STAGE-DISCHARGE RELATIONS FOR BLACK WARRIOR RIVER AT WARRIOR DAM NEAR EUTAW, ALABAMA--UPDATED 1985

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

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DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

Dallas Peck, Director

For additional information write to:

District Chief
U.S. Geological Survey
520 19th Avenue
Tuscaloosa, Alabama 35401

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U.S. Geological Survey
Box 25425, Federal Center
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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
feet (ft)	0.3048	meters
miles (mi)	1.609	kilometers
square miles (mi^2)	2.590	square kilometers
cubic feet per second (ft^3/s)	0.02832	cubic meters per second
acre-feet (acre-ft)	1,233	cubic meters

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

The construction of Warrior Dam, completed in 1962, has resulted in changes to the stage-discharge relations in the vicinity. The scarcity of current-meter measurements coupled with backwater conditions, makes definition of a single stage-discharge relation impossible without considerable error. However, as an useful alternative, limit curves were developed in 1983 that defined the limits of possible stage-discharge relations at the dam tailwater section. Since the 1983 report, 37 discharge values computed through the dam for the flood of December 1983 were used to verify or update the lower end of the limit curves. Data obtained from a current-meter measurement of the February 1961 flood (furnished by the U. S. Army Corps of Engineers) were used to update the upper end of the curves. This report presents the updated information.

INTRODUCTION

Changes caused by the construction of Warrior Dam (fig. 1) have resulted in changes in the stage-discharge relation in the vicinity (Nelson and Ming, 1983). The purpose of this report is to provide updated limit curves for the dam tailwater and to portray the scatter of the plotted subsequent data points. The scope of the work was limited to plotting available current-meter measurements and discharge values computed bi-hourly versus tailwater stage for the flood of December 1983.

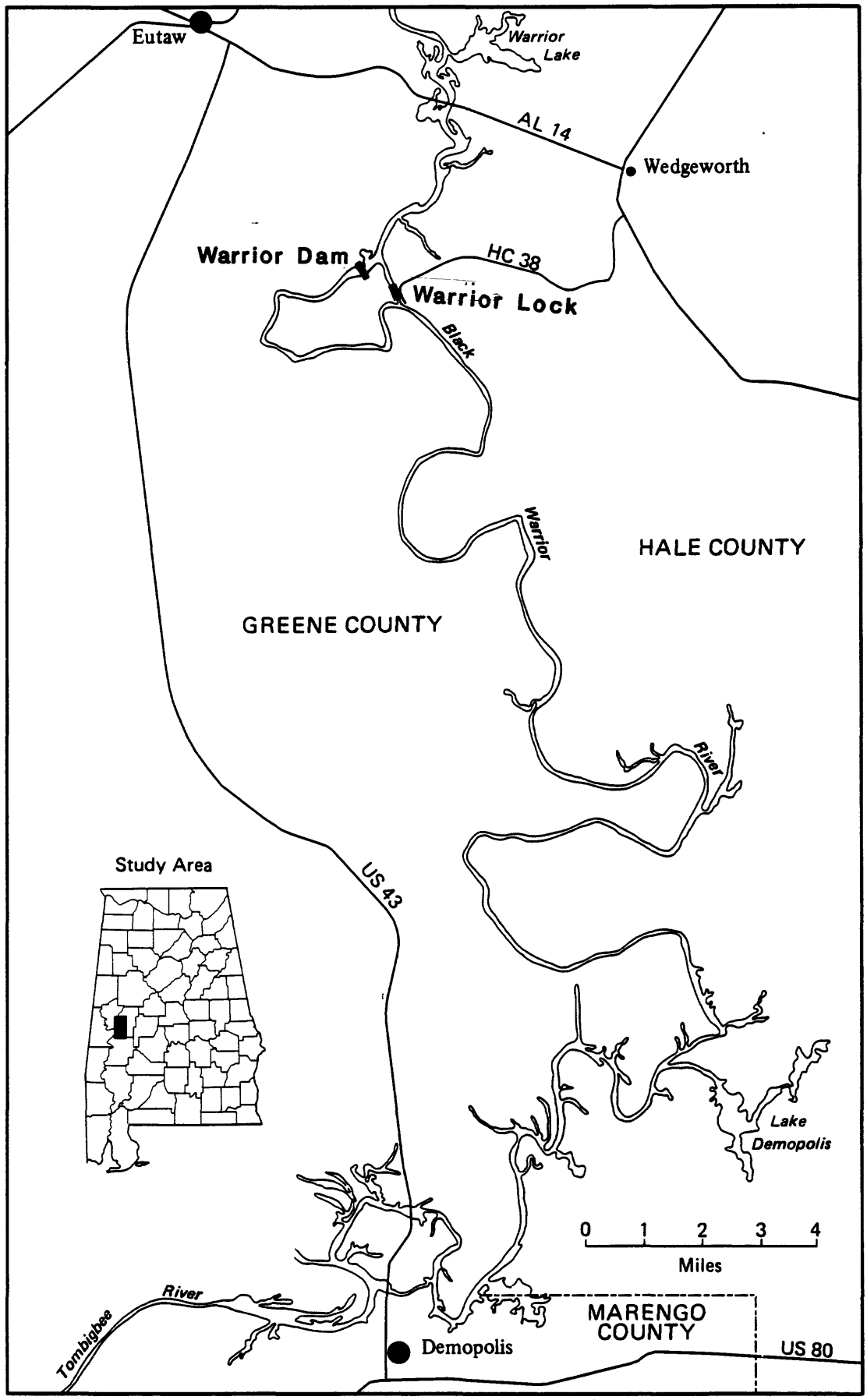


Figure 1.--Location of Warrior Dam.

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

Warrior Dam is located on the Black Warrior River about 5 miles east of Eutaw, Greene County, Alabama (fig. 1). The dam consists of a gate-controlled spillway section with six 60-foot wide radial gates. The gates are operated by the U.S. Army Corps of Engineers in accordance with guidelines identified by their Reservoir Regulation Section.

Drainage area of the Warrior River at the dam is about 5,800 square miles. Warrior Lake (fig. 1), formed by the dam, has a storage capacity of 49,100 acre-feet at normal pool elevation.

The reach of river downstream from Warrior Dam to Demopolis is about 43 miles long (fig. 1). It is characterized by a well developed meandering channel with moderate to steep sloped banks. The channel is about 600 feet wide near Eutaw 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 Needham, Hines, and Big Prairie Creeks. The Black Warrior River joins the Tombigbee River just north of Demopolis. Demopolis Lock and Dam is located on the Tombigbee River about 2 miles west of Demopolis.

STAGE-DISCHARGE RELATIONS

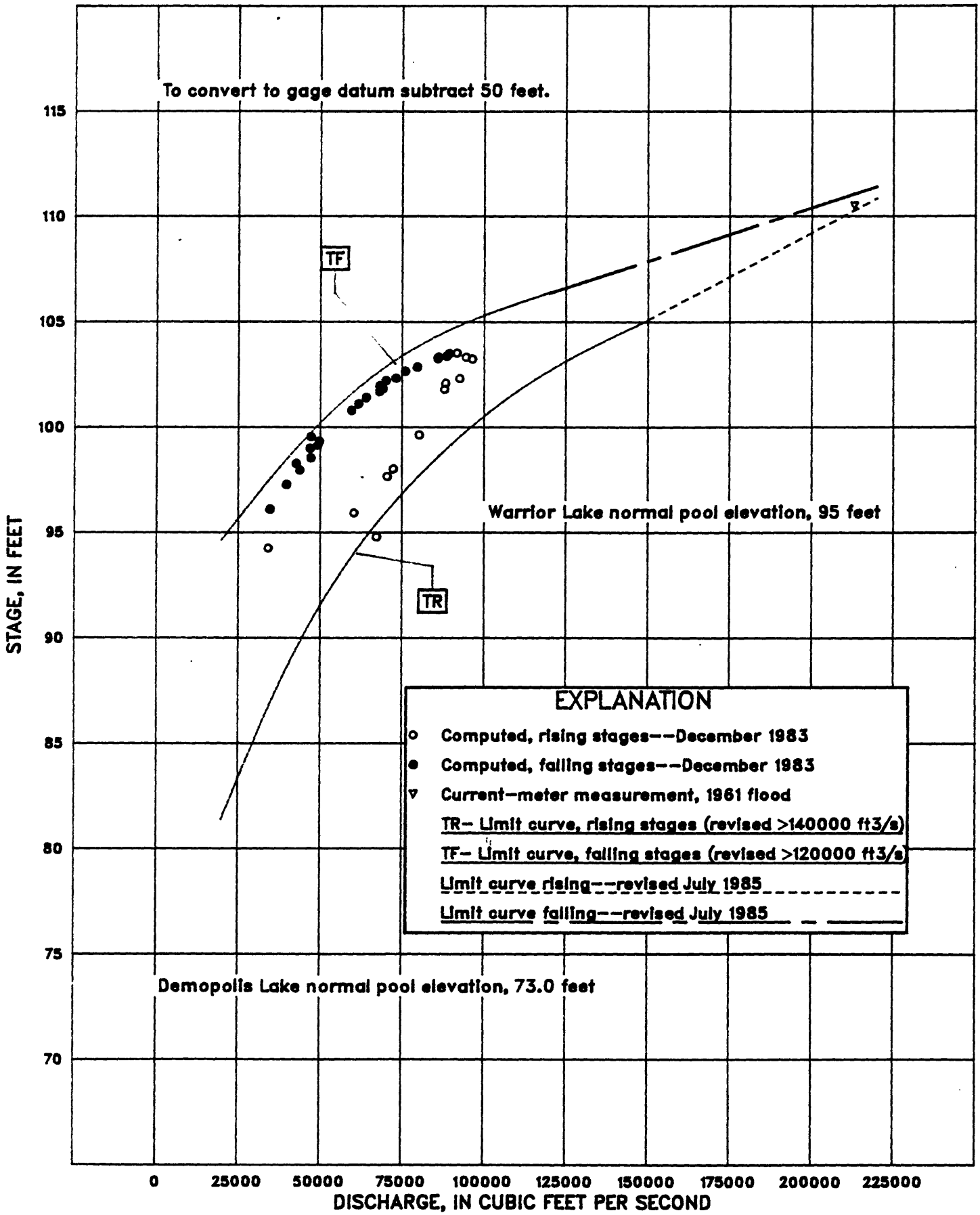
A single stage-discharge relation for the tailwater is impossible to define without considerable error due to the effects of backwater. As a useful alternative limit curves were developed that encompass a range of stage-discharge relations that may be possible at the dam tailwater (Nelson and Ming, 1983). The limit curves shown in the 1983 preliminary report have been updated based on data collected during the flood of December 1983 using the 37 data points listed in table 1 and a current-meter measurement made during the February 1961 flood. Data from the current-meter measurement were furnished by the Corps of Engineers. The resulting limit curves are shown in figure 2. Verification and future updates to the curves will necessitate acquiring additional current-meter measurements.

SUMMARY

The stage-discharge relation for the tailwater at Warrior Dam is affected by backwater that makes definition of a single stage-discharge relation inaccurate. As a useful alternative limit curves were developed that encompass a range of stage and discharge that may occur at the dam (Nelson and Ming, 1983). The limit curves shown in the 1983 preliminary report have been updated based on data collected during the flood of December 1983 and a current-meter measurement made during the 1961 flood. Verification and future updates to the curves will necessitate acquiring additional current-meter measurements.

Table 1. List of computed discharge values for the flood of December 1983 for Black Warrior at Warrior Dam

Date	Time	Tailwater Stage (feet)	Computed Discharge (cubic feet per second)
1983			
Dec. 4	1200	94.24	34,200
Dec. 4	1400	94.78	67,300
Dec. 4	2000	95.92	60,300
Dec. 5	0600	97.66	70,500
Dec. 5	0800	98.02	72,300
Dec. 5	1800	99.64	80,200
Dec. 6	0200	100.96	87,100
Dec. 6	0800	101.82	87,900
Dec. 6	1000	102.11	88,200
Dec. 6	1200	102.33	92,600
Dec. 7	0200	103.26	96,400
Dec. 7	0400	103.34	94,500
Dec. 7	1400	103.54	91,700
Dec. 8	0400	103.53	89,300
Dec. 8	0600	103.48	89,100
Dec. 8	1000	103.40	88,600
Dec. 8	1200	103.35	86,100
Dec. 8	1400	103.28	85,800
Dec. 8	2400	102.88	79,600
Dec. 9	0400	102.68	75,900
Dec. 9	1000	102.35	73,100
Dec. 9	1200	102.24	70,100
Dec. 9	1600	101.99	68,100
Dec. 9	1800	101.85	69,100
Dec. 9	2000	101.71	68,100
Dec. 9	2400	101.42	64,000
Dec. 10	0400	101.12	61,700
Dec. 10	0800	100.80	59,500
Dec. 10	2400	99.55	47,200
Dec. 11	0200	99.32	49,700
Dec. 11	0400	99.15	49,200
Dec. 11	0600	98.99	46,900
Dec. 11	1000	98.54	47,100
Dec. 11	1200	98.27	42,700
Dec. 11	1400	97.96	43,700
Dec. 11	1800	97.27	39,700
Dec. 11	2400	96.10	34,700



--Updated limit curves for Black Warrior River at Warrior Dam, tailwater.

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