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DATA EVALUATION FOR

YAZOO BASIN STUDY

Prepared for

U.S. Army Corps of Engineers
Vicksburg District
Vicksburg, Mississippi

Prepared by

Water and Environment Consultants, Inc.
Fort Collins, Colorado

For

Colorado State University

Project Manager

D. B. Simons
Department of Civil Engineering
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DATA EVALUATION REPORT

and RECOMMENDATIONS

YAZOO BASIN STUDY

Prepared for

COLORADO STATE UNIVERSITY

Fort Collins, Colorado

November 1977

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1.0 INTRODUCTION

Historically, the Yazoo River system in northwest Mississippi has acted both as a tributary and distributary system. Under normal conditions the Yazoo system has provided drainage to the delta via the tributaries. Under conditions of high discharge, however, the Yazoo system has not only acted as drainage for waters arising in the Eastern hill areas, but also has provided drainage facilities for flood waters from the Mississippi River which lies to the West.

With increasing pressure to utilize the delta area for agriculture, man's tolerance for flooding of the land has reduced. Accordingly, the Yazoo River system has been altered in an attempt to increase its capacity to carry flood waters while restricting flows to established channels. Much of the alteration work on the Yazoo system was executed by local groups prior to more comprehensive flood control measures by the U.S. Army Corps of Engineers. During the earliest alterations to the river system, little was known about fluvial geomorphology and its long-term effects. Some of the long-term effects of the alterations, coupled with recent meteorological events, caused substantial instabilities in some major components of the river system. Presently, the Yazoo River system is not able to maintain a stable configuration and accommodate flood flows of the magnitudes occurring during the past five years.

Considerable economic pressures stimulate the search for stability in the river system. Agricultural concerns need

assurance of reasonable flood protection of farmland and suitable drainage to insure healthy crops. The Corps of Engineers, the agency responsible for river maintenance and navigation, is economically restricted regarding river maintenance. However, the inhabitants of the delta area need assurance of an environment relatively safe from destructive floods.

Economic and environmental conditions must be identified to achieve systematic progress in the Yazoo Delta area. Parameters affecting the river system must be identified to preserve stability of the river area. Furthermore, it is perceived that future river usage may depend upon analyzing the consequences in advance.

Colorado State University, under the sponsorship of the U.S. Army Corps of Engineers, has undertaken to describe the behavior of the river system through mathematical modeling. Modeling will include a mathematical description of the present behavior of the river and assessment of the effects of the proposed changes. As expected, an accurate description of system functioning is dependent upon availability of reliable data regarding factors that interact to define river behavior.

Previous reports included an inventory of data on the Yazoo River system. A summary of those results is included in the following section.

2.0 DATA INVENTORY RESULTS

Data was collected to describe, locate and quantify the river system from July through October 1976. Results of that inventory were published in the Completion Report, Data Inventory Phase, Yazoo Basin Study (October 1976). Available data were divided into eleven categories as listed in Table 1. Within each category, data were subdivided by location, type and time. All elements of available data were entered into a data bank by encoding on punch cards and transferring the encoded data to magnetic tape.

From the raw data bank, any element of data can be extracted and combined with other elements to generate a file of processed data for use in mathematical modeling. Where inadequate input data exists, synthesized data may be devised. The synthesized data may be keyed into any available system to provide the greatest possible accuracy. In determining need for data synthesis, the reliability and completeness of the raw data are considered. Reliability is verified by checking that necessary elements of each measurement have been included and transcribed in a manner ccnsistent with other data. Data availibility at required locations and its importance in providing a sufficient data base for modeling is listed in Table 2. Location of these stations is shown in Figure 1.

While synthesized data should give satisfactory results for an initial study of the river system, detailed analyses should be derived from collected data. Based upon the quantity of synthesized data necessary in some of the categories,

model accuracy may be improved with complete, reliable prototype data. An evaluation of the capability of available data to support various degrees of systems analyses is presented in Section 3.

TABLE 1

DATA STRUCTURE FOR THE YAZOO BASIN STUDY

Data Category	Sub-Categories	Number of Locations	Time Span of Available Data	Intermittent(I) Continuous(C)
River Sediment	Suspended Sediment	40	1937-present	I
	Bed Mat'l	45	1942-present	I
	Bank Mat'l	45	1976	I
River Hydraulics	Stage		1945-present	I
	Discharge			
River Geometry	Cross-Sections	425 (Ranges)	1941-present	
	Plan Grid Points	425	1973	I
River Structures	Bridges	42(main stem)	1975	I
	Wiers	3	1965-present	I
Reservoirs	--	4	1960-present	C
Water Quality	N.D.*	N.D.*	N.A.**	N.A.**
Watershed Sediment	Suspended Sediment	5	1954-present	I
	Bed Mat'l	5	"	I
	Bank Mat'l	5	"	I
	W.S. Soil Class.	5	"	I
	W.S. Cover Type	5	"	I
Watershed Hydraulics	Stage	5	"	C
	Discharge	5	"	C
Watershed Geometry	Cross-Sections	25	"	I
	Plan Grid Points	25	"	I

TABLE 1
(continued)

Data Category	Sub-Categories	Number of Locations	Time Span of Available Data	Intermittent(I)or Continuous(C)
	Valley Slope	5	1954-present	I
	Hill Slope	5	"	I
	Drainage Density	5	"	I
Watershed Structures	Bridges	N.A.	N.A.	N.A.
	Checks	"	"	"
	Controls	"	"	"
Climatology	Precipitation	25	1945-present	I
	Air Temperature	25	"	I
	Water Temperature	25	"	I
	Wind Velocity	N.A.	N.A.	N.A.

* N.D. = Not Determined
** N.A. = Not Available

TABLE 2

TABULATION OF DATA AVAILABILITY, NEEDS, and LOCATION

Station	#	Cross Section Available	Discharge Available	Stage Available	Bed Sample Available	Sediment Size Dist	Sediment d_{50}	Suspended Available*
Coldwater @ Arkabutla Dam	133B	Yes	Yes	Stage Discharge (SD)†	Yes	On Hand	ok	Yes
Lake Cormorant Bayou	420A	Yes	No	SD	No	Est	Est	
Coldwater River Pritchard	315	No	No	No	No			
Strayhorn Creek	---	No	No	No	No	Est	Est	
Arkabutla Canal near Arkabutla	146A	No	No	SD	No	Est	Est	
Coldwater at Sarah	136E	Yes	No	SD	No			
Coldwater at Crenshaw	327	Yes	No	Yes	Yes	On Hand	ok	Yes
Sledge	328	No	No	SD	No			
Darling	319	Yes	No	SD	No			
Burrell Bayou	479	Yes	No	No	No	Est	Est	
Coldwater at Marks	320	Yes	No	SD				Yes
Bobo Bayou	390	Yes	No	Yes	No	Est	Est	
Tallahatchie near Lambert	132B	Yes	Yes	Yes	Yes	Est	Est	Yes
Lt. Tallahatchie at Sardis Dam	132Y	Yes	Yes	Yes				Yes
McIvor Drainage	----	Yes	No	No	No	Est	Est	
Lt. Tallahatchie near Batesville	324	Yes	No	SD	No	Est	Est	
P - Q Floodway near Batesville	132J	Yes	No	SD	Yes	On Hand	ok	Yes

* No size analyses of suspended sediment available.

† Stage and rating curve available

Station	#	Cross Section Available	Discharge Available	Stage Available	Sediment			
					Bed Sample Available	Size Dist	d_{50}	Suspended Available
Yocona at Enid Dam	131	Yes	Yes	Yes				Yes
Peters Creek	---	No	No	No	No	Est	Est	
Yocona near Crowder	131B	Yes	No	No	Yes	On Hand	ok	Yes
P-Q Floodway near Paducah Wells	324B	Yes	No	No	Yes	On Hand	ok	Yes
Tillatoba Creek near Charleston	202B	Yes	No	No	No	Est	Est	
Tallahatchie near Locopolis	335	Yes	No	SD	No			
Tallahatchie at Swan Lake	132D	Yes	Yes	SD	Yes	On Hand	ok	Yes
Tallahatchie at Greenwood	339A	Yes	No	No	Yes	On Hand	ok	Yes
Yalobusha at Grenada Dam	130B	Yes	Yes	Yes				Yes
Batupan Bogue	---	Yes	No	No	No			
Cane Creek	---	No	No	No	No	Est	Est	
Ascalmore Creek at Paynes	221	Yes	Yes	SD	No	Est	Est	
Potococowa Creek	470	Yes	No	No				Yes
Yalobusha at Whaley	350	Yes	No	SD	Yes	On Hand	ok	Yes
Teoc Creek	471	Yes	No	No	No	Est	Est	
Big Sand near Valley Hill	389	Yes	Yes	Yes	Yes	On Hand	ok	Yes
Yazoo at Greenwood	129	Yes	Yes	Yes	Yes	--	ok	Yes

Station	#	Cross Section Available	Discharge Available	Stage Available	Bed Sample Available	Sediment Size Dist	Sediment d_{50}	Suspended Available
Pelucia Creek	438	Yes	No	No	Yes	---	ok	Yes
Pelucia Creek near Valley Hill	438A	Yes	No	SD	No			
Abiaca Creek near Cruger	300	Yes	No	No	No	Est	Est	
Abiaca Creek at Pine Bluff	300A	Yes	No	SD	No			
Yazoo at Belzoni	353	Yes	No	Yes	Yes	On Hand	ok	Yes
Tchula Lake near Refuge	342A	No	No	No				Yes
Tchula Lake near Mileston	342	No	No	SD	No			
Fannegusha Creek near Howard	437B	No	No	No	No	Est	Est	
Black Creek near Howard	437A	No	No	No	No	Est	Est	
Techeva Creek near Eden	432	No	No	No	No	Est	Est	
Black Creek near Bee Lake	437	No	No	No	No	Est	Est	
LAC near Louise	354A	Yes	No	No	Yes	On Hand	ok	Yes
Piney Creek near Yazoo City	469	No	No	No	No	Est	Est	
Yazoo at Yazoo City	129C	Yes	No	SD	Yes	On Hand	ok	Yes
Short Creek	---	No	No	No	No	Est	Est	
Yazoo at Satartia	355	Yes	No	Yes	Yes	On Hand	ok	Yes
Big Sunflower at Holly Bluff	307	No	No	Yes	No	Est		

Station	#	Cross Section Available	Discharge Available	Stage Available	Bed Sample Available	Sediment Size Dist	Sediment d_{50}	Suspended Available
Little Sunflower near Rolling Fork	430	No	No	No	No	Est		
Deer Creek mear Rolling Fork	333B	No	No	No	No	Est		
Steele Bayou 0.25 miles above mouth	333F	No	No	Yes	No	Est		
Yazoo Canal at Vicksburg	128	No	No	No	No			

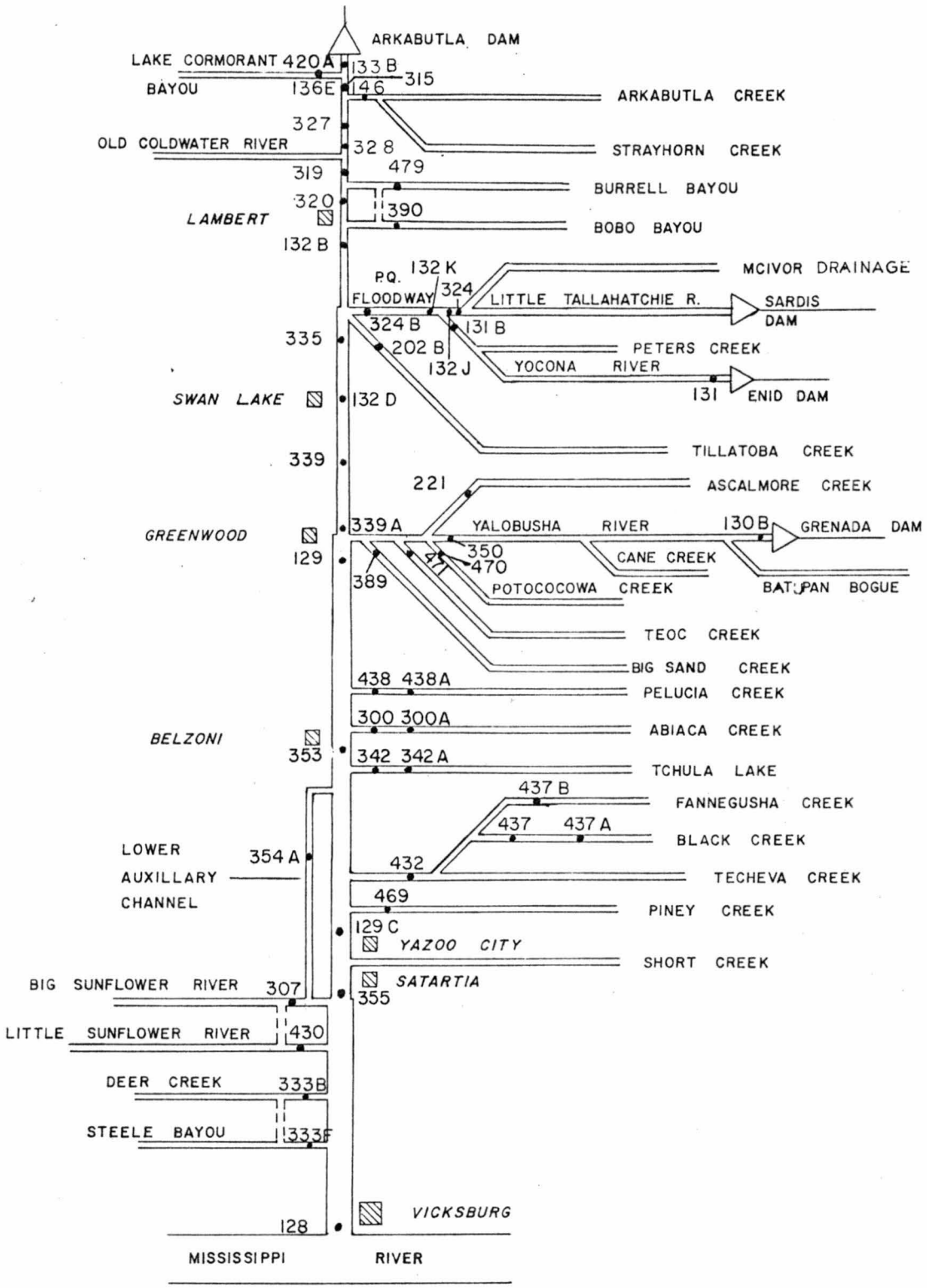

FIGURE 1

LOCATION OF EXISTING DATA COLLECTION STATIONS

3.0 EVALUATION OF DATA

3.1 Introduction

The accuracy with which any physical system can be simulated is highly dependent upon the accuracy of the input data. The purposes of this section are to assess the levels of confidence that can be placed on the modeling efforts with variable qualities of input information, and to identify the type and quality of data collection necessary for more sophisticated analyses of the river systems.

Current analysis and mathematical model development is orientated towards the main stem of the river and its major tributaries. The goal of the analysis is to simulate, in a general way, response of the river to induced changes in the river and major tributaries. Results of the analysis will provide information about bed slope changes and rates of change, cross-sectional changes and rates of change, and an order-of-magnitude estimate of sediment transport rates at selected points throughout the system. To the extent that man's induced changes can be described, and influences of non-quantified tributaries estimated, the response of the river may be predicted with a reasonable degree of accuracy.

The basic data required to support analysis of the main stem and major tributary system includes hydraulic and geometric influences outlined in Table 2. Elements of data on geometry, stages, discharges, bed material and suspended sediment should be available both upstream and downstream of all major confluences, as well as at points where history indicates a relatively high degree of channel

instability (if such points exist at locations separate from major confluence areas). An evaluation of the primary individual data types is given below.

3.2 Cross-Sectional Data

All data related to system geometry on the main stem are reasonably complete. The geometric data includes channel cross-sections, grid points, bridge sections, weir sections, and reservoirs. However, cross sections are not available or are inadequate for approximately one-half of the major tributaries. These missing cross sections will be synthesized. All of the data types mentioned have been inventoried, sorted by record period, and entered into the data bank.

3.3 Stage-Discharge Data

River stages have been measured at many Yazoo locations for a long period of time. Most of the stage data is continuous, that is, daily stages are available throughout the recorded period. Previously, much attention was given to the collection of stage data; consequently, complete continuous recordes are available for virtually any location that could be used as a modeling reference point.

While stage records are complete and continuous, this is not true for discharge records. The highly transient nature of many cross sections where stages have been measured has made stage-to-discharge conversions difficult. According to "Stages and Discharges of the Mississippi River and Tributaries in the Vicksburg District" (various years) only a few stations have continuous stage and discharge data. These include: Yazoo River at Greenwood, Tallahatchie-Yazoo at Fort Pemberton

cutoff, Tallahatchie River near Lambert and Swan Lake, and the outlets of the four major reservoirs. Daily discharge measurements at stations located throughout the basin have been augmented by data processing conducted by the U.S. Geological Survey (USGS) using U.S. Army Corps of Engineers stage data. Discharge data for 38 Yazoo system stations are available on magnetic tape from the USGS. However, these records are not always continuous or sufficient in time span to be generally and directly applied. The USGS records may be further developed by application of a stage-to-discharge conversion routine at specific stage record stations.

3.4 Suspended Sediment Data

An inspection of Table 2 indicates that most suspended sediment data required for analysis in the model must be synthesized. Available records indicate that a regular comprehensive program of sediment sampling was never implemented within the Yazoo system. Considerable sampling of suspended sediment is available for main stem stations at Belzoni, Greenwood and Swan Lake, but information regarding sampling method, water discharge and sampling instrument is not recorded. As a result of erratic intervals of data gathering and missing elements of sampling information, it appears that no reliable historic data on suspended sediment trends and their relation to system configuration is available for the Yazoo River system.

3.5 Bed and Bank Material Data

The available records on bed material sampling

appear to be similar to the suspended sediment records. However, some generalised size analyses have been conducted on bed samples. Longer periods of record, around ten years, are again indicated for Belzoni, Greenwood, and Swan Lake. However, there are no accompanying records of discharge or water surface slopes. Due to slower response characteristics of changes in bed material size, existing records are useful in estimating trends in bed material changes at the three locations mentioned. Also, results of the 1976 bed material sampling program present a comprehensive picture of the entire main stem and major tribuatry system for the Yazoo for the single time period. The 1976 information adds substantially to knowledge of system behavior for a single configuration. The 1976 bed material results, when coupled with 1976 configuration and hydraulic data, may be used as a base for synthesis of additional information required on bed material conditions throughtout the system.

Bank material was sampled for the first time during the 1976 program. Results of the bank material sampling indicate a consistency of the type of materials composing the banks of major streams in the system. All bank samples consisted primarily of clays and sandy clays. Knowledge of the bank material constituency will permit assumptions to be made about lateral stability of the streams, which will be combined with synthesized data for sediment transport routines.

3.6 Meteorological Data

Meteorological data was supplied by the National Oceanic and Atmospheric Administration Offices in Asheville,

North Carolina. The data include hourly and daily precipitation from all reporting stations in Northwest Mississippi since 1947, approximately.

4.0 FUTURE DATA REQUIERMENTS

Data requirements in support of existing operational requirements and future analysis should be sufficiently detailed to allow for an accurate estimation of the system's response. The recommended data collection for ongoing operation and anticipated modification of the Yazoo main stem and tributaries are divided into short and long-term requirements.

Short-term requirements reflect the data necessary for current operation. The data suggest continued operation of most current stations with some recommendations for modifications of frequency of data collection and/or changes in type of data collected. The basic data needs for more precise system definition and operation primarily include hydraulic and sediment data. A complete description of the data types with their recommended locations is given in Section 4.1.

Long-term requirements are aimed primarily at the development of a complete evaluation of the Yazoo Basin. A study of this nature would assess all of the environmental conditions within the Basin, and involve the development of a complete data bank storage and retrieval system for the main stem, tributaries, reservoirs, lakes, basin topography, and geography, and all biological conditions. Development of a complete data bank system of this nature would allow immediate access to data relevant to a particular area, thereby significantly reducing time requirements for retrieval, collation, and manipulation fo basic data. Data types and

their recommended locations are given in Section 4.2 following.

4.1 Short-Term Data Requirements

Further data types required to support current operation and monitoring of the system include hydraulic and sediment data. New cross sections at all current main stem locations and major tributaries will also be required.

Table 3 lists stations that are currently operational along with recommendations of types of data and the frequency of collection. Recommended frequencies are offered only as a guide and may be altered in relation to the stability or instability of the location or reach, such as following flood events or extended periods of low flow, The table also lists additional locations on tributaries where new data colleetion stations are recommended.

The initial data analysis has revealed that the following tributaries are significantly important to the overall system operation, and for further development of the Yazoo Basin model:

Yalabusha River
Panola-Quitman Floodway
Little Tallahachie River
Yocona River
Abiaca Creek
Pelucia Creek
Tillatoba Creek
Techeva Creek
Teoc Creek
Strayhorn Creek
Tehula Lake
McIvor Drainage
Peters Creek
Cane Creek

EXISTING STATIONS

Stream	Location	Station #	Cross Section & General Geometric Data	Stage Data	Discharge Measm'ts	Suspended Sediment Data	Bed Material Data
Coldwater	Arkabutla Dam	133B	A	C	M	BM	A
Coldwater	Pritchard	315	A	C	M	BM	A
Arkabutla Ck.	Near Sarah	146	A	C	BW	M	A
Coldwater	Sarah	136E	A	C	M	BM	A
Coldwater	Crenshaw	327	A	C	M	BM	A
Coldwater	Sledge	328	A	C	M	BM	A
Coldwater	Darling	319	A	C	M	BM	A
Coldwater	Marks	320	A	C	M	BM	A
Tallahatchie	Near Lambert	132B	A	C	M	BM	A
Little Tallahatchie	Near Batesville	324	A	C	BM	BM	A
P-Q Floodway	Near Peducah Wells	324B	A	C	M	BM	A
Yocona River	Near Crowder	131B	TA	C	BW	M	TA
Little Tallahatchie	Sardis Dam	132Y	A	C	BW	M	TA
Tillatoba	Near Charleston	202B	TA	C	BW	M	TA
Tallahatchie	Locopolis	335	A	C	M	BM	A
Tallahatchie	Swan Lake	132D	A	C	M	BM	A

TABLE 3

RECOMMENDED SHORT TERM DATA COLLECTION STATIONS and DATA TYPES

Stream	Location	Station #	Cross Section & General Geometric Data	Stage Data	Discharge Measm'ts	Suspended Sediment Data	Bed Material Data
Yocona R.	Enid Dam	131	A	C	M	BM	A
Tallahatchie	Money	339	A	C	M	BM	A
Ascalmore Ck.	Paynes	221	A	C	BM	BM	A
Tallahatchie	Greenwood	339A	TA	C	BW	M	TA
Yalobusha	Grenada Dam	130B	A	C	BW	M	TA
Yazoo	Greenwood	129	TA	C	BW	M	TA
Potococowa Ck.		470	TA	C	BW	M	TA
Teoc Ck.		471	TA	C	BW	M	TA
Big Sand Ck.	Near Valley Hill	389	TA	C	BW	M	TA
Pelucia Ck.	Near Rising Sun	438	TA	C	BW	M	TA
Abiaca Ck.	Near Cruger	300	A	C	BW	BM	A
Yazoo	Belzoni	353	A	C	M	BM	A
Black Ck.	Near Bee Lake	437	A	C	BM	BM	A
Tescheva Ck.	Near Eden	432	TA	C	M	M	TA
LAC	Near Louise	354A	A	C	BM	BM	A
Yazoo	Yazoo City	129C	A	C	BM	BM	A
Yazoo	Satartia	355	TA	C	M	M	TA
Steele Bayou	Above Mouth	333F	A	C	BM	BM	A
Yazoo Ck.	Vicksburg	128	TA	C	M	M	TA

Stream	Location	Station #	Cross Section & General Geometric Data	Stage Data	Discharge Measm'ts	Suspended Sediment Data	Bed Material Data
Peters Creek	above confluence		A	C	BM	BM	A
McIvor Drainage	above confluence		A	C	BM	BM	A
Cane Creek	above confluence						

A.....Annually

TA....Twice Annually

M.....Monthly

BM....Bi-Monthly

BW....Bi-Weekly

C.....Continuous

It is recommended that additional cross sectional surveys, suspended sediment samples, bed and bank material samples, and velocity measurements be collected on these tributaries. The number of cross sections, sediment samples and velocity measurements on each of the above tributaries will be dependent upon their effect on the main stem, and any proposed construction activity within the tributary itself. At the junction of these tributaries with the main stem, it is also recommended that potential aggradation or degradation be monitored. Plan sheets for the main stem and major tributaries should be updated for the short-term data requirements and whenever river alignment changes occur. Updatings should show present alignment, permanent range locations, new structures such as bridges, and new river mileage if the mile base was changed. Figure 2 illustrates existing stations and recommendations of new locations.

4.2 Long-Term Requirements

As previously mentioned, long-term data requirements are primarily aimed at development of an entire Basin Data Bank for complete inventory of the main stem, tributaries and reservoirs. Data required for a complete data bank may be categorized into the following main sections:

1) Topographic and Hydrographic Data
2) Geologic Data
3) Hydrologic Data
4) Hydraulic and Sediment Data
5) Environmental Data
6) Climatological Data

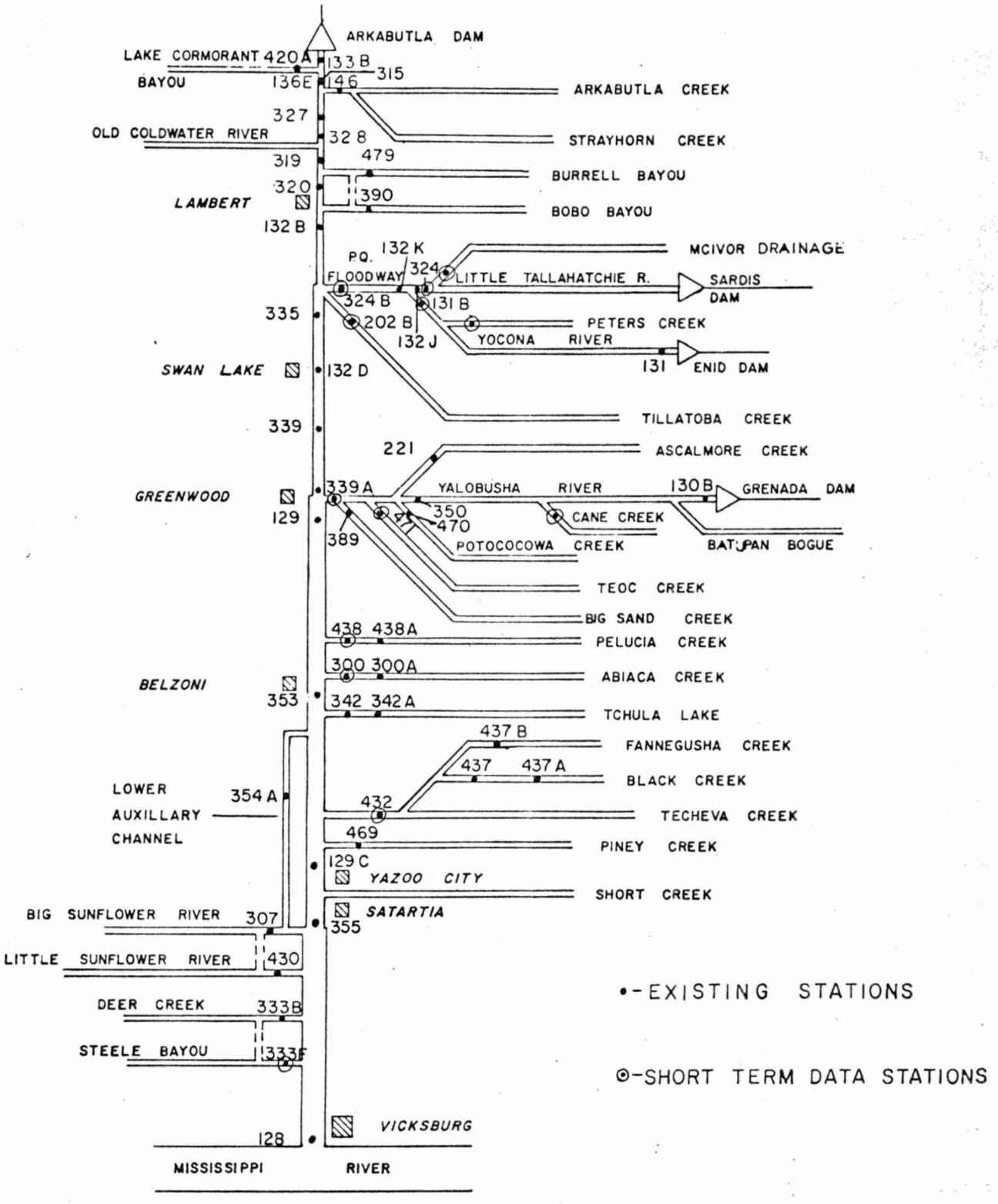

FIGURE 2

LOCATION OF RECOMMENDED SHORT TERM DATA COLLECTION STATIONS

These data may be further divided into specific data descriptions as listed in the following subsections.

4.2.1 Topographic and Hydrographic Data

1) Maps and charts
2) Dredging surveys
3) Potamology surveys
4) Color aerial photos
5) Color infrared photos
6) Ground photos
7) Information on existing structures; dams, locks, dikes, diversions or outfalls.

4.2.2 Geologic and Geomorphic Data

1) Maps and charts
2) Basic rock types and locations of outcrops
3) Glacial and river deposits
4) Soil types

4.2.3 Hydrologic Data

1) Discharge records
2) Stage records
3) Stage-discharge relationship
4) Flood frequency curves
5) Flow duration curves

4.2.4 Hydraulic and Sediment Data

1) Channel geometry
   a) Main channel cross sections
   b) Side channels cross sections
   c) Island size and locations
   d) Floodplains
   e) Water surface and bed slopes
   f) Bars
   g) Sinuosity
   h) Type (straight, meandering, braided)

i) Controls (falls, rapids, restricitons, rock outcroppings, dams, diversions)

2) Sediment discharge
   a) Size distribution
   b) Bed and bank material sizes
   c) Bed load
   d) Suspended load
   e) Wash load

3) Ice occurrence and relevant data

4) Regulating structures

5) Scour and deposition areas

4.2.5 Environmental Data

1) Forest Types
2) Other vegetation types
3) Wildlife
4) Fish habitat
5) Turbidity
6) Water quality
7) Water temperature

4.2.6 Climatological Data

1) Precipitation
2) Wind
3) Temperature

Data outlined would be collected at all locations within the Yazoo system where significant geomorphological activity occur. In addition to recommendations for the continuance of data stations for short-term data requirements, Table 4 shows proposed stations if development of a data bank is anticipated. Figure 3 give the location of these additional stations.

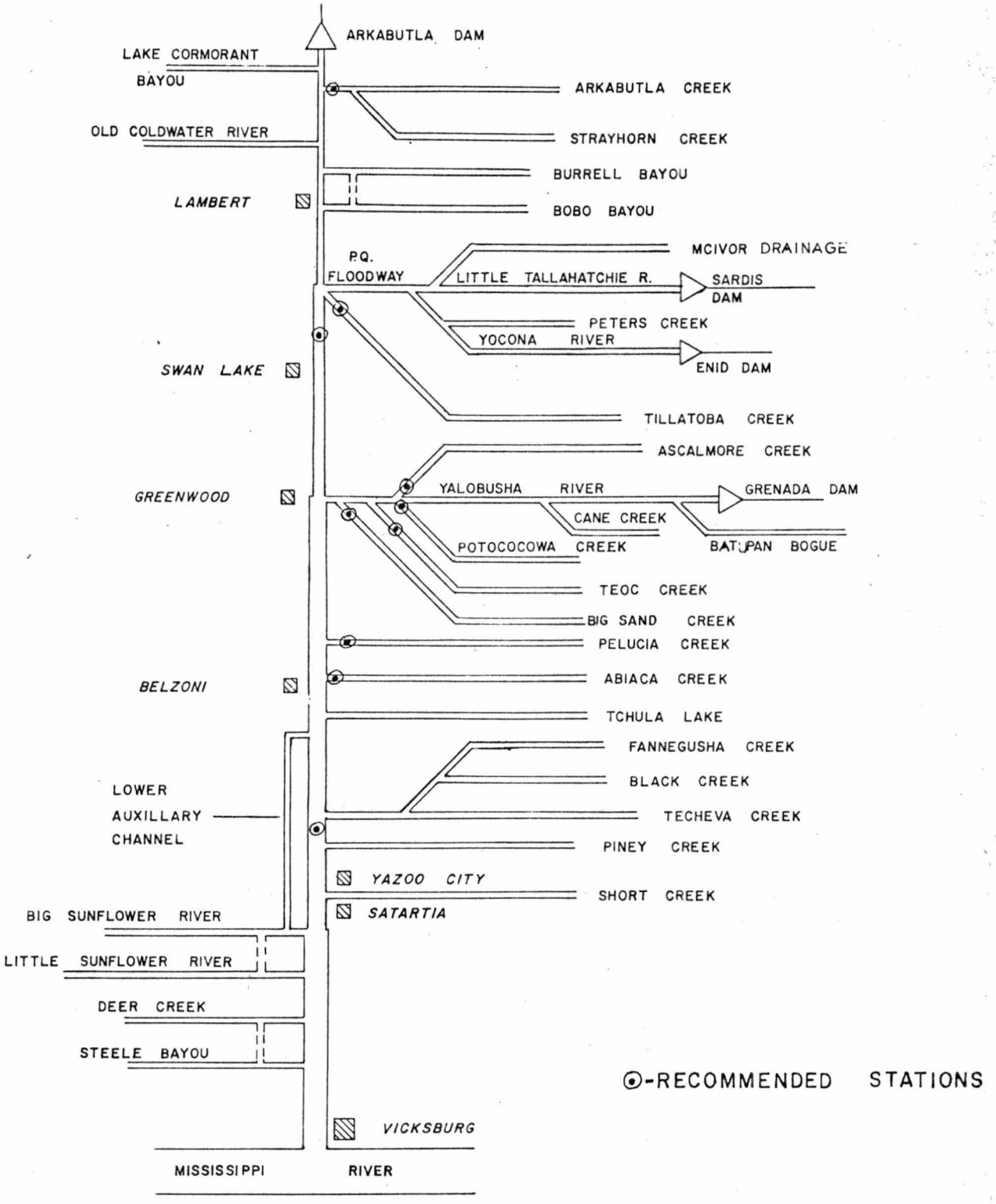

FIGURE 3

LOCATION OF RECOMMENDED ADDITIONAL LONG TERM DATA COLLECTION STATIONS

Stream	Location	Cross Section & General Geometric Data	Stage Data	Discharge Measm'ts	Suspended Sediment Data	Bed Material Data
Arkabutla Ck.	Above Coldwater R. Confluence	A	C	BM	BM	A
Tillatoba Ck.	Above Tallahatchie R. Confluence	A	C	BM	BM	A
Tallahatchie R.	Below P-Q Floodway Confluence	TA	C	BW	M	TA
Potococowa Ck.	Above Yalobusha R. Confluence	A	C	BM	BM	A
Ascalmore Ck.	Above Yalobusha R. Confluence	A	C	BM	BM	A
Teoc Ck.	Above Yalobusha R. Confluence	A	C	BM	BM	A
Big Sand Ck.	Above Yalobusha R. Confluence	A	C	BM	BM	A
Pelucia Ck.	Above Yazoo R. Confluence	A	C	M	M	A
Abiaca Ck.	Above Yazoo R. Confluence	A	C	BM	BM	A
Yazoo R.	Below Techeva Ck. Confluence	TA	C	BW	M	TA

TABLE 4
RECOMMENDED ADDITIONAL LONG TERM DATA COLLECTION STATIONS and DATA TYPES

A...Annually
TA..Twice Annually
M...Monthly
BM...Bi-Monthly
BW...Bi-Weekly
C....Continuous

5.0 RECOMMENDATIONS

Numerous stage and discharge data are available from currently operating hydrologic stations and numerous discontinued stations within the Yazoo River Basin. Much of these data are applicable directly to development of a mathematical model of the main stem. It is recommended, however, these data be collated into the specific program and that numerical evaluation of these data should be completed, especially for stations within the sediment sampling program.

Stations listed have been located specifically for water and sediment data collection to assist towards alleviation of sediment problems within the area. It is recognized that many of the existing data collection stations may be operated for purposes not directly related to the analysis of the river system or to sediment oriented studies within the Yazoo River system. Stations currently operating on the Yazoo River tributaries that are not referred to in the sediment sampling program still should be retained for other data collection purposes.

It is recommended that the proposed program be implemented to help develop a river operation that will reduce current dredging requirements, determine short and long-term response of the system caused by reservoir operation and hydraulic structures and to facilitate design changes in the navigation channel to improve its water, sediment and barge handling capabilities.

Data collected would be used for studies of locations or river reaches that have specific problems. Data would also be

used to devise a mathematical model for the entire system, or for short reaches of the river. With an adequate water and sediment sampling network, the future program may be extended to include environmental considerations, such as pesticide routing, dissolved and undissolved chemical transport and the development of a complete data bank.

The number of sediment sampling verticals considered at each data collection site should be determined in relation to stream width, depth, discharge and horizontal velocity distribution. In general terms, it can be considered that approximately five vertical sections would be required for navigation channel stations, three for tributary inflow stations, and three for reservoir stations, at upstream and downstream sites. Depending upon the vertical section width at least three suspended sediment samples and two bed material samples should be collected from each vertical. Also, at least one bank material sample should be collected from each side of the river.

Due to field decisions regarding the number of sampling verticals, these tabulations are not intended to be explicit for the entire study area, but are included to give a general approximation of the number of suspended sediment, and bed and bank material sample analysis numbers.

In addition to the preceding recommendations regarding sediment and discharge data collection and analysis, the following general recommendations are made.

1) Recognizing that implementation of the program may induce access, legal or economic constraint problems

regarding the shifting of current data collection sites and the installation of new stations, this program is necessary to solve current sediment problems and reduce the operation cost of the current river system.

The size of the program is the minimum recommended network required to assess the problems listed in Section 1. A reduction in the program size would reduce the overall accuracy of future data use and may necessitate synthetic data generation for the river system and reservoir operation.

2) Also, cross-sectional surveys of lakes and reservoirs that have comparatively large sediment inflows should be conducted. These surveys are particularly important at the river inlets.
3) A longitudinal bed profile of current problem reaches should be compiled regularly to ascertain any marked changes in bed and water surface profiles.
4) A longitudinal profile of the main stem system should also be compiled annually. Electronic depth sounding equipment would prove satisfactory for this purpose.
5) Data regarding quantities of dredged material and spoil locations should be retained and tabulated to assist in total sediment routing through the system.
6) Continuous monitoring of the navigation system should be maintained to determine noticeable areas of sediment degradation and aggradation.
7) Data reduction, collation and evaluation should be conducted on a quarterly basis if a total data bank is

implemented.

8) Because of the large volume of data that is anticipated from the recommended collection scheme, an efficient method for storage and retrieval of data is necessary. It is suggested that the computerized data bank storage and retrieval system utilizing current concepts in interactive computer applications continue to be implemented to manage the anticipated volume of data.