	530.6
Lindbergh Boulevard	7-0100.40	-	7.40	+	518.8
Warson Road-------	7-0100.44	8.59	6.70	502.20	505.3
Litzsinger Road---	7-0100.51	-	5.05	472.15	474.0
McKnight Road-----	7-0100.66	-	4.00	464.00	467.5
Manchester Road---	7-0100.68	-	3.50	459.93	459.7
Brentwood Boulevard	7-0100.74	-	2.76	450.61	453.7
Breckenridge Industrial Court.	7-0100.76	-	1.63	441.43	446.1
Laclede Station Road.	7-0100.85	-	1.05	435.20	442.7
Big Bend Boulevard	7-0100.86	36.49	0.67	432.01	439.8
Twomile Creek at:					
Geyer Road--------	7-0100.57	4.18	2.93	530.02	535.0
Lindbergh Boulevard	7-0100.59	-	2.34	516.00	522.1
Warson Road-------	7-0100.60	-	1.26	493.48	497.5
Trent Drive-------	7-0100.61	6.42	0.70	477.39	483.8
Overbrook Drive---	7-0100.62	-	0.19	470.24	472.3

Table 4.--Gage locations and flood elevations in feet above mean sea level for floods in Deer Creek basin--continued

Gage location	Station number	Drainage area (sq mi)	River mile	Flood recorded Apr. 23, 1970	Flood of June 1957 based on interview
Deer Creek tributary at mile 3.24 at:					
Berry Road--------	-	-	1.40	+	532.3
Rock Hill Road----	-	-	0.57	+	480.0
Des Peres Avenue--	-	-	0.30	+	463.2
Shady Grove Creek at:					
Berry Road--------	-	-	1.87	546.22	-
Rock Hill Road----	7-0100.71	-	1.12	502.43	504.6
Elm Street--------	-	-	0.58	+	478.1
Ravine Avenue-----	-	-	0.22	+	461.34
Black Creek at:					
Ladue Road--------	-	-	4.71	+	556.2
Price Road--------	7-0100.77	-	4.27	533.25	536.5
McKnight Road-----	7-0100.78	-	3.75	513.06	518.1
Clayton Road------	7-0100.79	3.71	2.44	477.82	482.5
Agnes Street------	7-0100.80	-	1.52	461.72	463.6
Litzsinger Road---	7-0100.81	-	0.60	445.59	447.8
Manchester Road---	7-0100.84	-	0.20	442.66	447.8
Tributary to Black Creek at mile 0.23 at:					
Weaver Avenue -----	-	-	0.51	+	455.0

+ Gaging station not established.

1957 flood could not be obtained at all stage gage-locations. Tabulated elevations at these points were interpolated from the profiles based on interviews obtained upstream and downstream. Drainage areas are tabulated only at points where continuous recorders are located.

FLOOD PROFILES

The distances used for plotting the flood profiles were measured in miles and tenths of miles along the thread of the stream on each map of plates 1a-4. The distances shown for each tributary were measured in the same way with mile zero at the mouth where the creek joins the larger stream.

Water-surface elevations upstream from bridge openings are often raised when the opening constricts the natural channel, or when debris collects on the upstream side of the bridge piers or wingwalls. Vegetal growth along and in the channel, and debris collected along the channel will also tend to increase the flood height. Slopes of different flood profiles along the same reach of a stream may be different due to variations in the amounts of inflow into the stream.

Water-surface elevations are often increased within certain reaches of the stream where levees have been constructed. In some areas the increased water surface of more recent floods may exceed the historical flood due to the flow being confined to the main channel even though the discharge might have been greater during the historical flood.

Elevations determined for the flood of April 1970, June 1970 (shown on River des Peres above Pennsylvania Avenue), and June 1957 and for the channel bed (referenced to mean sea level) were plotted with respect to distances measured on U.S. Geological Survey topographic maps to develop the profiles shown in figures 6a-20. The June 1970 flood and April 1970 flood elevations are from the stage gages. The June 1957 elevations are from interviews and floodmarks, and the channel-bed elevations are from surveyed cross sections at the gages. In general, straight lines were drawn between plotted points. At some places observations of local conditions along with the other available data were used as guides in drawing lines that were not straight connections between points. These profiles are shown as figures 6a-20.

Each profile shows the entire basin length to the last upstream crest-stage gage or to where interviews are available. In the special case of Coldwater Creek where the main channel

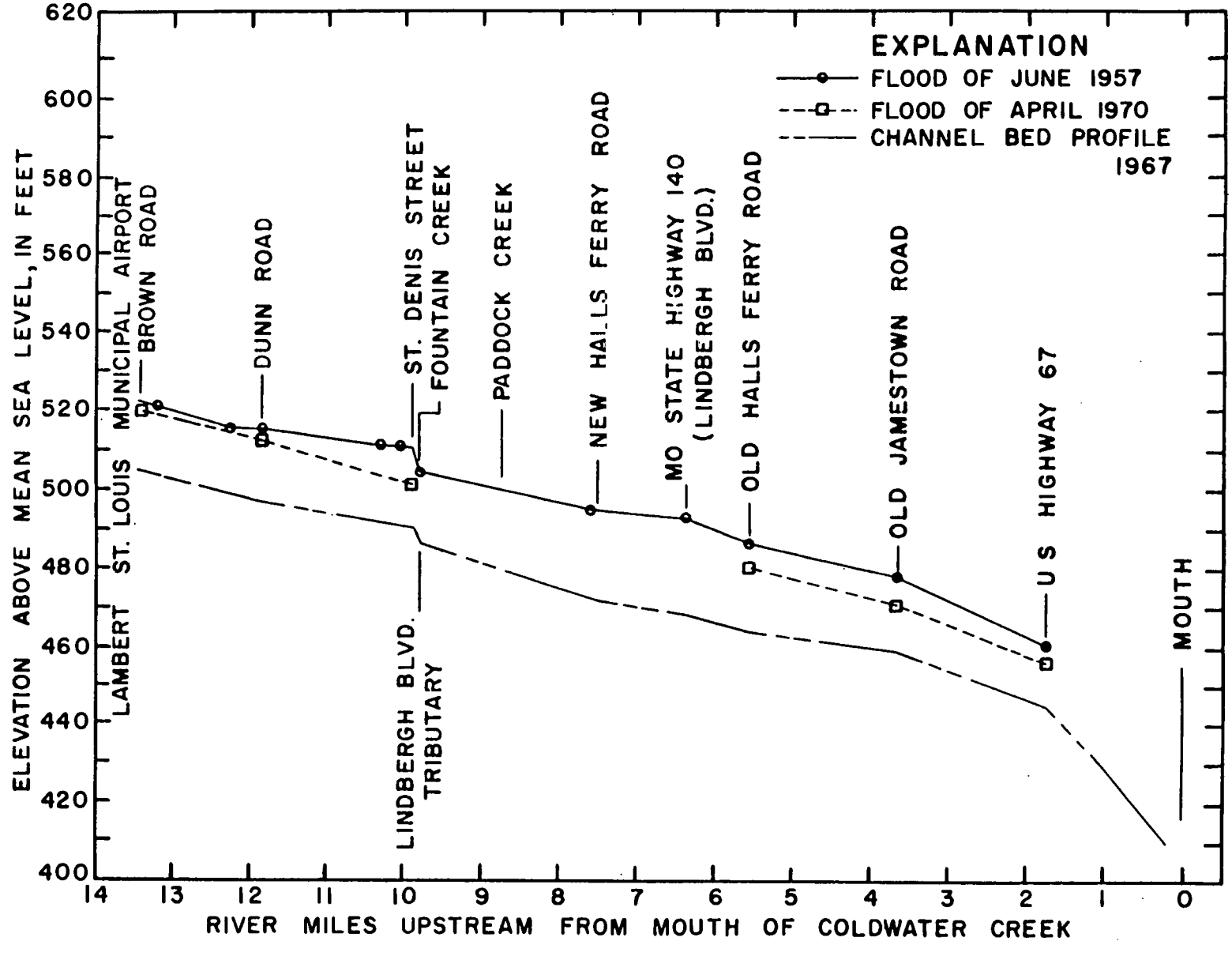

Figure 6a.--Profiles of floods on Coldwater Creek, downstream from Lambert-St. Louis Municipal Airport, St. Louis County, Mo.

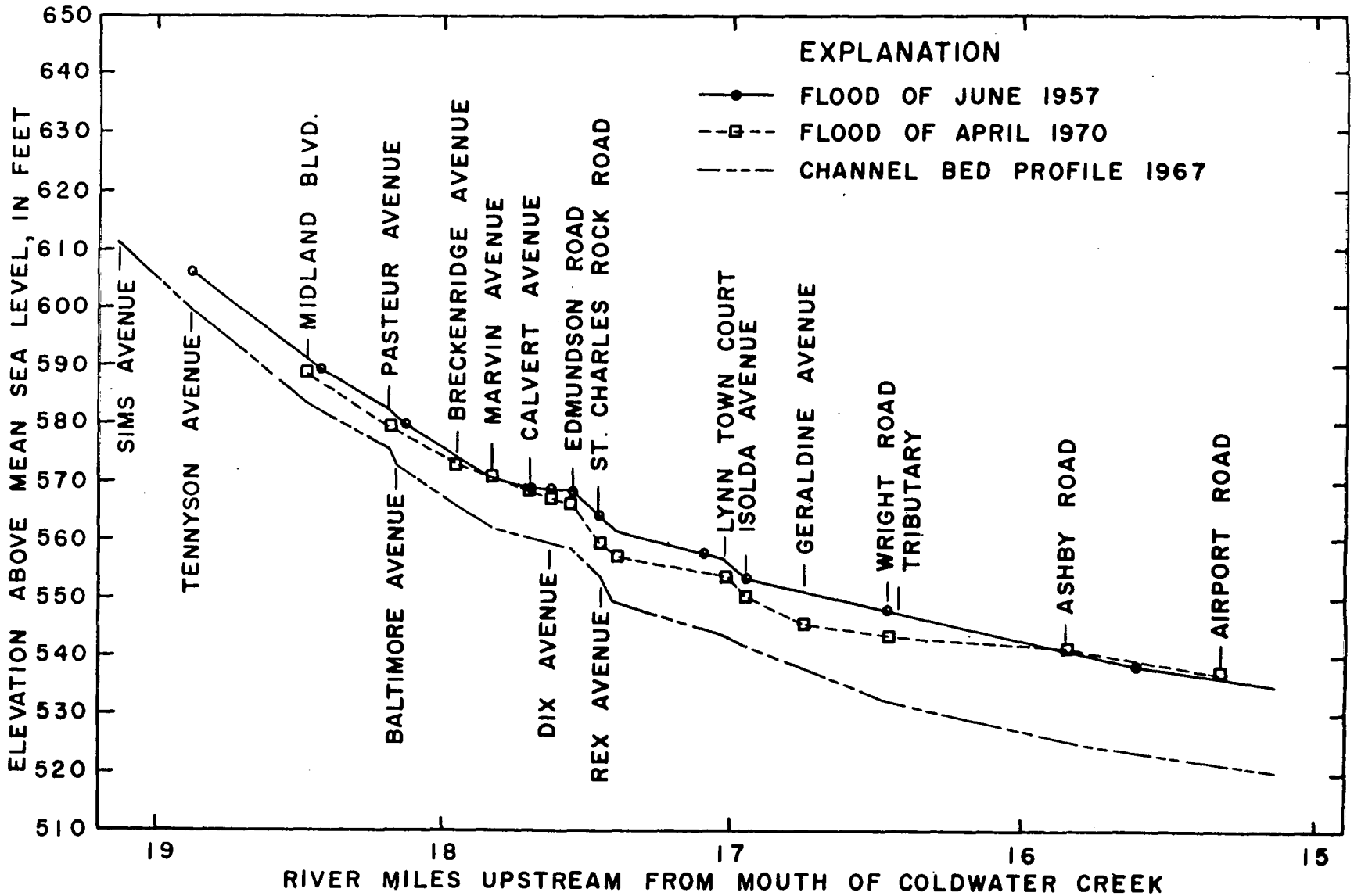

Figure 6b.--Profiles of floods on Coldwater Creek, upstream from Lambert-St. Louis Municipal Airport, St. Louis County, Mo.

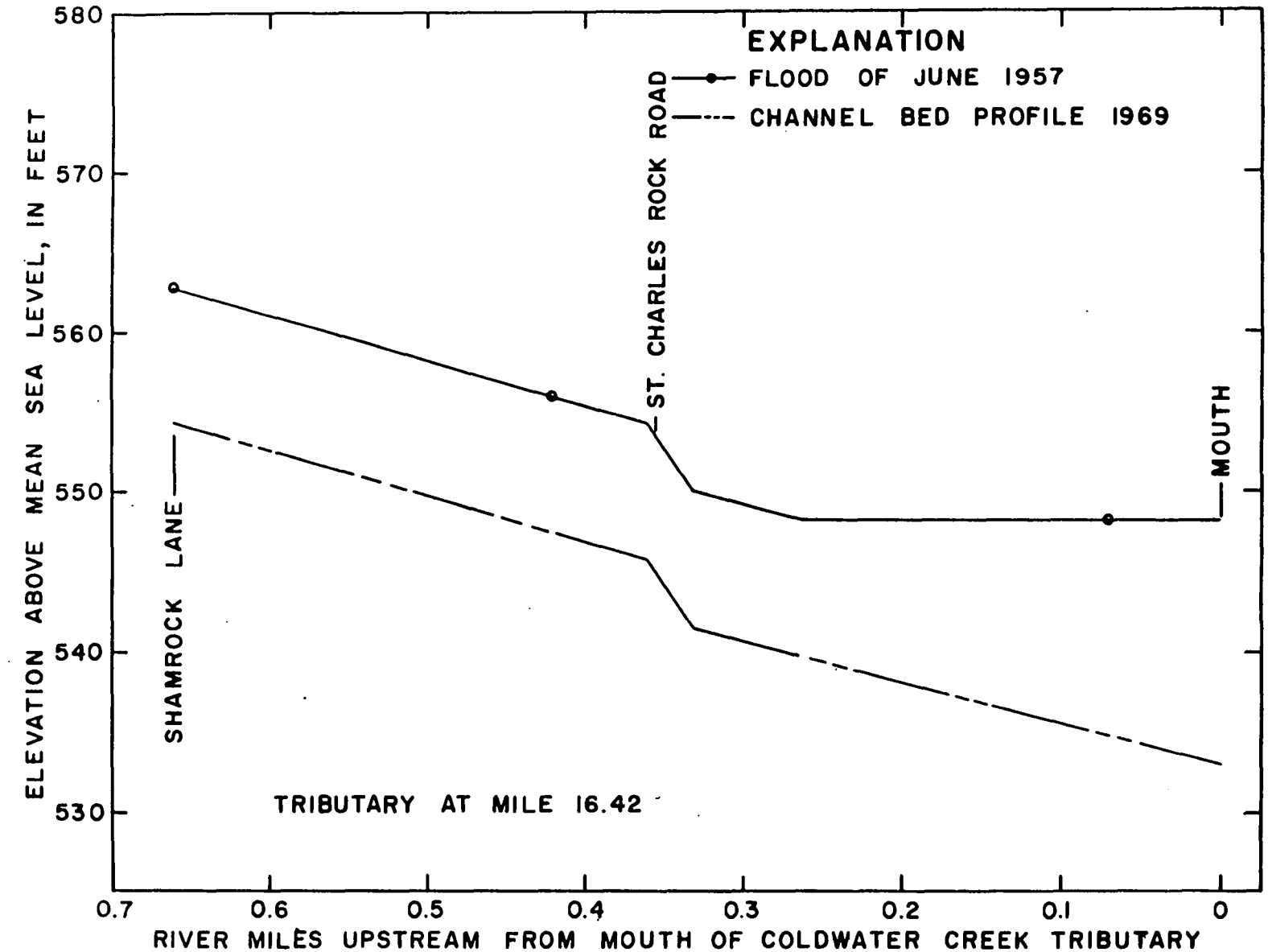

Figure 7.--Profiles of floods on Coldwater Creek Tributary (mile 16.42), St. Louis County, Mo.

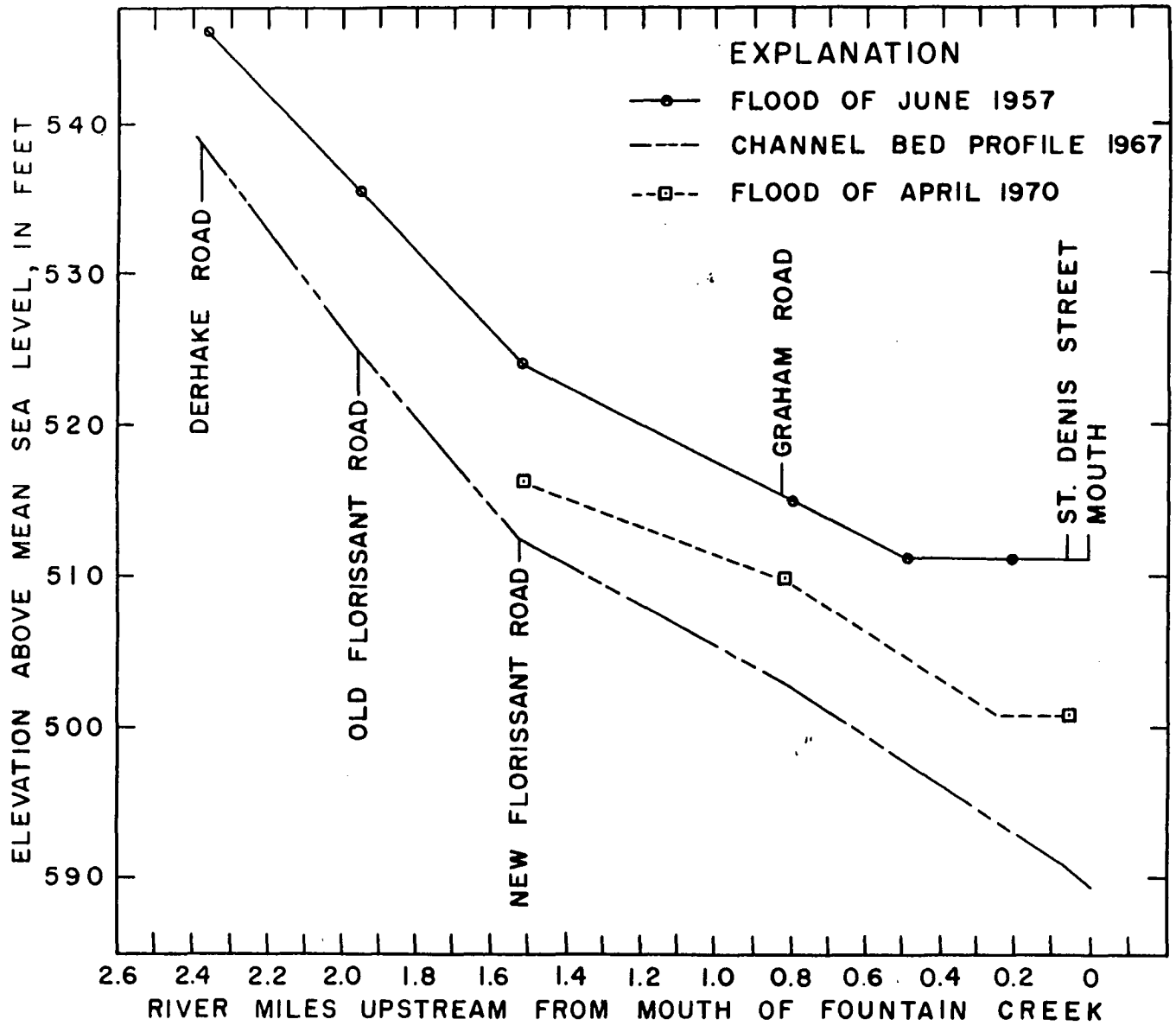

Figure 8.--Profiles of floods on Fountain Creek, St. Louis County, Mo.

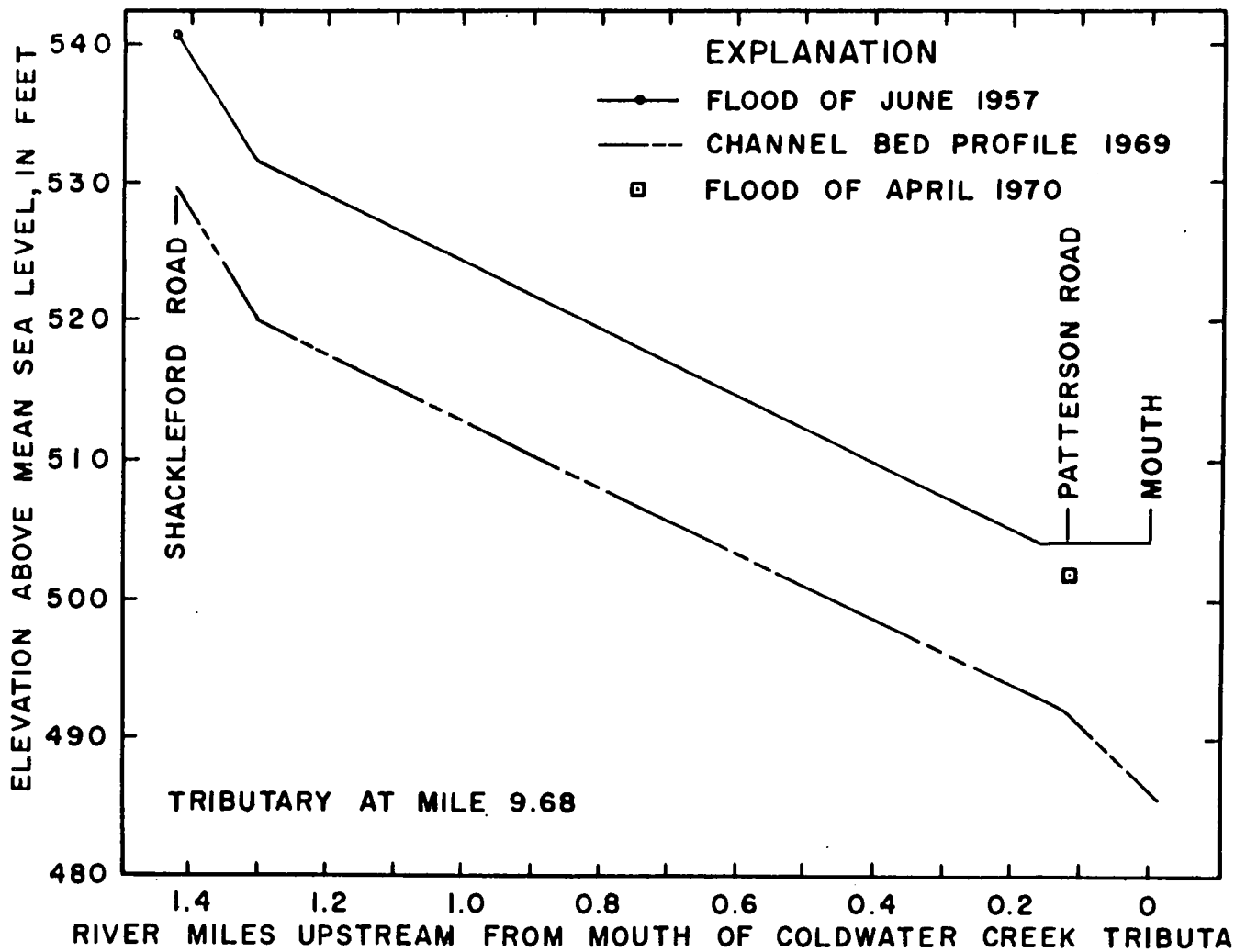

Figure 9.--Profiles of floods on Coldwater Creek Tributary (mile 9.68), St. Louis County, Mo.

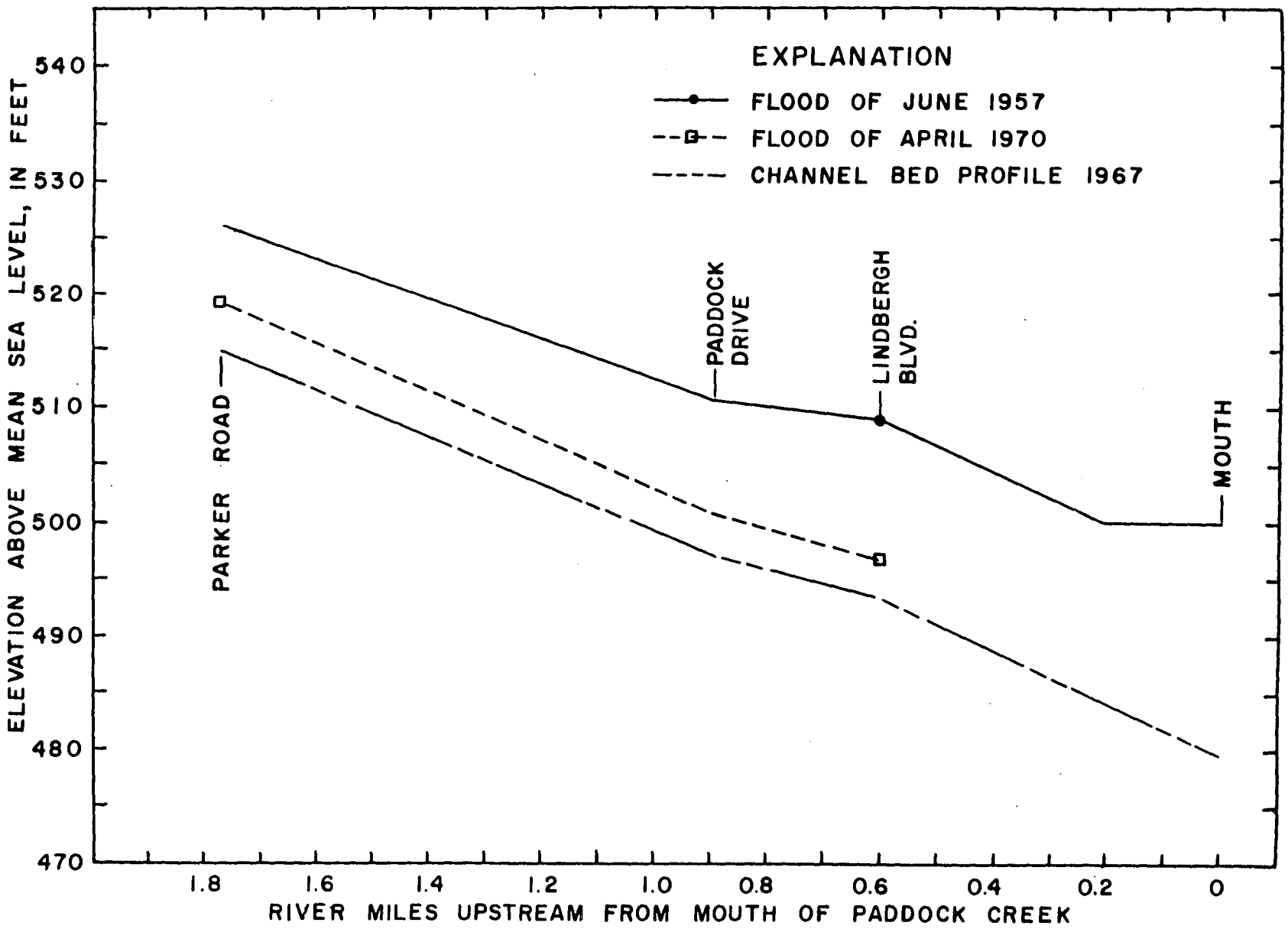

Figure 10.--Profiles of floods on Paddock Creek, St. Louis County, Mo.

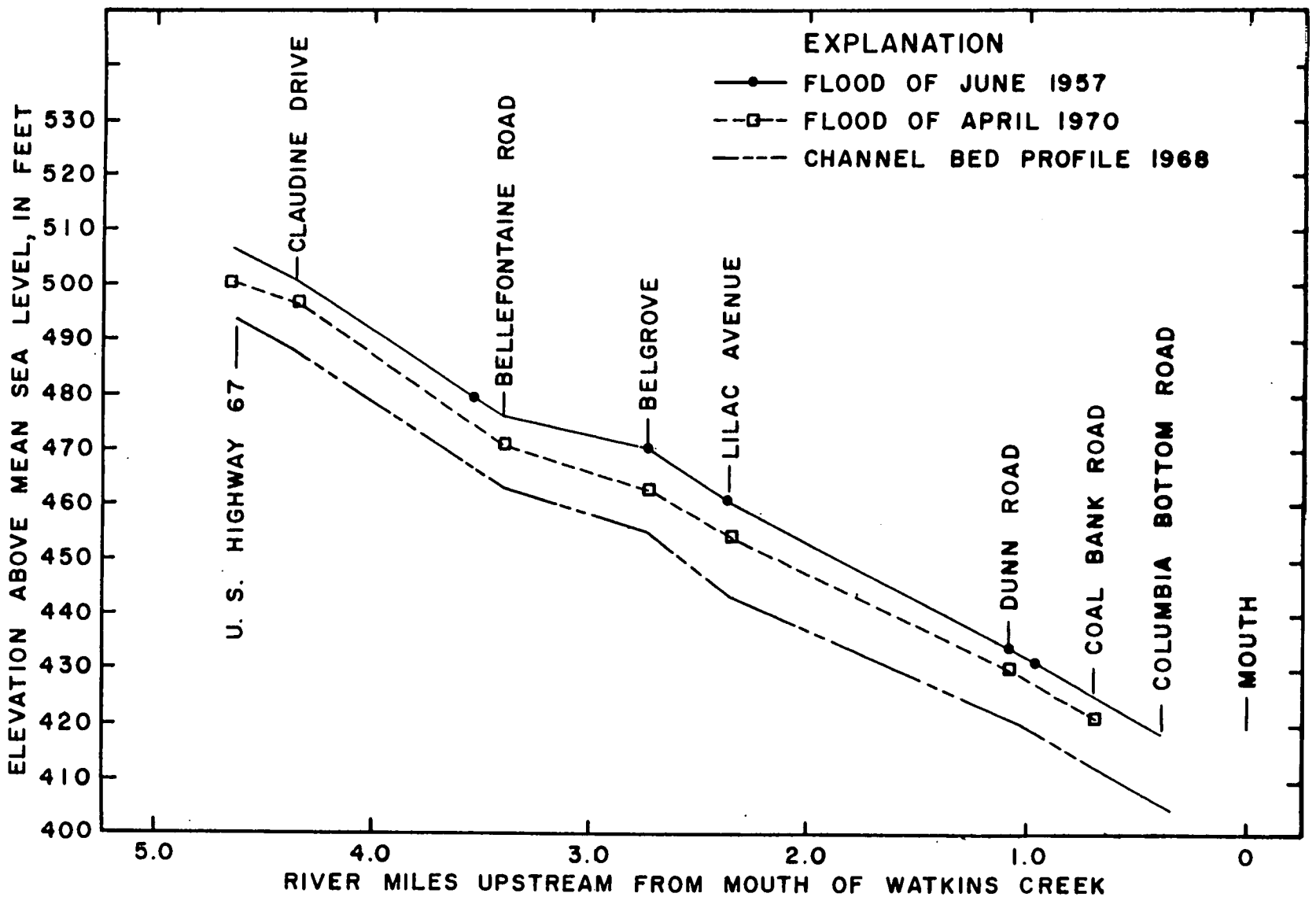

Figure 11.--Profiles of floods on Watkins Creek, St. Louis County, Mo.

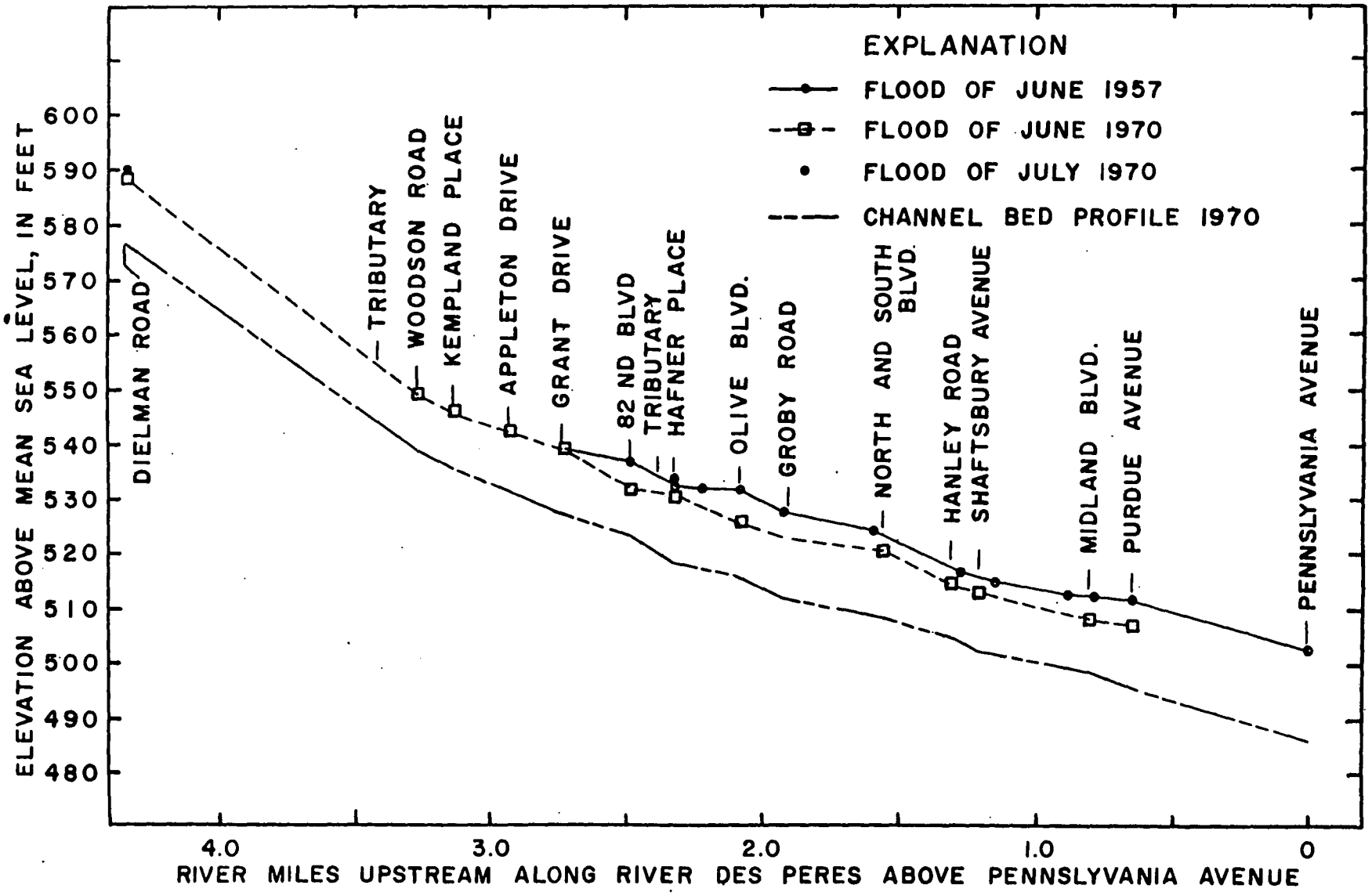

Figure 12.--Profiles of floods on River des Peres, St. Louis County, Mo.

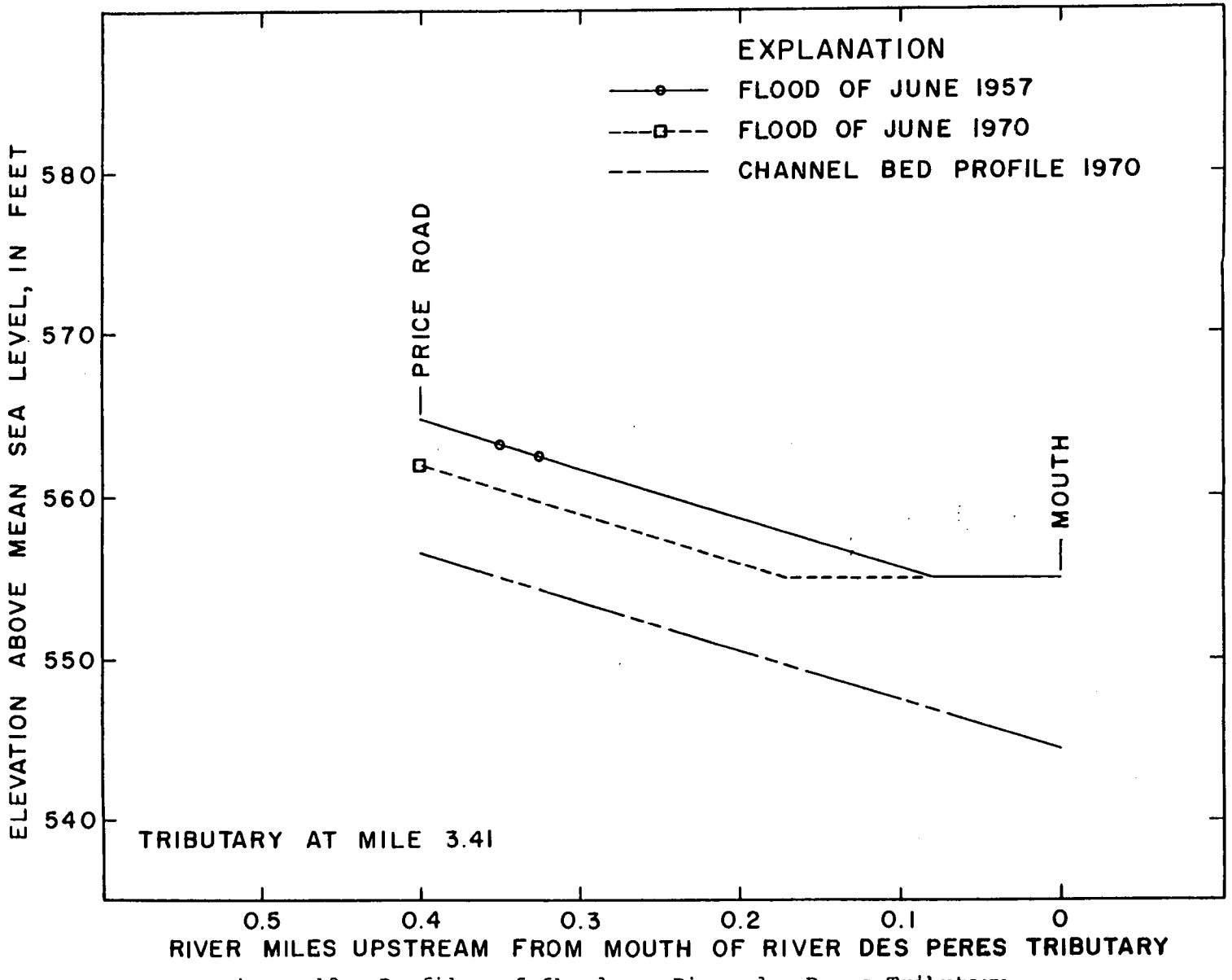

Figure 13.--Profiles of floods on River des Peres Tributary (mile 3.41), St. Louis County, Mo.

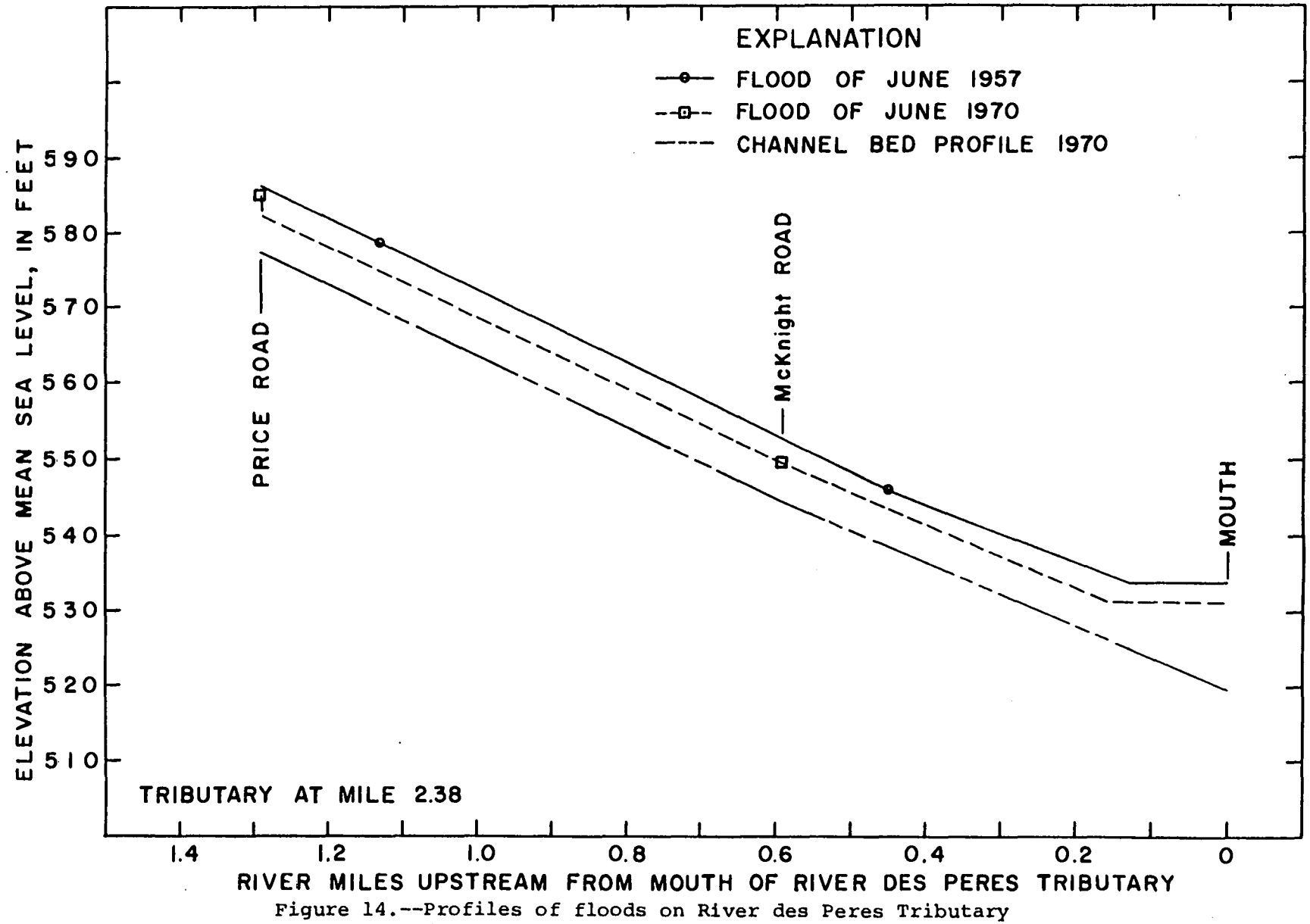

Figure 14.--Profiles of floods on River des Peres Tributary (mile 2.38), St. Louis County, Mo.

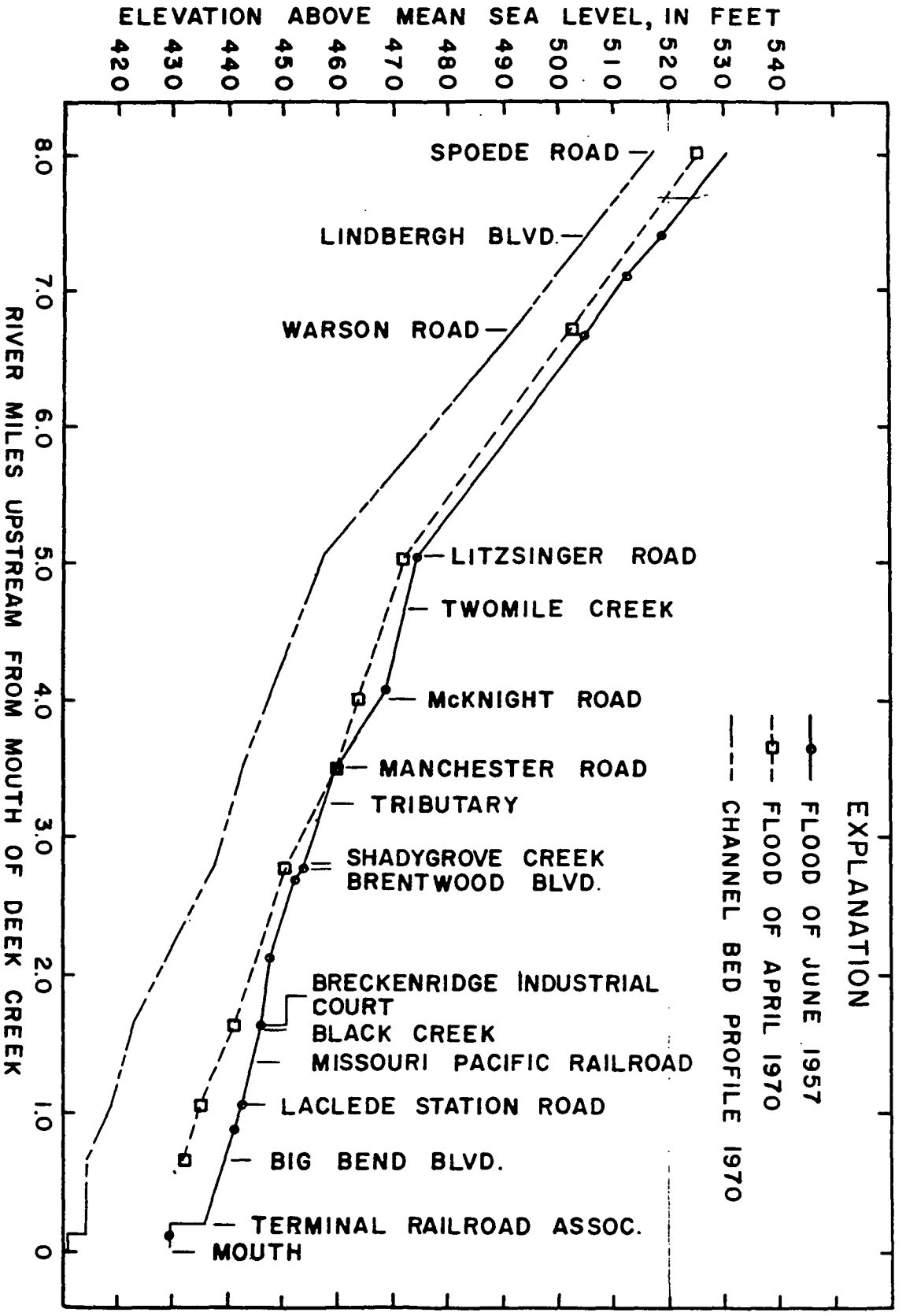

Figure 15.--Profiles of floods on Deer Creek, St. Louis County, Mo.

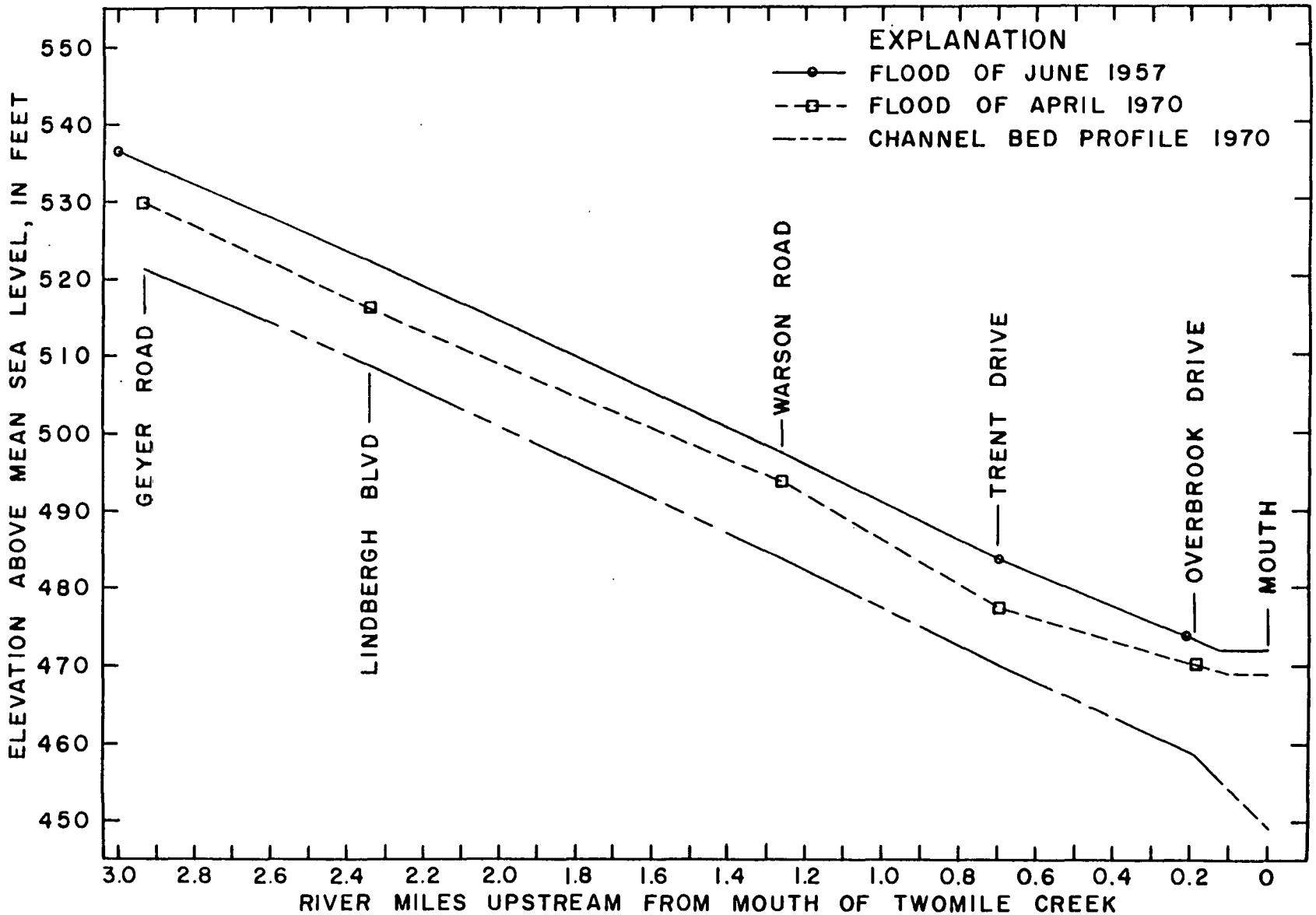

Figure 16.--Profiles of floods on Twomile Creek, St. Louis County, Mo.

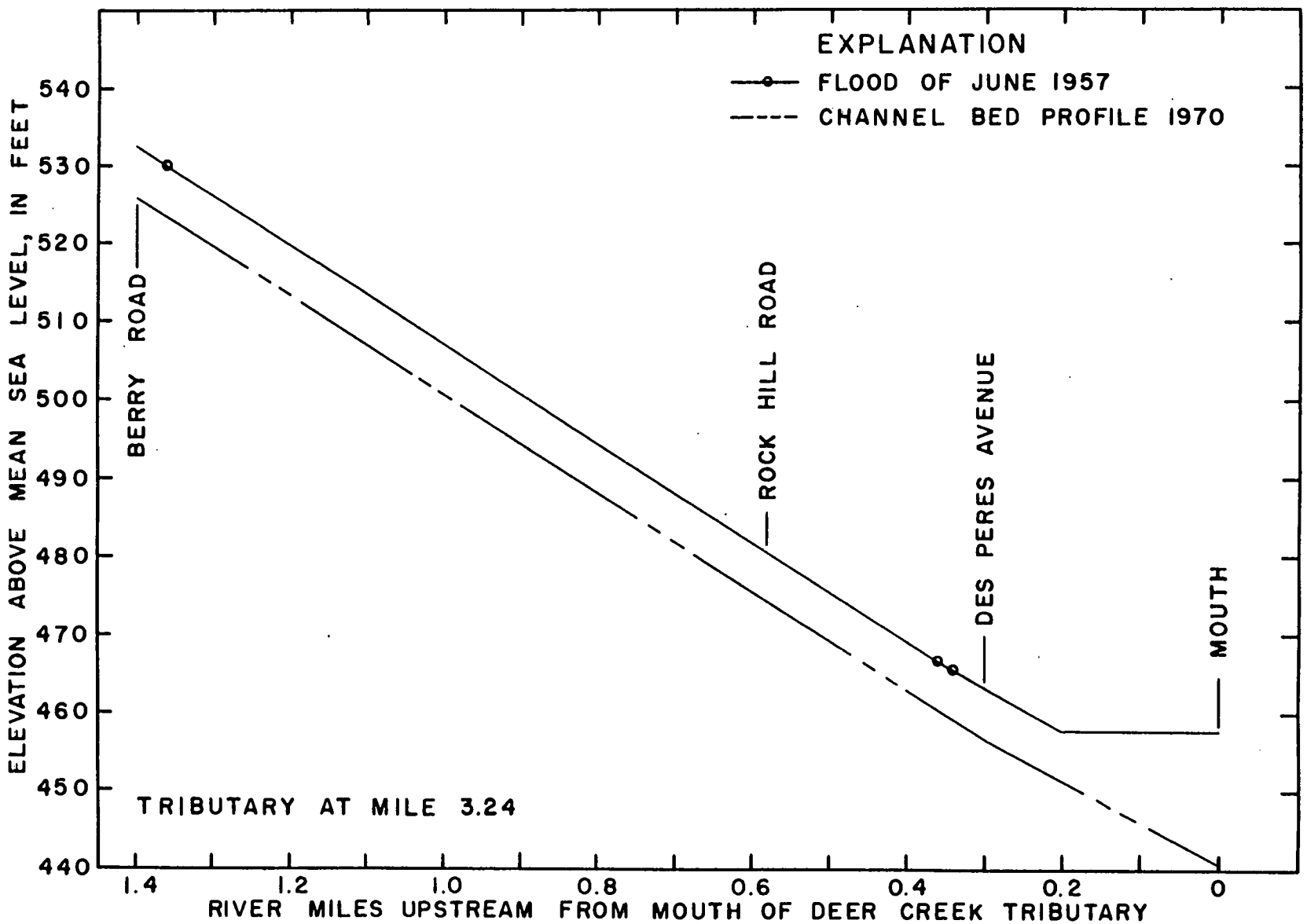

Figure 17.--Profiles of floods on Deer Creek Tributary, St. Louis County, Mo.

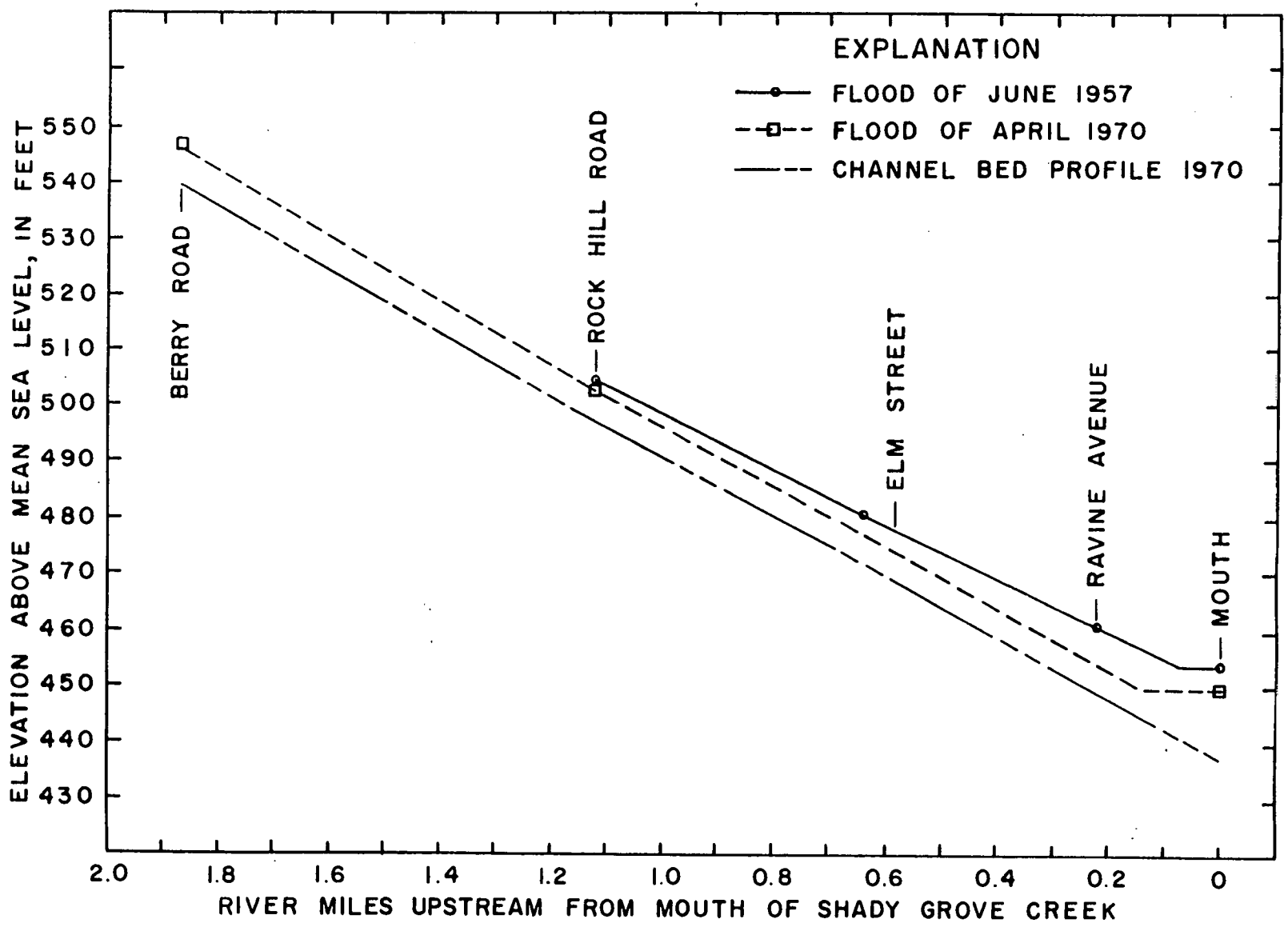

Figure 18.--Profiles of floods on Shady Grove Creek, St. Louis County, Mo.

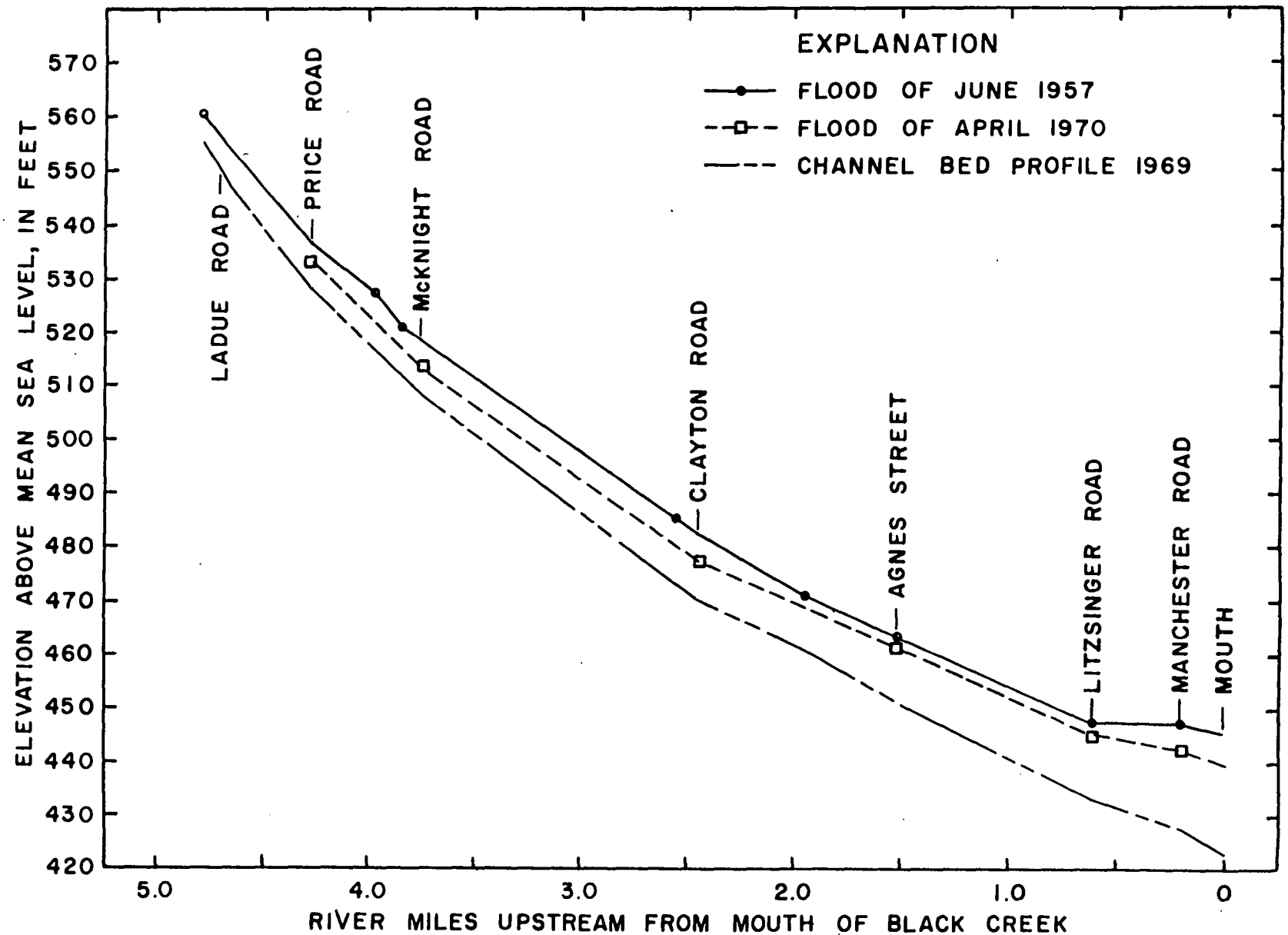

Figure 19.--Profiles of floods on Black Creek, St. Louis County, Mo.

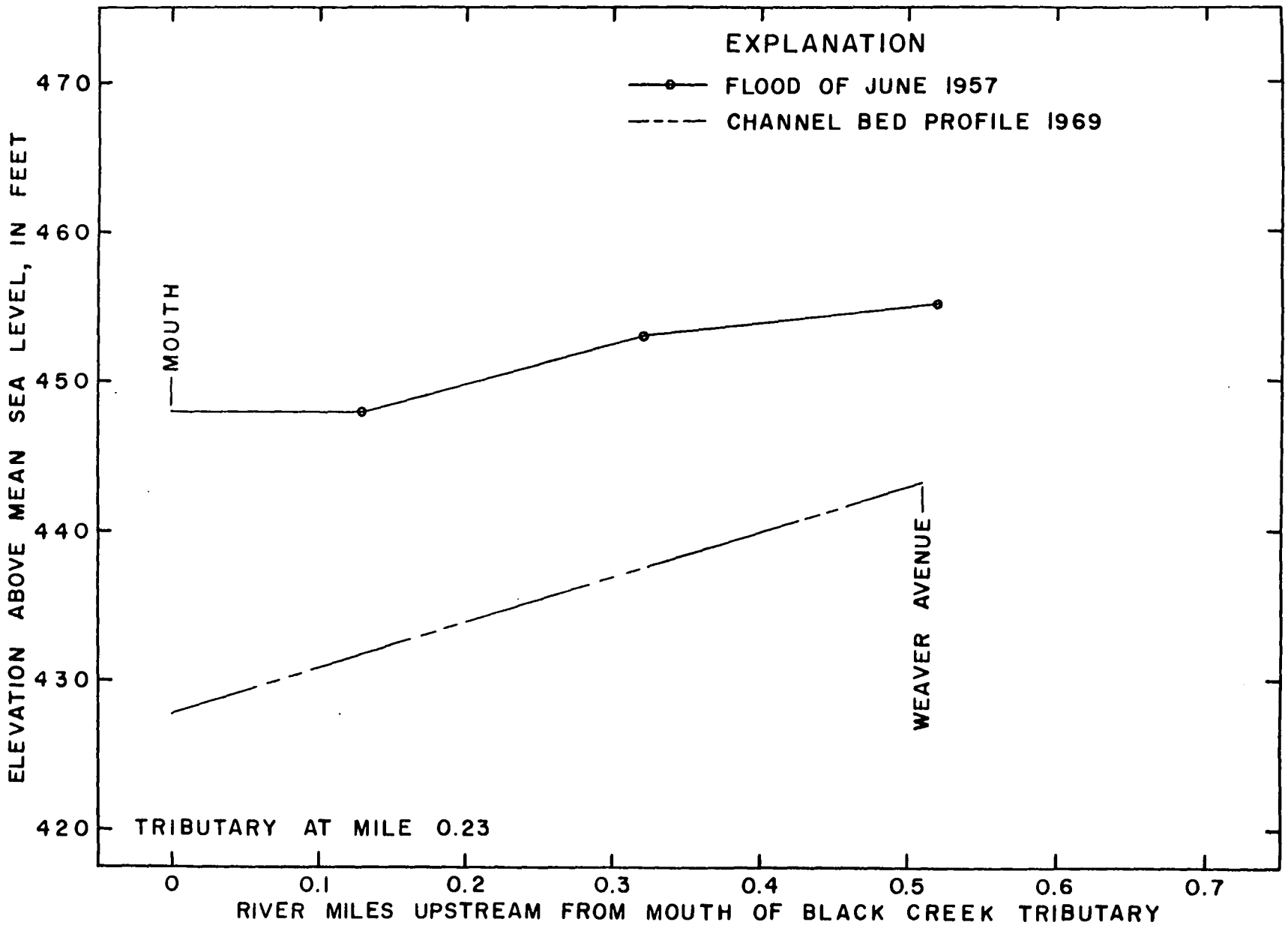

Figure 20.--Profiles of floods on Black Creek Tributary, St. Louis County, Mo.

is long, the profile is shown in two parts. The break in profile was placed at Lambert-St. Louis Municipal Airport because the main channel goes underground and profile elevations are uncertain. Profiles for the main stem of River des Peres are not shown below Pennsylvania Avenue because the channel has already been improved or has been placed underground.

FLOOD INUNDATION

The base maps used for showing inundation (pl. 1a-4) are composites of two or more topographic quadrangles to show the entire basin. For convenience to the user of the report, the inundation pattern for Coldwater Creek is shown on two maps (pl. 1a, 1b). The division was made at Lambert-St. Louis Municipal Airport as discussed under "Flood Profiles." Each map shows the area inundated during the 1957 flood.

The general procedure used in defining the flood boundaries was to construct the flood profiles described earlier in the text. Then the extent of flooding was delineated from the profiles by interpolation between contours (lines of equal ground elevations) and by plotting overflow limits identified during field investigations and surveys. The portrayal of flood boundaries is consistent with the scale of the map (1 inch=2,000 ft; contour interval, 10 ft).

Conditions presently existing in the channels and along the flood plains conceivably could alter the inundation pattern shown on plates 1a-4. To evaluate the extent and magnitude of flooding that would result from a storm equal in magnitude to that of 1957 under present conditions would involve additional study. Data are now being collected to provide a basis for stochastic analyses of the effect of urbanization on the magnitude and frequency of flood discharges.

FLOOD DEPTHS

Approximate depth of flooding can be determined by subtracting the ground elevation from the corresponding profile elevation for a given point. Caution should be exercised when using this method to determine flood depths, because extensive earthwork in some areas has significantly altered the ground elevation from that shown by contours in plates 1a-4. More accurate depths may be obtained by leveling from nearby bench marks to the site in question and subtracting the ground elevation from the corresponding elevation from high-water figures 6a-20.

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