STAGE-DISCHARGE RELATIONS FOR TOMBIGBEE RIVER AT ALICEVILLE LOCK AND DAM, NEAR PICKENSVILLE, ALABAMA--UPDATED 1985

By G. H. Nelson, Jr. and C. O. Ming

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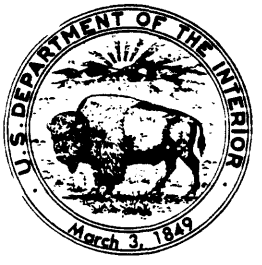

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UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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CONVERSION FACTORS

For readers who prefer to use metric units, conversion factors for terms used in this report are listed below:

Multiply	By	To obtain
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
Acre-foot (acre-ft)	1,233	cubic meters (m^3)

Water-surface elevation is referred to as stage in this report.

River mileages used in this report were furnished by the U.S. Army Corps of Engineers, Mobile District.

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ABSTRACT

Preliminary stage-discharge relations (limit curves) were developed for Aliceville Lock and Dam covering the period February 1980 to May 1983. Subsequent data collected at the dam indicated a need for a revision to those preliminary curves. Periodic review and possible update will be needed to keep the curves current. Using 92 data points defined by the flood of December 1983, the curves have been updated and are shown in this report.

INTRODUCTION

Aliceville Lock and Dam and related channel alterations are an integral part of the Tennessee-Tombigbee Waterway project. Land excavation and channel dredging, resulting from construction of the dam, have caused changes to the limit curves. Periodic review of data collected at the dam and verification of the curves is necessary for future planning.

The purpose of this report is to present the findings of a recent review of data collected since May 1983 and to show revisions to the preliminary limit curves based on these subsequent data. The scope of work was limited to a review of subsequent data and plotting stage versus discharge.

This report has been prepared by the U.S. Geological Survey in cooperation with the U.S. Army Corps of Engineers, Mobile District. Appreciation is expressed to the Corps for their assistance.

STUDY AREA

The Aliceville Lock and Dam is located on the Tombigbee River about 2 miles southwest of Pickensville, Pickens County (fig. 1). The lock is 110 feet wide, 600 feet long, and has a lift capability of 27 feet. The dam consists of a gate-controlled spillway section with four 60-foot wide radial gates and a 150-foot uncontrolled (fixed crest) spillway. Elevation of the gate-controlled spillway crest is 111 feet. Elevation of the uncontrolled spillway crest is 135.3 feet. The normal pool elevation is 136 feet. The facility is operated by the U.S. Army Corps of Engineers in accordance with guidelines identified by their Reservoir Regulation Section.

Drainage area of the Tombigbee River at the dam is about 5,750 square miles. Aliceville Lake (fig. 1), formed by the dam, has a storage capacity of 60,400 acre-feet at normal pool elevation.

The reach of river downstream from the Aliceville Lock and Dam to Gainesville is about 47 miles (fig. 1). It is characterized by a well developed, meandering channel with moderate to steep sloped banks. The channel is about 500 feet wide near Aliceville and gradually increases in width downstream. Its banks are densely covered with trees and thick undergrowth. The flood plain is relatively wide and level and is wooded except for scattered areas cultivated for crops or pasture. Major tributaries to the reach are Big Beaver, Bogue Chitto, and Lubbub Creeks, and Sipsey River.

Two major bendway cut-off channels completed in 1979 are located near Big Creek and Cooks Bend (fig. 1). Dredging of the channel to facilitate navigation will be performed routinely to maintain a minimum depth of 9 feet. Twenty-six sediment disposal areas are located at various sites to accommodate the dredged materials.

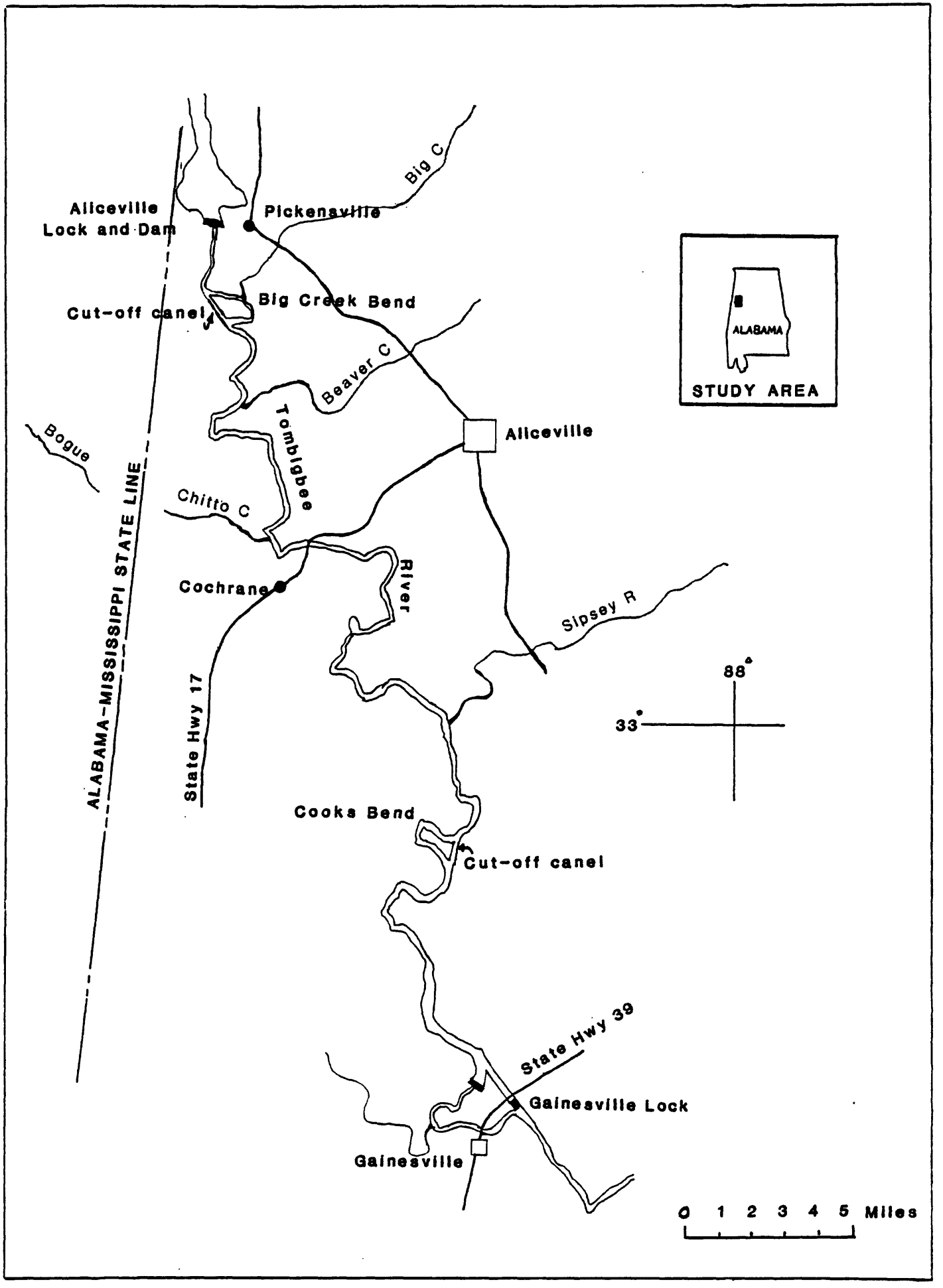

Figure 1.- Map showing location of Aliceville Lock and Dam.

UPDATE OF PRELIMINARY LIMIT CURVES

Accurate definition of a single stage-discharge relation for the pool or the tailwater is impossible due to the effects of backwater. As an alternative, preliminary limit curves were developed (Nelson and Ming, 1983).

Discharge was computed by indirect methods (Collins, 1976) for the flood of December 1983 using vertical gate openings and recorded stages for the pool and tailwater. This discharge was plotted versus stage to better define limit curves for both pool and tailwater. Bi-hourly computed discharge values with corresponding stages used to update the curves are shown in table 1.

The revised curves are shown in figures 2 and 3. Verification and improvements to the curves will necessitate acquiring additional stage and discharge data at the dam as well as current-meter measurements. Periodic review of data will determine the need for future revisions.

SUMMARY

The stage-discharge relation for both pool and tailwater at Aliceville Dam are affected by backwater that makes the development of an accurate single stage-discharge relation impossible. As a useful alternative, limit curves have been developed to define possible extremes of a series of stage-discharge relations (Nelson and Ming, 1983). Subsequent data indicated a need to revise the curves. Based on data for the flood of December 1983, the limit curves have been revised. Future updating will be needed as additional data become available.

Table 1.- List of computed discharge values for Aliceville Lock and Dam, tailwater.

Date	Time	Tailwater stage (ft)	Pool stage (ft)	Computed discharge (ft^3/s)	Date	Time	Tailwater stage (ft)	Pool stage (ft)	Computed discharge (ft^3/s)
1983					1983				
Dec 3	0200	114.53	135.23	26,300	Dec 7	0200	138.89	141.65	115,000
Dec 3	0400	117.18	135.10	34,700	Dec 7	0400	138.84	141.72	117,000
Dec 3	0600	119.63	135.12	44,400	Dec 7	0600	138.84	141.71	117,000
Dec 3	0800	121.50	135.12	49,300	Dec 7	0800	138.84	142.05	123,000
Dec 3	1000	123.39	135.09	57,300	Dec 7	1000	138.84	141.74	117,000
Dec 3	1200	124.86	135.11	59,600	Dec 7	1200	139.27	141.91	116,000
Dec 3	1400	126.52	135.06	64,100	Dec 7	1400	139.26	142.00	118,000
Dec 3	1600	126.92	135.34	63,400	Dec 7	1600	139.28	141.95	116,000
Dec 3	1800	127.84	135.67	64,600	Dec 7	1800	139.42	141.88	114,000
Dec 3	2000	128.84	135.58	68,300	Dec 7	2000	139.53	141.89	113,000
Dec 3	2200	129.70	135.63	66,900	Dec 7	2200	139.49	141.95	114,000
Dec 3	2400	130.33	135.83	66,400	Dec 7	2400	139.47	141.88	113,000
Dec 4	0200	130.77	136.05	88,700	Dec 8	0200	139.42	141.82	113,000
Dec 4	0400	131.56	136.28	90,000	Dec 8	0400	139.27	141.56	110,000
Dec 4	0600	131.74	136.58	92,100	Dec 8	0600	139.35	141.63	110,000
Dec 4	0800	132.20	136.90	94,200	Dec 8	0800	139.21	141.68	112,000
Dec 4	1000	132.66	137.16	95,000	Dec 8	1000	138.97	141.63	114,000
Dec 4	1200	133.07	137.33	97,100	Dec 8	1200	139.00	141.63	114,000
Dec 4	1400	133.37	137.50	98,200	Dec 8	1400	139.06	141.39	109,000
Dec 4	1600	133.64	137.69	99,500	Dec 8	1600	138.99	141.39	110,000
Dec 4	1800	133.80	137.86	101,000	Dec 8	1800	138.72	141.29	111,000
Dec 4	2000	134.23	137.98	100,500	Dec 8	2000	138.61	141.36	113,000
Dec 4	2200	133.97	138.15	103,000	Dec 8	2200	138.39	141.12	111,000
Dec 4	2400	134.51	138.26	102,000	Dec 8	2400	138.46	140.81	106,000
Dec 5	0200	134.62	138.41	103,000	Dec 9	0200	138.29	140.69	105,000
Dec 5	0400	134.91	138.55	103,000	Dec 9	0400	138.29	140.69	105,000
Dec 5	0600	135.11	138.73	105,000	Dec 9	0600	138.19	140.36	101,000
Dec 5	0800	135.27	138.77	104,000	Dec 9	0800	138.02	140.26	101,000
Dec 5	1000	135.31	138.92	106,000	Dec 9	1000	137.79	140.23	103,000
Dec 5	1200	135.21	138.92	106,000	Dec 9	1200	137.60	139.94	100,000
Dec 5	1400	135.84	139.32	107,000	Dec 9	1400	137.36	139.68	98,000
Dec 5	1600	136.01	139.47	108,000	Dec 9	1600	137.22	139.47	96,000
Dec 5	2000	136.30	139.81	110,000	Dec 9	2000	136.56	138.85	93,000
Dec 5	2200	136.50	139.99	111,000	Dec 9	2200	136.31	138.39	88,000
Dec 5	2400	136.67	140.18	113,000	Dec 9	2400	136.00	137.85	85,000
Dec 6	0200	136.87	140.21	111,000	Dec 10	0200	135.53	137.52	82,000
Dec 6	0400	137.03	140.18	109,000	Dec 10	0400	135.22	136.90	76,000
Dec 6	0600	137.24	140.45	112,000	Dec 10	0600	134.66	136.33	74,000
Dec 6	0800	137.35	140.54	112,000	Dec 10	0800	133.94	135.93	65,000
Dec 6	1000	137.12	140.82	119,000	Dec 10	1000	133.23	135.95	45,000
Dec 6	1200	137.68	140.85	114,000	Dec 10	1200	132.51	135.72	45,000
Dec 6	1400	137.81	140.97	115,000	Dec 10	1400	131.25	136.05	36,000
Dec 6	1800	138.12	141.29	117,000	Dec 10	1600	130.33	135.99	38,600
Dec 6	2000	138.29	141.45	118,000	Dec 10	2200	127.59	136.03	28,600
Dec 6	2200	138.54	141.45	115,000	Dec 10	2400	126.72	136.07	27,900
Dec 6	2400	138.73	141.41	113,000					

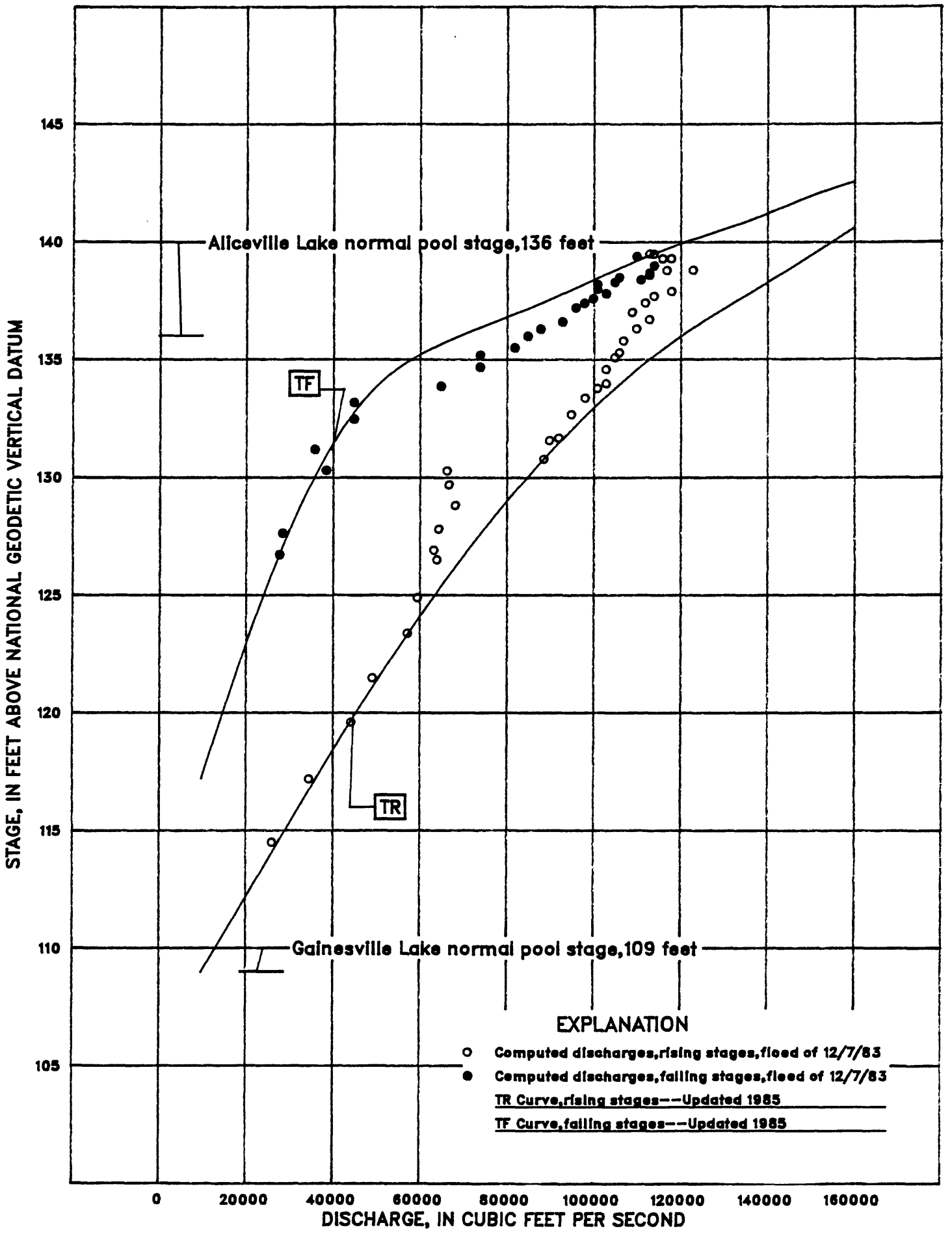

Figure 2.– Limit curves defining the ranges in stage for Tombigbee River at Aliceville Lock and Dam, tailwater.

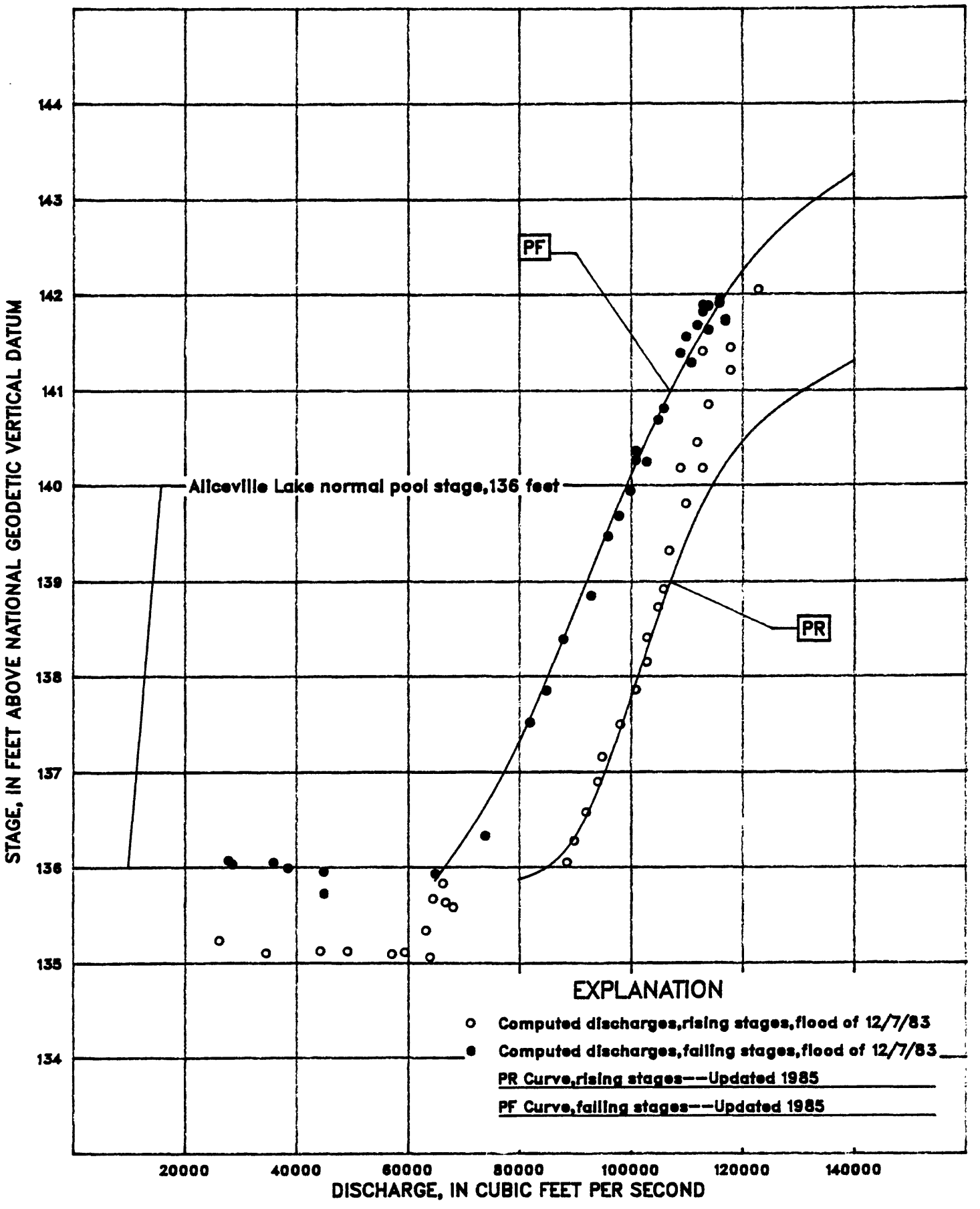

Figure 3.— Limit curves defining the ranges in stage for Tombigbee River at Aliceville Lock and Dam, pool.

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