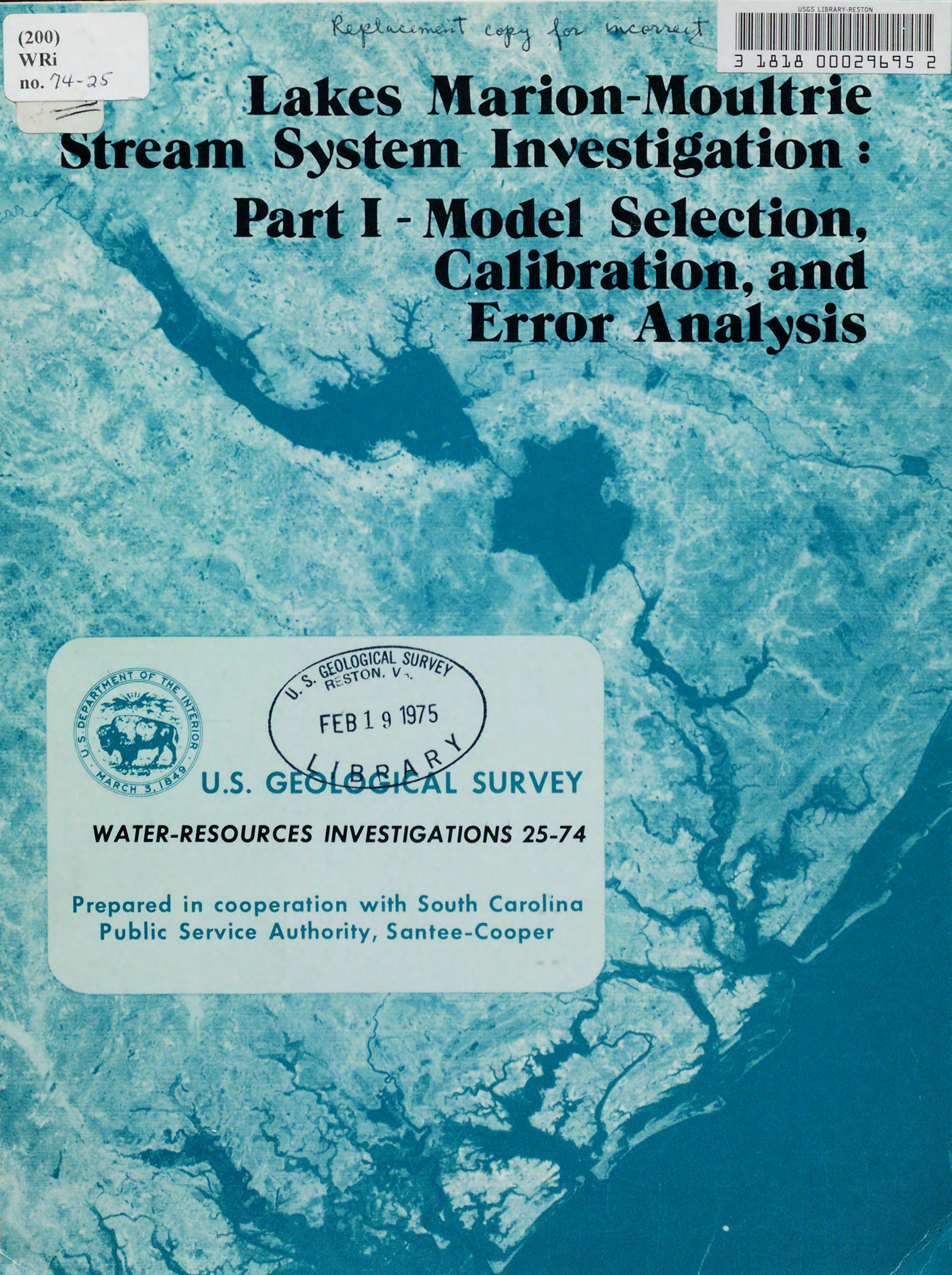
# Lakes Marion-Moultrie Stream System Investigation: Part I - Model Selection, Calibration, and Error Analysis





U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

U.S. GEOLOGICAL SURVEY

**WATER-RESOURCES INVESTIGATIONS 25-74**

Prepared in cooperation with South Carolina Public Service Authority, Santee-Cooper

| BIBLIOGRAPHIC DATA SHEET | 1. Report No. | 2. | 3. Recipient's Accession No. |
|---|---|---|---|
| 4. Title and Subtitle<br>LAKES MARION-MOULTRIE STREAM SYSTEM INVESTIGATION: PART I - MODEL SELECTION, CALIBRATION, AND ERROR ANALYSIS | | | 5. Report Date<br>October 1974<br>6. |
| 7. Author(s)<br>H. H. Jeffcoat, M. E. Jennings, and J. B. Peterson | | | 8. Performing Organization Rept. No. WRI 25-74 |
| 9. Performing Organization Name and Address<br>U.S. Geological Survey<br>2001 Assembly Street, Suite 200<br>Columbia, South Carolina 29201 | | | 10. Project/Task/Work Unit No.<br>11. Contract/Grant No. |
| 12. Sponsoring Organization Name and Address<br>U.S. Geological Survey<br>2001 Assembly Street, Suite 200<br>Columbia, South Carolina 29201 | | | 13. Type of Report & Period Covered<br>Final<br>14. |

15. Supplementary Notes
Prepared in cooperation with South Carolina Public Service Authority, Santee-Cooper

16. Abstracts

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17. Key Words and Document Analysis. 17a. Descriptors

*Flood routing, *River systems, *Streamflow forecasting, South Carolina, Reservoir stages.

17b. Identifiers/Open-Ended Terms

Streamflow prediction, Reservoir mass-balance.

17c. COSATI Field/Group

| 18. Availability Statement | 19. Security Class (This Report) | 21. No. of Pages |
|---|---|---|
| No restriction on distribution | UNCLASSIFIED | 63 |
| | 20. Security Class (This Page) UNCLASSIFIED | 22. Price |

FORM NTIS-35 (REV. 3-72) THIS FORM MAY BE REPRODUCED USCOMM-DC 14952-P72

COVER--Space view of Lakes Marion-Moultrie area from National Aeronautics and Space Administration ERTS-1 satellite,

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UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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CONTENTS



ILLUSTRATIONS

TABLES

## FACTORS FOR CONVERTING ENGLISH UNITS TO INTERNATIONAL SYSTEM (SI) UNITS

The following factors may be used to convert the English units published herein to the International System of Units (SI).

| Multiply English units | By | To obtain SI units |
|---|---|---|
| | *Length* | |
| inches (in) | 25.4 | millimetres (mm) |
| feet (ft) | .3048 | metres (m) |
| | *Area* | |
| square miles ($mi^2$) | 2.590 | square kilometres ($km^2$) |
| | *Volume* | |
| cubic feet per second per day ($ft^3/s$-d) | 2447 | cubic metres ($m^3$) |
| cubic feet per second per day ($ft^3/s$-d) | $2.447 \times 10^{-3}$ | cubic hectometres ($hm^3$) |
| | *Flow* | |
| cubic feet per second ($ft^3/s$) | .02832 | cubic metres per second ($m^3/s$) |

# LAKES MARION-MOULTRIE STREAM SYSTEM INVESTIGATION: PART I - MODEL SELECTION, CALIBRATION, AND ERROR ANALYSIS

By Hillary H. Jeffcoat, Marshall E. Jennings, and Johannes B. Peterson

## ABSTRACT

Application of a daily stream-reservoir model of the Lakes Marion-Moultrie system located in the lower Santee River basin, S.C. is described. Twelve hydrologic events, representing a range of streamflow magnitudes, are used to calibrate the model. The model is useful as a real-time forecasting tool for predicting Lakes Marion-Moultrie inflows and stages. An error-prediction method, based on probability concepts, is used to construct volume and elevation (stage) error-frequency relations for both reservoirs. The relations allow rapid assessment of prediction errors. The model is designed for further studies associated with hydrologic simulation of the Lakes Marion-Moultrie system with regard to hydropower-optimization studies.

## INTRODUCTION

### Purpose and Objectives of Study

In 1971, the U.S. Geological Survey, in cooperation with the South Carolina Public Service Authority, Santee-Cooper, embarked on a study program to develop an operational, mathematical model of the lower Santee River system. The study program, to be accomplished in three phases, has as its eventual objective the development of a simulation model of the Lakes Marion-Moultrie hydrologic system as it relates to hydropower production. Results of the first and second phases of the program described herein are: (a) Application of a Lake Marion inflow model, and (b) development of a stream-reservoir model of the Lakes Marion-Moultrie system. The third phase of the program, utilizing the mathematical model for simulation studies, will be reported in a separate report entitled "Lakes Marion-Moultrie stream system investigation: part II - simulation studies."

In addition to providing a basis for simulation studies, the operational stream-reservoir model is useful as a real-time forecasting tool for predicting Lake Marion storage volumes and stages in advance of actual occurences.

## Lower Santee Stream-Reservoir System

The South Carolina Public Service Authority is a State-owned utility which provides electric power, navigation, recreation, and flood control in the Santee River basin. The Lakes Marion-Moultrie reservoir system, located in the lower Santee River basin, impounds water from a watershed drainage of approximately 15,000 $mi^2$ (38,850 $km^2$). As seen in figure 1 (map of study area), Lake Marion, the primary storage reservoir, receives basin runoff from the Wateree and Congaree Rivers and discharges through a diversion canal into Lake Moultrie and down the Santee River. A hydroelectric generating plant located at Lake Moultrie dam releases water into the adjacent Cooper River basin. Spilling of excess water into the Santee River from the Lakes Marion-Moultrie system is accomplished through 62 crest gates located at the Lake Marion dam.

The mainstream inflow to the Lakes Marion-Moultrie reservoir system is from the highly-regulated Wateree and Saluda Rivers, and the semi-regulated Broad River. Major hydroelectric plants exist on the Wateree and Saluda Rivers, while modifications to the natural flow in the Broad River generally originate from low-storage-capacity dams. Within the study area, tributary drainage comprises 12.1 percent of the total drainage area. For modeling purposes, tributary and flow contributions within the study area are represented by Congaree Creek and Colonels Creek.

## DATA BASE AND ITS RELIABILITY

Table 1 lists the data base of available Geological Survey gaging stations in the study area. Streamflow data from four mainstream gages, two tributary gages, two reservoir gages, and one differential-slope gage are available for use in this study. In addition, daily precipitation and evaporation data collected at Rimini, S.C., are available from the National Weather Service.

Station no. 02169800, Santee River near Fort Motte, was operated solely for stage data prior to the 1967 water year. Stream-gaging conditions at the site are such that the stage-discharge relationship above bank-full stage is poor. To improve the relationship, several discharge measurements at high stages are made at nearby locations.

The quality of gaging-station data at other stream-gaging stations is considered to be good, with the exception of discharge records for the diversion canal. These are poor when the fall between the lakes reaches about 0.10 foot (0.030 m).

Existing elevation (stage)-volume relationships, developed by Harza Engineering Company, for both lakes were used to make reservoir mass-balance computations. Because lake volumes obtained for Lake Marion above 75.0 feet (22.86 m) are from curves extrapolated by the South Carolina Public Service Authority, the volumes may be subject to considerable error.

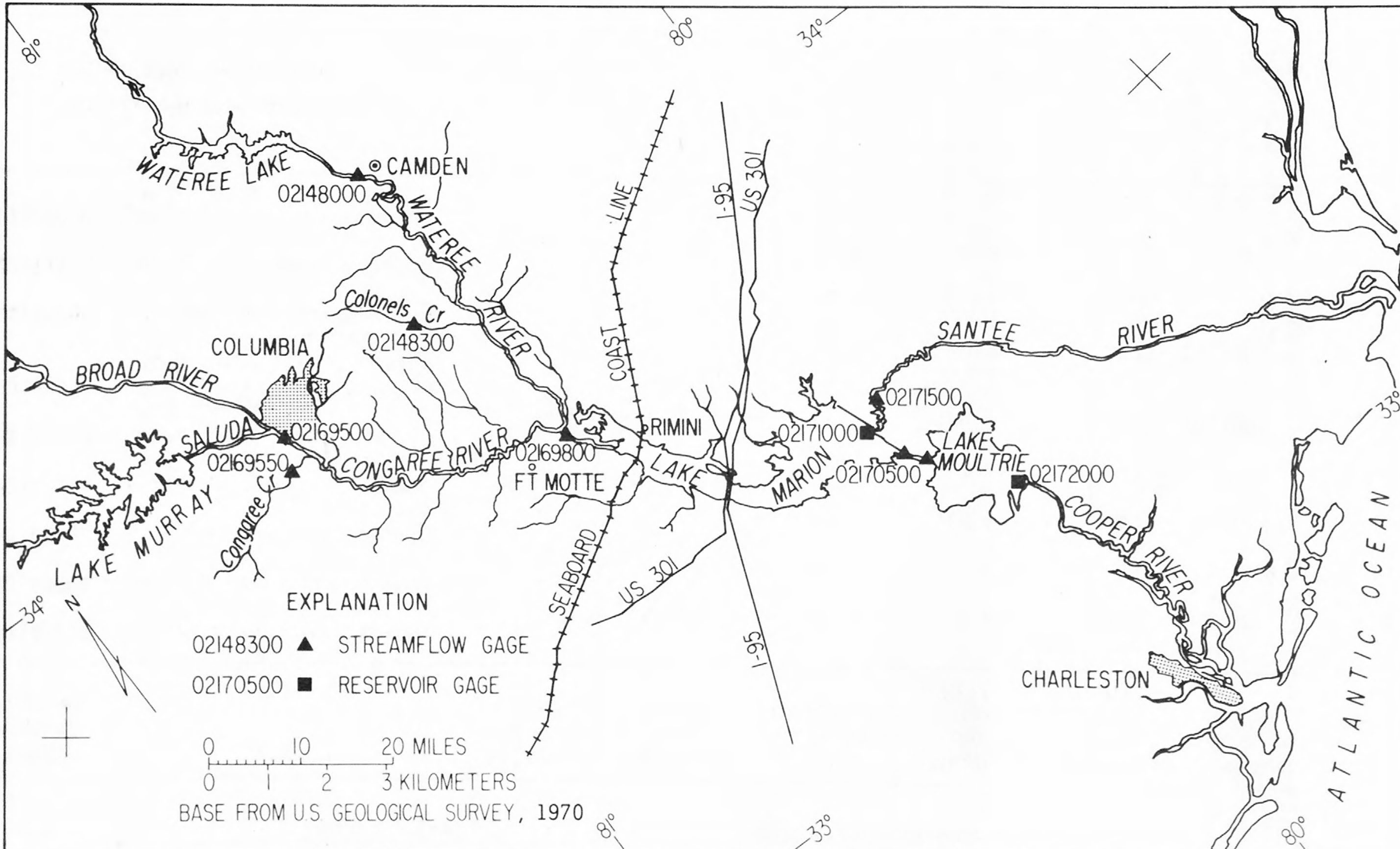


Figure 1.--Location of study area.

Table 1.--Gaging-station data and streamflow characteristics

| USGS station number | Location | Length of record (years) | Drainage area ($mi^2$) | Miles above Lake Moultrie dam | Maximum daily flow ($ft^3/s$) | Minimum daily flow ($ft^3/s$) | Average discharge ($ft^3/s$) |
|---|---|---|---|---|---|---|---|
| 02148000 | Wateree River near Camden, S.C. | 49[a] | 5,070 | 121.0 | 12,900 | 163 | 6,168 |
| 02148300 | Colonels Creek near Leesburg, S.C. | 5 | 38.1 | 85.4 | 893 | 12 | 43.9 |
| 02169500 | Congaree River at Columbia, S.C. | 32 | 7,850 | 102.4 | 126,000 | 662 | 8,914 |
| 02169550 | Congaree Creek at Cayce, S.C. | 11 | 136 | 101.9 | 1,390 | 126 | 228 |
| 02169800 | Santee River near Fort Motte, S.C. | 19 | 14,100 | 52.1 | 156,000 | 4,000[b] | 15,490[b] |
| 02170500 | Lakes Marion-Moultrie diversion canal near Pineville, S.C. | 28 | ------ | 13.5 | 40,200 | 61 | 14,410 |
| 02171000 | Lake Marion near Pineville, S.C. | 29 | 14,700 | 15.0 | ------- | ------ | ------- |
| 02171500 | Santee River near Pineville, S.C. | 29 | 14,700 | 12.6 | 153,000 | 9 | 2,162 |
| 02172000 | Lake Moultrie near Pinopolis, S.C. | 29 | ------ | 0 | ------- | ------ | ------- |

[a]At present site since January 1935.

[b]Since 1967 water year.

Hydrologic quantities such as streamflow and reservoir variables have associated measurement error; thus, predicted quantities, using a modeling procedure, will have an error of prediction. One of the important aspects of this study is to investigate the effect of measurement and modeling errors on the predicted reservoir volume or stage.

## DESCRIPTION OF MODELING TECHNIQUES

In recent years there has been much interest in the use of hydrologic models for solving a wide range of operational problems in the water-resources field. Prediction is a basic goal in solving most of these problems.

Basically a hydrologic model is an assemblage of calculation routines, based on well-known and proven hydrologic concepts. These routines are linked to form an integrated tool for prediction. The term "model" implies that the calculation method, which is generally set up for digital computation, is capable of reproducing (with a given degree of accuracy) what is observed in field situations.

The Lakes Marion-Moultrie predictive model developed in this report requires two hydrologic models: (a) A streamflow-routing model, and (b) a reservoir water-balance model. These models, which are calibrated using field data, are described below.

### Streamflow-Routing Model

The streamflow-routing model used in this investigation is proposed by Sauer (1973). This model is a simplified, channel-routing model based on the continuity relation for a reach of stream channel and utilizes a convolution-type, calculation scheme as follows:

$$0(i) = \sum_{k=1}^{i} I(k)\,U(i-k+1)\,\Delta k \qquad (1)$$

where

$0(i)$ = reach outflow hydrograph, $ft^3/s$;
$I(k)$ = reach input hydrograph, $ft^3/s$;
$U(i-k+1)$ = channel unit-response function; and
$k$ = variable counter.

The channel unit-response function, $U(i-k+1)$, as described by Sauer, is defined as the reach outflow hydrograph resulting from a reach input of 1 $ft^3/s$ (0.03 $m^3/s$) occurring during a unit duration, $D$. The unit-response function is a function of three parameters, $K$, $W$, and $D$, described as follows:

*Proportionality constant, K.*--The parameter, $K$, measured in hours, is essentially the slope of the storage-discharge relation for the reach being studied. This parameter can be calculated from observed records or estimated from the slope and length of the reach.

*Time-base adjustment parameter, W*.--Varying this parameter causes minor adjustments in the shape of routed hydrographs. Generally, as a starting value, *W* is assigned a value equal to *K*.

*Duration, D*.--The duration, *D*, is the basic routing-computation interval. For this investigation, *D* is 24 hours.

In application, a unit-response function is determined for each river reach using estimates of the above parameters and an algorithm based on tables in Mitchell (1962). Because the unit-response function does not account for travel time of the flow hydrograph through the reach, separate relations for travel time are developed as a function of stream discharge.

*Calibration of streamflow-routing model*.--For calibration of the streamflow-routing model and the reservoir model described below, 12 flow events were chosen representing a range of flow magnitudes. Table 2 lists these events. Table 6 (in appendix) is a summary of all hydrologic data for each flow event listed in table 2. Gaging-station data, as given in table 1, are used as input to the streamflow-routing model. The observed flows at the Fort Motte gaging station are used to check the accuracy of routing computations.

Table 3 lists the final, calibrated parameter values for all routing reaches above Fort Motte gaging station and the corresponding unit-response functions.

To route daily flows to Fort Motte gaging station, the procedure below is used for all flow events studied. In each instance, daily flow-routing computations are made on the same time basis.

| Step | Operation |
|---|---|
| 1 | Wateree at Camden flows routed to Fort Motte |
| 2 | Colonels Creek flows adjusted for ungaged, intervening, drainage area and the results routed to Fort Motte |
| 3 | Congaree at Columbia flows routed to Fort Motte |
| 4 | Congaree Creek flows adjusted for ungaged, intervening, drainage area and results routed to Fort Motte |
| 5 | Routed results at Fort Motte obtained by summing results of steps 1-4 |

Figure 2 is a typical comparison of routed and observed flows which occurred March 4 through April 18, 1973, at Fort Motte. In general, the results using the streamflow-routing model give an acceptable fit to observed flows. Fort Motte is considered the input location to the Lakes Marion-Moultrie reservoir system.

## Reservoir Water-Balance Model

Use of the streamflow-routing model to generate Lakes Marion-Moultrie daily flow input provides one element of the reservoir water-balance model.

Table 2.--Flows analyzed

| Flow event number | Inclusive dates |
|---|---|
| 1 | Aug. 15, 1967 - Sept. 15, 1967 |
| 2 | Dec. 15, 1967 - Jan. 15, 1968 |
| 3 | June 1, 1967 - June 30, 1968 |
| 4 | Sept. 1, 1968 to Sept. 30, 1968 |
| 5 | Apr. 10, 1969 - May 10, 1969 |
| 6 | Aug. 25, 1969 - Sept. 20, 1969 |
| 7 | Oct. 1, 1969 - Oct. 31, 1969 |
| 8 | Dec. 1, 1969 - Dec. 31, 1969 |
| 9 | Aug. 1, 1970 - Aug. 31, 1970 |
| 10 | Feb. 1, 1971 - Mar. 31, 1971 |
| 11 | Aug. 7, 1971 - Aug. 31, 1971 |
| 12 | Mar. 1, 1973 - Apr. 17, 1973 |

Table 3.--Reach streamflow-routing parameters[a]

| Wateree River near Camden, S.C. $K$ = 19 hours $W$ = 19 hours | | Congaree River at Columbia, S.C. $K$ = 19 hours $W$ = 19 hours | |
|---|---|---|---|
| Unit response ordinates | | Unit response ordinates | |
| Time | Ordinates | Time | Ordinates |
| 0 | 0.000 | 0 | 0.000 |
| 24. | .498 | 24. | .498 |
| 48. | .355 | 48. | .355 |
| 72. | .107 | 72. | .107 |
| 96. | .029 | 96. | .029 |
| 120. | .008 | 120. | .008 |
| 144. | .002 | 144. | .002 |
| 168. | .0006 | 168. | .0006 |
| 192. | .0002 | 192. | .0002 |

| Colonels Creek near Leesburg, S.C. $K$ = 8 hours $W$ = 8 hours | | Congaree Creek at Cayce, S.C. $K$ = 10 hours $W$ = 10 hours | |
|---|---|---|---|
| Unit response ordinates | | Unit response ordinates | |
| Time | Ordinates | Time | Ordinates |
| 0 | 0.000 | 0 | 0.000 |
| 24. | .916 | 24. | .847 |
| 48. | .080 | 48. | .139 |
| 72. | .004 | 72. | .013 |
| | | 96. | .001 |

[a]Gaging station indicated is at the upstream end of each routing reach.

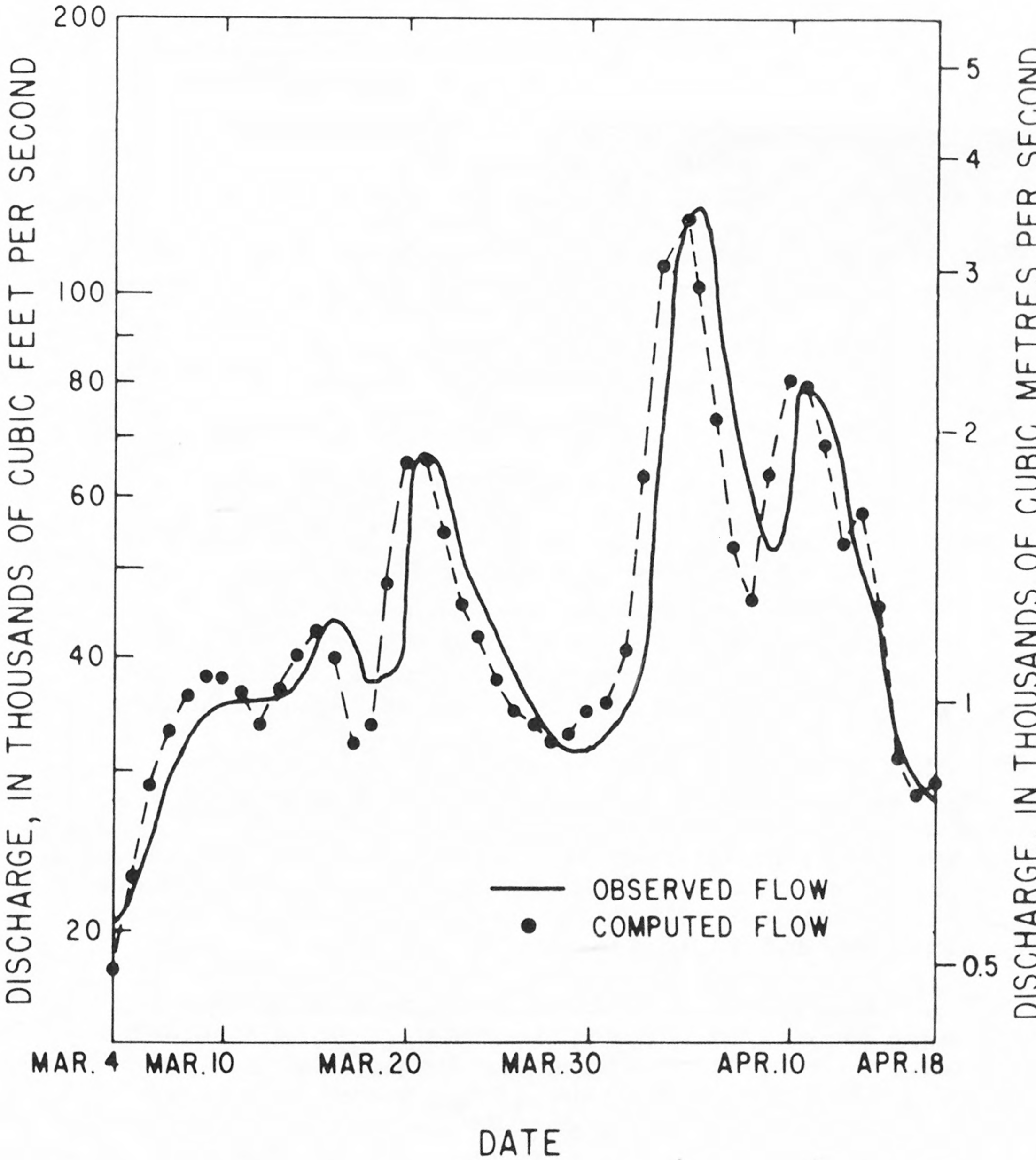


Figure 2.--Comparison of observed and computed flows, Santee River at Fort Motte, S.C., 1973.

Other elements which are considered in this investigation include: (a) Spillway releases from Lake Marion; (b) precipitation input to Lakes Marion-Moultrie; (c) evaporation and other losses from Lakes Marion-Moultrie; (d) diversion canal releases to Lake Moultrie; and (e) local inflow to Lake Marion below Fort Motte. In addition to these items which have direct impact on the disposition of water volumes into and out of the system, other influences such as wind effect on stage determinations were evaluated. As stated before, the stream-reservoir model is designed to predict Lake Marion and Lake Moultrie volumes and stages in advance of actual occurrences. The following equation is written to describe the Lake Marion reservoir water-balance model:

$$VOL_t = VOL_{t-1} + IU_t + IL_t - OS_t + P_t - E_t - OC_t \qquad (2)$$

where

$VOL_t$, $VOL_{t-1}$ = Lake Marion reservoir volumes at times $t$ and $t - 1$, in days;

$IU_t$ = upstream inflow volumes determined from streamflow-routing model;

$IL_t$ = local inflow volume entering Lake Marion below Fort Motte;

$OS_t$ = gated spillway outflow volumes from Lake Marion;

$P_t$ = precipitation volumes on Lake Marion;

$E_t$ = evaporative and other volume losses; and

$OC_t$ = diversion canal outflow volumes.

The model given by equation 2 is a fundamental statement of a volume water balance for Lake Marion. Because lake volume and lake stage are related, equation 2 may also be used to predict daily lake elevation.

*Calibration of reservoir water-balance model.*--To gain some understanding of the important items in equation 2, known input and output for the 12 flow events given in table 2 are used to calibrate the model. The procedure involves comparing computed lake volumes calculated using equation 2 with observed lake volumes. Calibration includes adjusting computed results until a reasonable fit with observed values is obtained in terms of volume magnitudes and timing of flows.

The calibration procedure revealed several interesting aspects of the problem and led to a revised version of equation 2. Agreement in timing was reached when the Fort Motte flows were lagged 1 day to allow for travel time from Fort Motte to the dam. Thus, $IU_t$ in equation 2 becomes $IFM_{t-1}$, where $IFM_{t-1}$ is the routed flow at Fort Motte on the preceding day. Because of the relatively small part of drainage area below Fort Motte (roughly 4 percent of the drainage area above that point), no estimates are made of $IL_t$, the local lake inflows. Deletion of this term from equation 2 has little effect on computed results. Of significant consequence, however, to the volume calculation is the effect of probable errors in the elevation-volume relation for Lake Marion, especially for calculations above an elevation of 75.0 feet (22.86 m).

Equation 2 was therefore reduced to

$$VOL_t = VOL_{t-1} + IFM_{t-1} - OS_t + P_t - E_t - OC_t \qquad (3)$$

Because each item in equation 3 has a measurement error associated with it, as described in previous sections, long-term simulations using that equation are expected to contain the effects of accumulated errors.

As a prediction tool, equation 3 is used for short-time intervals, generally less than 5-7 days. Therefore, a detailed analysis of the prediction error associated with short-term volume and associated elevation estimates is given in following sections.

## PREDICTIVE CAPABILITY OF STREAM-RESERVOIR MODEL

In most hydrologic modeling problems where streamflow quantities are estimated, probable error of the predicted quantities are investigated. Thus, not only is an estimate of the hydrologic quantity required, but an error statement indicating probable error bound in the estimate is also needed.

In this section, a statistical error-of-prediction model is developed. The model is based on the following definitions:

$V_c^n$ = computed lake volume at the end of the $n$th-day time step;

$V_o^n$ = observed lake volume at the end of the $n$th-day time step;

$f^n$ = volume flux through Lake Marion during the $n$th-day time step defined as $f^n = I^n - O^n$, where $I^n$ is the volume input, and $O^n$ is the volume output to the lake during the $n$th-day time step; and

$V^n$, $\Delta V^n$ = lake volume and lake-volume error for $n$th-day prediction.

### Development of Error-Model Equations

The Lake Marion or Lake Moultrie volume at the end of the $n$th time period is computed as

$$V_c^n = V_o^o + \sum_{i=i}^{n} f^i \qquad (4)$$

The accumulated error in $V_c^n$ is computed by taking the total derivative of equation 4 as follows:

$$dV_c^n = dV_o^o + \sum_{i=1}^{n} df^i \qquad (5)$$

Defining $\Delta V^n = V_c^n - V_o^n$, and noting that $V_c^n = V^n + dV_c^n$, and $V_o^n = V^n + dV_o^n$, then,

$$\Delta V^n = dV_c^n - dV_o^n \quad (6)$$

Substitution of equation 5 into equation 6 gives the following equation of total error in lake volume:

$$\Delta V^n = -dV_o^n + dV_o^o + \sum_{i=1}^{n} df^i \quad (7)$$

where the terms are:

- $\Delta V^n$: Lake-volume error for an *n*th-day prediction
- $-dV_o^n$: Observation error in *n*th-day volume
- $dV_o^o$: Observation error in initial-day volume
- $\sum_{i=1}^{n} df^i$: Sum of flux errors

Equation 7 states that lake-volume errors have two sources: (a) Observation errors in lake-volume determinations; and (b) errors in inflows and outflows. Observation errors arise from the fact that lake volumes are not directly obtained but are derived from an elevation-reservoir volume relation. Also included in observation errors are errors in reading the gage, representativeness of elevation observation, and errors which affect elevation errors such as wind. For time periods longer than a few days, errors in inflow and outflow, which include errors in streamflow routing and outflow measurement errors, are expected to dominate the determination of $\Delta V^n$.

## Determination of Mean and Variance of Volume Errors

To evaluate probability distributions of errors, the statistical parameters of mean and variance of volume error must be determined. The mathematical expectation, $E(\Delta V^n)$, is

$$E(\Delta V^n) = -E(dV_o^n) + E(dV_o^o) + E\left(\sum_{i=1}^{n}\right) df^i$$

Because $dV_o^n$ and $dV_o^o$ are from the same population, their expected values are equal and therefore cancel. Thus,

$$\mu_{\Delta V^n} = n\mu_{df} \quad (8)$$

where

$\mu_{\Delta V^n}$ = mean of volume-prediction error; and

$\mu_{df}$ = mean-flux error.

Similarly, the variance, $\sigma^2_{\Delta V^n}$, is computed from equation 7 as

$$\sigma^2_{\Delta V^n} = n\sigma^2_{df} + 2\sigma^2_{dV} \quad (9)$$

where

$\sigma^2_{df}$ = variance of flux error; and

$\sigma^2_{dV}$ = observed-volume error.

Equations 8 and 9 are basic equations for predicting probability characteristics of $n$th-day lake-volume predictions. The equations are based on the assumption that flux errors, $df^i$, are essentially uncorrelated. The operation of the Lakes Marion-Moultrie system, strongly influenced by incoming flow variation, tends to substantiate the assumption. Note that equation 9 is a linear function of $n$, where $\sigma^2_{df}$ is the slope, and $2\sigma^2_{dV}$ is the intercept.

### Parameter Estimation

To evaluate $\mu_{\Delta V^n}$ and $\sigma^2_{\Delta V^n}$, the observed flows in table 2 are used. The assumption is that these flows represent a range of occurrences upon which reasonably stable parameter estimates are obtained.

The sample estimate, $\overline{\overline{X}}_{df}$ of $\mu_{df}$, is computed from equation 8 as

$$\overline{\overline{X}}_{df} = \frac{1}{N} \sum_{n=1}^{N} \frac{\overline{\overline{X}}_{\Delta V^n}}{n} \tag{10}$$

where

$\overline{\overline{X}}_{\Delta V^n}$ = mean $n$th-day volume error evaluated from all storms, $n = 1, 2, \ldots, N$; and

$\overline{\overline{X}}_{df}$ = linear least-squares estimate of $\mu_{df}$, given a zero intercept.

Therefore, equation 8 becomes

$$\overline{\overline{X}}_{\Delta V^n} = n\,\overline{\overline{X}}_{df} \tag{11}$$

where

$\overline{\overline{X}}_{\Delta V^n}$ = least-squares sample estimate of $\mu_{\Delta V^n}$.

The standard least-squares fit to equation 9 of $\sigma^2_{df}$ and $\sigma^2_{dV}$ yields $S^2_{dV}$, representing, respectively, sample estimates of $\sigma^2_{df}$ and $\sigma^2_{dV}$. These are:

$$S^2_{df} = \frac{6}{N(N+1)\ (N-1)} \sum_{n=1}^{N} \left[ S^2_{\Delta V^n} (2n - N - 1) \right] \tag{12}$$

and

$$S^2_{dV} = \frac{1}{N(N-1)} \sum_{n=1}^{N} \left[ S^2_{\Delta V^n} (2N - 3n + 1) \right] \quad (13)$$

where

$S^2_{\Delta V^n}$ = variance of the $n$th-day volume error evaluated from all storms.

Substitution of equations 12 and 13 into equation 9 gives,

$$\overline{S}^2_{\Delta V^n} = nS^2_{df} + 2S^2_{dV} \quad (14)$$

where

$\overline{S}^2_{\Delta V^n}$ = least-squares estimator of $\sigma^2_{\Delta V^n}$.

The use of equations 11 and 12 makes possible the construction of probability distributions of lake-volume errors for any $n$th-day prediction period. When the empirical frequency distributions of lake volume for $n$ = 1, 2, 3, and 4 days ($n$ = 4) are plotted on arithmetic-probability paper, the plots indicate that a normal (Gaussian) probability distribution provides a good fit to the empirical distributions. Table 4 a-b gives sample statistics computed from the 12 flows listed in table 2. Figures 3a-b compare least squares and observed $n$th-day means and variances for Lakes Marion and Moultrie.

Probability Distribution of Lake-Elevation Prediction Errors

The probability distributions of Lakes Marion-Moultrie elevation errors are computed from the lake-volume error distributions by use of the applicable reservoir elevation-volume relation defined as

$$E^n = \varepsilon(V^n) \quad (15)$$

where

$V^n$ = volume at time $n$;

$E^n$ = associated lake elevation at time $n$; and

$\varepsilon$ = proportionality factor.

The error, $dE^n$, in elevation is computed by taking the total derivative of equation 14,

$$dE^n = \frac{d\varepsilon}{dV} dV^n \quad (16)$$

Because the expectation of equation 16 is $\mu_{dE^n} = \frac{d\varepsilon}{dV} \mu_{\Delta V^n}$, the expression for $\overline{X}_{dE^n}$, the sample mean lake-elevation error, is

$$\overline{X}_{dE^n} = n \frac{d\varepsilon}{dV} \overline{\overline{X}}_{df} \quad (17)$$

Similarly, the sample variance of lake-elevation error is

Table 4a--*n*th-day sample means and variances for Lakes Marion and Moultrie

| *n* | Lake Marion | | Lake Moultrie | |
|---|---|---|---|---|
| | Sample mean (times $10^2$) | Sample variance (times $10^8$) | Sample mean (times $10^2$) | Sample variance (times $10^7$) |
| 1------- | 9.097 | 1.313 | - 3.831 | 2.606 |
| 2------- | 5.361 | 3.169 | - 8.098 | 2.034 |
| 3------- | 3.661 | 4.718 | -10.48 | 3.662 |
| 4------- | 6.324 | 5.775 | -14.08 | 5.267 |

Table 4b.--Least-squares estimates of coefficients used in equations 11 and 14

| Lake Marion | Lake Moultrie |
|---|---|
| $S^2_{df} = 1.49 \times 10^8$ | $S^2_{df} = 9.61 \times 10^6$ |
| $S^2_{dV} = 5.00 \times 10^5$ | $S^2_{dV} = 4.95 \times 10^6$ |
| $\overline{\overline{X}}_{df} = 3.64 \times 10^2$ | $\overline{\overline{X}}_{df} = -3.72 \times 10^2$ |

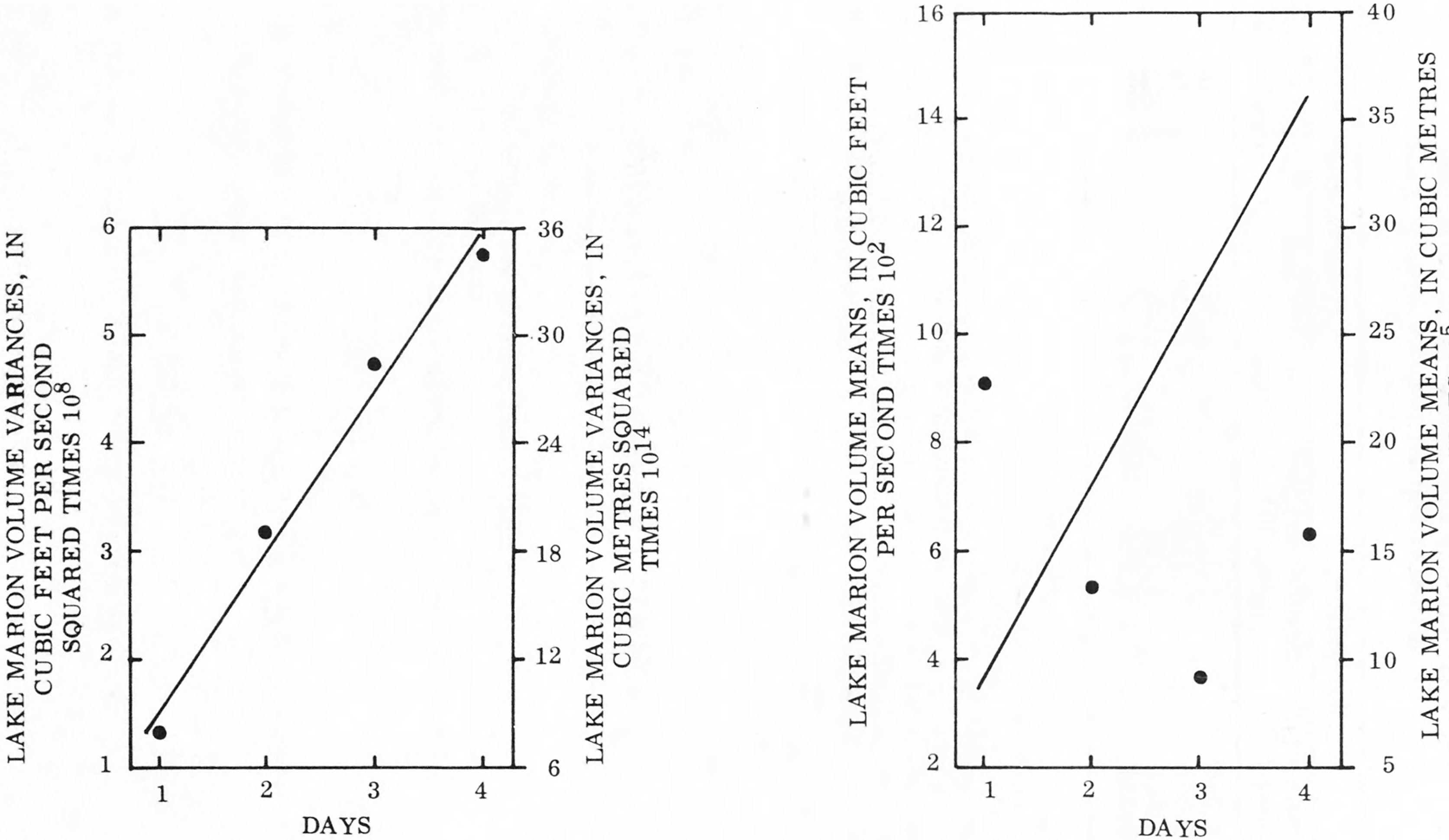


Figure 3a.--Least-squares fit for *n*th-day means and variances of lake volume for Lake Marion.

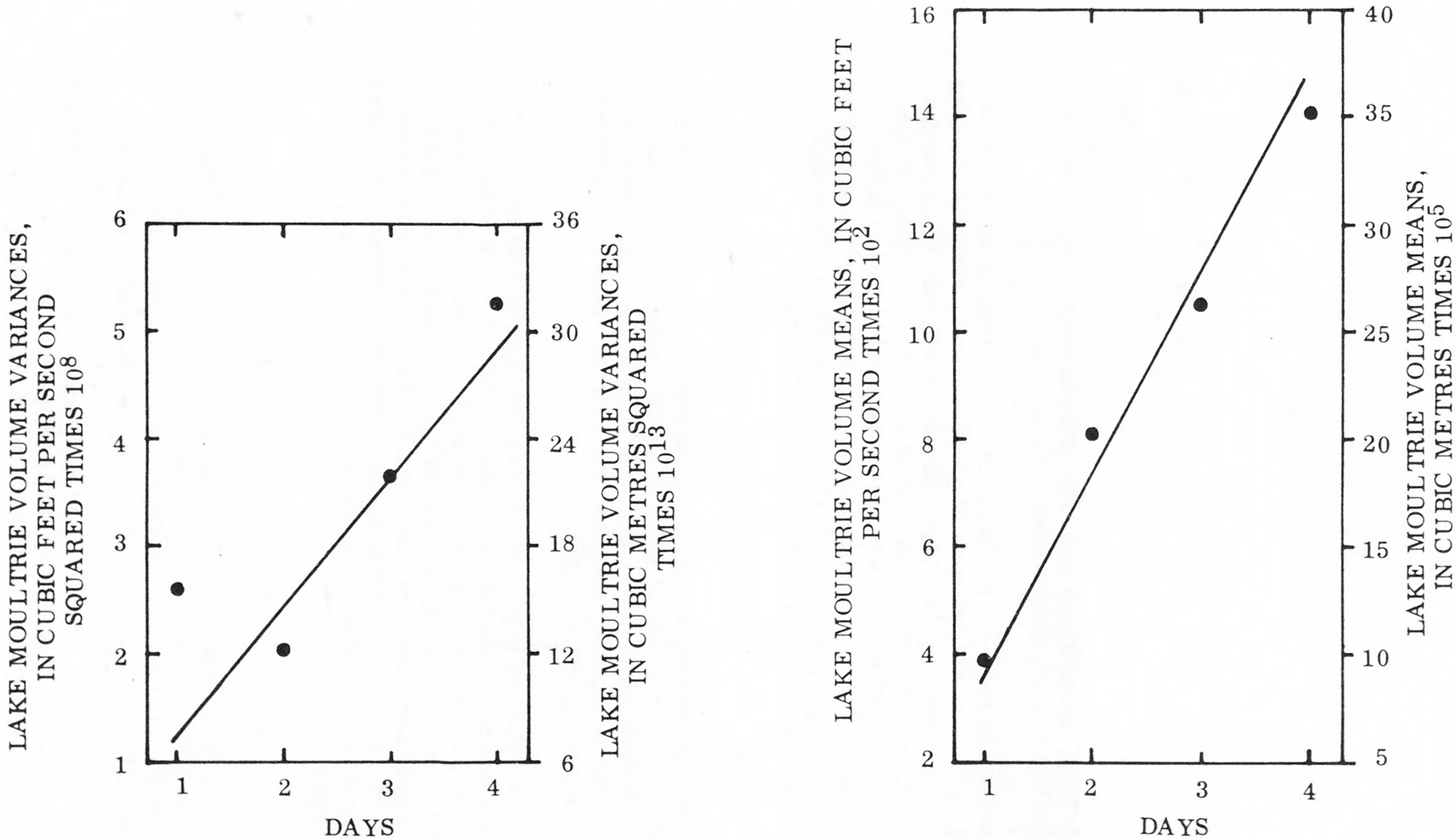


Figure 3b.--Least-squares fit for *n*th-day means and variances of lake volume for Lake Moultrie.

$$S^2_{dE^n} = \left(\frac{d\varepsilon}{dV}\right)^2 S^2_{\Delta V^n} \qquad (18)$$

Note that equations 17 and 18 are functions of $\frac{d\varepsilon}{dV}$, the slope of the elevation-volume relation.

Figure 4a is a plot of the $n$th-day error-frequency distributions for Lake Marion. Also shown on the right part of the graph is the lake-elevation error relation. Figure 4b is a similar graph for Lake Moultrie. Both graphs are constructed by computing the probability of $|\Delta V^n| < V$, where $0 < V \leq 80{,}000$ ft$^3$/s-days (2,265 m$^3$/s-days), assuming a normal distribution of $\Delta V^n$, with mean $\overline{\overline{X}}_{dV^n}$ (eq. 11) and variance, $S^2_{dV^n}$ (eq. 14). Equation 15 is used to transform elevation into volume.

A word of caution is relevant to the errors expressed in equation 16. $dV^n$ is the error in the volume because of a measurement error in the lake elevation, $dE^n$. The errors in the stage-volume curve, per se, equation 15 are not in the mathematical analysis; however, they do appear in the numerical values developed from the flow events used to estimate the statistical parameters. Also, as mentioned above, the stage-volume curve extended above 75.0 feet (22.86 m) probably introduces a systematic error in violation of the assumptions of the above analysis.

## CONCLUSIONS

This report has described the selection and application of an operational stream-reservoir volume and stage-forecast model designed for use in further simulation studies of the Lakes Marion-Moultrie reservoir system. The simulation studies related to hydropower-operation studies will be reported in a separate report.

Because, at the outset of this study it was recognized that errors in model-input data (as well as modeling errors) would produce errors in predicted quantities, an error-of-prediction analysis was made. This analysis resulted in error-frequency graphs for each lake, the graphs being based on a study of 12 actual flow events. Thus, this part of the study has produced not only a prediction tool, but also a method of assessing prediction errors for selected probabilities for any arbitrary $n$th-day lake-volume or stage prediction.

## FUTURE SIMULATION STUDIES

The stream-reservoir model can be used for a number of different simulation studies. One of these is an examination of the "rule curve" or method of operation of the Lakes Marion-Moultrie system. Planning for water releases that will result in maximum hydropower production and minimum spillage to the Santee River involves several factors. However, two conditions are primary: (a) At what level should Lake Marion be maintained, on a seasonal basis, to ensure maximum efficiency of operation in terms of hydropower production; and (b) given a seasonal

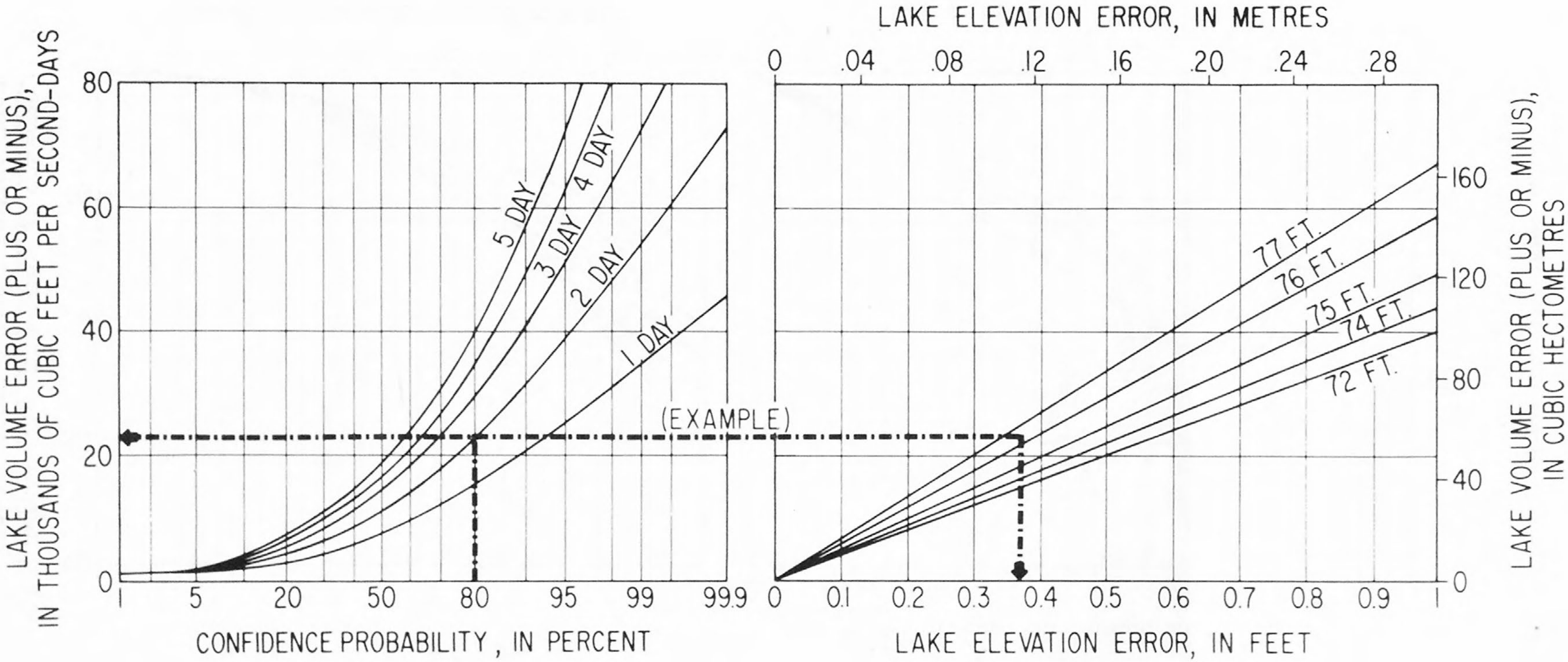


Figure 4a.--Lake Marion volume and elevation error-frequency relations.

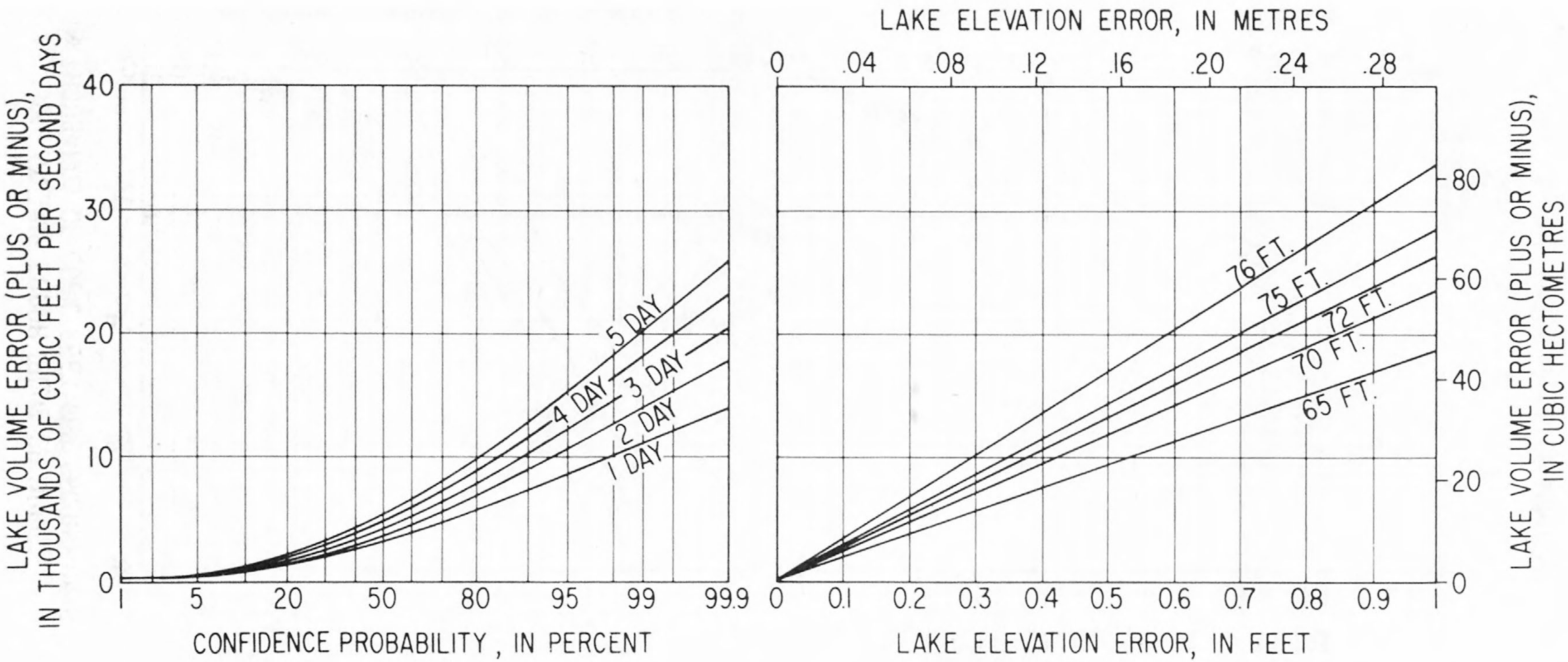


Figure 4b.--Lake Moultrie volume and elevation error-frequency relations.

reservoir level to be maintained and a developing flood situation, what strategy should be used to distribute in time the anticipated flows as determined by the model?

Several different combinations of rule-curve assumption and release strategy, as explained above, will be examined. Power production, spills, and other model results for each combination will be tabulated on a daily, monthly, and annual basis to provide explicit visual comparisons. A mathematical programming technique, such as linear programming (Hillier and Lieberman, 1967), will be investigated as a tool for identification of an optimum rule-curve and release strategy. The simulation studies will involve a close-working association with Santee-Cooper engineering personnel so that results of the simulation will represent a close correspondence to actual Lakes Marion-Moultrie operation.

## REFERENCES

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Mitchell, W. D., 1962, Effects of reservoir storage on peak flow: U.S. Geol. Survey Water-Supply Paper 1580-C, p. C1-C25.

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APPENDIX

## Example of An Operational Forecast of Lake Marion Inflows

To illustrate the stream-reservoir model prediction method, tables 5a-b are included to show a set of sample calculations. The calculations for Lake Marion and Lake Moultrie volume and stage quantities are based on estimated canal-outflow and spill-outflow values. The tables also give a comparison of computed and observed stages for both lakes for a 3-day forecast period starting on March 15, 1973. The calculations can easily be made on a desktop electronic calculator.

As an illustration of the use of the error-frequency graph, consider the March 17, 1973, Lake Marion stage forecast (2 days in advance). The estimated midnight stage is 76.39 feet (22.28 m). Suppose that an error bound, such that the true value is included with 80 percent confidence probability, is required. Reading from the Lake Marion graph for $N = 2$ days (fig. 4a), the lake-volume error is seen to be plus or minus about 23,000 $ft^3/s$-days (56.28 $hm^3$), while the plus or minus stage error is about 0.35 foot (0.11 m). Thus, tne predicted value is 76.39 $\pm$ 0.35 foot (22.28 $\pm$ 0.11 m) with 80 percent confidence probability. The predicted value happens to be 0.31 foot (0.064 m) low as compared to the observed value. Note that the error-frequency graphs (figs. 4a, 4b) for both lakes are based on actual, rather than estimated, inflow quantities. Thus, additional error is introduced when estimated quantities are used in the stream-reservoir prediction model.

In the use of the error-frequency graph, the reader might choose to use error limits associated with higher confidence probabilities (90-95 percent) to ensure more confidence in prediction. However, the model predicts only a single answer for a given calculation; the only difference between error limits for 20 percent confidence probability, as opposed to 80 percent confidence probability, is that larger error limits associated with 80 percent confidence probability are more likely to include the observed value.

Table 5a.--Example of stage-estimation procedure for Lake Marion, forecasted on March 15, 1973

| Date | Midnight | | Routed river inflow ($ft^3$/s-d) | Estimated | | Intermediate[a] | | Estimated | | Observed stage |
|---|---|---|---|---|---|---|---|---|---|---|
| | Stage (ft) | Volume ($ft^3$/s-d) | | Canal outflow ($ft^3$/s-d) | Spill outflow ($ft^3$/s-d) | Volume ($ft^3$/s-d) | Stage (ft) | Rainfall (ft) | Evaporation (ft) | |
| 3/15/73 | 76.52 | 549,640 | 42,800 | 25,000 | 15,000 | 552,440 | 76.50 | 0 | 0.020 | ----- |
| 3/16/73 | 76.48 | 546,920 | 39,900 | 25,000 | 20,000 | 541,820 | 76.41 | 0 | .020 | 76.50 |
| 3/17/73 | 76.39 | 540,790 | 31,700 | 25,000 | 20,000 | 527,490 | 76.19 | 0 | .020 | 76.70 |
| 3/18/73 | 76.17 | ------- | ------ | ------ | ------ | -------- | ----- | - | ----- | 76.17 |

Table 5b.--Example of stage-estimation procedure for Lake Moultrie, forecasted on March 15, 1973

| Date | Stage (ft) | Volume ($ft^3$/s-d) | Estimated | | Intermediate[a] | | Estimated | | Observed stage (ft) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Canal inflow ($ft^3$/s-d) | Power plant outflow ($ft^3$/s-d) | Volume ($ft^3$/s-d) | Stage (ft) | Rainfall (ft) | Evaporation (ft) | |
| 3/15/73 | 74.91 | 321,640 | 25,000 | 28,500 | 318,140 | 74.79 | 0 | 0.020 | ----- |
| 3/16/73 | 74.77 | 317,680 | 25,000 | 28,500 | 314,180 | 74.74 | 0 | .020 | 74.87 |
| 3/17/73 | 74.72 | 316,270 | 25,000 | 29,000 | 312,270 | 74.58 | 0 | .020 | 74.90 |
| 3/17/73 | 74.56 | ------- | ------ | ------ | ------- | ----- | -- | ------ | 74.88 |

[a]Uncorrected for rainfall and evaporation.

| Date | Inflows to Lake Marion: Wateree River (ft$^3$/s) | Colonels Creek (ft$^3$/s) | Congaree River (ft$^3$/s) | Congaree Creek (ft$^3$/s) | Santee River at Fort Motte: Observed (ft$^3$/s) | Computed (ft$^3$/s) |
|---|---|---|---|---|---|---|
| 8 15 67 | 4800. | 92. | 3360. | 160. | 8530. | 9560. |
| 8 16 67 | 5160. | 70. | 2960. | 154. | 8860. | 9830. |
| 8 17 67 | 1850. | 58. | 4470. | 151. | 8740. | 10100. |
| 8 18 67 | 3720. | 56. | 4980. | 151. | 8560. | 8190. |
| 8 19 67 | 2940. | 52. | 2740. | 152. | 8050. | 8560. |
| 8 20 67 | 877. | 50. | 2710. | 153. | 7600. | 9180. |
| 8 21 67 | 4130. | 49. | 5480. | 165. | 6340. | 7170. |
| 8 22 67 | 6620. | 91. | 5680. | 339. | 6980. | 7310. |
| 8 23 67 | 13500. | 151. | 18200. | 578. | 10000. | 11900. |
| 8 24 67 | 64500. | 335. | 76000. | 707. | 19200. | 19400. |
| 8 25 67 | 76200. | 295. | 94800. | 876. | 26900. | 57600. |
| 8 26 67 | 48500. | 177. | 86700. | 589. | 68000. | 116000. |
| 8 27 67 | 27900. | 125. | 50100. | 359. | 128000. | 141000. |
| 8 28 67 | 19200. | 97. | 24900. | 283. | 156000. | 131000. |
| 8 29 67 | 17100. | 79. | 17400. | 247. | 116000. | 98500. |
| 8 30 67 | 16100. | 67. | 14600. | 220. | 68100. | 65700. |
| 8 31 67 | 14400. | 60. | 14000. | 200. | 46500. | 45900. |
| 9 1 67 | 11000. | 59. | 13700. | 192. | 37500. | 36000. |
| 9 2 67 | 1830. | 62. | 7100. | 188. | 31800. | 30200. |
| 9 3 67 | 446. | 56. | 5300. | 181. | 25300. | 23100. |
| 9 4 67 | 5090. | 51. | 4210. | 176. | 17700. | 14900. |
| 9 5 67 | 5660. | 50. | 8300. | 174. | 13300. | 12200. |
| 9 6 67 | 6200. | 47. | 10600. | 171. | 15100. | 11700. |
| 9 7 67 | 6080. | 44. | 11000. | 168. | 17000. | 13700. |
| 9 8 67 | 6700. | 43. | 10000. | 165. | 17700. | 16300. |
| 9 9 67 | 7320. | 65. | 7500. | 207. | 18700. | 18100. |
| 9 10 67 | 12200. | 258. | 11000. | 296. | 17700. | 19100. |
| 9 11 67 | 9440. | 177. | 13000. | 326. | 15400. | 23600. |
| 9 12 67 | 13700. | 117. | 13500. | 274. | 14200. | 24000. |
| 9 13 67 | 13300. | 85. | 14100. | 217. | 18700. | 26500. |
| 9 14 67 | 10400. | 66. | 9100. | 184. | 21900. | 28100. |
| 9 15 67 | 7530. | 56. | 8200. | 173. | 23300. | 27300. |

for flows analyzed

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 75.28 | 547. | 11600. | 0.0 | 0.21 | 74.84 | 17122. | 0.0 |
| 75.14 | 547. | 9660. | 0.0 | 0.19 | 74.68 | 15524. | 0.0 |
| 75.08 | 541. | 6990. | 0.0 | 0.20 | 74.66 | 13271. | 0.20 |
| 74.98 | 541. | 9590. | 0.16 | 0.08 | 74.61 | 14231. | 0.0 |
| 74.90 | 531. | 9520. | 0.0 | 0.19 | 74.46 | 15014. | 0.0 |
| 74.81 | 534. | 3020. | 0.0 | 0.23 | 74.38 | 12357. | 0.0 |
| 74.71 | 537. | 9390. | 0.0 | 0.17 | 74.31 | 15276. | 0.34 |
| 74.59 | 547. | 9320. | 0.74 | 0.08 | 74.20 | 13960. | 0.10 |
| 74.53 | 547. | 11000. | 0.13 | 0.07 | 74.13 | 13380. | 0.0 |
| 74.50 | 705. | 15900. | 0.46 | 0.24 | 73.75 | 20929. | 0.05 |
| 74.32 | 12600. | 16200. | 0.04 | 0.18 | 73.58 | 22229. | 0.45 |
| 73.63 | 41300. | 17000. | 0.0 | 0.16 | 73.04 | 27967. | 0.26 |
| 73.00 | 43500. | 17300. | 0.0 | 0.20 | 72.34 | 27853. | 0.0 |
| 74.13 | 38400. | 25100. | 0.0 | 0.25 | 72.05 | 27960. | 0.0 |
| 75.43 | 39600. | 31900. | 0.0 | 0.20 | 72.08 | 27803. | 0.0 |
| 76.35 | 26500. | 36600. | 0.0 | 0.15 | 72.42 | 25471. | 0.0 |
| 76.47 | 26900. | 34400. | 0.0 | 0.18 | 72.96 | 21114. | 0.07 |
| 76.55 | 11800. | 32800. | 0.04 | 0.16 | 73.50 | 19835. | 0.0 |
| 76.56 | 8500. | 26900. | 0.0 | 0.05 | 73.95 | 20306. | 0.0 |
| 76.60 | 3490. | 30500. | 0.0 | 0.23 | 74.28 | 20738. | 0.0 |
| 76.58 | 1650. | 28100. | 0.0 | 0.21 | 74.58 | 21141. | 0.0 |
| 76.41 | 867. | 25700. | 0.0 | 0.12 | 74.80 | 21282. | 0.03 |
| 76.18 | 557. | 22800. | 0.0 | 0.20 | 74.89 | 20927. | 0.0 |
| 76.02 | 531. | 21200. | 0.0 | 0.20 | 74.90 | 21123. | 0.0 |
| 75.95 | 509. | 20000. | 0.0 | 0.20 | 74.90 | 20807. | 0.0 |
| 75.89 | 506. | 20600. | 0.0 | 0.15 | 74.90 | 22096. | 0.0 |
| 75.96 | 519. | 20500. | 1.52 | 0.0 | 74.88 | 24633. | 0.47 |
| 75.85 | 509. | 20400. | 0.0 | 0.17 | 74.82 | 21236. | 0.0 |
| 75.83 | 509. | 20400. | 0.0 | 0.23 | 74.80 | 19633. | 0.0 |
| 75.85 | 522. | 20400. | 0.0 | 0.22 | 74.80 | 19604. | 0.0 |
| 75.91 | 484. | 20500. | 0.0 | 0.19 | 74.85 | 19129. | 0.0 |
| 75.95 | 500. | 21100. | 0.0 | 0.23 | 74.89 | 19051. | 0.0 |

| Date | Inflows to Lake Marion: Wateree River ($ft^3/s$) | Colonels Creek ($ft^3/s$) | Congaree River ($ft^3/s$) | Congaree Creek ($ft^3/s$) | Santee River at Fort Motte: Observed ($ft^3/s$) | Computed ($ft^3/s$) |
|---|---|---|---|---|---|---|
| 12 15 67 | 9300. | 47. | 25600. | 188. | 37500. | 40300. |
| 12 16 67 | 10000. | 47. | 19300. | 181. | 46800. | 44900. |
| 12 17 67 | 3790. | 45. | 11500. | 177. | 45400. | 41400. |
| 12 18 67 | 5400. | 44. | 12800. | 174. | 37500. | 32100. |
| 12 19 67 | 9750. | 44. | 13500. | 174. | 26600. | 23600. |
| 12 20 67 | 10000. | 43. | 16600. | 173. | 25100. | 22600. |
| 12 21 67 | 9950. | 43. | 18400. | 172. | 25500. | 24000. |
| 12 22 67 | 7830. | 43. | 13500. | 172. | 26700. | 26200. |
| 12 23 67 | 2540. | 50. | 13200. | 175. | 26700. | 27300. |
| 12 24 67 | 2580. | 47. | 12000. | 171. | 23500. | 22600. |
| 12 25 67 | 612. | 43. | 12000. | 167. | 19200. | 18900. |
| 12 26 67 | 5060. | 42. | 13400. | 167. | 16500. | 16000. |
| 12 27 67 | 7310. | 41. | 14200. | 165. | 15700. | 16800. |
| 12 28 67 | 11500. | 57. | 14700. | 190. | 19300. | 19700. |
| 12 29 67 | 13300. | 85. | 25400. | 258. | 22500. | 24200. |
| 12 30 67 | 13400. | 66. | 36100. | 272. | 25900. | 28300. |
| 12 31 67 | 13400. | 55. | 26200. | 230. | 31400. | 35000. |
| 1 1 68 | 13400. | 53. | 15900. | 203. | 40200. | 44300. |
| 1 2 68 | 13400. | 62. | 15100. | 223. | 42900. | 44200. |
| 1 3 68 | 13400. | 60. | 14500. | 239. | 37200. | 37300. |
| 1 4 68 | 13400. | 58. | 13400. | 228. | 32000. | 32600. |
| 1 5 68 | 13500. | 58. | 14400. | 227. | 28800. | 30700. |
| 1 6 68 | 13500. | 53. | 15300. | 215. | 27500. | 29500. |
| 1 7 68 | 13700. | 58. | 12500. | 210. | 27200. | 29400. |
| 1 8 68 | 13600. | 54. | 17300. | 211. | 26000. | 30200. |
| 1 9 68 | 13500. | 50. | 18000. | 193. | 26400. | 29100. |
| 1 10 68 | 14600. | 70. | 20300. | 256. | 28300. | 30400. |
| 1 11 68 | 18700. | 157. | 54700. | 514. | 31000. | 33200. |
| 1 12 68 | 23000. | 135. | 58700. | 555. | 35700. | 39700. |
| 1 13 68 | 23800. | 125. | 44300. | 491. | 54200. | 61700. |
| 1 14 68 | 20400. | 117. | 29800. | 431. | 71000. | 78200. |
| 1 15 68 | 18400 | 97. | 21900. | 361. | 66200. | 75000. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 74.36 | 563. | 18800. | 0.0 | 0.07 | 73.18 | 22404. | 0.02 |
| 74.49 | 563. | 21000. | 0.08 | 0.11 | 73.05 | 23723. | 0.0 |
| 74.75 | 563. | 22800. | 0.0 | 0.09 | 73.03 | 22292. | 0.0 |
| 75.03 | 563. | 24000. | 0.0 | 0.05 | 73.11 | 23504. | 0.0 |
| 75.19 | 563. | 24000. | 0.0 | 0.01 | 73.23 | 23078. | 0.0 |
| 75.15 | 550. | 23600. | 0.0 | 0.05 | 73.23 | 22525. | 0.0 |
| 75.10 | 553. | 22900. | 0.0 | 0.08 | 73.30 | 22735. | 0.0 |
| 75.11 | 558. | 23000. | 0.0 | 0.08 | 73.32 | 22723. | 0.0 |
| 75.15 | 768. | 22300. | 0.32 | 0.07 | 73.46 | 24960. | 0.35 |
| 75.03 | 560. | 22400. | 0.0 | 0.07 | 73.35 | 25091. | 0.0 |
| 75.00 | 563. | 22100. | 0.0 | 0.23 | 73.31 | 24003. | 0.0 |
| 74.92 | 563. | 21700. | 0.0 | 0.13 | 73.29 | 23576. | 0.0 |
| 74.80 | 500. | 20500. | 0.0 | 0.07 | 73.23 | 23618. | 0.0 |
| 74.79 | 576. | 20800. | 0.30 | 0.02 | 73.20 | 24785. | 0.97 |
| 74.68 | 553. | 20700. | 0.76 | 0.05 | 73.17 | 25467. | 0.50 |
| 74.60 | 563. | 21000. | 0.0 | 0.06 | 73.02 | 25521. | 0.0 |
| 74.60 | 544. | 21700. | 0.0 | 0.05 | 72.96 | 23429. | 0.0 |
| 74.69 | 534. | 22500. | 0.15 | 0.06 | 72.94 | 23119. | 0.07 |
| 74.90 | 525. | 24400. | 0.39 | 0.02 | 73.02 | 24642. | 0.35 |
| 75.22 | 509. | 26000. | 0.11 | 0.12 | 73.02 | 26398. | 0.34 |
| 75.45 | 497. | 26400. | 0.03 | 0.04 | 73.12 | 26077. | 0.02 |
| 75.45 | 503. | 26400. | 0.20 | 0.04 | 73.16 | 26416. | 0.05 |
| 75.48 | 478. | 26400. | 0.02 | 0.04 | 73.20 | 26900. | 0.0 |
| 75.56 | 557. | 26200. | 0.27 | 0.04 | 73.30 | 26671. | 0.16 |
| 75.50 | 494. | 25800. | 0.0 | 0.0 | 73.26 | 27015. | 0.0 |
| 75.56 | 376. | 25900. | 0.0 | 0.0 | 73.28 | 26485. | 0.0 |
| 75.47 | 592. | 26300. | 0.20 | 0.0 | 73.32 | 27365. | 0.15 |
| 75.67 | 608. | 26800. | 1.46 | 0.0 | 73.39 | 28035. | 0.93 |
| 75.74 | 611. | 26500. | 1.46 | 0.0 | 73.40 | 28469. | 0.05 |
| 75.55 | 18000. | 26000. | 0.35 | 0.0 | 73.37 | 28419. | 0.08 |
| 75.63 | 20700. | 28100. | 0.39 | 0.0 | 73.34 | 28370. | 0.14 |
| 76.08 | 22700. | 29700. | 0.39 | 0.0 | 73.43 | 28656. | 0.02 |

| Date | Inflows to Lake Marion: Wateree River (ft³/s) | Colonels Creek (ft³/s) | Congaree River (ft³/s) | Congaree Creek (ft³/s) | Santee River at Fort Motte: Observed (ft³/s) | Computed (ft³/s) |
|---|---|---|---|---|---|---|
| 6 1 68 | 282. | 20. | 4320. | 135. | 7600. | 6620. |
| 6 2 68 | 220. | 20. | 4070. | 134. | 7540. | 5980. |
| 6 3 68 | 4300. | 20. | 8260. | 134. | 7520. | 5550. |
| 6 4 68 | 5540. | 20. | 10100. | 133. | 8230. | 7360. |
| 6 5 68 | 5560. | 20. | 6510. | 132. | 11800. | 11400. |
| 6 6 68 | 5530. | 20. | 10700. | 131. | 11700. | 14600. |
| 6 7 68 | 6770. | 25. | 10000. | 142. | 13700. | 14200. |
| 6 8 68 | 11000. | 40. | 16600. | 200. | 15500. | 16100. |
| 6 9 68 | 10100. | 170. | 32700. | 271. | 20200. | 20000. |
| 6 10 68 | 11700. | 155. | 48000. | 371. | 25900. | 26800. |
| 6 11 68 | 11500. | 112. | 40300. | 353. | 35800. | 38500. |
| 6 12 68 | 11300. | 79. | 31300. | 247. | 49500. | 52400. |
| 6 13 68 | 11300. | 75. | 23200. | 201. | 55200. | 55000. |
| 6 14 68 | 11000. | 58. | 11700. | 166. | 51000. | 49500. |
| 6 15 68 | 9240. | 42. | 7910. | 147. | 43500. | 41500. |
| 6 16 68 | 5410. | 35. | 6660. | 142. | 32200. | 30500. |
| 6 17 68 | 5100. | 30. | 7550. | 138. | 22000. | 20700. |
| 6 18 68 | 5200. | 31. | 7740. | 139. | 17500. | 15400. |
| 6 19 68 | 6370. | 40. | 8820. | 148. | 15700. | 14000. |
| 6 20 68 | 6530. | 30. | 9320. | 150. | 15700. | 14700. |
| 6 21 68 | 5620. | 26. | 9560. | 138. | 15800. | 15700. |
| 6 22 68 | 1910. | 24. | 10200. | 134. | 15600. | 15900. |
| 6 23 68 | 1500. | 24. | 5330. | 131. | 14900. | 14200. |
| 6 24 68 | 5480. | 23. | 9000. | 133. | 10900. | 13000. |
| 6 25 68 | 5320. | 25. | 7860. | 135. | 11400. | 12300. |
| 6 26 68 | 4750. | 23. | 8320. | 131. | 13000. | 13700. |
| 6 27 68 | 1910. | 20. | 9970. | 127. | 12900. | 13900. |
| 6 28 68 | 430. | 19. | 8500. | 124. | 13400. | 12400. |
| 6 29 68 | 342. | 17. | 7520. | 122. | 11300. | 11500. |
| 6 30 68 | 312. | 17. | 4460. | 120. | 9570. | 10500. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow: Spillway ($ft^3/s$) | Outflow: Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 75.48 | 534. | 4320. | 0.0 | 0.24 | 75.12 | 6769. | 0.0 |
| 75.43 | 534. | 6030. | 0.0 | 0.29 | 75.00 | 6342. | 0.0 |
| 75.40 | 525. | 7600. | 0.0 | 0.31 | 75.10 | 8509. | 0.0 |
| 75.33 | 528. | 6280. | 1.38 | 0.26 | 75.12 | 7206. | 0.75 |
| 75.32 | 454. | 9560. | 0.0 | 0.30 | 75.10 | 4743. | 0.0 |
| 75.38 | 534. | 11700. | 0.0 | 0.27 | 75.10 | 11661. | 0.0 |
| 75.39 | 550. | 16500. | 0.02 | 0.25 | 74.76 | 19858. | 1.31 |
| 75.60 | 534. | 19600. | 1.20 | 0.04 | 74.91 | 15659. | 1.86 |
| 75.72 | 528. | 25200. | 1.10 | 0.05 | 74.82 | 23097. | 0.20 |
| 75.84 | 534. | 27200. | 1.30 | 0.02 | 74.72 | 25933. | 0.98 |
| 75.86 | 595. | 28600. | 0.0 | 0.19 | 74.59 | 27371. | 0.01 |
| 76.09 | 608. | 29800. | 0.60 | 0.21 | 74.56 | 27706. | 1.80 |
| 76.44 | 4500. | 29100. | 0.0 | 0.32 | 74.60 | 27310. | 0.43 |
| 76.60 | 12400. | 28100. | 0.0 | 0.30 | 74.61 | 27673. | 0.0 |
| 76.57 | 15600. | 29000. | 0.0 | 0.23 | 74.68 | 27492. | 0.0 |
| 76.70 | 6390. | 28700. | 0.0 | 0.22 | 74.70 | 27539. | 0.0 |
| 76.64 | 3140. | 28500. | 0.0 | 0.31 | 74.75 | 25821. | 0.0 |
| 76.50 | 941. | 26000. | 0.0 | 0.19 | 74.89 | 21787. | 0.0 |
| 76.33 | 550. | 24000. | 0.0 | 0.18 | 75.00 | 22248. | 0.20 |
| 76.19 | 596. | 21100. | 0.0 | 0.16 | 75.07 | 21247. | 0.10 |
| 76.05 | 566. | 19900. | 0.0 | 0.11 | 75.99 | 21391. | 0.50 |
| 75.93 | 576. | 18500. | 0.0 | 0.23 | 75.09 | 16738. | 0.0 |
| 75.89 | 573. | 17600. | 0.60 | 0.25 | 75.10 | 16042. | 0.0 |
| 75.79 | 592. | 15900. | 0.0 | 0.29 | 75.08 | 18364. | 0.0 |
| 75.67 | 547. | 14100. | 0.0 | 0.22 | 75.17 | 15919. | 0.55 |
| 75.63 | 576. | 13200. | 0.35 | 0.27 | 75.09 | 15216. | 0.02 |
| 75.57 | 573. | 13400. | 0.0 | 0.35 | 75.02 | 12804. | 0.0 |
| 75.56 | 566. | 10600. | 0.0 | 0.33 | 75.16 | 8276. | 0.95 |
| 75.56 | 557. | 8520. | 0.0 | 0.34 | 75.25 | 9219. | 0.0 |
| 75.53 | 550. | 8880. | 0.0 | 0.31 | 75.22 | 9186. | 0.0 |

| Date | Inflows to Lake Marion: Wateree River (ft$^3$/s) | Colonels Creek (ft$^3$/s) | Congaree River (ft$^3$/s) | Congaree Creek (ft$^3$/s) | Santee River at Fort Motte: Observed (ft$^3$/s) | Computed (ft$^3$/s) |
|---|---|---|---|---|---|---|
| 9 1 68 | 163. | 18. | 2130. | 150. | 6120. | 4680. |
| 9 2 68 | 619. | 20. | 1810. | 153. | 2540. | 4420. |
| 9 3 68 | 5090. | 18. | 2270. | 147. | 3090. | 3300. |
| 9 4 68 | 6540. | 17. | 4350. | 142. | 3230. | 3330. |
| 9 5 68 | 7640. | 17. | 3910. | 139. | 8160. | 5600. |
| 9 6 68 | 4160. | 19. | 2630. | 147. | 11700. | 8080. |
| 9 7 68 | 306. | 31. | 2100. | 179. | 12400. | 10800. |
| 9 8 68 | 181. | 33. | 2290. | 152. | 7590. | 10400. |
| 9 9 68 | 1380. | 31. | 2320. | 149. | 3210. | 7130. |
| 9 10 68 | 1260. | 30. | 2340. | 147. | 3270. | 4650. |
| 9 11 68 | 1110. | 26. | 4420. | 144. | 4500. | 4430. |
| 9 12 68 | 1690. | 23. | 5400. | 141. | 4400. | 4610. |
| 9 13 68 | 2930. | 21. | 4140. | 150. | 6330. | 4520. |
| 9 14 68 | 542. | 20. | 2830. | 151. | 7890. | 5750. |
| 9 15 68 | 240. | 18. | 2290. | 142. | 7870. | 7780. |
| 9 16 68 | 4210. | 18. | 2460. | 137. | 4170. | 7030. |
| 9 17 68 | 3560. | 18. | 1960. | 135. | 3330. | 5180. |
| 9 18 68 | 3440. | 18. | 2800. | 134. | 7470. | 5990. |
| 9 19 68 | 3180. | 20. | 2690. | 135. | 6320. | 6700. |
| 9 20 68 | 2320. | 20. | 2490. | 139. | 7040. | 6520. |
| 9 21 68 | 720. | 18. | 3060. | 138. | 6670. | 6650. |
| 9 22 68 | 416. | 18. | 2270. | 134. | 5610. | 6330. |
| 9 23 68 | 5510. | 18. | 3460. | 132. | 4580. | 5100. |
| 9 24 68 | 6020. | 17. | 3210. | 132. | 3490. | 4490. |
| 9 25 68 | 7910. | 17. | 7010. | 131. | 9770. | 6500. |
| 9 26 68 | 5660. | 18. | 3700. | 133. | 10000. | 8830. |
| 9 27 68 | 2150. | 29. | 2620. | 150. | 15700. | 10700. |
| 9 28 68 | 270. | 27. | 2230. | 148. | 10200. | 12400. |
| 9 29 68 | 276. | 22. | 1910. | 143. | 5570. | 10000. |
| 9 30 68 | 5510. | 20. | 2040. | 139. | 3390. | 6340. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow: Spillway (ft$^3$/s) | Outflow: Canal (ft$^3$/s) | Rain (in) | | Level (ft) | Outflow powerplant (ft$^3$/s) | Rain (in) |
| 74.47 | 544. | 2430. | 0.0 | 0.16 | 74.32 | 47. | 0.01 |
| 74.50 | 537. | 3180. | 0.0 | 0.07 | 74.42 | 3781. | 0.13 |
| 74.47 | 534. | 3300. | 0.0 | 0.25 | 74.36 | 7757. | 0.0 |
| 74.40 | 531. | 4630. | 0.0 | 0.22 | 74.20 | 4630. | 0.0 |
| 74.39 | 531. | 5690. | 0.0 | 0.21 | 74.18 | 6295. | 0.0 |
| 74.41 | 528. | 4790. | 0.0 | 0.20 | 74.18 | 5621. | 0.0 |
| 74.49 | 531. | 4640. | 0.10 | 0.11 | 74.34 | 3473. | 0.15 |
| 74.51 | 531. | 3680. | 0.0 | 0.26 | 74.37 | 1894. | 0.0 |
| 74.52 | 531. | 2490. | 0.0 | 0.16 | 74.38 | 2795. | 0.21 |
| 74.57 | 589. | 8460. | 0.0 | 0.22 | 74.43 | 4888. | 0.02 |
| 74.68 | 534. | 7030. | 0.04 | 0.22 | 74.50 | 5840. | 1.13 |
| 74.59 | 541. | 3150. | 0.0 | 0.28 | 74.47 | 1955. | 0.0 |
| 74.64 | 534. | 3150. | 0.0 | 0.25 | 74.53 | 2263. | 0.0 |
| 74.67 | 531. | 1660. | 0.0 | 0.25 | 74.56 | 1071. | 0.0 |
| 74.71 | 531. | 602. | 0.0 | 0.25 | 74.60 | 0. | 0.0 |
| 74.75 | 531. | 2680. | 0.0 | 0.26 | 74.58 | 5370. | 0.0 |
| 74.69 | 531. | 5950. | 0.0 | 0.24 | 74.46 | 9817. | 0.0 |
| 74.59 | 531. | 6420. | 0.0 | 0.19 | 74.30 | 9980. | 0.0 |
| 74.49 | 531. | 6310. | 0.0 | 0.14 | 74.18 | 11372. | 0.0 |
| 74.43 | 528. | 8840. | 0.0 | 0.15 | 74.07 | 10622. | 0.0 |
| 74.29 | 519. | 7340. | 0.0 | 0.24 | 74.06 | 6157. | 0.0 |
| 74.27 | 512. | 4030. | 0.0 | 0.27 | 74.09 | 3126. | 0.0 |
| 74.26 | 512. | 5630. | 0.0 | 0.25 | 74.03 | 10024. | 0.0 |
| 74.18 | 512. | 5880. | 0.0 | 0.22 | 73.95 | 5875. | 0.0 |
| 74.15 | 512. | 4940. | 0.0 | 0.24 | 73.96 | 4364. | 0.0 |
| 74.19 | 512. | 5270. | 0.0 | 0.23 | 73.98 | 3534. | 0.04 |
| 74.29 | 512. | 5510. | 0.0 | 0.18 | 74.08 | 4025. | 0.0 |
| 74.32 | 512. | 4870. | 0.0 | 0.19 | 74.16 | 1897. | 0.0 |
| 74.39 | 512. | 3140. | 0.0 | 0.22 | 74.26 | 167. | 0.0 |
| 74.40 | 512. | 3380. | 0.0 | 0.17 | 74.27 | 4866. | 0.0 |

| Inflows to Lake Marion | | | | | | |
|---|---|---|---|---|---|---|
| Date | Wateree River ($ft^3/s$) | Colonels Creek ($ft^3/s$) | Congaree River ($ft^3/s$) | Congaree Creek ($ft^3/s$) | Santee River at Fort Motte | |
| | | | | | Observed ($ft^3/s$) | Computed ($ft^3/s$) |
| 4 10 69 | 7020. | 45. | 6860. | 152. | 15400. | 20000. |
| 4 11 69 | 6080. | 43. | 8480. | 154. | 14400. | 12500. |
| 4 12 69 | 2420. | 42. | 7230. | 159. | 14600. | 14900. |
| 4 13 69 | 591. | 41. | 6630. | 157. | 13600. | 14500. |
| 4 14 69 | 6870. | 40. | 9490. | 161. | 11000. | 12300. |
| 4 15 69 | 9680. | 47. | 10700. | 189. | 11900. | 14000. |
| 4 16 69 | 19400. | 154. | 44600. | 473. | 17200. | 18900. |
| 4 17 69 | 17300. | 148. | 60400. | 769. | 23900. | 31500. |
| 4 18 69 | 15800. | 124. | 63400. | 534. | 36600. | 56800. |
| 4 19 69 | 20500. | 113. | 89400. | 398. | 64600. | 73400. |
| 4 20 69 | 24900. | 93. | 84500. | 327. | 85200. | 83700. |
| 4 21 69 | 17200. | 75. | 56100. | 280. | 106000. | 103000. |
| 4 22 69 | 15200. | 62. | 38300. | 254. | 106000. | 108000. |
| 4 23 69 | 14200. | 54. | 28300. | 213. | 83800. | 91500. |
| 4 24 69 | 13800. | 47. | 23000. | 184. | 64600. | 70300. |
| 4 25 69 | 13700. | 44. | 20900. | 177. | 51300. | 54600. |
| 4 26 69 | 13500. | 42. | 18900. | 174. | 44800. | 45100. |
| 4 27 69 | 7100. | 42. | 12500. | 170. | 40500. | 40100. |
| 4 28 69 | 9450. | 41. | 11000. | 166. | 35700. | 33900. |
| 4 29 69 | 12800. | 39. | 10500. | 164. | 29400. | 28300. |
| 4 30 69 | 10400. | 38. | 10500. | 160. | 24900. | 26700. |
| 5 1 69 | 7940. | 36. | 8960. | 159. | 22400. | 25100. |
| 5 2 69 | 6740. | 36. | 8750. | 157. | 19400. | 22800. |
| 5 3 69 | 5540. | 35. | 5600. | 155. | 17700. | 20300. |
| 5 4 69 | 1610. | 34. | 5640. | 151. | 14800. | 18200. |
| 5 5 69 | 5590. | 33. | 6370. | 147. | 12500. | 13700. |
| 5 6 69 | 6620. | 32. | 5540. | 145. | 11100. | 12900. |
| 5 7 69 | 7770. | 30. | 8830. | 143. | 11300. | 14300. |
| 5 8 69 | 5950. | 29. | 8370. | 142. | 13600. | 15300. |
| 5 9 69 | 5020. | 34. | 8510. | 149. | 14300. | 16300. |
| 5 10 69 | 2040. | 34. | 7000. | 153. | 13800. | 16400. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway (ft$^3$/s) | Outflow Canal (ft$^3$/s) | Rain (in) | | Level (ft) | Outflow powerplant (ft$^3$/s) | Rain (in) |
| 75.92 | 534. | 17200. | 0.0 | 0.29 | 75.25 | 14437. | 0.0 |
| 75.92 | 534. | 17000. | 0.0 | 0.13 | 75.33 | 16406. | 0.07 |
| 75.88 | 544. | 16000. | 0.0 | 0.23 | 75.33 | 12759. | 0.0 |
| 75.88 | 541. | 15800. | 0.0 | 0.18 | 75.35 | 11719. | 0.0 |
| 75.86 | 537. | 14600. | 0.0 | 0.18 | 75.34 | 17861. | 0.0 |
| 75.81 | 541. | 15900. | 0.0 | 0.06 | 75.17 | 20189. | 0.05 |
| 75.85 | 534. | 18600. | 1.50 | 0.03 | 75.02 | 25498. | 1.65 |
| 75.61 | 12000. | 18500. | 0.0 | 0.11 | 74.79 | 27645. | 0.03 |
| 75.37 | 14900. | 18200. | 0.0 | 0.26 | 74.58 | 27904. | 0.09 |
| 75.34 | 25200. | 20100. | 0.0 | 0.12 | 74.24 | 27942. | 0.58 |
| 75.08 | 45200. | 20100. | 0.0 | 0.21 | 73.99 | 27948. | 0.0 |
| 75.28 | 45000. | 22500. | 0.0 | 0.24 | 73.75 | 27759. | 0.0 |
| 75.79 | 45400. | 27600. | 0.0 | 0.20 | 73.68 | 27698. | 0.0 |
| 76.15 | 43000. | 30100. | 0.0 | 0.35 | 73.75 | 27885. | 0.0 |
| 76.25 | 33500. | 30500. | 0.0 | 0.27 | 73.81 | 27944. | 0.0 |
| 76.57 | 18500. | 31600. | 0.0 | 0.20 | 73.93 | 27992. | 0.0 |
| 76.64 | 21900. | 31200. | 0.0 | 0.26 | 74.09 | 27792. | 0.0 |
| 76.76 | 6940. | 31200. | 0.0 | 0.33 | 74.25 | 26299. | 0.0 |
| 76.73 | 9920. | 30600. | 0.0 | 0.35 | 74.36 | 28521. | 0.0 |
| 76.64 | 9620. | 29800. | 0.01 | 0.32 | 74.46 | 28426. | 0.03 |
| 76.53 | 5180. | 28600. | 0.0 | 0.34 | 74.56 | 25806. | 0.0 |
| 76.47 | 1580. | 27100. | 0.0 | 0.27 | 74.67 | 23129. | 0.0 |
| 76.38 | 863. | 25500. | 0.0 | 0.29 | 74.82 | 22006. | 0.0 |
| 76.31 | 728. | 24100. | 0.0 | 0.31 | 74.94 | 20382. | 0.0 |
| 76.21 | 692. | 22900. | 0.0 | 0.23 | 75.00 | 21390. | 0.0 |
| 76.08 | 659. | 21500. | 0.0 | 0.28 | 75.00 | 21387. | 0.0 |
| 75.88 | 630. | 19900. | 0.0 | 0.35 | 74.98 | 19096. | 0.0 |
| 75.71 | 617. | 18100. | 0.0 | 0.33 | 75.01 | 16210. | 0.0 |
| 75.61 | 611. | 16700. | 0.0 | 0.40 | 74.96 | 18109. | 0.0 |
| 75.58 | 608. | 17500. | 0.0 | 0.36 | 74.84 | 10069. | 0.0 |
| 75.59 | 850. | 13600. | 0.0 | 0.30 | 74.21 | 5818. | 0.05 |

| Date | Inflows to Lake Marion: Wateree River (ft³/s) | Colonels Creek (ft³/s) | Congaree River (ft³/s) | Congaree Creek (ft³/s) | Santee River at Fort Motte: Observed (ft³/s) | Computed (ft³/s) |
|---|---|---|---|---|---|---|
| 8 25 69 | 3670. | 20. | 7830. | 138. | 8580. | 10400. |
| 8 26 69 | 5360. | 19. | 10000. | 136. | 8800. | 10100. |
| 8 27 69 | 1700. | 18. | 8780. | 135. | 12100. | 12900. |
| 8 28 69 | 312. | 17. | 4050. | 134. | 12600. | 14000. |
| 8 29 69 | 968. | 17. | 3290. | 132. | 8870. | 12700. |
| 8 30 69 | 460. | 16. | 3380. | 130. | 7850. | 9670. |
| 8 31 69 | 220. | 17. | 3050. | 131. | 7480. | 7280. |
| 9 1 69 | 241. | 21. | 2450. | 141. | 7560. | 6260. |
| 9 2 69 | 6180. | 27. | 3240. | 161. | 7350. | 5940. |
| 9 3 69 | 5760. | 38. | 5300. | 182. | 7210. | 8730. |
| 9 4 69 | 3670. | 49. | 11900. | 232. | 9090. | 11100. |
| 9 5 69 | 1050. | 46. | 19300. | 230. | 13900. | 12600. |
| 9 6 69 | 4140. | 42. | 29600. | 183. | 17000. | 14800. |
| 9 7 69 | 1690. | 36. | 17800. | 183. | 18600. | 20800. |
| 9 8 69 | 7560. | 28. | 11900. | 164. | 23300. | 28800. |
| 9 9 69 | 7480. | 25. | 10700. | 150. | 23900. | 29500. |
| 9 10 69 | 6500. | 23. | 7450. | 149. | 22700. | 25400. |
| 9 11 69 | 3070. | 21. | 6440. | 147. | 18500. | 21800. |
| 9 12 69 | 1430. | 20. | 5050. | 142. | 14100. | 17000. |
| 9 13 69 | 635. | 19. | 4510. | 139. | 10700. | 12800. |
| 9 14 69 | 537. | 18. | 3980. | 137. | 8760. | 9840. |
| 9 15 69 | 3510. | 18. | 4330. | 136. | 8170. | 8190. |
| 9 16 69 | 6230. | 18. | 4120. | 137. | 7810. | 8790. |
| 9 17 69 | 8130. | 19. | 5870. | 141. | 8190. | 11000. |
| 9 18 69 | 8930. | 29. | 6520. | 164. | 10400. | 13200. |
| 9 19 69 | 8030. | 29. | 6360. | 175. | 12700. | 15900. |
| 9 20 69 | 6360. | 38. | 8930. | 179. | 13800. | 17100. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 75.23 | 506. | 6740. | 0.0 | 0.33 | 74.97 | 9248. | 0.0 |
| 75.22 | 503. | 7640. | 0.0 | 0.26 | 74.94 | 12067. | 0.0 |
| 75.15 | 531. | 9260. | 0.0 | 0.30 | 74.87 | 10417. | 0.0 |
| 75.19 | 522. | 8410. | 0.0 | 0.30 | 74.84 | 8781. | 0.0 |
| 75.17 | 519. | 7100. | 0.0 | 0.30 | 74.88 | 6585. | 0.0 |
| 75.12 | 522. | 4730. | 0.0 | 0.33 | 74.96 | 3037. | 0.0 |
| 75.14 | 525. | 1890. | 0.0 | 0.27 | 74.95 | 4167. | 0.31 |
| 75.20 | 528. | 2500. | 0.20 | 0.10 | 74.97 | 7272. | 0.25 |
| 75.18 | 525. | 1890. | 0.0 | 0.02 | 74.95 | 5849. | 0.34 |
| 75.18 | 528. | 3540. | 0.25 | 0.0 | 74.98 | 7456. | 0.0 |
| 75.20 | 522. | 1510. | 0.10 | 0.06 | 74.95 | 9090. | 0.01 |
| 75.20 | 519. | 6730. | 0.0 | 0.18 | 74.92 | 7215. | 0.0 |
| 75.34 | 522. | 11500. | 0.0 | 0.12 | 75.02 | 13483. | 0.25 |
| 75.40 | 519. | 11600. | 0.0 | 0.20 | 74.96 | 11766. | 0.0 |
| 75.46 | 512. | 13200. | 0.0 | 0.12 | 74.89 | 14826. | 0.34 |
| 75.55 | 525. | 14900. | 0.0 | 0.22 | 74.99 | 15125. | 0.01 |
| 75.63 | 553. | 13600. | 0.0 | 0.25 | 75.07 | 12244. | 0.47 |
| 75.69 | 534. | 15100. | 0.0 | 0.28 | 75.14 | 12299. | 0.0 |
| 75.70 | 534. | 14800. | 0.0 | 0.21 | 75.21 | 12647. | 0.0 |
| 75.68 | 531. | 13700. | 0.0 | 0.23 | 75.29 | 12100. | 0.0 |
| 75.59 | 534. | 11700. | 0.0 | 0.24 | 75.26 | 9146. | 0.0 |
| 75.49 | 528. | 10600. | 0.0 | 0.23 | 75.19 | 13808. | 0.0 |
| 75.39 | 522. | 11600. | 0.0 | 0.21 | 75.03 | 16051. | 0.0 |
| 75.27 | 519. | 12600. | 0.0 | 0.19 | 74.86 | 16625. | 0.12 |
| 75.20 | 512. | 14300. | 0.0 | 0.13 | 74.69 | 15643. | 0.34 |
| 75.15 | 516. | 14500. | 0.0 | 0.32 | 74.57 | 12205. | 0.18 |
| 75.17 | 528. | 12600. | 0.30 | 0.36 | 74.77 | 4965. | 0.0 |

| Date | Inflows to Lake Marion | | | | Santee River at Fort Motte | |
|---|---|---|---|---|---|---|
| | Wateree River ($ft^3/s$) | Colonels Creek ($ft^3/s$) | Congaree River ($ft^3/s$) | Congaree Creek ($ft^3/s$) | Observed ($ft^3/s$) | Computed ($ft^3/s$) |
| 10 1 69 | 626. | 23. | 5960. | 143. | 8800. | 0. |
| 10 2 69 | 9680. | 70. | 9740. | 167. | 10400. | 1150. |
| 10 3 69 | 11300. | 112. | 9060. | 193. | 14600. | 9750. |
| 10 4 69 | 6350. | 80. | 6920. | 173. | 16000. | 18600. |
| 10 5 69 | 1100. | 56. | 6970. | 153. | 15200. | 18900. |
| 10 6 69 | 2970. | 37. | 6000. | 146. | 13400. | 13800. |
| 10 7 69 | 6880. | 32. | 6110. | 145. | 10300. | 11400. |
| 10 8 69 | 8930. | 29. | 5120. | 145. | 10400. | 12600. |
| 10 9 69 | 6920. | 28. | 5360. | 147. | 11300. | 14600. |
| 10 10 69 | 3150. | 26. | 6420. | 146. | 11700. | 14200. |
| 10 11 69 | 464. | 25. | 6010. | 145. | 11400. | 11600. |
| 10 12 69 | 300. | 24. | 4190. | 143. | 9630. | 9310. |
| 10 13 69 | 6480. | 24. | 8740. | 141. | 8300. | 7980. |
| 10 14 69 | 7280. | 23. | 9570. | 140. | 9370. | 9650. |
| 10 15 69 | 5670. | 23. | 8710. | 139. | 13600. | 13700. |
| 10 16 69 | 3190. | 23. | 7070. | 139. | 14100. | 15600. |
| 10 17 69 | 2260. | 24. | 7500. | 140. | 12100. | 14400. |
| 10 18 69 | 2360. | 23. | 4690. | 139. | 10500. | 12000. |
| 10 19 69 | 381. | 23. | 3940. | 139. | 8470. | 11000. |
| 10 20 69 | 3120. | 24. | 7340. | 140. | 8040. | 8480. |
| 10 21 69 | 2620. | 26. | 8520. | 149. | 8110. | 7750. |
| 10 22 69 | 5400. | 26. | 6430. | 147. | 10300. | 9440. |
| 10 23 69 | 7170. | 25. | 5640. | 142. | 9650. | 12500. |
| 10 24 69 | 6530. | 24. | 7490. | 139. | 10400. | 14100. |
| 10 25 69 | 2520. | 24. | 3760. | 139. | 11800. | 13700. |
| 10 26 69 | 503. | 25. | 3790. | 140. | 9550. | 12200. |
| 10 27 69 | 5460. | 25. | 5800. | 143. | 8190. | 8490. |
| 10 28 69 | 8270. | 25. | 6450. | 142. | 8060. | 8680. |
| 10 29 69 | 8820. | 24. | 6810. | 141. | 10600. | 12200. |
| 10 30 69 | 6810. | 24. | 5880. | 139. | 12100. | 14800. |
| 10 31 69 | 3800. | 25. | 6210. | 144. | 11900. | 15000. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 75.36 | 534. | 10800. | 0.0 | 0.13 | 75.04 | 15415. | 0.04 |
| 75.43 | 534. | 14700. | 1.58 | 0.17 | 74.87 | 18445. | 0.05 |
| 75.35 | 531. | 15900. | 0.29 | 0.07 | 74.75 | 19685. | 0.54 |
| 75.30 | 531. | 15200. | 0.0 | 0.20 | 74.74 | 6785. | 0.0 |
| 75.31 | 534. | 11900. | 0.0 | 0.16 | 74.95 | 5949. | 0.0 |
| 75.42 | 541. | 12500. | 0.0 | 0.17 | 74.98 | 13703. | 0.03 |
| 75.42 | 537. | 13800. | 0.0 | 0.13 | 74.95 | 14858. | 0.0 |
| 75.36 | 534. | 13400. | 0.0 | 0.15 | 74.88 | 15816. | 0.37 |
| 75.30 | 534. | 13600. | 0.02 | 0.08 | 74.79 | 15948. | 0.0 |
| 75.20 | 531. | 14300. | 0.0 | 0.20 | 74.70 | 14507. | 0.0 |
| 75.18 | 531. | 13200. | 0.0 | 0.19 | 74.73 | 9709. | 0.0 |
| 75.18 | 534. | 10900. | 0.0 | 0.14 | 74.85 | 8147. | 0.0 |
| 75.14 | 519. | 10800. | 0.0 | 0.17 | 74.80 | 14355. | 0.0 |
| 75.03 | 519. | 12500. | 0.0 | 0.19 | 74.65 | 15175. | 0.0 |
| 74.97 | 516. | 12800. | 0.0 | 0.21 | 74.54 | 12542. | 0.0 |
| 74.98 | 519. | 12800. | 0.0 | 0.16 | 74.55 | 11340. | 0.0 |
| 75.00 | 525. | 14300. | 0.0 | 0.06 | 74.43 | 16548. | 0.0 |
| 74.90 | 516. | 12400. | 0.0 | 0.22 | 74.45 | 7059. | 0.0 |
| 74.90 | 516. | 7050. | 0.01 | 0.14 | 74.65 | 3165. | 0.0 |
| 74.92 | 506. | 7070. | 0.0 | 0.09 | 74.63 | 11056. | 0.29 |
| 74.90 | 512. | 8510. | 0.0 | 0.12 | 74.64 | 10578. | 0.15 |
| 74.89 | 503. | 8490. | 0.0 | 0.13 | 74.54 | 10704. | 0.0 |
| 74.85 | 481. | 7000. | 0.0 | 0.26 | 74.55 | 8815. | 0.0 |
| 74.82 | 512. | 7000. | 0.0 | 0.19 | 74.52 | 8432. | 0.0 |
| 74.86 | 509. | 8470. | 0.0 | 0.16 | 74.56 | 5649. | 0.0 |
| 74.92 | 512. | 3470. | 0.0 | 0.07 | 74.70 | 2381. | 0.01 |
| 74.99 | 516. | 3480. | 0.0 | 0.09 | 74.76 | 7953. | 0.0 |
| 74.94 | 522. | 4660. | 0.0 | 0.13 | 74.74 | 9433. | 0.0 |
| 74.90 | 531. | 7030. | 0.0 | 0.21 | 74.55 | 11641. | 0.0 |
| 74.90 | 531. | 10100. | 0.0 | 0.16 | 74.51 | 11127. | 0.0 |
| 74.90 | 528. | 10600. | 0.0 | 0.16 | 74.51 | 10013. | 0.02 |

| Date | Inflows to Lake Marion: Wateree River (ft3/s) | Colonels Creek (ft3/s) | Congaree River (ft3/s) | Congaree Creek (ft3/s) | Santee River at Fort Motte: Observed (ft3/s) | Computed (ft3/s) |
|---|---|---|---|---|---|---|
| 12 1 69 | 3240. | 28. | 8460. | 149. | 7150. | 1160. |
| 12 2 69 | 3570. | 27. | 7730. | 148. | 7460. | 4770. |
| 12 3 69 | 4710. | 27. | 5560. | 150. | 9020. | 9620. |
| 12 4 69 | 7050. | 27. | 7200. | 154. | 8110. | 12300. |
| 12 5 69 | 5170. | 27. | 10000. | 153. | 9710. | 13300. |
| 12 6 69 | 1860. | 27. | 7320. | 152. | 12800. | 13400. |
| 12 7 69 | 3310. | 33. | 4390. | 156. | 10700. | 13200. |
| 12 8 69 | 8820. | 46. | 8330. | 174. | 8000. | 12500. |
| 12 9 69 | 4380. | 40. | 11600. | 164. | 10000. | 13600. |
| 12 10 69 | 8030. | 52. | 12600. | 190. | 15200. | 14000. |
| 12 11 69 | 13000. | 90. | 13400. | 313. | 16700. | 17700. |
| 12 12 69 | 10000. | 78. | 25100. | 358. | 20100. | 24200. |
| 12 13 69 | 9660. | 59. | 17900. | 280. | 24600. | 26200. |
| 12 14 69 | 3900. | 44. | 10800. | 209. | 28200. | 31300. |
| 12 15 69 | 4550. | 36. | 10000. | 178. | 27100. | 28300. |
| 12 16 69 | 4740. | 33. | 10300. | 167. | 21300. | 21400. |
| 12 17 69 | 5090. | 31. | 10300. | 162. | 18200. | 17600. |
| 12 18 69 | 7920. | 31. | 8810. | 162. | 16200. | 16700. |
| 12 19 69 | 3490. | 31. | 6290. | 158. | 14600. | 18000. |
| 12 20 69 | 1550. | 30. | 5560. | 154. | 12200. | 16000. |
| 12 21 69 | 1390. | 30. | 5390. | 154. | 9120. | 12000. |
| 12 22 69 | 4580. | 45. | 5930. | 176. | 8130. | 9380. |
| 12 23 69 | 6390. | 46. | 8310. | 192. | 7600. | 10200. |
| 12 24 69 | 1420. | 38. | 8550. | 173. | 10200. | 12300. |
| 12 25 69 | 2200. | 35. | 7670. | 163. | 11100. | 11900. |
| 12 26 69 | 7290. | 52. | 9430. | 194. | 8740. | 11800. |
| 12 27 69 | 11100. | 52. | 14100. | 211. | 10100. | 14400. |
| 12 28 69 | 11000. | 43. | 12000. | 183. | 16200. | 18800. |
| 12 29 69 | 7600. | 37. | 10300. | 169. | 18000. | 23300. |
| 12 30 69 | 6140. | 35. | 8870. | 164. | 17400. | 22700. |
| 12 31 69 | 5180. | 34. | 7520. | 162. | 15700. | 19800. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 74.08 | 569. | 16374. | 0.0 | 0.14 | 73.73 | 8230. | 0.0 |
| 73.91 | 573. | 16300. | 0.0 | 0.14 | 73.48 | 9540. | 0.0 |
| 73.87 | 573. | 16450. | 0.0 | 0.11 | 73.29 | 12200. | 0.0 |
| 73.73 | 573. | 18206. | 0.0 | 0.18 | 73.18 | 12600. | 0.0 |
| 73.58 | 573. | 17983. | 0.0 | 0.07 | 72.96 | 12800. | 0.0 |
| 73.49 | 576. | 16596. | 0.0 | 0.07 | 72.82 | 12700. | 0.0 |
| 73.49 | 579. | 8827. | 0.10 | 0.02 | 72.86 | 12200. | 0.0 |
| 73.50 | 579. | 10599. | 0.50 | 0.02 | 73.03 | 12000. | 0.0 |
| 73.43 | 579. | 9965. | 0.0 | 0.04 | 73.02 | 10600. | 0.0 |
| 73.61 | 598. | 11440. | 0.14 | 0.02 | 73.08 | 11400. | 0.30 |
| 73.70 | 582. | 13866. | 0.81 | 0.01 | 73.13 | 13200. | 0.65 |
| 73.75 | 582. | 17591. | 0.0 | 0.09 | 73.11 | 14500. | 0.0 |
| 73.78 | 579. | 20204. | 0.0 | 0.08 | 72.93 | 15800. | 0.0 |
| 73.90 | 582. | 16977. | 0.0 | 0.11 | 72.86 | 17600. | 0.0 |
| 73.98 | 582. | 15560. | 0.0 | 0.22 | 72.97 | 18100. | 0.0 |
| 74.11 | 582. | 17776. | 0.0 | 0.08 | 73.07 | 18200. | 0.0 |
| 74.16 | 582. | 19929. | 0.0 | 0.06 | 73.07 | 18500. | 0.0 |
| 74.14 | 595. | 22505. | 0.0 | 0.08 | 72.95 | 19000. | 0.0 |
| 74.09 | 595. | 20493. | 0.0 | 0.08 | 72.92 | 19300. | 0.0 |
| 73.95 | 595. | 20885. | 0.0 | 0.10 | 72.85 | 18800. | 0.0 |
| 73.78 | 595. | 18805. | 0.0 | 0.10 | 72.81 | 16700. | 0.0 |
| 73.67 | 712. | 18229. | 0.47 | 0.17 | 72.85 | 16500. | 0.85 |
| 73.48 | 595. | 17894. | 0.0 | 0.06 | 72.74 | 14600. | 0.0 |
| 73.41 | 595. | 19130. | 0.0 | 0.08 | 72.64 | 14300. | 0.0 |
| 73.30 | 595. | 19066. | 0.0 | 0.06 | 72.46 | 14200. | 0.0 |
| 73.36 | 595. | 20267. | 0.60 | 0.05 | 72.48 | 16800. | 0.61 |
| 73.14 | 595. | 19756. | 0.01 | 0.05 | 72.31 | 15500. | 0.0 |
| 73.05 | 595. | 18812. | 0.0 | 0.06 | 72.16 | 15800. | 0.0 |
| 73.05 | 592. | 20607. | 0.0 | 0.03 | 72.03 | 16400. | 0.0 |
| 73.05 | 592. | 20282. | 0.01 | 0.10 | 71.92 | 17100. | 0.0 |
| 73.12 | 592. | 20666. | 0.0 | 0.15 | 71.84. | 18300. | 0.0 |

| Date | Inflows to Lake Marion: Wateree River (ft$^3$/s) | Colonels Creek (ft$^3$/s) | Congaree River (ft$^3$/s) | Congaree Creek (ft$^3$/s) | Santee River at Fort Motte: Observed (ft$^3$/s) | Santee River at Fort Motte: Computed (ft$^3$/s) |
|---|---|---|---|---|---|---|
| 8 1 70 | 6040. | 16. | 6740. | 133. | 16000. | 17700. |
| 8 2 70 | 1150. | 15. | 3380. | 129. | 19000. | 15700. |
| 8 3 70 | 6500. | 13. | 6900. | 129. | 15000. | 11800. |
| 8 4 70 | 6540. | 13. | 6880. | 125. | 9000. | 10500. |
| 8 5 70 | 5280. | 13. | 6310. | 123. | 14000. | 12300. |
| 8 6 70 | 4160. | 13. | 2460. | 123. | 15000. | 13000. |
| 8 7 70 | 3010. | 13. | 3390. | 124. | 15000. | 12100. |
| 8 8 70 | 579. | 18. | 2560. | 124. | 12000. | 8960. |
| 8 9 70 | 215. | 29. | 2210. | 127. | 10000. | 6320. |
| 8 10 70 | 1210. | 33. | 6170. | 159. | 8000. | 4790. |
| 8 11 70 | 12100. | 34. | 20200. | 397. | 8000. | 5960. |
| 8 12 70 | 12000. | 52. | 38800. | 677. | 9000. | 12800. |
| 8 13 70 | 13500. | 64. | 32100. | 508. | 25000. | 26400. |
| 8 14 70 | 14600. | 54. | 22800. | 377. | 38000. | 42700. |
| 8 15 70 | 15700. | 37. | 10800. | 265. | 45000. | 48400. |
| 8 16 70 | 8460. | 26. | 6320. | 186. | 30000. | 44200. |
| 8 17 70 | 13600. | 21. | 6930. | 154. | 20000. | 31300. |
| 8 18 70 | 10600. | 22. | 6590. | 147. | 15000. | 23300. |
| 8 19 70 | 6570. | 21. | 6530. | 143. | 12000. | 20200. |
| 8 20 70 | 5880. | 19. | 5960. | 149. | 9000. | 16800. |
| 8 21 70 | 9310. | 18. | 5710. | 144. | 8000. | 14500. |
| 8 22 70 | 2460. | 18. | 4300. | 140. | 10000. | 14800. |
| 8 23 70 | 2140. | 31. | 3720. | 142. | 10000. | 12100. |
| 8 24 70 | 5520. | 32. | 5030. | 150. | 10000. | 9280. |
| 8 25 70 | 4880. | 27. | 6430. | 160. | 10000. | 9470. |
| 8 26 70 | 4820. | 23. | 6170. | 156. | 10000. | 10400. |
| 8 27 70 | 5280. | 20. | 3930. | 150. | 10000. | 11400. |
| 8 28 70 | 5100. | 19. | 3830. | 143. | 10000. | 12100. |
| 8 29 70 | 5380. | 17. | 6740. | 140. | 10000. | 11100. |
| 8 30 70 | 1730. | 16. | 5000. | 141. | 10000. | 10300. |
| 8 31 70 | 8370. | 15. | 6960. | 146. | 10000. | 9750. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway (ft$^3$/s) | Outflow Canal (ft$^3$/s) | Rain (in) | | Level (ft) | Outflow powerplant (ft$^3$/s) | Rain (in) |
| 75.84 | 566. | 15100. | 0.0 | 0.33 | 75.37 | 15625. | 0.63 |
| 75.82 | 566. | 15700. | 0.0 | 0.26 | 75.33 | 14930. | 0.04 |
| 75.79 | 566. | 15400. | 0.0 | 0.31 | 75.33 | 11716. | 0.0 |
| 75.72 | 585. | 12600. | 0.0 | 0.42 | 75.46 | 10089. | 0.0 |
| 75.70 | 569. | 11700. | 0.0 | 0.39 | 75.43 | 8201. | 0.0 |
| 75.70 | 573. | 11700. | 0.0 | 0.30 | 75.42 | 7693. | 0.0 |
| 75.73 | 576. | 11700. | 0.0 | 0.13 | 75.50 | 10960. | 0.06 |
| 75.66 | 579. | 11700. | 0.0 | 0.24 | 75.34 | 14396. | 0.0 |
| 75.56 | 579. | 11600. | 0.20 | 0.24 | 75.22 | 8746. | 0.0 |
| 75.50 | 579. | 9740. | 1.21 | 0.18 | 75.22 | 12702. | 0.24 |
| 75.56 | 579. | 13900. | 1.60 | 0.02 | 75.06 | 22066. | 1.65 |
| 75.33 | 685. | 17400. | 0.0 | 0.10 | 74.60 | 27336. | 0.04 |
| 75.37 | 582. | 18600. | 0.70 | 0.0 | 74.47 | 22734. | 0.47 |
| 75.39 | 582. | 20100. | 0.30 | 0.04 | 74.39 | 24064. | 1.09 |
| 75.43 | 582. | 21600. | 0.0 | 0.16 | 74.30 | 22285. | 0.0 |
| 75.60 | 589. | 22800. | 0.40 | 0.24 | 74.30 | 21954. | 0.0 |
| 75.77 | 589. | 22300. | 0.0 | 0.22 | 74.41 | 17805. | 0.0 |
| 75.83 | 589. | 20700. | 0.0 | 0.29 | 74.70 | 16503. | 0.0 |
| 75.85 | 589. | 21000. | 0.10 | 0.23 | 74.98 | 14058. | 0.0 |
| 75.89 | 592. | 22500. | 0.0 | 0.19 | 74.88 | 16476. | 0.15 |
| 75.88 | 592. | 19300. | 0.0 | 0.35 | 74.95 | 15284. | 0.0 |
| 75.83 | 592. | 17000. | 0.0 | 0.13 | 75.05 | 9333. | 0.0 |
| 75.86 | 592. | 17900. | 0.20 | 0.23 | 75.30 | 5092. | 0.0 |
| 75.93 | 595. | 17000. | 0.0 | 0.37 | 75.40 | 15001. | 0.0 |
| 75.92 | 598. | 15800. | 1.30 | 0.13 | 75.27 | 12749. | 1.64 |
| 75.88 | 601. | 16500. | 0.30 | 0.09 | 75.29 | 14765. | 0.17 |
| 75.81 | 601. | 17100. | 0.0 | 0.12 | 75.18 | 16546. | 0.49 |
| 75.78 | 601. | 10500. | 0.0 | 0.21 | 75.10 | 16466. | 0.03 |
| 75.68 | 601. | 16400. | 0.0 | 0.19 | 75.16 | 12136. | 0.0 |
| 75.60 | 608. | 15000. | 0.0 | 0.22 | 75.06 | 10663. | 0.0 |
| 75.60 | 605. | 16400. | 0.0 | 0.24 | 75.07 | 15965. | 0.0 |

| Date | Inflows to Lake Marion: Wateree River (ft³/s) | Colonels Creek (ft³/s) | Congaree River (ft³/s) | Congaree Creek (ft³/s) | Santee River at Fort Motte: Observed (ft³/s) | Computed (ft³/s) |
|---|---|---|---|---|---|---|
| 2 1 71 | 10900. | 68. | 15900. | 220. | 22000. | 16000. |
| 2 2 71 | 12200. | 54. | 13600. | 202. | 22400. | 20200. |
| 2 3 71 | 14600. | 52. | 12400. | 189. | 23900. | 22900. |
| 2 4 71 | 15700. | 48. | 10400. | 185. | 23700. | 26700. |
| 2 5 71 | 16100. | 45. | 9050. | 192. | 22000. | 28900. |
| 2 6 71 | 14200. | 60. | 17600. | 202. | 20400. | 28700. |
| 2 7 71 | 11300. | 80. | 23000. | 204. | 23200. | 27200. |
| 2 8 71 | 16800. | 90. | 41400. | 314. | 25900. | 28500. |
| 2 9 71 | 20100. | 70. | 52500. | 435. | 31800. | 35700. |
| 2 10 71 | 21900. | 62. | 41300. | 379. | 41100. | 50700. |
| 2 11 71 | 18500. | 57. | 27200. | 299. | 57200. | 66200. |
| 2 12 71 | 17000. | 50. | 17800. | 248. | 61400. | 66100. |
| 2 13 71 | 16800. | 47. | 13200. | 218. | 53000. | 55100. |
| 2 14 71 | 15200. | 45. | 12300. | 213. | 44400. | 40700. |
| 2 15 71 | 13000. | 42. | 17000. | 200. | 36900. | 33100. |
| 2 16 71 | 9450. | 40. | 15700. | 194. | 32700. | 29700. |
| 2 17 71 | 9030. | 37. | 13300. | 192. | 31400. | 27100. |
| 2 18 71 | 7910. | 36. | 10200. | 188. | 30000. | 24900. |
| 2 19 71 | 6230. | 35. | 9180. | 185. | 26600. | 23700. |
| 2 20 71 | 2380. | 36. | 8350. | 186. | 22500. | 21100. |
| 2 21 71 | 670. | 37. | 7900. | 198. | 18400. | 16700. |
| 2 22 71 | 7910. | 45. | 11600. | 217. | 15300. | 12900. |
| 2 23 71 | 13300. | 85. | 18800. | 371. | 16200. | 14400. |
| 2 24 71 | 8810. | 103. | 29500. | 428. | 21900. | 20800. |
| 2 25 71 | 8360. | 85. | 27700. | 345. | 26600. | 26800. |
| 2 26 71 | 9970. | 69. | 20800. | 269. | 32700. | 34600. |
| 2 27 71 | 4820. | 64. | 12000. | 248. | 38400. | 38700. |
| 2 28 71 | 1060. | 59. | 10100. | 265. | 37500. | 33200. |
| 3 1 71 | 8680. | 57. | 10800. | 258. | 28700. | 22900. |
| 3 2 71 | 12300. | 87. | 21000. | 355. | 25900. | 19800. |
| 3 3 71 | 20800. | 212. | 47800. | 704. | 32700. | 23300. |
| 3 4 71 | 27200. | 323. | 76000. | 1030. | 43500. | 37500. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway (ft$^3$/s) | Outflow Canal (ft$^3$/s) | Rain (in) | | Level (ft) | Outflow powerplant (ft$^3$/s) | Rain (in) |
| 75.54 | 592. | 23900. | 0.0 | 0.18 | 74.35 | 26885. | 0.09 |
| 75.48 | 547. | 24000. | 0.0 | 0.08 | 74.21 | 26231. | 0.0 |
| 75.41 | 537. | 24500. | 0.0 | 0.14 | 74.10 | 26914. | 0.0 |
| 75.41 | 534. | 24900. | 0.0 | 0.11 | 74.01 | 26782. | 0.02 |
| 75.36 | 531. | 25200. | 0.10 | 0.04 | 73.93 | 28957. | 0.34 |
| 75.36 | 525. | 25600. | 0.0 | 0.02 | 73.80 | 29087. | 0.15 |
| 75.40 | 534. | 25600. | 0.0 | 0.10 | 73.74 | 26361. | 0.0 |
| 75.50 | 547. | 26600. | 0.70 | 0.09 | 73.79 | 26772. | 1.24 |
| 75.49 | 2390. | 27900. | 1.70 | 0.15 | 73.81 | 29347. | 0.37 |
| 75.65 | 1300. | 28000. | 0.0 | 0.15 | 73.71 | 29699. | 0.0 |
| 75.72 | 745. | 29000. | 0.0 | 0.15 | 73.68 | 29300. | 0.0 |
| 76.16 | 4360. | 31100. | 0.0 | 0.17 | 73.75 | 28914. | 0.0 |
| 76.52 | 23100. | 32600. | 0.0 | 0.05 | 73.85 | 29440. | 0.21 |
| 76.31 | 13500. | 32000. | 0.0 | 0.15 | 74.02 | 29498. | 0.0 |
| 76.58 | 4040. | 32500. | 0.0 | 0.05 | 74.11 | 29576. | 0.0 |
| 76.71 | 1550. | 33100. | 0.0 | 0.15 | 74.25 | 29179. | 0.06 |
| 76.75 | 1040. | 32400. | 0.0 | 0.16 | 74.41 | 29192. | 0.0 |
| 76.76 | 2620. | 31800. | 0.0 | 0.11 | 74.55 | 29228. | 0.0 |
| 76.75 | 1100. | 31200. | 0.0 | 0.12 | 74.65 | 29150. | 0.0 |
| 76.72 | 1100. | 30600. | 0.0 | 0.16 | 74.72 | 29212. | 0.0 |
| 76.58 | 812. | 29500. | 0.0 | 0.06 | 74.76 | 29241. | 0.0 |
| 76.36 | 592. | 28000. | 0.0 | 0.07 | 74.74 | 29202. | 0.01 |
| 76.29 | 2360. | 28200. | 0.40 | 0.17 | 74.71 | 29219. | 0.03 |
| 76.05 | 789. | 26600. | 0.0 | 0.27 | 74.60 | 29243. | 0.0 |
| 75.97 | 525. | 26500. | 0.0 | 0.15 | 74.48 | 28833. | 0.0 |
| 75.98 | 500. | 26800. | 0.0 | 0.12 | 74.44 | 28193. | 0.0 |
| 76.16 | 481. | 28300. | 0.40 | 0.35 | 74.46 | 27994. | 0.64 |
| 76.33 | 528. | 29200. | 0.0 | 0.10 | 74.51 | 27915. | 0.22 |
| 76.53 | 646. | 29700. | 1.32 | 0.0 | 74.68 | 29087. | 1.31 |
| 76.54 | 630. | 29700. | 0.13 | 0.06 | 74.70 | 29177. | 0.02 |
| 76.68 | 901. | 29800. | 1.91 | 0.03 | 74.71 | 29142. | 0.35 |
| 76.30 | 36300. | 28200. | 0.0 | 0.14 | 74.95 | 29180. | 0.69 |

| Date | Inflows to Lake Marion | | | | Santee River at Fort Motte | |
|---|---|---|---|---|---|---|
| | Wateree River ($ft^3/s$) | Colonels Creek ($ft^3/s$) | Congaree River ($ft^3/s$) | Congaree Creek ($ft^3/s$) | Observed ($ft^3/s$) | Computed ($ft^3/s$) |
| 3 5 71 | 30300. | 172. | 68400. | 656. | 62800. | 63700. |
| 3 6 71 | 20800. | 123. | 45000. | 418. | 90800. | 90400. |
| 3 7 71 | 18600. | 99. | 27600. | 327. | 94300. | 96500. |
| 3 8 71 | 17600. | 84. | 23200. | 293. | 77000. | 81100. |
| 3 9 71 | 17000. | 74. | 20900. | 269. | 58400. | 61300. |
| 3 10 71 | 16600. | 67. | 19700. | 250. | 48000. | 48900. |
| 3 11 71 | 13600. | 63. | 17700. | 242. | 42600. | 42800. |
| 3 12 71 | 7440. | 59. | 13500. | 236. | 39600. | 38200. |
| 3 13 71 | 2060. | 56. | 8460. | 230. | 35100. | 29100. |
| 3 14 71 | 2460. | 54. | 8020. | 227. | 28300. | 21700. |
| 3 15 71 | 7050. | 54. | 12400. | 229. | 22000. | 16500. |
| 3 16 71 | 6440. | 62. | 14000. | 243. | 20600. | 15900. |
| 3 17 71 | 8240. | 60. | 14400. | 250. | 22000. | 18900. |
| 3 18 71 | 9870. | 55. | 11200. | 229. | 22700. | 20700. |
| 3 19 71 | 10300. | 53. | 10300. | 219. | 23200. | 21400. |
| 3 20 71 | 8540. | 59. | 11700. | 236. | 22000. | 22700. |
| 3 21 71 | 2930. | 54. | 11800. | 240. | 21400. | 22600. |
| 3 22 71 | 814. | 50. | 10800. | 223. | 21300. | 19800. |
| 3 23 71 | 5810. | 52. | 8230. | 243. | 18700. | 16500. |
| 3 24 71 | 5930. | 52. | 8760. | 260. | 16500. | 17200. |
| 3 25 71 | 9640. | 50. | 10900. | 245. | 15700. | 17200. |
| 3 26 71 | 10600. | 136. | 16100. | 436. | 18600. | 18600. |
| 3 27 71 | 5990. | 151. | 14400. | 588. | 23200. | 23600. |
| 3 28 71 | 5060. | 127. | 15000. | 446. | 26300. | 27100. |
| 3 29 71 | 13000. | 111. | 20000. | 341. | 26700. | 25000. |
| 3 30 71 | 15900. | 103. | 25800. | 310. | 28600. | 26600. |
| 3 31 71 | 15200. | 88. | 22900. | 296. | 31400. | 33300. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 75.77 | 34800. | 22800. | 0.0 | 0.20 | 74.70 | 29190. | 0.0 |
| 75.76 | 38800. | 24600. | 0.0 | 0.14 | 74.45 | 29114. | 0.0 |
| 76.13 | 43800. | 29000. | 0.35 | 0.19 | 74.43 | 29188. | 0.26 |
| 76.27 | 44200. | 29700. | 0.0 | 0.41 | 74.43 | 29241. | 0.0 |
| 76.31 | 23500. | 29800. | 0.0 | 0.21 | 74.37 | 29192. | 0.0 |
| 76.51 | 14800. | 30800. | 0.11 | 0.13 | 74.41 | 29246. | 0.0 |
| 76.60 | 14900. | 31300. | 0.0 | 0.05 | 74.53 | 29058. | 0.12 |
| 76.57 | 10000. | 30500. | 0.0 | 0.16 | 74.58 | 28851. | 0.0 |
| 76.62 | 5000. | 30500. | 0.0 | 0.21 | 74.65 | 28823. | 0.0 |
| 76.72 | 5000. | 30600. | 0.03 | 0.15 | 74.73 | 28920. | 0.12 |
| 76.64 | 2500. | 29500. | 0.27 | 0.20 | 74.77 | 28795. | 0.03 |
| 76.58 | 1500. | 29200. | 0.0 | 0.12 | 74.83 | 29020. | 0.34 |
| 76.47 | 1000. | 28800. | 0.0 | 0.33 | 74.86 | 29055. | 0.0 |
| 76.28 | 700. | 26900. | 0.0 | 0.21 | 74.77 | 28981. | 0.0 |
| 76.18 | 600. | 26700. | 0.06 | 0.17 | 74.54 | 27989. | 0.0 |
| 76.36 | 900. | 28500. | 0.0 | 0.18 | 74.77 | 28138. | 0.04 |
| 75.94 | 1200. | 25800. | 0.0 | 0.24 | 74.57 | 26832. | 0.0 |
| 75.90 | 800. | 25400. | 0.0 | 0.22 | 74.56 | 24767. | 0.0 |
| 75.90 | 700. | 25500. | 0.22 | 0.19 | 74.57 | 24770. | 0.11 |
| 75.77 | 600. | 24800. | 0.0 | 0.24 | 74.47 | 26433. | 0.0 |
| 75.58 | 592. | 24100. | 0.74 | 0.16 | 74.33 | 27162. | 0.0 |
| 75.72 | 679. | 26800. | 1.14 | 0.0 | 74.36 | 29004. | 1.58 |
| 75.63 | 662. | 25400. | 0.0 | 0.0 | 74.23 | 28049. | 0.02 |
| 75.57 | 585. | 25100. | 0.0 | 0.14 | 74.15 | 24208. | 0.0 |
| 75.65 | 579. | 25600. | 0.23 | 0.0 | 74.16 | 24285. | 0.0 |
| 75.72 | 592. | 26500. | 0.0 | 0.16 | 74.19 | 26456. | 0.18 |
| 75.74 | 582. | 26800. | 0.0 | 0.20 | 74.13 | 27609. | 0.0 |

| Date | Inflows to Lake Marion: Wateree River (ft$^3$/s) | Colonels Creek (ft$^3$/s) | Congaree River (ft$^3$/s) | Congaree Creek (ft$^3$/s) | Santee River at Fort Motte: Observed (ft$^3$/s) | Computed (ft$^3$/s) |
|---|---|---|---|---|---|---|
| 8 7 71 | 1060. | 34. | 10200. | 198. | 19800. | 17600. |
| 8 8 71 | 614. | 29. | 9030. | 185. | 17200. | 14600. |
| 8 9 71 | 4960. | 25. | 11300. | 200. | 13900. | 12300. |
| 8 10 71 | 6010. | 23. | 11400. | 269. | 14200. | 14600. |
| 8 11 71 | 7460. | 22. | 10000. | 244. | 16600. | 17400. |
| 8 12 71 | 1970. | 22. | 11300. | 302. | 17500. | 18400. |
| 8 13 71 | 656. | 22. | 11400. | 284. | 17400. | 16800. |
| 8 14 71 | 488. | 21. | 7910. | 212. | 15200. | 14800. |
| 8 15 71 | 306. | 21. | 5880. | 182. | 12300. | 11800. |
| 8 16 71 | 6240. | 32. | 11100. | 347. | 10100. | 9040. |
| 8 17 71 | 6870. | 103. | 22500. | 400. | 14600. | 14100. |
| 8 18 71 | 6660. | 157. | 24800. | 600. | 22500. | 25000. |
| 8 19 71 | 6470. | 112. | 19500. | 450. | 27500. | 33000. |
| 8 20 71 | 7390. | 79. | 13100. | 300. | 32100. | 31700. |
| 8 21 71 | 6400. | 53. | 10600. | 200. | 32600. | 26500. |
| 8 22 71 | 2040. | 36. | 6260. | 180. | 27800. | 21500. |
| 8 23 71 | 5000. | 32. | 9520. | 180. | 19800. | 14800. |
| 8 24 71 | 4150. | 29. | 7600. | 160. | 17300. | 14200. |
| 8 25 71 | 4200. | 28. | 9620. | 160. | 16300. | 13800. |
| 8 26 71 | 3980. | 27. | 9310. | 160. | 15800. | 14200. |
| 8 27 71 | 3820. | 27. | 10500. | 150. | 15600. | 14400. |
| 8 28 71 | 3420. | 25. | 7600. | 150. | 15600. | 14900. |
| 8 29 71 | 750. | 24. | 4220. | 140. | 14000. | 13600. |
| 8 30 71 | 1830. | 23. | 7140. | 140. | 10200. | 9430. |
| 8 31 71 | 2510. | 23. | 7600. | 140. | 9950. | 8930. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 76.07 | 544. | 19300. | 0.0 | 0.05 | 75.26 | 20033. | 0.05 |
| 76.04 | 544. | 19500. | 0.20 | 0.15 | 75.26 | 19058. | 0.05 |
| 76.00 | 541. | 18100. | 0.0 | 0.13 | 75.27 | 17704. | 0.0 |
| 75.90 | 537. | 17400. | 0.0 | 0.17 | 75.26 | 17774. | 0.0 |
| 75.83 | 503. | 17700. | 0.0 | 0.17 | 75.24 | 16778. | 0.0 |
| 75.83 | 566. | 15800. | 0.0 | 0.15 | 75.26 | 14776. | 0.03 |
| 75.80 | 563. | 16200. | 0.0 | 0.23 | 75.24 | 16724. | 0.0 |
| 75.78 | 563. | 15800. | 0.0 | 0.26 | 75.22 | 14364 | 0.06 |
| 75.70 | 550. | 7540. | 0.0 | 0.15 | 75.24 | 6089. | 3.41 |
| 75.75 | 550. | 13300. | 0.0 | 0.18 | 75.45 | 12640. | 1.11 |
| 76.02 | 633. | 19200. | 3.50 | 0.01 | 75.36 | 22141. | 3.30 |
| 76.04 | 802. | 20600. | 0.0 | 0.0 | 75.15 | 25719. | 1.50 |
| 76.02 | 569. | 21500. | 0.0 | 0.17 | 75.12 | 22017. | 0.0 |
| 76.09 | 614. | 22400. | 0.0 | 0.22 | 75.17 | 20059. | 0.02 |
| 76.19 | 712. | 23600. | 0.10 | 0.24 | 75.16 | 21888. | 0.0 |
| 76.28 | 601. | 24500. | 0.10 | 0.26 | 75.12 | 24240. | 0.86 |
| 76.30 | 948. | 25000. | 0.0 | 0.15 | 75.17 | 22884. | 0.62 |
| 76.32 | 582 | 24600. | 0.20 | 0.14 | 75.11 | 27144. | 0.0 |
| 76.19 | 563. | 23900. | 0.0 | 0.24 | 75.00 | 26210. | 2.81 |
| 76.12 | 735. | 22300. | 0.0 | 0.16 | 75.04 | 27859. | 1.86 |
| 76.03 | 659. | 23500. | 0.0 | 0.12 | 74.93 | 27489. | 0.0 |
| 75.83 | 579. | 22600. | 0.0 | 0.17 | 74.70 | 27715. | 0.04 |
| 75.67 | 563. | 20600. | 0.0 | 0.24 | 74.72 | 18359. | 0.0 |
| 75.53 | 563. | 18100. | 0.0 | 0.23 | 74.77 | 19135. | 0.30 |
| 75.38 | 563. | 16900. | 0.0 | 0.18 | 74.77 | 17706. | 0.02 |

| Date | Inflows to Lake Marion: Wateree River (ft³/s) | Colonels Creek (ft³/s) | Congaree River (ft³/s) | Congaree Creek (ft³/s) | Santee River at Fort Motte: Observed (ft³/s) | Computed (ft³/s) |
|---|---|---|---|---|---|---|
| 3 1 73 | 4070. | 48. | 9720. | 185. | 20100. | 0. |
| 3 2 73 | 5410. | 60. | 10200. | 250. | 19400. | 8230. |
| 3 3 73 | 7460. | 80. | 10000. | 310. | 19500. | 14600. |
| 3 4 73 | 11500. | 100. | 11500. | 375. | 20300. | 18200. |
| 3 5 73 | 13100. | 110. | 16600. | 380. | 22200. | 22800. |
| 3 6 73 | 15400. | 100. | 18100. | 390. | 25800. | 28700. |
| 3 7 73 | 16400. | 100. | 17900. | 420. | 29400. | 33600. |
| 3 8 73 | 16700. | 110. | 18100. | 560. | 32400. | 36300. |
| 3 9 73 | 16700. | 115. | 15900. | 580. | 32400. | 38200. |
| 3 10 73 | 16400. | 105. | 16300. | 460. | 33600. | 37800. |
| 3 11 73 | 15100. | 100. | 12400. | 440. | 33900. | 36600. |
| 3 12 73 | 16300. | 110. | 21600. | 450. | 33900. | 33600. |
| 3 13 73 | 13200. | 90. | 26600. | 440. | 34400. | 37100. |
| 3 14 73 | 14000. | 80. | 26900. | 350. | 36400. | 40800. |
| 3 15 73 | 16000. | 78. | 17900. | 323. | 39900. | 42500. |
| 3 16 73 | 7900. | 71. | 15800. | 301. | 42300. | 39700. |
| 3 17 73 | 14800. | 75. | 20100. | 309. | 39800. | 32200. |
| 3 18 73 | 15900. | 76. | 43400. | 338. | 36200. | 33500. |
| 3 19 73 | 16000. | 68. | 58100. | 309. | 37500. | 48500. |
| 3 20 73 | 16000. | 65. | 43400. | 282. | 47400. | 65200. |
| 3 21 73 | 16000. | 60. | 27100. | 278. | 66000. | 65800. |
| 3 22 73 | 16000. | 60. | 23000. | 296. | 64800. | 54700. |
| 3 23 73 | 16000. | 60. | 21400. | 286. | 53600. | 46000. |
| 3 24 73 | 16000. | 50. | 17200. | 276. | 47200. | 41700. |
| 3 25 73 | 15900. | 50. | 14900. | 260. | 43000. | 37900. |
| 3 26 73 | 16000. | 50. | 15200. | 260. | 38800. | 34700. |
| 3 27 73 | 16000. | 45. | 13500. | 250. | 35200. | 33500. |
| 3 28 73 | 15900. | 45. | 16400. | 250. | 32600. | 32200. |
| 3 29 73 | 15500. | 50. | 19100. | 260. | 31500. | 32900. |
| 3 30 73 | 15500. | 100. | 16100. | 275. | 31500. | 35000. |
| 3 31 73 | 16800. | 115. | 25700. | 350. | 32800. | 35400. |

for flows analyzed (continued)

Lakes Marion-Moultrie reservoir water-balance data

| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
|---|---|---|---|---|---|---|---|
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 76.00 | 520. | 20000. | 0.0 | 0.11 | 74.96 | 22300. | 0.0 |
| 75.93 | 520. | 19100. | 0.0 | 0.12 | 74.97 | 21200. | 0.03 |
| 75.99 | 520. | 18100. | 0.94 | 0.07 | 75.02 | 20400. | 0.63 |
| 75.97 | 520. | 18400. | 0.0 | 0.12 | 75.01 | 20800. | 0.02 |
| 75.96 | 520. | 18200. | 0.14 | 0.0 | 75.01 | 21700. | 0.29 |
| 76.00 | 520. | 20000. | 0.0 | 0.0 | 75.01 | 25600. | 0.11 |
| 76.05 | 520. | 21700. | 0.31 | 0.0 | 74.91 | 26300. | 0.25 |
| 76.13 | 520. | 23300. | 0.0 | 0.06 | 74.84 | 27400. | 0.0 |
| 76.24 | 520. | 24400. | 0.07 | 0.28 | 74.80 | 27900. | 0.73 |
| 76.36 | 520. | 25000. | 0.03 | 0.04 | 74.80 | 28200. | 0.05 |
| 76.49 | 630. | 26400. | 0.0 | 0.09 | 74.80 | 28200. | 0.05 |
| 76.65 | 3950. | 28000. | 0.79 | 0.22 | 74.85 | 28200. | 0.03 |
| 76.63 | 9500. | 26900. | 0.0 | 0.34 | 74.91 | 28500. | 0.0 |
| 76.56 | 12500. | 26200. | 0.0 | 0.19 | 74.92 | 28600. | 0.0 |
| 76.52 | 14000. | 26000. | 0.0 | 0.24 | 74.91 | 28700. | 0.0 |
| 76.50 | 14500. | 24600. | 0.0 | 0.22 | 74.87 | 28500. | 0.0 |
| 76.70 | 18000. | 27600. | 0.04 | 0.32 | 74.90 | 28800. | 0.13 |
| 76.17 | 26200. | 22900. | 0.0 | 0.31 | 74.88 | 29000. | 0.0 |
| 75.80 | 23700. | 20800. | 0.0 | 0.26 | 74.67 | 29000. | 0.0 |
| 75.62 | 21600. | 20700. | 0.0 | 0.20 | 74.46 | 29000. | 0.0 |
| 75.78 | 21100. | 24300. | 0.03 | 0.04 | 74.32 | 28800. | 0.06 |
| 76.07 | 21100. | 27700. | 0.0 | 0.04 | 74.26 | 28900. | 0.0 |
| 76.30 | 21100. | 29500. | 0.0 | 0.18 | 74.25 | 29100. | 0.0 |
| 76.37 | 17900. | 29400. | 0.0 | 0.17 | 74.30 | 28900. | 0.0 |
| 76.55 | 8400. | 30000. | 0.0 | 0.04 | 74.40 | 29000. | 0.0 |
| 76.75 | 8980. | 31300. | 0.60 | 0.0 | 74.54 | 29100. | 0.75 |
| 76.62 | 11800. | 29300. | 0.0 | 0.09 | 74.63 | 29200. | 0.0 |
| 76.60 | 6610. | 28200. | 0.0 | 0.16 | 74.68 | 29100. | 0.08 |
| 76.64 | 5380. | 28500. | 0.21 | 0.13 | 74.74 | 29100. | 0.13 |
| 76.63 | 5400. | 28000. | 0.19 | 0.05 | 74.80 | 29200. | 0.36 |
| 76.66 | 8620. | 27300. | 0.63 | 0.0 | 74.84 | 29100. | 0.55 |

| Inflows to Lake Marion | | | | | | |
|---|---|---|---|---|---|---|
| Date | Wateree River (ft³/s) | Colonels Creek (ft³/s) | Congaree River (ft³/s) | Congaree Creek (ft³/s) | Santee River at Fort Motte | |
| | | | | | Observed (ft³/s) | Computed (ft³/s) |
| 4 1 73 | 20900. | 150. | 56000. | 600. | 35100. | 40600. |
| 4 2 73 | 51800. | 150. | 88400. | 550. | 39800. | 62800. |
| 4 3 73 | 43900. | 130. | 76300. | 350. | 65200. | 108000. |
| 4 4 73 | 28200. | 95. | 46400. | 250. | 112000. | 123000. |
| 4 5 73 | 21600. | 85. | 30700. | 230. | 127000. | 100000. |
| 4 6 73 | 17400. | 75. | 21200. | 210. | 103000. | 72500. |
| 4 7 73 | 17100. | 90. | 24900. | 250. | 73000. | 52700. |
| 4 8 73 | 22800. | 160. | 51300. | 560. | 56400. | 46200. |
| 4 9 73 | 29500. | 145. | 57100. | 530. | 51200. | 63100. |
| 4 10 73 | 24000. | 115. | 46800. | 450. | 64800. | 80300. |
| 4 11 73 | 19500. | 110. | 36500. | 340. | 77500. | 79500. |
| 4 12 73 | 16700. | 90. | 24600. | 280. | 76200. | 68200. |
| 4 13 73 | 16400. | 80. | 46000. | 250. | 66400. | 53900. |
| 4 14 73 | 16000. | 70. | 13000. | 245. | 53700. | 57000. |
| 4 15 73 | 10300. | 60. | 10800. | 230. | 44600. | 45600. |
| 4 16 73 | 10400. | 55. | 17200. | 230. | 35800. | 31300. |
| 4 17 73 | 14200. | 50. | 14000. | 240. | 29000. | 28500. |

for flows analyzed (continued)

| Lakes Marion-Moultrie reservoir water-balance data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Lake Marion | | | | Basin evaporation (in) | Lake Moultrie | | |
| Level (ft) | Outflow Spillway ($ft^3/s$) | Outflow Canal ($ft^3/s$) | Rain (in) | | Level (ft) | Outflow powerplant ($ft^3/s$) | Rain (in) |
| 76.64 | 16700. | 26400. | 0.86 | 0.27 | 74.91 | 29200. | 0.55 |
| 76.25 | 38100. | 21600. | 0.23 | 0.26 | 74.90 | 29200. | 0.58 |
| 75.50 | 45900. | 16200. | 0.0 | 0.25 | 74.65 | 29200. | 0.0 |
| 75.46 | 44700. | 19800. | 0.18 | 0.24 | 74.40 | 29000. | 0.41 |
| 75.90 | 48300. | 26200. | 0.01 | 0.24 | 74.26 | 29000. | 0.0 |
| 76.32 | 49600. | 29900. | 0.0 | 0.19 | 74.23 | 29000. | 0.0 |
| 76.43 | 44700. | 29800. | 0.0 | 0.15 | 74.32 | 29000. | 0.0 |
| 76.44 | 45900. | 29400. | 0.22 | 0.11 | 74.43 | 29000. | 0.45 |
| 76.12 | 37100. | 25000. | 0.0 | 0.14 | 74.43 | 29200. | 0.0 |
| 76.13 | 33300. | 27400. | 0.0 | 0.20 | 74.41 | 29100. | 0.0 |
| 76.00 | 31500. | 26000. | 0.0 | 0.29 | 74.36 | 29200. | 0.0 |
| 76.25 | 31500. | 28500. | 0.0 | 0.21 | 74.30 | 29100. | 0.0 |
| 76.43 | 29100. | 29900. | 0.0 | 0.35 | 74.33 | 29200. | 0.0 |
| 76.53 | 26900. | 30100. | 0.0 | 0.27 | 74.40 | 29100. | 0.0 |
| 76.50 | 21100. | 29300. | 0.0 | 0.16 | 74.48 | 28500. | 0.0 |
| 76.64 | 10600. | 29900. | 0.0 | 0.22 | 74.56 | 29100. | 0.0 |
| 76.71 | 6710. | 29900. | 0.0 | 0.21 | 74.64 | 29200. | 0.0 |