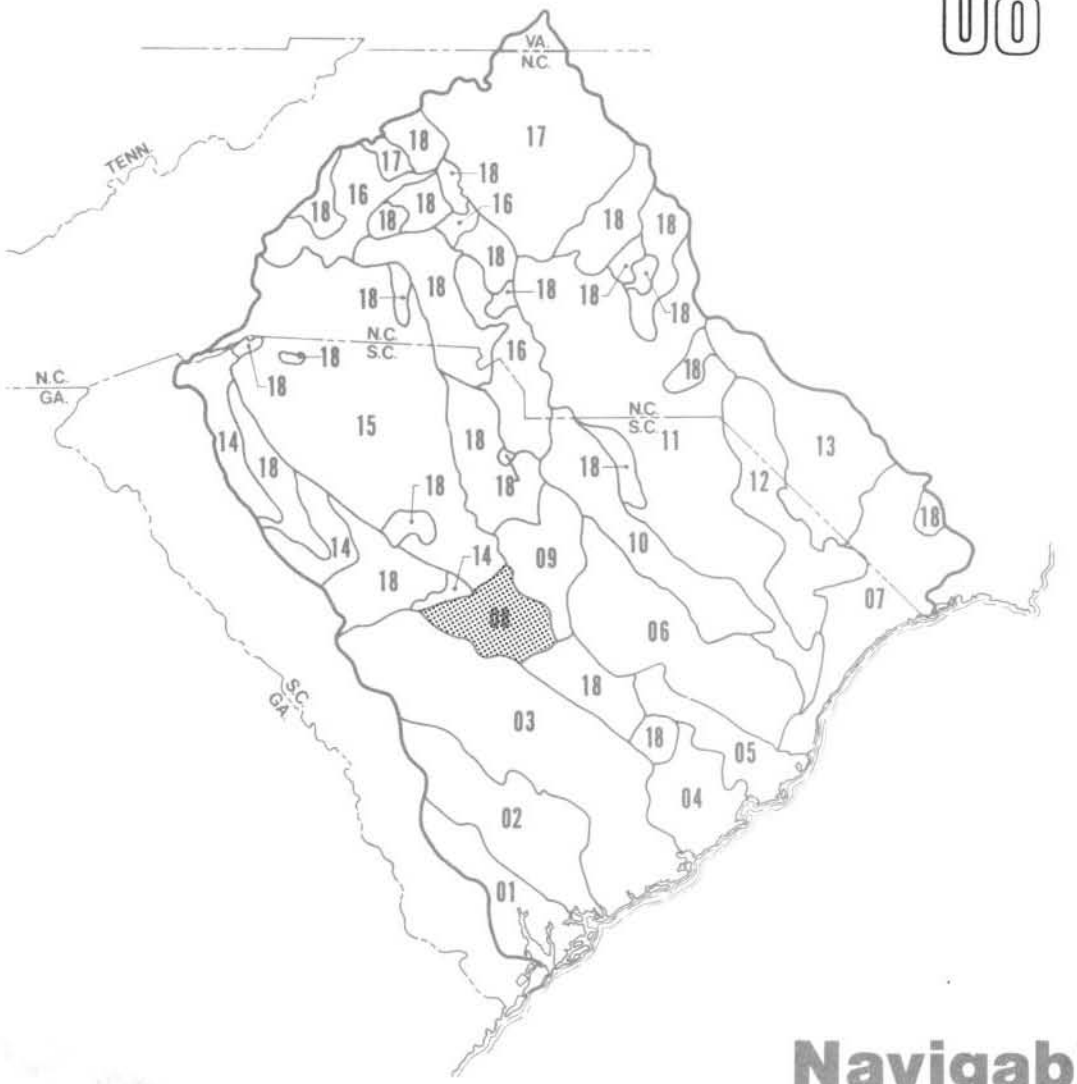
U.S. ARMY CORPS OF ENGINEERS
CHARLESTON DISTRICT
Charleston, South Carolina

CONGAREE RIVER BASIN

Report No. 08



Navigability Study
1977

STANLEY CONSULTANTS

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SECTION 1 - INTRODUCTION

Purpose

The purpose of this study is to collect, develop, and evaluate information on waterbodies within the boundaries of the Charleston District, Corps of Engineers, for establishing the classification of "navigable waters of the U. S." and "waters of the U. S." (During the course of this study the term "navigable waters" was changed to "waters of the U. S." Herein references to "navigable waters" are synonymous with "waters of the U. S.") Study objectives include definition of the present head of navigation, the historic head of navigation, the potential head of navigation, and the headwaters of all waterbodies within the district.

The information generated as a part of the study will be utilized by the Charleston District in administration of its programs dealing with water resource project construction permits in "navigable waters of the U. S." (River and Harbor Act of 1899), and the deposition of dredge or fill material in "navigable waters" or their contiguous wetlands (Section 404 of PL 92-500).

Scope

The scope of this project is generally summarized by the following:

1. Outline drainage areas, locate headwater points where mean flow is five cubic feet per second (cfs), summarize lake data (10 to 1,000 acres), establish stream mileage for "navigable waters of the U. S.", and prepare a stream catalog summary for the district.
2. Conduct field surveys of waterbodies to establish mean water levels and obstruction clearances for evaluating the potential head of navigation.
3. Analyze available hydrological data to estimate mean, maximum, and minimum discharge rates at obstructions and other selected locations.
4. Conduct a literature review to identify past, present, and future uses of waterbodies for interstate commerce.

5. Conduct a legal search to identify Federal and state court cases which impact on navigation classifications.
6. Prepare plan and profile drawings, maps of the district showing significant physical features, and a map delineating the recommended navigation classifications.
7. Prepare reports on all major river basins and large lakes (greater than 1,000 acres) including information on physical characteristics, navigation projects, interstate commerce, court decisions, navigation obstructions, and recommended classification of waterbodies for navigation.
8. Prepare a summary report outlining navigation-related information for the entire district as well as the methodology, procedures, and other factors pertinent to the development of each of the river basin reports.

Conduct of this study relies heavily upon available information. Compilation and evaluation of existing data from many sources and development of field survey information are the main contributions to the new water resource data base represented by this study.

Related Reports

Information pertaining to this navigability study for the Charleston District has been compiled into a series of reports, one of which is represented by this document. A complete listing of the reports is presented below to facilitate cross referencing.

Number	Title
--	Summary Report
01	Coosawhatchie River Area
02	Combahee River Area
03	Edisto River Area
04	Cooper River Area
05	Santee River Basin
06	Black River Area
07	Waccamaw River Basin
08	Congaree River Basin
09	Wateree River Basin
10	Lynches River Basin

Number	Title
11	Great Pee Dee River Basin
12	Little Pee Dee River Basin
13	Lumber River Basin
14	Saluda River Basin
15	Broad River Basin
16	Catawba River Basin
17	Yadkin River Basin
18	Lakes - Greater Than 1,000 Acres
--	Coastal Supplement

The eighteen reports covering various drainage areas in the district present information for the specific basins. The Summary Report provides an overview of the entire study of district waterbodies and presents information applicable to all waters in the district. Reference should be made to both the individual drainage area reports as well as the Summary Report to obtain a thorough understanding of the study approach and results.

Acknowledgements and Data Sources

The contribution of many project team members within the Corps of Engineers, Charleston District, and Stanley Consultants is gratefully acknowledged by Stanley Consultants. In addition to the legal search and other evaluations and input from Charleston District staff, several others made significant contributions to this study effort. Dr. John W. Gordon, Assistant Professor in the Department of History, The Citadel, prepared the narrative and literature review information for past and present interstate commerce.

Several state water resource, transportation, utility, and planning agencies also cooperated and provided useful data for compiling these reports. Federal water resource and regulatory agencies and private utilities provided information along with public and private operators of large reservoirs.

Specific numbered data sources are referenced in the reports in parentheses. These data sources are listed in the Bibliography of each report of the navigation study.

SECTION 2 - PHYSICAL CHARACTERISTICS

As shown on Plate 08-1, the Congaree River basin is located in the central portion of the state of South Carolina and is tributary to the Santee-Cooper River system. The Congaree River is the major river in the basin; there are no significant tributary streams. The Congaree River is formed by the confluence of the Saluda and Broad Rivers on the west side of Columbia, South Carolina, and flows approximately 50 miles to the Wateree River. The confluence of the Congaree and Wateree Rivers form the Santee River about two miles above Lake Marion. Plates 08-2 and 08-3 indicate these and other significant features in the basin. Physical characteristics of the Santee, Cooper, Broad, and Saluda Rivers are discussed in Reports 05, 04, 15 and 14, respectively.

The relatively short Congaree River maintains a fairly uniform stream bed consisting of a wide, approximately rectangular channel section. The lower reaches of the river are characterized by low, wide flood plains and a meandering channel. Considerable vegetation overhangs the banks and numerous branches and logs are carried by the river. Table 1 presents selected key physical characteristics, such as approximate drainage area, mean discharge, and elevation change. The methodology used in developing these characteristics is defined in the Summary Report. Table 2 presents information on the USGS gaging station located on the Congaree River. Additional flows, river miles, and slopes are presented in Section 6.

TABLE 1

PHYSICAL CHARACTERISTICS (1)(2)(3)(4)*

Length to Headwaters[1)]	52 miles
Elevation Change to Headwaters	55 feet
Drainage Area	730 square miles
Upstream Contributing Drainage Areas[2)]	7,850 square miles
Mean Discharge at Mouth	10,140 cfs
Limit of Tidal Influence	None
Length of Present Navigable Waters of the U. S.[3)]	50.6 miles (river mile [R.M.] 125.3 to R.M. 175.9)

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1) From confluence with Wateree River to confluence of Broad and Saluda Rivers.

2) See Reports 14, 15, and 18.

3) River mileage on the Congaree has been continued from the Santee River (river miles presented in this report - 125.3 = mileage from the mouth of Congaree).

* See Bibliography for these references.

TABLE 2

KEY STREAM GAGING STATION (1)(5)

USGS Gaging Station Number	02169500
Location Description	Columbia, S. C., Lexington County, downstream from Gervais Street Bridge and downstream from the confluence of Broad and Saluda Rivers (R.M. 174.8)
Drainage Area	7,850 square miles
Mean Flow	9,294 cfs
Minimum Flow[1)]	3,220 cfs
Maximum Flow[2)]	15,700 cfs

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1) Exceeded or equaled 90 percent of the time.

2) Exceeded or equaled 10 percent of the time.

SECTION 3 - NAVIGATION IMPROVEMENT PROJECTS

Federal Navigation Projects

The only authorized Federal navigation improvement project in the basin provides for a 4 feet deep navigable channel over the lower 49 miles of the Congaree River, to be secured by dredging and bank protection, and for the construction of a lock and dam at R.M. 173.4 to extend deep water to Gervais Street bridge, Columbia, South Carolina (R.M. 175.9). (6)

The last report on the project (issued in 1946) stated that 71 percent of the channel work and all of the lock and dam work had been completed for several years. The remaining work consists of revetting about 20,000 feet of bank in the vicinity of the Congaree River and Gills Creek (about 5 miles below Columbia). The responsibility for operation and care of the lock and dam site was conveyed to the state of South Carolina as represented by the South Carolina Public Service Authority on 17 December 1957. Recent field observation indicated that some rework of completed channelized areas, as well as reconstruction and renovation of the lock and dam, would be required to meet past construction conditions. Table 3 summarizes this project.

TABLE 3

AUTHORIZED FEDERAL NAVIGATION PROJECT (6)

Waterbody	Congaree River
Work Authorized	A 4 feet deep navigable channel and construction of a lock and dam.
Date Complete	Channelization 71 percent complete and lock and dam fully completed as of 1946. no indication of any work since.
Project Location	Lower 49 miles of river (R.M. 125 to 174). Lock and dam at R.M. 173.4, pool extended to R.M. 175.9.
Authorization	River and Harbor Acts: 8 August 1886, H. Ex. Doc. 254, 48th Cong., 2nd Sess. 3 March 1899, H. Ex. Doc. 66, 53rd Cong., 2nd Sess.

Other Navigation Projects

The only other navigation project identified on the Congaree River is the Columbia Canal. This project was constructed in 1820-23 and provided for a 3 mile long navigable canal with four lifting locks. The project was part of an act passed by the state of South Carolina. The canal is still in existence, although it has been modified and is now primarily used for power generation. Field observation of the canal revealed a uniform cross section with an apparent navigable width and depth. Additional historic description of the canal is found in Section 4.

In addition, the state of South Carolina has responsibility for the lock and dam site below the Gervais Street bridge; however, no information on the operational status of the facility has been identified.

Inquiries made at various state and Federal agencies have indicated no additional projects are now planned or under construction which would improve or substantially benefit navigation on the Congaree River.

SECTION 4 - INTERSTATE COMMERCE

Past

Indian trade appears to have been the earliest commercial use of the Congaree River. In return for deerskins, "Muskets, powder, lead, woolen cloth, tools, and ironware were supplied to the Indians." (7) These goods were apparently sent up the west bank of the Congaree, along a route then known as the "Cherokee Path". (8) The deerskins were sent by boat down the river, eventually arriving at Charleston. The first settlement, up to 1750, was described as being located at "the 'Congarees' ..., at the head of the schooner navigation." (9)

In 1791, South Carolina passed an act for opening and improving the navigation of the Congaree and other principal rivers. Further investigative efforts to 1820 were aimed at removing the sandbars and logs which had accumulated in the river. The construction of the Columbia Canal, an ambitious project in 1820, was brought about by the short staple cotton agriculture. This project, which took three years to complete, seems to have been one of the more successful inland improvement schemes. The Canal was three miles long and consisted of four lifting locks which enabled traffic to avoid the falls by travelling on the Columbia side of the mouth of the Broad and the head of the Congaree. By 1827, nearly 60,000 bales of cotton were being sent down the Congaree, much of it via the Canal. In these years, two and sometimes three, steamboats operated on the river. (10 through 14)

This traffic continued until it reached its height in 1883, when 66,597 bales of cotton and 1,027 boats went through the Columbia Canal. In addition, "Steamboats carrying 800 to 1,000 bales of cotton" went up the river "as far as Granby (two miles below Columbia) and to Camden (up the Wateree)." (15) These developments helped to make Columbia the largest cotton shipping port in the interior. Within a few years, however, the Congaree trade had declined. When the U. S. Army Corps of Engineers examined the river in 1885, it was noted that "the channel has become so much obstructed by overhanging trees

and fallen timber that no boats have been able to run. At present, there is no commerce ..." (15)(16)(17)

Thereafter, a series of River and Harbor Acts brought Federal funds to change that situation. The Act of 5 August 1886, provided for "a 4 feet deep navigation channel over the lower 49 miles of the river to be secured by dredging and bank protection, and for a lock and dam to extend deep water to Gervais Street bridge, Columbia, South Carolina." (18) Additional acts helped to produce the desired effect, and commercial traffic on the Congaree increased considerably, peaking about 1911. Two years before, commerce on the river comprised 26,354 short tons, valued at about $331,000. Material shipped was over fifty percent logs and the rest general merchandise. "A steamboat line," reported the Corps, "operating two steamers between Columbia and Georgetown has been established. Connection is made at Georgetown with steamers for New York, Baltimore, and Charleston." (18) This trade network "enables merchants in Columbia to import stock via the Clyde Line to Georgetown and river steamers to Columbia at rates less than railroad rates." (17)(18)(19)(20)

After that time, however, the river traffic fell off. In August, 1920, the lock and dam was placed out of commission and the buildings were being rented. Snagging operations conducted in 1936-37 reopened the river to navigation. By 1939, however, there were "no public terminals on the river," and "the movement of petroleum products to the [Gulf Oil Corporation's] terminus has been temporarily discontinued." (19) Waterborne Commerce of the United States, 1953 reflected a status of "No commerce reported" for the Congaree, as did the volumes up through 1975. In 1973, the Corps of Engineers summarized the Congaree project as having been "inactive for many years due to lack of commerce and the entire lock and dam site was conveyed to the state of South Carolina in 1957." (4)(19)(20)(21)

Present

The Congaree River, between its mouth at the Wateree River and the head of navigation at the Gervais Street bridge in Columbia,

South Carolina, has been a significant and extensively used artery of interstate commerce. Records indicate, however, that it is not being used at the present for such commerce and has not been used since the 1950's.

Future Potential

Comprehensive analysis of the regional economics (income, education, employment, community facilities, transportation systems, and similar factors), which would indicate growth patterns and the services needed to sustain various types of industrial and commercial activities, is beyond the scope of this study. Thus, the potential use of the Congaree River and its tributaries for interstate commerce in future years is difficult to predict. It is anticipated, however, that the river has the potential to be utilized for shipment of goods into other states since it is an important element of the Santee-Cooper River system, Charleston Harbor, and the Atlantic Ocean. Although, the upstream reaches of the basin are not currently used for interstate commerce, future potential commerce could be significant on the river due to the more commercial-industrial developed urban area of Columbia, South Carolina. Industrial and commercial activity is presently dependent on other forms of transportation, including the interstate highway system, railroads, and air transport.

SECTION 5 - LEGAL AUTHORITY

General

This section presents information pertaining to the legal aspects of the navigability investigation. Such Federal and state court decisions as apply to the specific basin reported on herein are outlined. The Summary Report presents more complete documentation and references to the court cases dealing with navigation classifications and legal jurisdiction.

Navigability Interpretations

The term "navigable waters of the U. S." is used to define the scope and extent of the regulatory powers of the Federal government. Precise definitions of "navigable waters" or "navigability" are ultimately dependent on judicial interpretation, and are not made conclusively by administrative agencies.

Definitions of "navigability" are used for a wide variety of purposes and vary substantially between Federal and state courts. Primary emphasis must therefore be given to the tests of navigability which are used by the Federal courts to delineate Federal powers. Statements made by state courts, if in reference to state tests of navigability, are not authoritative for Federal purposes.

Federal courts may recognize variations in definition of navigability or its application where different Federal powers are under consideration. For instance, some tests of navigability may include:

1. Questions of title to beds underlying navigable waters.
2. Admiralty jurisdiction.
3. Federal regulatory powers.

This study is concerned with Federal regulatory powers. Unfortunately, courts often fail to distinguish between the tests, and instead rely on precedents which may be inapplicable. Thus, a finding that waters are "navigable" in a question dealing with land title may have a somewhat different meaning than "navigable waters of the U. S." which pertains to Federal regulatory functions.

In this study, the term "navigable waters of the U. S." is used to define the extent and scope of certain regulatory powers of the Federal government (River and Harbor Act); this is distinguished from the term "navigable waters" which refers to other Federal regulatory powers (Section 404 of PL 92-500).

Administratively, "navigable waters of the U. S." are determined by the Chief of Engineers and they may include waters that have been used in the past, are now used, or are susceptible to use as a means to transport interstate commerce landward to their ordinary high water mark and up to the head of navigation. "Navigable waters of the U. S." are also waters subject to the ebb and flow of the tide shoreward to their mean high water mark. These waters are deemed subject to a Federal "navigation servitude". The term "navigable waters of the U. S." defines the more restricted jurisdiction which pertains to the River and Harbor Acts -- particularly the one of 1899 which specifically defined certain regulatory functions for the Corps of Engineers.

In contrast, the term "navigable waters" defines the new broader jurisdiction with respect to Section 404 of the Federal Water Pollution Control Act Amendments of 1972. Accordingly, "navigable waters" not only include those waters subject to the navigation servitude, but adjacent or contiguous wetlands, tributaries, and other waters, as more fully defined in revised Corps of Engineers Regulations.

Although this navigability study covers both "navigable waters of the U. S." and "navigable waters", the analysis of judicial interpretation has only focused upon determining "navigable waters of the U. S." to the head of navigation. Due to common usages in court cases, the terms "navigability" and "navigable waters" may herein appear interchangeably with the term "navigable waters of the U. S." However, the summary of court cases is directed at the Federal regulatory jurisdiction of the River and Harbor Acts, and not necessarily regulatory jurisdiction under the Federal Water Pollution Control Act.

General Federal Court Cases

Powers of the Federal government over navigable waters stem from the Commerce Clause of the U. S. Constitution (Art. I,§8). Pursuant

to its powers under the Commerce Clause, Congress enacted the River and Harbor Act of 1899 which particularly specifies regulatory powers of the Federal government in "navigable waters of the U. S."

The well-established Federal test of navigability is whether a body of water is used or is capable of being used in conjunction with other bodies of water to form a continuous highway upon which commerce with other states or countries might be conducted.

Several Federal court decisions make it clear that a waterway which was navigable in its natural or improved state retains its character as "navigable in law" even though it is not presently used for commerce. The test of navigability is not whether the particular body of water is in fact being used for any form of commerce but whether it has the capacity for being used for some type of commerce. Several cases substantiate this (see the Summary Report for details on the court decisions).

The ebb and flow of the tide is another test which remains a constant rule of navigability in tidal areas, even though it has sometimes been disfavored as a test of Federal jurisdiction. Several cases note that ebb and flow should not be the sole criterion of navigability, but that extension of Federal jurisdiction into the major non-tidal inland waters is possible by an examination of the waters "navigable character". The ebb and flow test, however, remains valid as a rule of navigability in tidal areas; it is merely no longer a restriction for non-tidal areas. For bays and estuaries, this extends to the entire surface and bed of all waterbodies subject to tidal action, even though portions of the waterbody may be extremely shallow or obstructed by shoals, vegetation, or other barriers as long as such obstructions are seaward of the mean high tidal water line. Marshlands and similar areas are thus considered "navigable in law" insofar as they are subject to inundation by the mean high waters. The relevant test is therefore the presence of the mean high tidal waters. Navigable waters are considered navigable laterally over the entire surface regardless of depth.

Another factor relevant to navigability determinations is land title. Whatever title a party may claim under state law, the private ownership of the underlying lands has no bearing on the existence or

extent of the dominant Federal jurisdiction over "navigable waters of the U. S." Ownership of a river or lake bed will vary according to state law; however, the Supreme Court has consistently held that title to the bottomlands is subordinate to the public right of navigation.

Specific Federal Court Cases

Navigability, in the sense of actual usability for navigation or as a legal concept embracing both public and private interests, is not defined or determined by a precise formula which fits every type of stream or body of water under all circumstances and at all times. A general definition or test which has been formulated for Federal purposes is that rivers or other bodies of water are navigable when they are used, or are susceptible of being used, in their ordinary condition as highways for commerce over which trade and travel are or may be conducted in the customary modes of trade and travel on water.

The question of navigability of water when asserted under the Constitution of the U. S., as is the case with "navigable waters of the U. S.", is necessarily a question of Federal law to be determined according to the general rule recognized and applied in the Federal courts.

Review of Federal case history reveals one court decision which applies to navigation in the Congaree River basin. This case is briefly summarized below. (3)

State of South Carolina ex rel. Maybank v. South Carolina Electric and Gas Co.* - In this case, the court held that the question of navigability was not germane and that the action, seeking specific performance of a contract and to recover damages for breach thereof, did not really and substantially involve a controversy within the jurisdiction of the Federal Court. The court did state, however, that the Federal statutes provide that it "shall be" the duty of the Secretary of War to prescribe regulations for the use, administration, and navigation of navigable waters; and it "shall be" the duty of district attorneys of the U. S. to prosecute offenders against the

* 41 F. Supp. 111 (1941).

provision of the chapter relating to protection of navigable waters and of harbor and river improvements, and to impose mandatory requirements. No discretion may be exercised in these respects.

South Carolina State Court Cases

The South Carolina legislative enactment defining navigability and requiring freedom from obstruction may be found in Section 70-1 of the South Carolina Code of Laws. This Section essentially provides that all streams which can float rafts of lumber or timber are considered navigable by state law.

Many of the South Carolina state cases reported are primarily concerned with state ownership questions. While the majority of states actually own streams and exercise control over their navigable waters, the ultimate authority has been granted to the Federal government by the Commerce Clause of the Constitution. The general rule, then, is that the states both own and control the navigable streams within their borders, subject to exercise of the superior right of control by the U. S. Although case histories show that state and Federal concepts of navigability do not always agree, when Federal interests are at stake, the Federal test will govern.

There are exceptions, however, to the "overwhelming majority rule of state ownership of lands beneath navigable waters", and South Carolina is in the minority. In the minority states, it was considered that property rights were vested at the time of independence from England and that the state took title only to tidal-navigable streams while riparian owners took title to all stream beds, both navigable and non-navigable, if non-tidal. Even in the minority states, however, private ownership of the bed does not affect the rights of the public to the use of navigable waters.

A review of legal documentation indicates several state court decisions which apply to navigation in the Congaree basin. The cases are briefly summarized below. (3)

Boatwright v. Bookman* - In this action, the court avoided several navigability issues which were raised at trial. The plaintiff sued some commissioners, charged with the maintenance of fish sluices, for destroying the plaintiff's fish traps in the Congaree River. The commissioners contended that they were authorized to assure the free passage of fish in this navigable stream. The plaintiff, however, maintained that the side of the stream he used was not used or useful for fish or boat sluices and was, therefore, outside the jurisdiction of the commissioners. The question was thus raised whether a stream may be navigable in the middle and non-navigable toward the edge. The trial court bought that theory and held that even though the Congaree was navigable, the part the plaintiff had obstructed "was not to be considered a highway for the purpose of navigation ..." On appeal, the court avoided this interesting proposition by merely holding that the river being public, the public may trap it so long as navigation is not, as here, obstructed.

State v. City of Columbia** - The city of Columbia sought to impose a tax upon the bridge across the Congaree River. The bridge owner contended that the city's boundary was the river and that, since the bridge was, therefore, outside the city, it could not validly impose the tax. It was shown that the original layout of the city was a square which would include a good part of the river and the bridge unless the city could not own the river bed. The court held that the public has a navigation easement in streams which are navigable in fact, yet where the streams are not technically navigable (meaning ebb and flow), the public right does not deprive the riparian of title to the center of the stream. Accordingly, although the beds of the non-tidal waters were subject to private ownership, the waters were still deemed navigable in fact.

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* Rice 447 (S. C. 1839).

** 27 S. C. 137, 3 S. E. 55 (1887).

State v. Columbia Water Power Co.* - In this case, the state sought to enjoin the Water Company from obstructing the Columbia Canal by its water intake pipe located just above the surface. The Broad and Congaree Rivers near the city of Columbia were declared to be navigable in fact based upon capacity for navigation. Since the issue was "whether in its present condition (the canal) is navigable", the court proceeded to examine that question by three approaches. Looking first to the legislature, the court found it had intended that the canal be constructed for navigation purposes and for the purpose of supplying water to the city. In fact, it was not being used for navigation since a lock was inoperative at one end, but was being used by the Water Company for its other intended purpose - water supply. Nevertheless, the court concluded that the intended use for navigation was clear for purpose of preventing obstructions. As to its navigability generally, the court provided what may be the clearest though strictest guidelines to that term:

> "It is true, that according to the generally accepted definition, water is navigable when in its ordinary state it forms by itself or its connection with other waters a continued highway over which commerce is or may be carried in the customary mode in which such commerce is conducted by water ... Under the definition, a stream not naturally navigable but made so by artificial means is not navigable in a legal sense ... (However,) the canal is to be regarded as a part of ... (the Broad and Congaree Rivers) and navigable, just as any other portion of them is navigable."

The fact that there was now no commerce on the canal was not controlling because:

> "(t)he navigability of water does not depend on actual use for navigation, but on its capacity for such use ... It is true that where the character of the water is in doubt, the fact that it has never been used for navigation after long settlement of the country might possibly be evidence tending to show that it was not susceptible for navigation; but it would be nothing more than evidence."

In a third approach, the court found that, by the terms of the grants to the property of the canal, its continued use for navigation was required.

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* 82 S. C. 181, 63 S. E. 884 (1909).

Early v. South Carolina Public Service Authority* - Although this case concerned the plaintiff's seeking of compensation by inverse condemnation for damages brought about by the backing of salt water into the otherwise fresh water Santee River, the court recognized that the Congaree, Wateree, Santee, and Cooper Rivers were all navigable rivers of the state and subject to a navigation servitude. The court, in setting the rights and limits of the state held:

> "The right of the sovereign, in the exercise of the navigation servitude, to take or damage or destroy private property without obligation to compensate therefore extends to the bed of the navigable stream, i.e., to mean high water mark on either bank - and no farther; for damage beyond that boundary the constitution requires just compensation."

Thus, the reservation of the title between high and low-water in the state allows the freedom and flexibility necessary, in some cases, to exercise the navigation servitude without the requirement of compensation.

Recent Federal Litigation

A review of recent Federal regulatory litigation concerning the Charleston District did not reveal any court actions in the Congaree River basin concerning navigation.

Federal Agency Jurisdiction

The delineation of "navigable waters of the U. S.", as discussed earlier, in essence, defines the Federal navigation servitude and is applicable to Federal jurisdiction generally (not merely applicable to the Corps of Engineers). No matter which Federal agency or activity may be involved, the assertion of "navigability" ("navigable waters of the U. S.") arises under the U. S. Constitution, or under application of Federal statute.

By virtue of the Commerce Clause of the Federal Constitution, and the clause empowering Congress to make all laws necessary to carry into execution the Federal judicial power in admiralty and maritime matters, "navigable waters of the U. S." are under the control of

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* 228 S. C. 392, 90 S. E. 2d 472 (1955).

Congress, which has the power to legislate with respect thereto. It is for Congress to determine when and to what extent its power shall be brought into activity. It may be exercised through general or special laws, by Congressional enactments, or by delegation of authority.

Thus, Congress has power which is paramount to that of the states to make improvements in the navigable streams of the U. S. and for this purpose to determine and declare what waters are navigable. The Federal government also has the power to regulate the use of, and navigation on, navigable waters.

The above presents the basis upon which Federal jurisdiction in "navigable waters of the U. S." is established. The basic definition or jurisdictional concept of "navigable waters of the U. S." remains consistent, irrespective of which department or office of the Federal government may be delegated particular responsibility. For instance, the safety, inspection, and marine working functions of the U. S. Coast Guard embrace vessel traffic within "navigable waters of the U. S." as previously defined.

With specific reference to agency regulation of construction or work within "navigable waters of the U. S.", other than by the Corps of Engineers, the Department of Transportation Act of 15 October 1966 (PL 89-670) transferred to and vested in the Secretary of Transportation, certain functions, powers, and duties previously vested in the Secretary of the Army and the Chief of Engineers. By delegation of authority from the Secretary of Transportation, the Commandant, U. S. Coast Guard, has been authorized to exercise certain of these functions, powers, and duties relating to the location and clearances of bridges and causeways in the "navigable waters of the U. S."

An additional agency of particular interest concerning work or construction within "navigable waters of the U. S." is the Federal Power Commission. The Federal Power Act, Title 16, United States Code, Sections 791 et. seq., contemplates the construction and operation of water power projects on navigable waters in pursuance of licenses granted by the Federal Power Commission. The statute was enacted to develop, conserve, and utilize the navigation and water power resources

of the nation. The act provides for the improvement of navigation, development of water power, and use of public lands to make progress with the development of the water power resources of the nation.

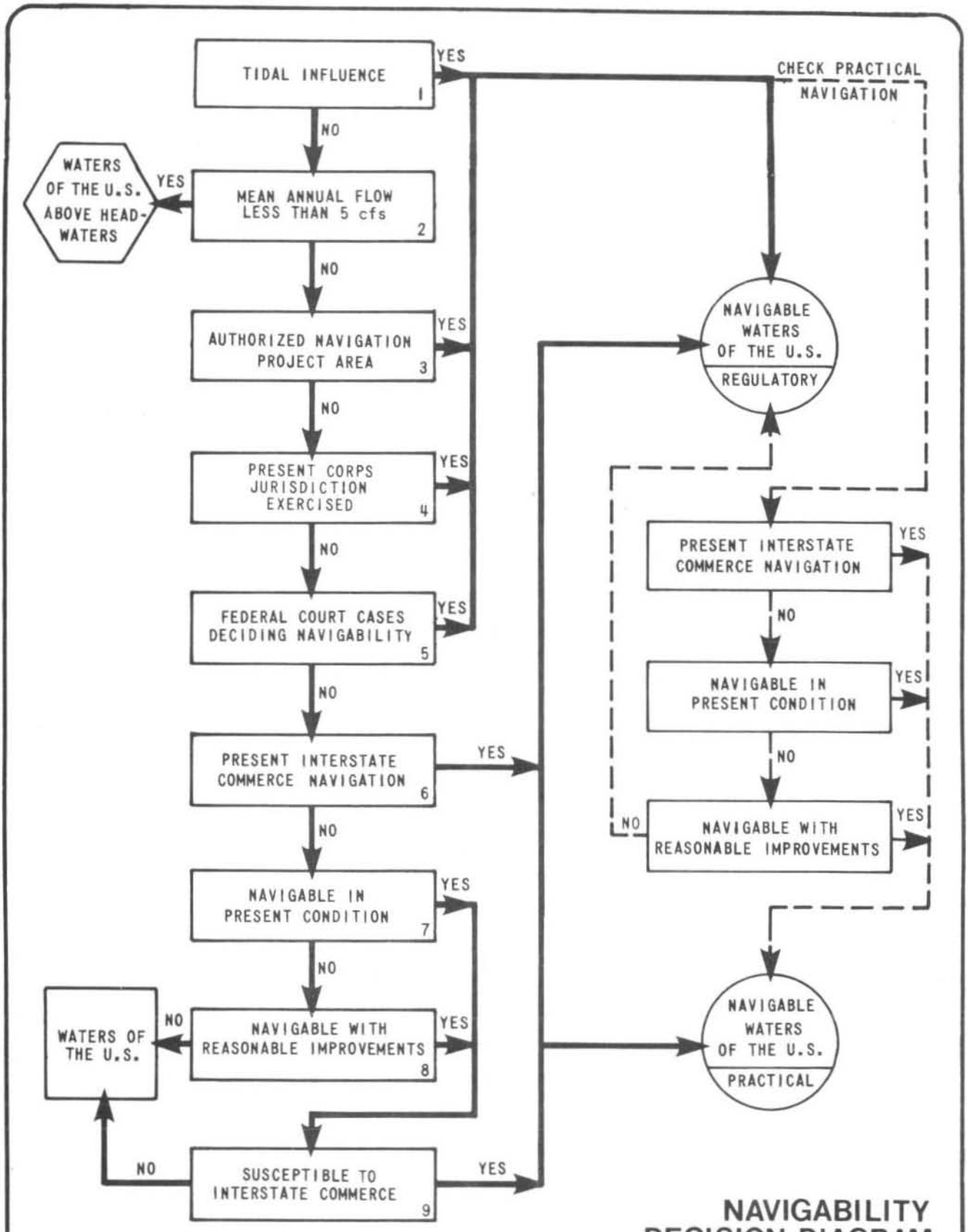
SECTION 6 - NAVIGATION OBSTRUCTIONS AND CLASSIFICATIONS

Navigation Classification Procedures

As noted in Section 5, definition of navigability is not subject to a single precise formula which applies to every circumstance. Many factors including stream physical characteristics (depth, width, flow, slope, etc.), presence of obstructions, court decisions, authorized navigation projects, potential for reasonable improvements, and susceptibility of a stream to interstate commerce activities, play a role in the decision-making process for classifying waterbodies in the Charleston District. In an effort to make the analytical process concerning stream classifications as systematic as possible, a "Navigability Decision Diagram" has been developed and is presented in Figure 1. This diagram has been utilized as a guide in assessing the various navigation classifications for streams in the Charleston District. The Summary Report includes a detailed presentation on the methodology and approaches used in the analysis; however, the following presents a brief synopsis of the techniques as indicated in Figure 1.

Tidal Influenced Areas - Tidal areas (see Item 1 in Figure 1) which are affected by mean high water are classified "navigable waters of the U. S." according to various legislative and judicial actions. The "navigable waters of the U. S." are subject to regulatory jurisdiction by the Corps of Engineers and other agencies. Even though all tidal areas are so classified and subject to regulatory procedures, many are not practically navigable based upon past and/or present requirements for vessels. Figure 1 shows that some additional "check" analyses are necessary to distinguish those tidal waters which are actually capable of practical navigation. Investigation of the tidal areas is beyond the scope of this study; however, drawings showing the "plan" of major rivers to their mouth, often tidal influenced, are presented in the interest of continuity.

Waters of the U. S. Above Headwaters - Section 404 of PL 92-500 considers the headwaters of waterbodies to be the point at which the mean annual flow is five cfs. Waterbodies or portions of waterbodies



NAVIGABILITY DECISION DIAGRAM
Figure 1

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CHARLESTON DISTRICT
U.S. ARMY CORPS OF ENGINEERS

located upstream of the headwaters are nationally permitted by law and will not require an individual application for dredge or fill discharge permits provided the proposed work will meet certain conditions. However, these waters are classified "waters of the U. S." and are within Corps of Engineers jurisdiction as applicable to Section 404. Item 2 in Figure 1 shows the testing procedure for the five cfs point.

Authorized Navigation Project Area - Any streams which currently have authorized Federal projects to aid navigation are classified as "navigable waters of the U. S." (Item 3 in Figure 1). Many of the projects thus authorized were based upon conditions which are not currently applicable (for example, use of pole boats or steamboats for justifying the navigation benefits). Consequently, many of the streams having older authorized projects will not allow passage of present-day commercial navigation vessels without some additional improvement. Thus, some portions of the authorized project areas are not considered practical for navigation. Figure 1 shows the additional "check" procedure which has been followed to assess the practical limit of "navigable waters of the U. S."

Present Corps Jurisdiction Exercised - The Corps of Engineers is exercising jurisdiction on several non-tidal waterbodies which are not covered by authorized projects (Item 4 in Figure 1). (4) Determinations previously made on these waterbodies under the River and Harbor Act indicated use for interstate commerce and hence the current classification as "navigable waters of the U. S." Some of these streams are not currently navigable by present-day commercial vessels and thus have practical limits. Figure 1 shows the "check" used to assess the practical limits of "navigable waters of the U. S."

Federal Court Decisions - As noted in Section 5, Federal case law is the predominant indicator which is to be used for establishing Federal jurisdiction over waterbodies in the Charleston District (Item 5 in Figure 1). Several decisions have been rendered which classify certain streams in the district as "navigable waters of the U. S." However, some of these court decisions have been arrived at under different circumstances or without the benefit of the data developed as a part of this investigation. Therefore, even though some of the

streams are classified by judicial review as "navigable waters of the U. S.", they are not practical for navigation with present-day vessels. Figure 1 shows the steps necessary to "check" those portions of the "navigable waters of the U. S." which are capable of practical navigation.

Present Interstate Commerce Navigation - Any rivers currently involved in interstate commerce activities are classified as "navigable waters of the U. S." from both the regulatory and practical standpoint (see Item 6 in Figure 1).

Waters of the U. S. Below Headwaters - For those streams, or portions of streams, not subject to authorized projects, court cases, or present interstate commerce navigation, several additional tests for determining navigability are required (Items 7 and 8 in Figure 1). If the waterbody is not judged to be navigable in its present state or with reasonable improvements, then it is beyond the limit of "navigable waters of the U. S." and is termed "waters of the U. S." over the remaining length. These "waters of the U. S." (as well as the "navigable waters of the U. S.") up to the headwaters (five cfs points) of the streams are subject to jurisdiction under Section 404 of PL 92-500. A general or individual permit is required for discharge of dredged or fill material below the headwaters (five cfs point) of "waters of the U. S." Discharges above the headwaters are discussed in the previous subsection, "Waters of the U. S. Above Headwaters."

Interstate Commerce - Some non-tidal waters in the district are not now subject to authorized projects, court decisions, or interstate commerce navigation, but can be navigated under present or reasonably improved conditions. These streams may be considered for classification as "navigable waters of the U. S." if they are susceptible to interstate commerce activities (past, present, or future). A combined judgment considering both "reasonable improvement" factors (Item 8 in Figure 1) and "interstate commerce" factors (Item 9 in Figure 1) has often been utilized in arriving at the conclusions and recommendations concerning navigability of waterbodies in the Charleston District. The Summary Report provides further details on these factors.

Navigation Classification Categories

This study classifies streams into several different categories, each of which is discussed subsequently:

1. Present "navigable waters of the U. S." (by regulatory procedures).
2. Historically navigable waters (based on literature review).
3. Recommended "navigable waters of the U. S." (based upon data developed as a part of this investigation).
4. Recommended waters for practical navigation (within "navigable waters of the U. S.").
5. Headwaters for all waterbodies (five cfs points).

The first four navigation classifications are displayed on the plates presented later in this report. The headwater limits are summarized in Appendix A.

Present Navigable Waters of the U. S.

Currently, the Congaree River is classified as "navigable waters of the U. S." from its confluence with the Wateree River (R.M. 125.3) to the Gervais Street bridge, U. S. 378, (R.M. 175.9). (3)(4)(20) This classification is based on the limits of the Federally authorized project, as discussed in Section 3, as well as Federal and state court decisions, as discussed in Section 5. (See plate 08-2 for map location.)

Historically Navigable Waters

The Congaree River was extensively used for navigation throughout the earlier development of the state. After the construction of the Columbia Canal, as referred to in Section 4, navigation extended over the entire length of the Congaree River (R.M. 176.9), and continued up the Broad River (see Report 15).

Recommended and Practical Navigable Waters of the U. S.

The recommended and practical limit of "navigable waters of the U. S." is at the Gervais Street bridge (R.M. 175.9). This is the same limit as the present classification, and is based on the Federal court

decisions and authorized project limits that established the present classification, as well as observations and calculations, which establish the practicality of navigation at all six bridges crossing the river. Analysis at each of the locations resulted in an approximate mean water depth of at least 7 feet, approximate channel width of at least 50 feet, and an average slope within the ranges for practical navigation. The river extends upstream for about one mile beyond R.M. 175.9; however, it becomes shallower and spotted with sandbars as it nears the confluence of the Broad and Saluda Rivers and would require extensive improvements to be navigable. In addition, entrance to the Columbia Canal, used at one time to by-pass this shallow area, is no longer operational due to installation of electric generating turbines and would also require extensive renovation to become functional.

These conclusions on the navigation limit meet the criteria established for the Federal test of navigability that the body of water is used, or is capable of being used, in conjunction with other bodies of water to form a continuous highway upon which commerce with other states or countries might be conducted.

There are no significant tributaries to the Congaree River capable of supporting navigation.

Plates 08-4 through 08-6 are plan and profiles of the recommended "navigable waters of the U. S." The plan and profile plates show mean water surface as determined from USGS maps, stream bed depth, 50 feet wide navigable channel depth, pier spacing for bridges crossing the river, and vertical clearances at structures. Approximate vertical clearances for overhead utilities are shown later in this Section in Table 4. It is emphasized that all references to elevation are approximate since vertical control was established from USGS contour maps and not field instrument surveys. Water depth and structure vertical clearance measurements are also approximate due to the accuracy inherent in the field techniques. (See the Summary Report for a detailed description of field procedures and the methodology used to calculate water depth at mean flow.)

Obstructions to Navigation

Table 4 presents the vertical clearance to mean water level and mean water slope at all obstructions, and the mean discharge of the river at all bridges, located within the recommended "navigable waters of the U. S." It is emphasized that mean discharge, slope, and vertical clearances are only approximations based on best available data. Specific procedures for determining these are discussed in the Summary Report.

Figures 2 through 15 are photographs of the obstructions. Each photograph is identified to correspond with the data in Table 4.

Waters of the U. S.

"Waters of the U. S." are considered to be all streams beyond the recommended limits of "navigable waters of the U. S." "Waters of the U. S." with more than five cfs mean annual flow require a permit for discharge of dredged or fill material. "Waters of the U. S." with less than five cfs mean annual flow are nationally permitted by law and will not require an individual application for dredge or fill discharge permits provided the proposed work will meet certain conditions.

Appendix A lists all the five cfs flow points located within the Congaree River basin. Each point is located by stream code, stream name, latitude and longitude, and a mileage reference.

Appendix B lists the lakes located in the Congaree River basin which have surface areas between 10 and 1,000 acres. The lake summary identifies the stream basin code, lake name or owner, county location, and, where data is available, the surface area and gross storage.

TABLE 4

OBSTRUCTION LISTING FROM MOUTH TO RECOMMENDED
LIMIT OF NAVIGABLE WATERS OF THE U. S. (2)

Congaree River Mile	Description	Mean Discharge (cfs)	Mean Water Slope (ft/mi)	Approximate Vertical Clearance To Obstruction (ft)
127.1	Utility Line (power)	--	0.75	87.0
127.1	Utility Line (power)	--	0.75	80.0
127.1	U. S. 601 Highway Bridge	10,000	0.75	64.0
129.8	Southern Railroad Bridge	9.950	0.75	17.0
167.6	Utility Line (power)	--	1.50	75.0
169.5	Utility Line (power)	--	1.50	91.0
169.5	Utility Line (power)	--	1.50	75.0
171.1	Utility Line (power)	--	2.10	57.0
172.4	Utility Line (power)	--	2.10	52.0
173.8	Utility (underground gas)	--	2.10	-5.0[2)]
173.9	Utility Line (power)	--	2.10	62.0
173.9	Utility Line (power)	--	2.10	62.0
174.2	Abandoned Lock and Dam	--	2.10	--
174.3	Utility Line (power)	--	2.10	60.0
174.4	Seaboard Coast Line Railroad Bridge	9,500	2.10	34.0
174.4	Southern Railroad Bridge	9,500	2.10	46.0
175.2	Utility (underground sewer)	--	2.10	-1.0[2)]
175.2	U. S. 176-21-321, S. C. 215 Bridge	9,500	2.10	42.0
175.9	U. S. 378-1 Highway Bridge	9,500	2.10	30.0

1) River Mile - 125.3 = mileage from mouth of Congaree River.

2) Estimated minimum depth below streambed at time of construction.

FIGURE 2 - TWO UTILITY LINES (R.M. 127.1)
(AND U. S. 601)

FIGURE 3 - U. S. 601 HIGHWAY BRIDGE (R.M. 127.1)

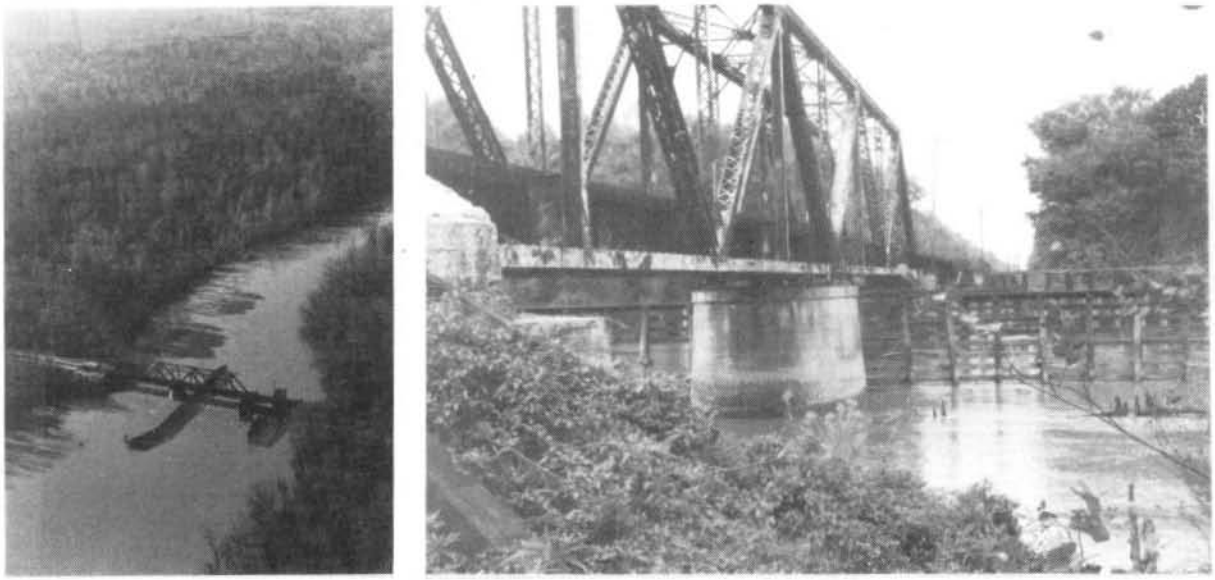

FIGURE 4 - SOUTHERN RAILROAD BRIDGE (R.M. 129.8)

FIGURE 5 - UTILITY LINE (R.M. 167.6)

FIGURE 6 - TWO UTILITY LINES (R.M. 169.5)

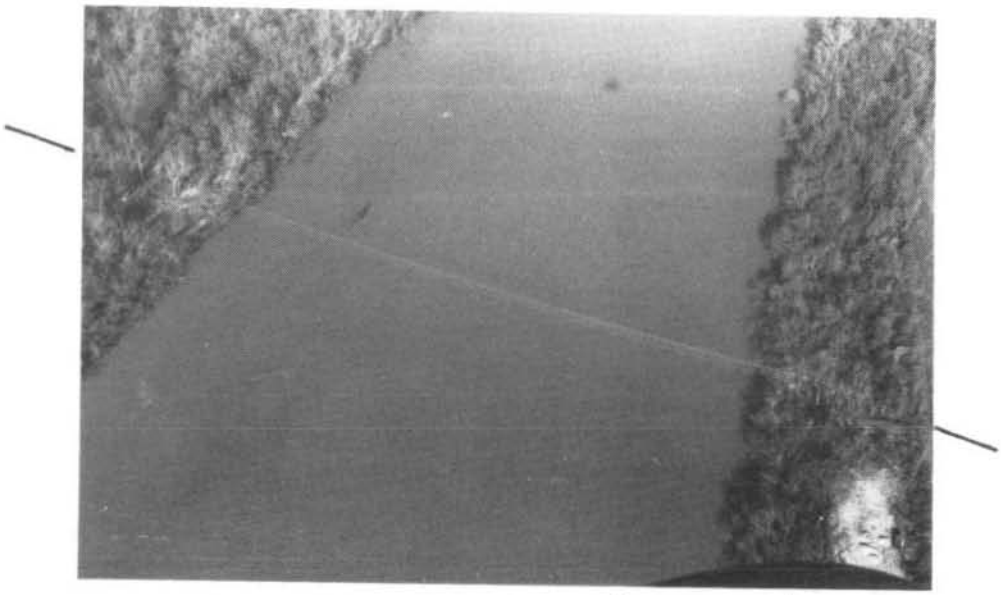

FIGURE 7 - UTILITY LINE (R.M. 171.1)

FIGURE 8 - UTILITY LINE (R.M. 172.4)

FIGURE 9 - TWO UTILITY LINES (R.M. 173.9)

FIGURE 10 - ABANDONED LOCK AND DAM (R.M. 174.2)

FIGURE 11 - UTILITY LINE (R.M. 174.3) (AND SEABOARD COAST LINE RAILROAD AND SOUTHERN RAILROAD BRIDGES)

FIGURE 12 - SEABOARD COAST LINE RAILROAD BRIDGE (R.M. 174.4)

FIGURE 13 - SOUTHERN RAILROAD BRIDGE (R.M. 174.4)

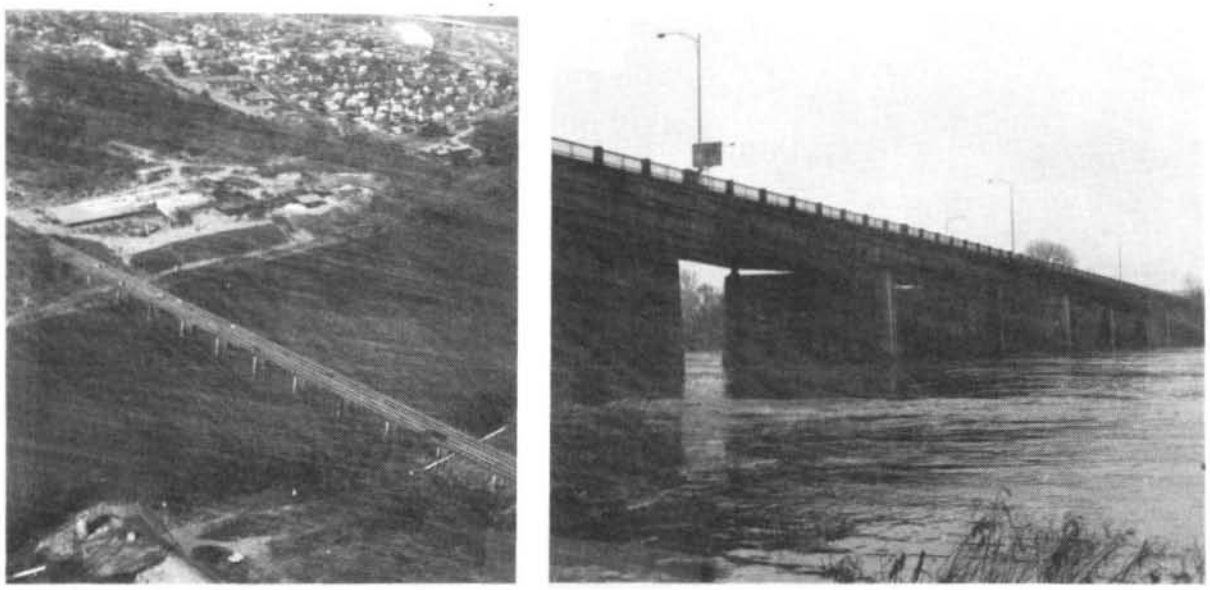

FIGURE 14 - U. S. 176-21-321, S. C. 215 HIGHWAY BRIDGE (R.M. 175.2)

FIGURE 15 - U. S. 378-1 HIGHWAY BRIDGE (R.M. 175.9)

SECTION 7 - CONCLUSIONS AND RECOMMENDATIONS

Five classifications of navigation on streams in the Congaree River basin have been determined and are presented below. The first two are classifications developed from historical evidence and current Federal stream classifications. Classification 3 is based on field measurements, observations, and data analysis for the river. Classification 4 is based on review of all previously determined limits with a recommendation of the most upstream location with supporting evidence of navigability. The fifth classification accounts for all streams not otherwise classified and was determined based on the drainage area and hydrological aspects of the stream.

1. The Congaree River is presently classified "navigable waters of the U. S." between its mouth at the confluence with the Wateree River (R.M. 125.3) to the Gervais Street bridge in Columbia (R.M. 175.9).
2. The historical limit of navigation on the Congaree River is, with the use of the Columbia Canal, to R.M. 177. The classification extends beyond the Congaree basin boundary to the Broad River (see Report 15).
3. The recommended practical limit of navigation is at the Gervais Street bridge (R.M. 175.9). Reasonable channel improvements will be necessary for commercial river traffic to actually use the river up to this point.
4. It is recommended that the Congaree River be classified "navigable waters of the U. S." between its mouth at the confluence with the Wateree River (R.M. 125.3) to the Gervais Street bridge, U. S. 378 (R.M. 175.9) based on the analytical procedures and tests of navigability used in this study effort.
5. All streams not recommended for classification as "navigable waters of the U. S." are recommended for classification as "waters of the U. S." throughout their entire length.

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Match Plate 08-3

18-04
LAKE MURRAY

14
SALUDA RIVER BASIN

08
CONGAREE RIVER BASIN

09

WATEREE RIVER BASIN

06
BLACK RIVER AREA

SANTEE RIVER BASIN

18-03
LAKE MARION

03
EDISTO RIVER AREA

LAKE MARION
NATIONAL / SANTEE WILDLIFE REFUGE

18-01
LAKE MOULTRIE
SANTEE
NATIONAL WILDLIFE REFUGE

LAKE MOULTRIE

02
COMBAHEE RIVER AREA

04
COOPER RIVER AREA

SAVANNAH RIVER PLANT
(ATOMIC ENERGY COMMISSION)

AUGUSTA

Aiken

Orangeburg

Columbia

Sumter

Charleston

North Augusta

Barnwell

Allendale

Walterboro

Moncks Corner

Berkeley

POPULATED PLACES
Over 500,000 — NEW ORLEANS
100,000 to 500,000 — CHARLOTTE
25,000 to 100,000 — CHARLESTON
5,000 to 25,000 — Georgetown
1,000 to 5,000 — Kingstree
Less than 1,000 — Nichols

RAILROADS
Standard gauge
Narrow gauge
BOUNDARIES
Park or reservation
State
County

ROADS
Primary, all-weather, hard surface
Secondary, all-weather, hard surface
Light-duty, all-weather, improved surface
Fair or dry weather, unimproved surface
Trail
Interchange
Route markers: Interstate, U.S., State

Landplane airport
Landing area
Seaplane airport
Seaplane anchorage
Power line
Landmark: School, Church, Other
Spot elevation in feet
Marsh or swamp
Intermittent or dry stream

USGS BASE MAP
AUGUSTA, GA., S.C.
1957, Revised 1969
NI 17-8

0 5 10
scale in miles

N

LEGEND:
- (N) PRESENT LIMIT OF NAVIGABLE WATERS OF THE U.S.
- (H) HISTORIC LIMIT OF NAVIGATION
- (P) PRACTICAL LIMIT OF NAVIGATION (RECOMMENDED)
- (R) LIMIT OF NAVIGABLE WATERS OF THE U.S. (RECOMMENDED)
- 20 RIVER MILE

1977

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CHARLESTON DISTRICT
Charleston, South Carolina

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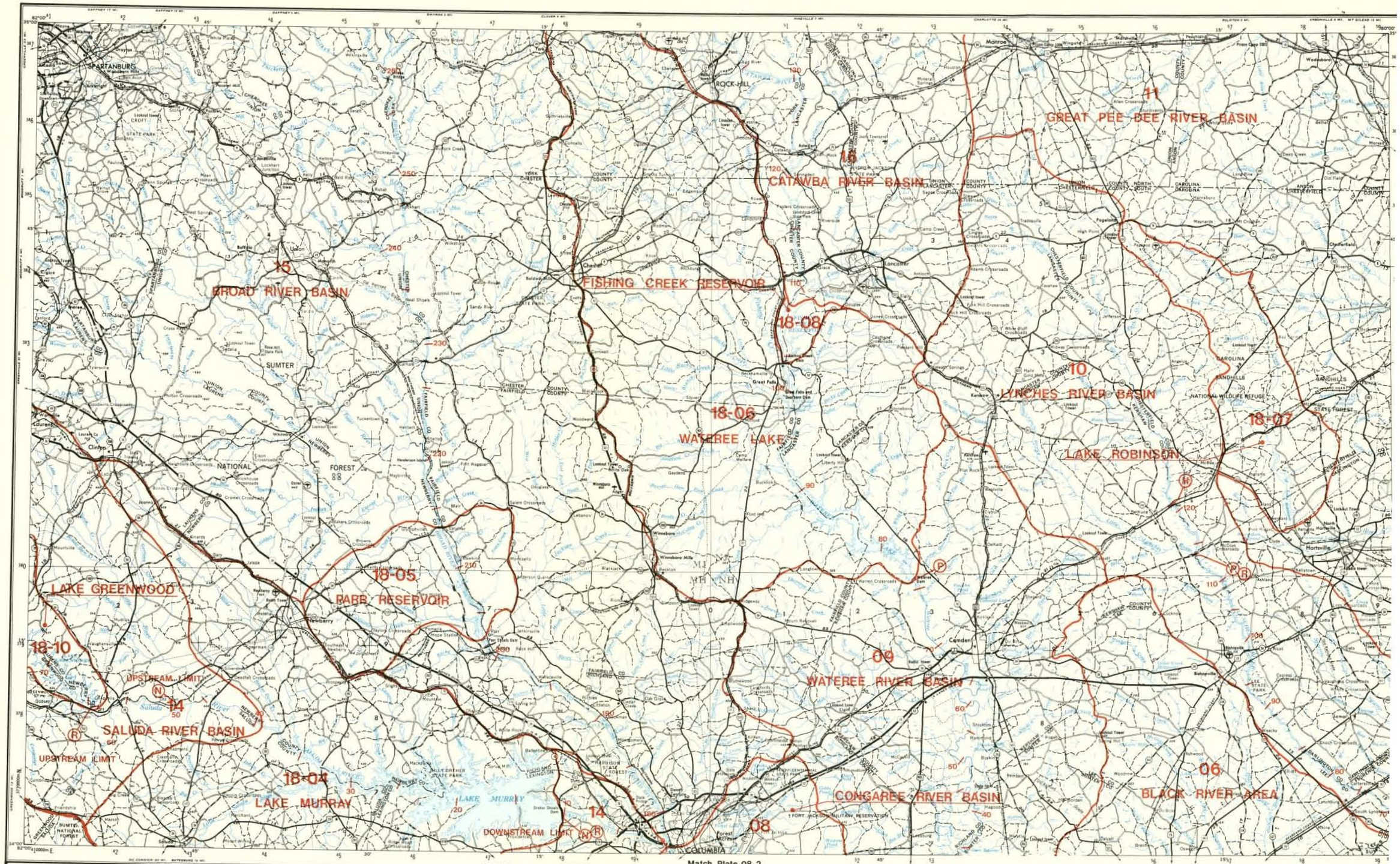
SIGNIFICANT FEATURES
CONGAREE RIVER BASIN
Report No. 01, 02, 03, 04, 05, 06, 08, 09, 14, 18
NAVIGABILITY STUDY
Plate 08-2



POPULATED PLACES
NEW ORLEANS
CHARLOTTE
CHARLESTON
Georgetown
Kingstree

ROADS

USGS BASE MAP
SPARTANBURG, S.C.; N.C.
1953, Revised 1969
NI 17-5

scale in miles

LEGEND:
- (N) PRESENT LIMIT OF NAVIGABLE WATERS OF THE U.S.
- (H) HISTORIC LIMIT OF NAVIGATION
- (P) PRACTICAL LIMIT OF NAVIGATION (RECOMMENDED)
- (R) LIMIT OF NAVIGABLE WATERS OF THE U.S. (RECOMMENDED)
- 70 RIVER MILE

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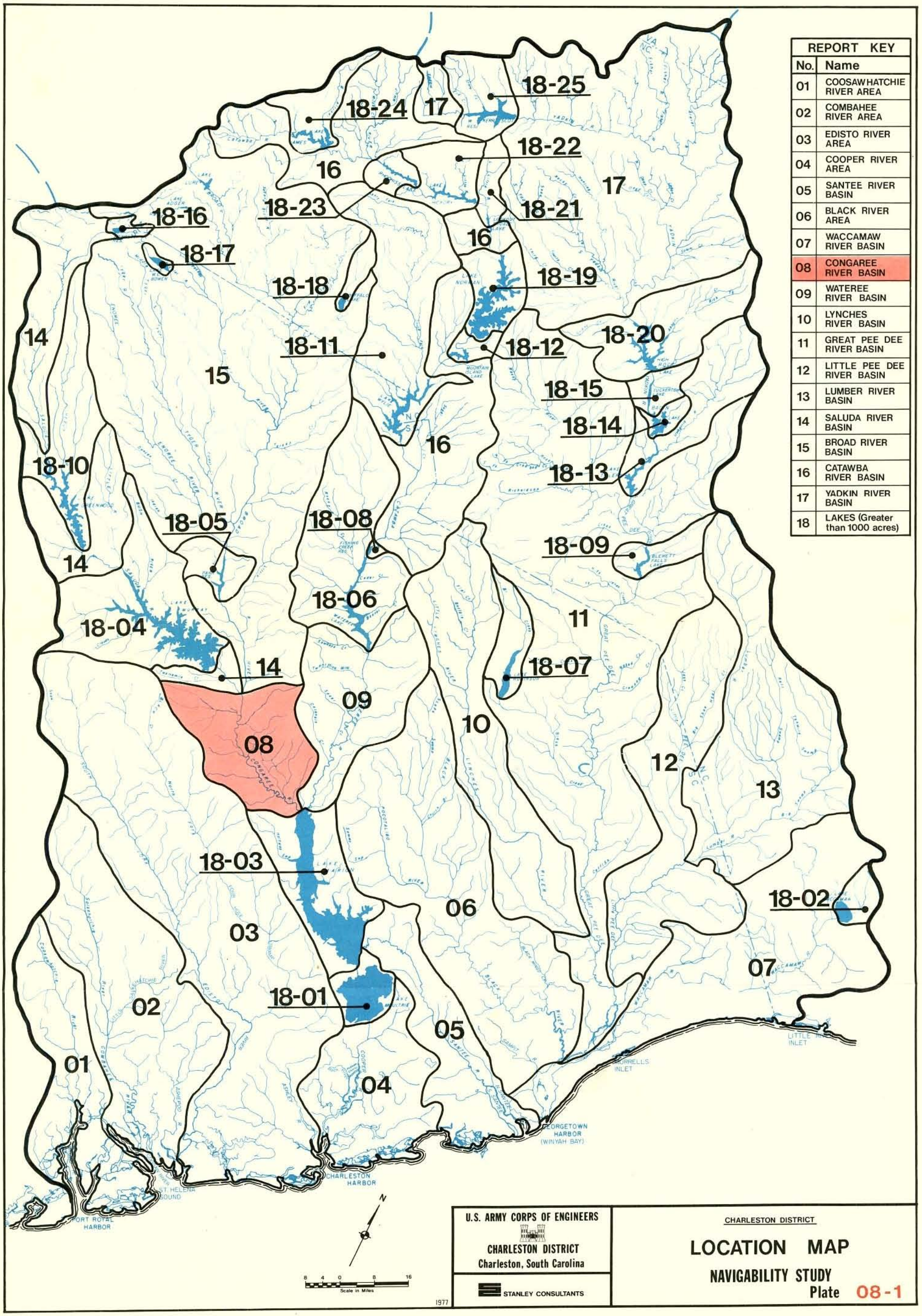
SIGNIFICANT FEATURES
CONGAREE RIVER BASIN
Report No. 06, 08, 09, 10, 11, 14, 15, 16, 18
NAVIGABILITY STUDY
Plate 08-3



REPORT KEY	
No.	Name
01	COOSAWHATCHIE RIVER AREA
02	COMBAHEE RIVER AREA
03	EDISTO RIVER AREA
04	COOPER RIVER AREA
05	SANTEE RIVER BASIN
06	BLACK RIVER AREA
07	WACCAMAW RIVER BASIN
08	CONGAREE RIVER BASIN
09	WATEREE RIVER BASIN
10	LYNCHES RIVER BASIN
11	GREAT PEE DEE RIVER BASIN
12	LITTLE PEE DEE RIVER BASIN
13	LUMBER RIVER BASIN
14	SALUDA RIVER BASIN
15	BROAD RIVER BASIN
16	CATAWBA RIVER BASIN
17	YADKIN RIVER BASIN
18	LAKES (Greater than 1000 acres)

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CHARLESTON DISTRICT
Charleston, South Carolina

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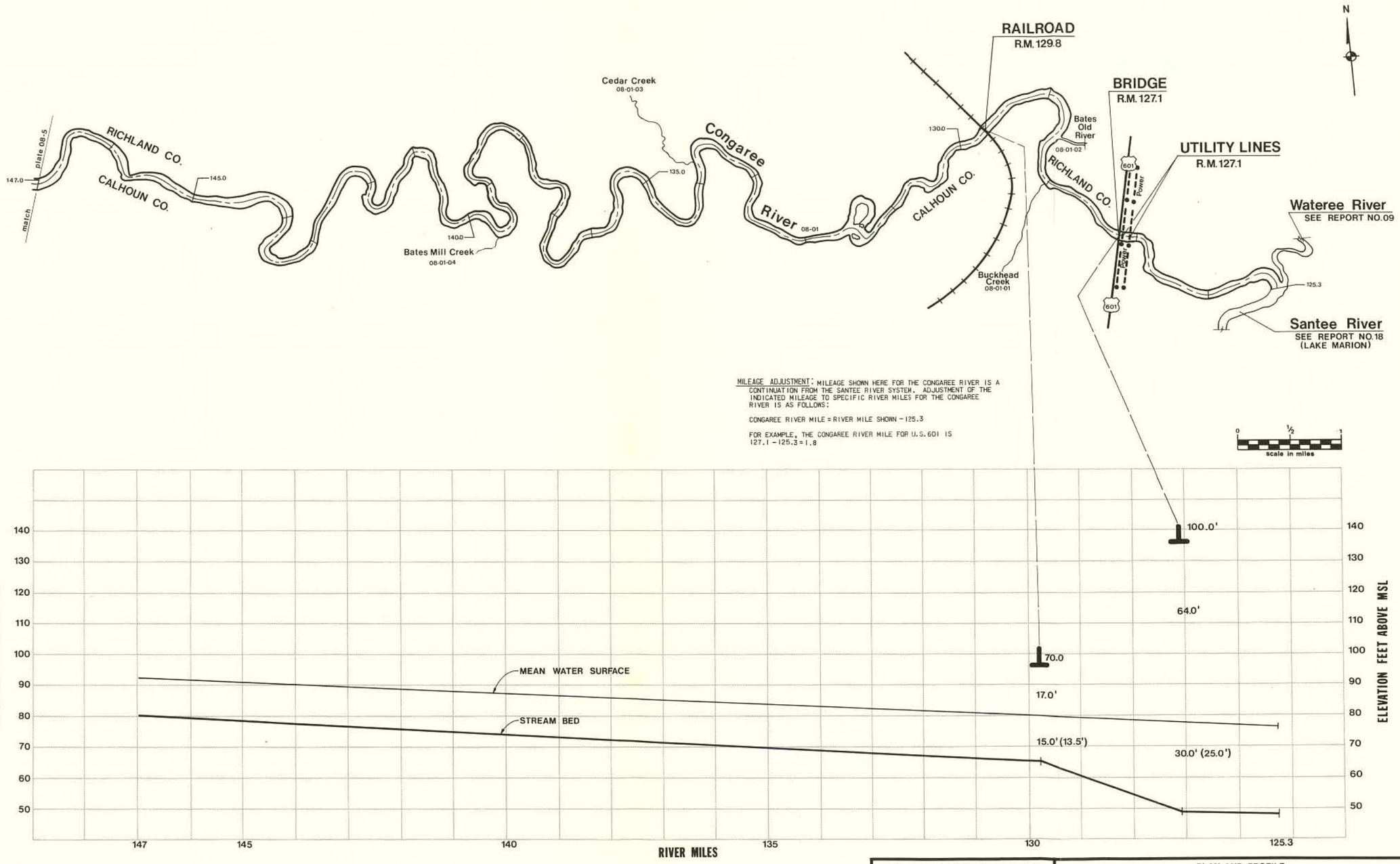
CHARLESTON DISTRICT

LOCATION MAP

NAVIGABILITY STUDY

Plate 08-1



MILEAGE ADJUSTMENT: MILEAGE SHOWN HERE FOR THE CONGAREE RIVER IS A CONTINUATION FROM THE SANTEE RIVER SYSTEM. ADJUSTMENT OF THE INDICATED MILEAGE TO SPECIFIC RIVER MILES FOR THE CONGAREE RIVER IS AS FOLLOWS:

CONGAREE RIVER MILE = RIVER MILE SHOWN - 125.3

FOR EXAMPLE, THE CONGAREE RIVER MILE FOR U.S. 601 IS 127.1 - 125.3 = 1.8

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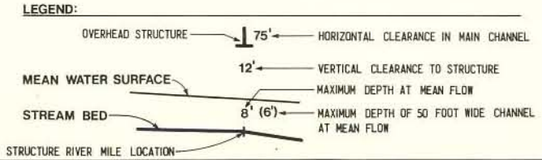

NOTES:

1. ELEVATION AND SLOPE OF MEAN WATER SURFACE ARE BASED ON USGS TOPOGRAPHIC MAPS AND ARE THEREFORE ONLY APPROXIMATIONS. VERTICAL DIMENSIONS FROM STREAM BED TO OVERHEAD STRUCTURES ARE FIELD MEASUREMENTS. RELATIVE LOCATION OF MEAN WATER SURFACE IS APPROXIMATED FROM CONTOUR MAPS, MEASURED CROSS SECTIONS AND VELOCITIES. STREAM FLOW RECORDS, THE MANNING EQUATION, AND FIELD OBSERVATIONS. SEE SUMMARY REPORT FOR COMPLETE EXPLANATION.

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Charleston, South Carolina

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PLAN AND PROFILE

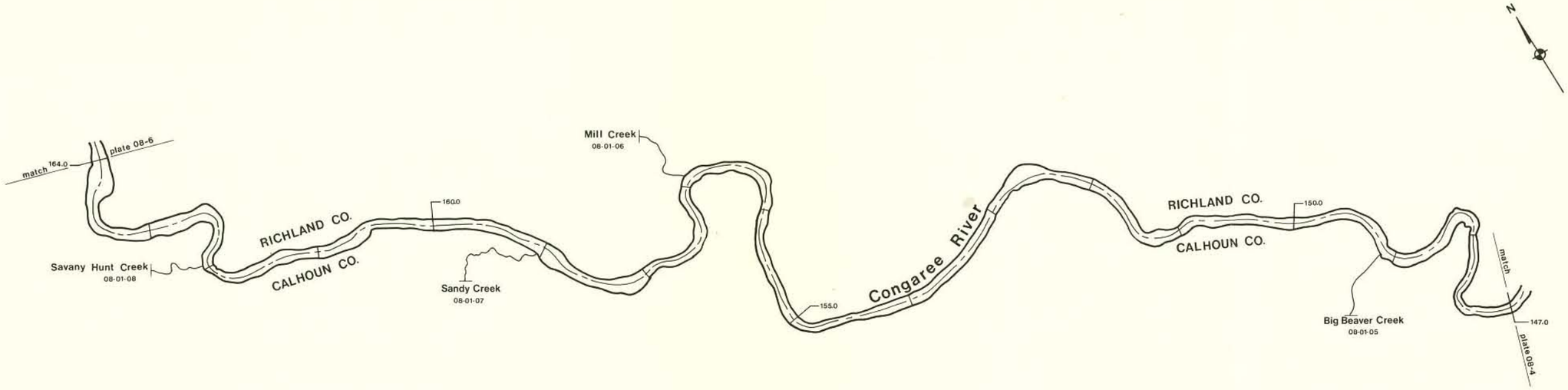
CONGAREE RIVER

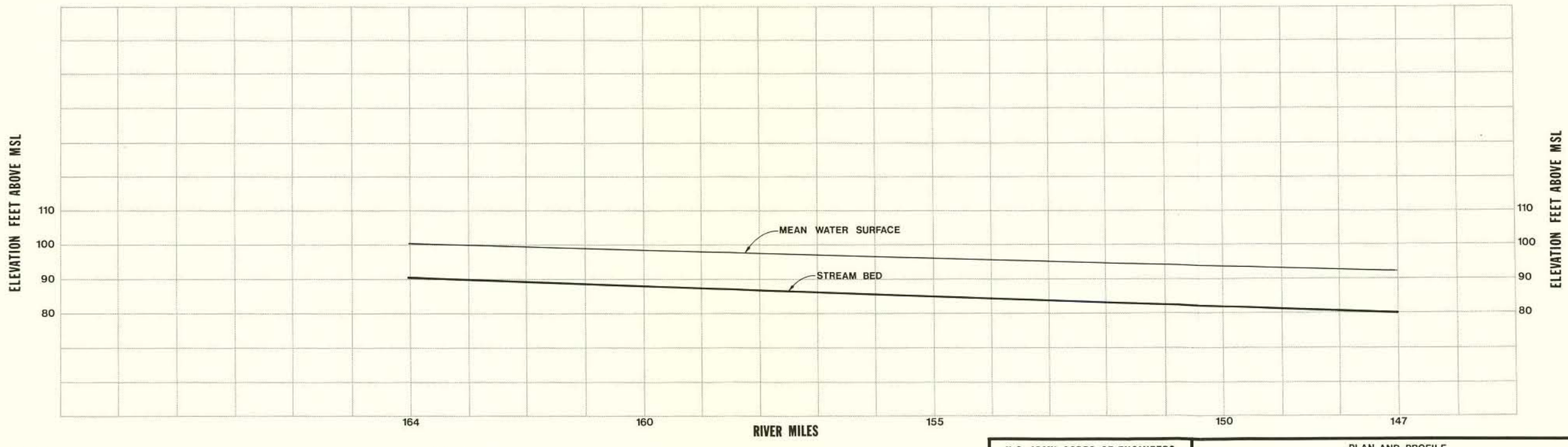
Congaree River Basin

CALHOUN-RICHLAND CO., S.C.

NAVIGABILITY STUDY

Miles 125.3 - 147.0 Plate 08-4





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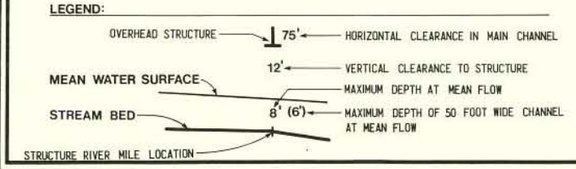

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STANLEY CONSULTANTS

PLAN AND PROFILE

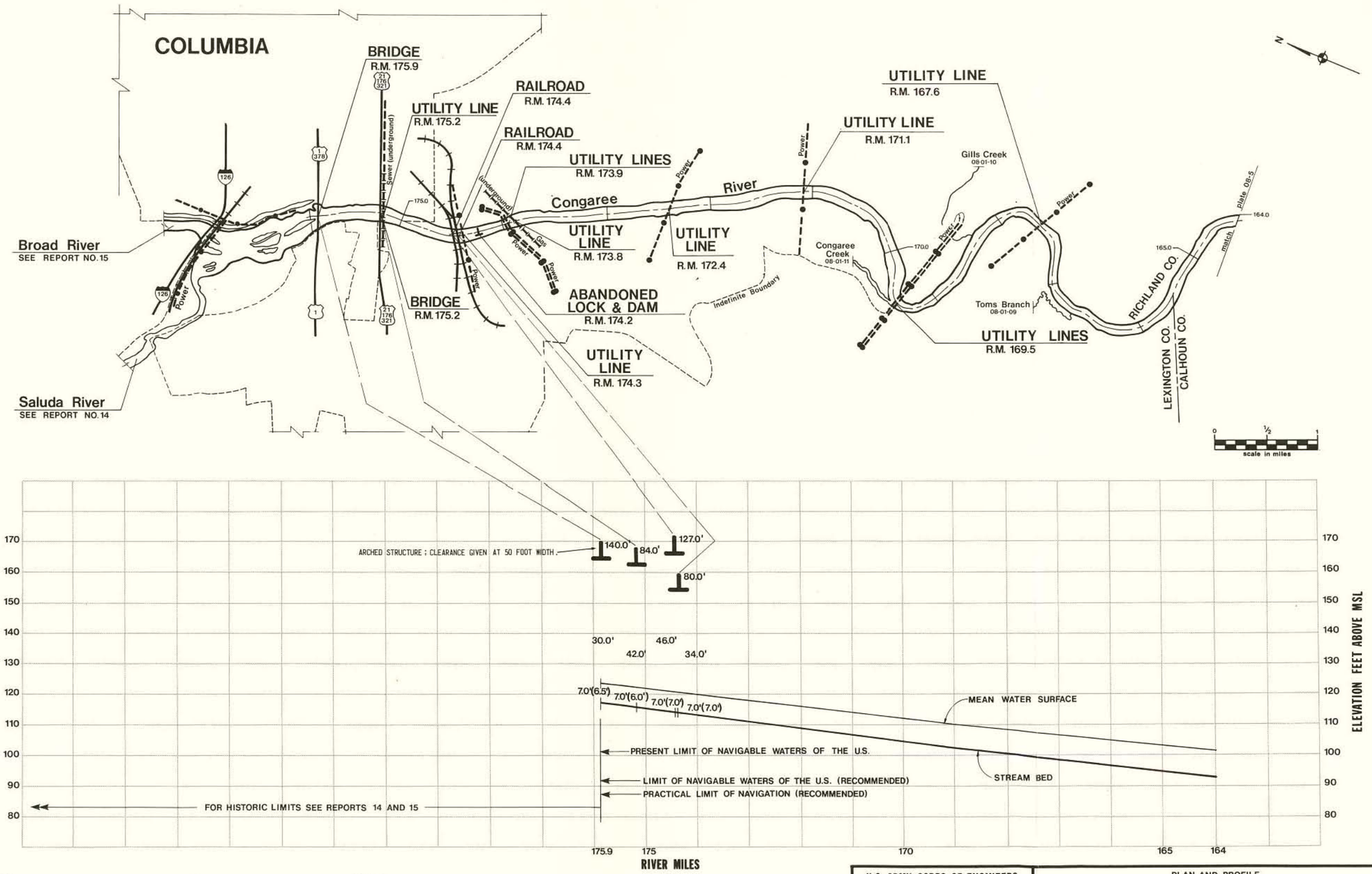
CONGAREE RIVER

Congaree River Basin

CALHOUN-RICHLAND CO., S.C.

NAVIGABILITY STUDY

Miles 147.0-164.0 Plate 08-5



LEGEND:

OVERHEAD STRUCTURE — 75' — HORIZONTAL CLEARANCE IN MAIN CHANNEL

12' — VERTICAL CLEARANCE TO STRUCTURE

MEAN WATER SURFACE — MAXIMUM DEPTH AT MEAN FLOW

STREAM BED — 8' (6') — MAXIMUM DEPTH OF 50 FOOT WIDE CHANNEL AT MEAN FLOW

STRUCTURE RIVER MILE LOCATION

NOTES:

1. ELEVATION AND SLOPE OF MEAN WATER SURFACE ARE BASED ON USGS TOPOGRAPHIC MAPS AND ARE THEREFORE ONLY APPROXIMATIONS. VERTICAL DIMENSIONS FROM STREAM BED TO OVERHEAD STRUCTURES ARE FIELD MEASUREMENTS. RELATIVE LOCATION OF MEAN WATER SURFACE IS APPROXIMATED FROM CONTOUR MAPS, MEASURED CROSS SECTIONS AND VELOCITIES. STREAM FLOW RECORDS, THE MANNING EQUATION, AND FIELD OBSERVATIONS. SEE SUMMARY REPORT FOR COMPLETE EXPLANATION.

1977

U.S. ARMY CORPS OF ENGINEERS
CHARLESTON DISTRICT
Charleston, South Carolina

STANLEY CONSULTANTS

PLAN AND PROFILE

CONGAREE RIVER

Congaree River Basin

CALHOUN-LEXINGTON-RICHLAND CO., S.C.

NAVIGABILITY STUDY

Miles 164.0-175.9 Plate 08-6

APPENDIX A
STREAM CATALOG

This appendix presents a coded listing of all streams located in the Congaree River basin having a mean annual flow greater than or equal to five cfs. The Congaree River and its tributaries are not tidally influenced; therefore, only those streams having a mean annual flow of five cfs or greater are coded.

The points where flow is approximately equal to five cfs (headwaters) are defined by approximate longitude and latitude, and river miles from the nearest named tributary, major highway, railroad, or other similar reference point. Some streams listed in the tabulation may not have headwater locations identified. This occurs when the name of a stream changes at a confluence where the flow immediately downstream is greater than five cfs. Thus, the headwater locations for streams with more than one name are associated with the appropriate upstream name found on USGS quadrangle maps. Some streams in this appendix listing are also coded in other reports for this study. Cross-references to specific reports are noted.

The coding system shown in the tabulation uses a procedure developed by the Charleston District, Corps of Engineers. Streams are summarized from the mouth of the major river upstream to the report boundary.

USGS data was used to identify the location where the mean annual stream flow is five cfs. Flow records from gaging stations throughout the Charleston District were evaluated and an isoflow map developed to indicate variations in runoff (cfs per square mile). These runoff values were then applied to the appropriate stream drainage areas (as determined from USGS quadrangle maps) so that a flow of five cfs was approximated.

APPENDIX A
STREAM CATALOG

STREAM CODE							STREAM NAME	HEADWATER LOCATION (Mean Flow = 5 cfs)				
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER		LATITUDE (° ' ")	LONGITUDE (° ' ")	STREAM MILES UP	STREAM MILES DOWN	FROM
08	01						Congaree River #					
		01					Buckhead Creek	33 43 30	80 44 15	2.1		Blue Creek
		02					Bates Old River					
			01				Singleton Creek	33 49 35	80 39 55	3.0		Running Creek
			02				Running Creek					
				01			Running Lake ##					
				02			Griffins Creek	33 52 45	80 41 05	0.3		Atlantic Coast Line Railroad Bridge
		03					Cedar Creek	34 00 25	80 49 55	0.5		Dam at Westons Pond
			01				Toms Creek	33 57 25	80 45 20	0.9		U.S. 378 Highway Bridge
				01			Running Lake					
				02			McKenzie Creek	33 49 20	80 42 15	1.6		Toms Creek
				03			Unnamed Tributary	33 49 05	80 44 35	1.2		Toms Creek
				04			Ray Branch	33 53 30	80 43 50	0.4		Atlantic Coast Line Railroad Bridge
			02				Dry Branch	33 55 05	80 46 55	1.3		Atlantic Coast Line Railroad Bridge

Dual code in Report 05.

Dual code in Report 08.

APPENDIX A
STREAM CATALOG

STREAM CODE							STREAM NAME	HEADWATER LOCATION (Mean Flow = 5 cfs)				
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER		LATITUDE (° ' ")	LONGITUDE (° ' ")	STREAM MILES UP	STREAM MILES DOWN	FROM
08	01	03	03				Myers Creek	33 55 20	80 54 00		0.5	Goose Branch
				01			Cabin Branch	33 55 00	80 51 00	2.5		Horsepen Branch
		04					Bates Mill Creek	33 42 40	80 48 40			Confluence-High Hill Creek
		05					Big Beaver Creek	33 44 10	80 57 35			Confluence-Rock Br
			01				Congaree Springs Branch	33 45 20	80 52 00			Confluence-Hildebrand Branch
			02				Little Beaver Creek	33 43 55	80 55 05	1.2		Falls Branch
		06					Mill Creek	33 59 10	80 54 35	2.6		Dam Sunview Lake
			01				Black Lake					
				01			Reeder Point Branch	33 56 50	80 56 20	2.6		Black Lake
		07					Big Sandy Run Creek	33 47 45	81 03 30	3.7		Little Sandy Run
			01				Little Sandy Run	33 46 15	81 01 35	1.8		Big Sandy Run Creek
		08					Savany Hunt Creek	33 50 45	81 03 15	4.2		Congaree River
		09					Toms Branch	33 52 35	81 03 15			Dam at Sweet Bay Pd
		10					Gills Creek	34 03 50	80 53 40	0.8		Bynum Creek
			01				Wildcat Creek	33 59 40	80 57 20	0.7		Gills Creek

APPENDIX A
STREAM CATALOG

STREAM CODE							STREAM NAME	HEADWATER LOCATION (Mean Flow = 5 cfs)				
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER		LATITUDE (° ' ")	LONGITUDE (° ' ")	STREAM MILES UP	STREAM MILES DOWN	FROM
08	01	10	02				Jackson Creek	34 04 45	80 54 40	2.9		Little Jackson Cr
				01			Little Jackson Creek	34 05 15	80 57 00	2.1		Jackson Creek
			03				Bynum Creek	34 03 35	80 53 10	1.1		Gills Creek
		11					Congaree Creek	33 52 15	81 16 45	2.9		West Fork Congaree Creek
			01				Sixmile Creek	33 58 20	81 06 40	2.7		Congaree Creek
			02				Savana Branch	33 56 40	81 08 50	2.8		Congaree Creek
			03				First Creek	33 50 20	81 08 00	3.9		Second Creek
				01			Second Creek					
					01		Bear Creek	33 51 05	81 10 45			Confluence-Hunt Br
			04				Red Bank Creek	33 55 00	81 17 50	1.4		Turkey Creek
				01			Lick Fork Branch	33 55 45	81 11 00	1.2		Bank Creek
			05				West Fork Congaree Cr	33 50 40	81 14 15			Confluence-East Fork
		12					Broad River #	35 34 00	82 16 55	0.3		Toms Creek
		13					Saluda River ##	35 02 50	82 44 50	2.6		Laurel Creek

Dual code in Report 15.

Dual code in Report 14.

APPENDIX B

SUMMARY OF 10 TO 1,000 ACRE LAKES

This appendix is a compilation of lakes from 10 to 1,000 acres which are contained in the Congaree River basin.

This inventory was compiled from the following sources:

1. Inventory of Lakes in South Carolina Ten Acres or More in Surface Area.
2. USGS Quadrangle Maps.

The USGS quadrangle maps were used to locate and to detect lakes that were not listed in the other sources. Actual surface area and gross storage information is supplied where available. The lakes were coded by major stream basin in accordance with other procedures developed for identifying streams. The map data from Source 1 above generally does not permit detailed location of the small lakes. Thus, lakes are coded by basin only as far as the secondary order.

APPENDIX B

SUMMARY OF 10 TO 1,000 ACRE LAKES

STREAM CODE							LAKE NAME OR OWNER	SURFACE AREA (acres)	GROSS STORAGE (acre-ft)	LOCATION BY COUNTY (SOUTH CAROLINA)
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
08	01	01					Wienges Lake	25	160	Calhoun
08	01	04					Spigner	25	140	Calhoun
08	01	04					Raysor	35	224	Calhoun
08	01	04					Prickett	18	101	Calhoun
08	01	04					Raysor	12	67	Calhoun
08	01	04					Raysor	15	84	Calhoun
08	01						Sikes Pond	18	115	Calhoun
08	01						Unnamed Lake	--	--	Calhoun
08	01	05	01				Geigers Pond	18	115	Calhoun
08	01	05	02				Dixon Brown (Ruckers Pond)	10	64	Calhoun
08	01	05	02				Crider	20	128	Calhoun
08	01	05	02				Wannamaker	15	108	Calhoun
08	01	05	02				Rucker	12	77	Calhoun
08	01	05					L. Rast	15	84	Calhoun
08	01	05					L. Rast	18	86	Calhoun
08	01						Saylors Lake	35	210	Calhoun

APPENDIX B

SUMMARY OF 10 TO 1,000 ACRE LAKES

STREAM CODE										
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER	LAKE NAME OR OWNER	SURFACE AREA (acres)	GROSS STORAGE (acre-ft)	LOCATION BY COUNTY (SOUTH CAROLINA)
08	01	07					Jessie Taylor	12	67	Calhoun
08	01	07					Jessie Taylor	10	56	Calhoun
08	01	07					Jack Derrenbacker	10	52	Calhoun
08	01	07					Edens	45	288	Calhoun
08	01	07					Huckababaas Millpond	32	141	Lexington
08	01	07					James Martin	16	86	Lexington
08	01	07					J. Drake Eden	11	53	Lexington
08	01	08					Lexington Acres	72	576	Lexington
08	01	08					State Record Co.	12	58	Lexington
08	01	09					Silver Lake (Old Martin Pond)	20	96	Lexington
08	01	09					Sweet Bay Pond	15	84	Lexington
08	01	09					Gigers Pond	20	112	Lexington
08	01	11	03				Thompsons Pond	24	124	Lexington
08	01	11	03				Cump Barstow	12	67	Lexington
08	01	11	03				Ervin F. Belser	12	67	Lexington

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STREAM CODE							LAKE NAME OR OWNER	SURFACE AREA (acres)	GROSS STORAGE (acre-ft)	LOCATION BY COUNTY (SOUTH CAROLINA)
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
08	01	11	03				Ervin F. Belser	14	78	Lexington
08	01	11	03				Fiegles Pond	11	53	Lexington
08	01	11	03				Gunard Pond	20	112	Lexington
08	01	11	03				Unnamed Lake	--	--	Lexington
08	01	11	01				Springdale Lake	11	44	Lexington
08	01	11	01				Columbia Airport	12	62	Lexington
08	01	11	01				Huffstetter Pond	--	--	Lexington
08	01	11	01				Lemon Pond	--	--	Lexington
08	01	11	02				Pitts Lake	16	83	Lexington
08	01	11	02				Hogan Really	10	64	Lexington
08	01	11	04				Durman Pond (Durham Pond)	19	106	Lexington
08	01	11	04				Willard Arrants (Durham Pond)	17	108	Lexington
08	01	11	04				Crystal Lake (Dr. J.G. McCauley)	50	240	Lexington
08	01	11	04				Red Bank Mill	32	205	Lexington
08	01	11	04				Billy Irwin	12	87	Lexington
08	01	11	04				R. C. Miller	13	63	Lexington

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SUMMARY OF 10 TO 1,000 ACRE LAKES

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REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
08	01	11					James Hunt Pond	65	390	Lexington
08	01	11					J. D. Carroll Pond	10	48	Lexington
08	01	11					Beaverdam Pond	10	56	Lexington
08	01	11					Buford Derrick	16	102	Lexington
08	01	11					Redmonds Pond	17	95	Lexington
08	01	11					Davis Morogne	85	680	Lexington
08	01	11	05				Redmonds Pond	12	67	Lexington
08	01	11	05				Shumperts Millpond	26	146	Lexington
08	01	11	05				Congaree Area Girl Scout Camp	15	72	Lexington
08	01	02	02				Williams Lake	16	60	Richland
08	01	02	02				Community Pond	--	--	Richland
08	01	03	01				Drafts Pond	80	160	Richland
08	01	03	01				Hills Lake	10	40	Richland
08	01	03	01				Scarborough Lake	12	48	Richland
08	01	03	01				McCutchan Lake	10	36	Richland
08	01	03	01				Westons Pond	50	150	Richland
08	01	03	01				Unnamed Lake	--	--	Richland

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SUMMARY OF 10 TO 1,000 ACRE LAKES

STREAM CODE										
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER	LAKE NAME OR OWNER	SURFACE AREA (acres)	GROSS STORAGE (acre-ft)	LOCATION BY COUNTY (SOUTH CAROLINA)
08	01	03	01				Bobby Revere	55	264	Richland
08	01	03	01				Haithcock Pond	60	240	Richland
08	01	03					Duffies Pond	80	160	Richland
08	01	03					Clarkston Pond	40	180	Richland
08	01	03	02				Robert Lindsey	28	280	Richland
08	01	03	02				Curtiss Gwinn	24	173	Richland
08	01	03	02				Unnamed Lake	--	--	Richland
08	01	03	02				Unnamed Lake	--	--	Richland
08	01	03	02				Unnamed Lake	--	--	Richland
08	01	03					B. A. Jordan, Jr.	24	144	Richland
08	01	03					Morrells Pond	60	180	Richland
08	01	03					Unnamed Lake	--	--	Richland
08	01	03					Harmons Pond	50	150	Richland
08	01	03					Unnamed Lake	--	--	Richland
08	01	03					Barney Jordan, Jr.	15	95	Richland
08	01	03					Weston Pond	240	2,300	Richland
08	01	03					Heise Pond No. 1	10	35	Richland

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REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
08	01	03	03				Reveres Pond	20	72	Richland
08	01	03	03				Unnamed Lake	--	--	Richland
08	01	06					Adams Pond	60	240	Richland
08	01	06					Pinewood (Coughmans Pond)	55	165	Richland
08	01	06					Sunview Lake	20	60	Richland
08	01	06					Ulmers Lakes	40	160	Richland
08	01	06					Griffin Lake	20	60	Richland
08	01	06					E. D. Sauls Co.	10	40	Richland
08	01	06					Lower Twin Lakes	18	86	Richland
08	01	10	01				Upper Legion Lake	12	70	Richland
08	01	10	01				Semmes Lake	29	192	Richland
08	01	10					Lake Katherine	80	180	Richland
08	01	10					Forrest Lake	120	600	Richland
08	01	10					Upper Rocky Ford Lake	20	80	Richland
08	01	10					Boyden Arbor Pond	32	128	Richland
08	01	10					Donnie Boyd	28	128	Richland
08	01	10					Jessie A. Rutledge	11	121	Richland
08	01	10	02				Rocky Ford Lake (Carys Lakes)	25	100	Richland

APPENDIX B

SUMMARY OF 10 TO 1,000 ACRE LAKES

REPORT NUMBER	STREAM CODE: MAJOR RIVER	STREAM CODE: PRIMARY	STREAM CODE: SECONDARY	STREAM CODE: TERTIARY	STREAM CODE: FOURTH ORDER	STREAM CODE: FIFTH ORDER	LAKE NAME OR OWNER	SURFACE AREA (acres)	GROSS STORAGE (acre-ft)	LOCATION BY COUNTY (SOUTH CAROLINA)
08	01	10	02				Windsor Lake	--	--	Richland
08	01	10	02				Arcadia Lake	60	300	Richland
08	01	10	02				Spring Lake	--	--	Richland
08	01	10	02				Burnside Lake	15	60	Richland
08	01	10	02				Frank Cooper	75	375	Richland
08	01	10	02				Springwood Lake	32	192	Richland
08	01	10	02				Edwin Cooper	46	330	Richland
08	01	10	02				Edwin Cooper	11	45	Richland
08	01	10	02				W. W. Bruner	10	60	Richland
08	01	10	02				Spring Valley Country Club	22	129	Richland
08	01	10	02				Edwin Cooper	33	236	Richland
08	01	10	02				Sesqui Centenial Park	25	230	Richland
08	01	10	02				Donnie Boyd	14	67	Richland
08	01						Columbia Waterworks	15	60	Richland
08	01	10	02				Unnamed Lake	--	--	Richland
08	01	10	02				Unnamed Lake	--	--	Richland
08	01	10	02				Unnamed Lake	--	--	Richland

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SUMMARY OF 10 TO 1,000 ACRE LAKES

STREAM CODE							LAKE NAME OR OWNER	SURFACE AREA (acres)	GROSS STORAGE (acre-ft)	LOCATION BY COUNTY (SOUTH CAROLINA)
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
08	01	10	02				Unnamed Lake	--	--	Richland
08	01	10	02				Unnamed Lake	--	--	Richland
08	01	10	02				Unnamed Lake	--	--	Richland