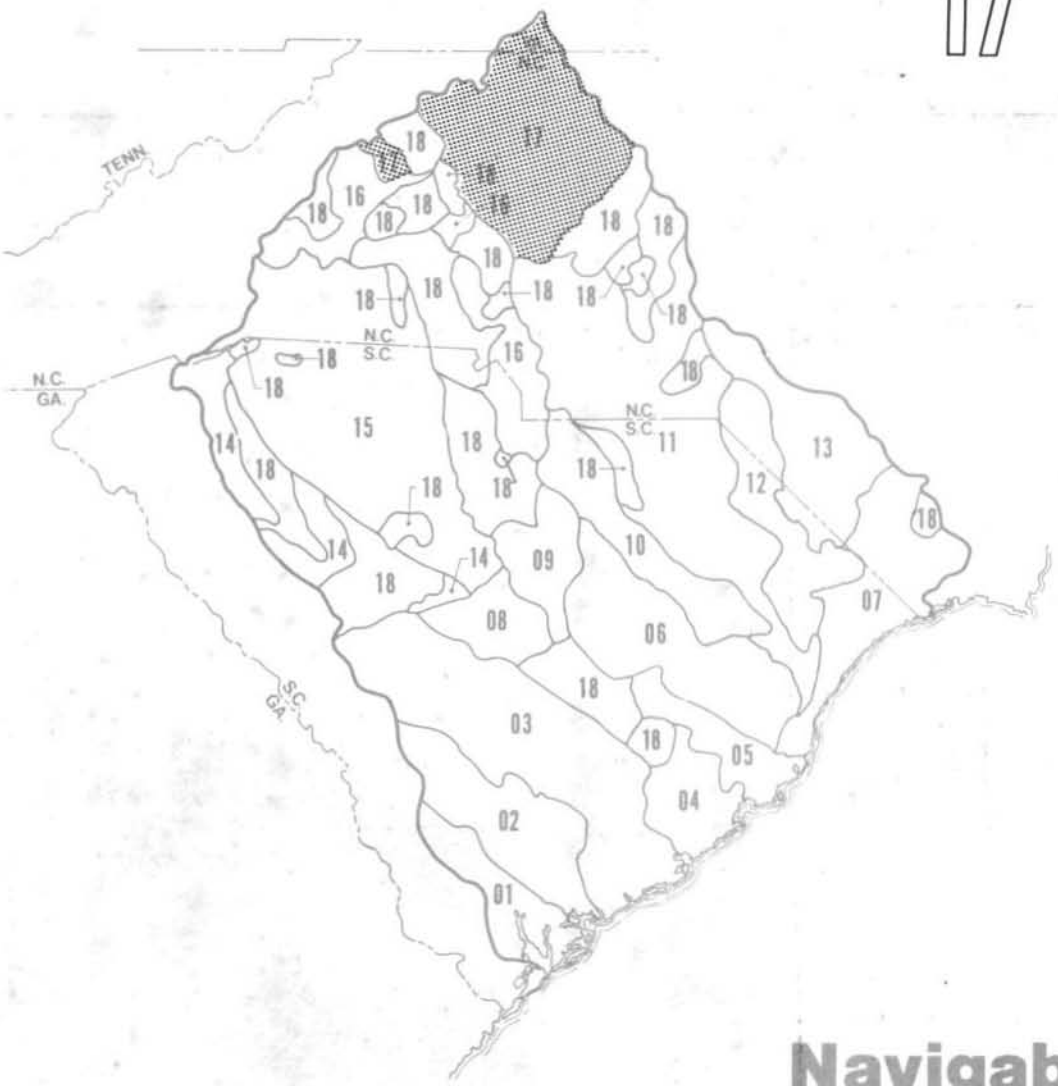
U.S. ARMY CORPS OF ENGINEERS
CHARLESTON DISTRICT
Charleston, South Carolina

YADKIN RIVER BASIN

Report No. 17



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

Number	Title
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 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

The Yadkin River is the major tributary river which forms the Great Pee Dee River where the Uwharrie and the Yadkin Rivers meet. From river mile (R.M.) 232 on the Great Pee Dee River, the Yadkin extends 198 river miles to its headwaters on the eastern slope of the Blue Ridge Mountains in western North Carolina. The shaded area on Plate 17-1 represents the geographic area covered in this report. Badin Lake, Tuckertown Lake, High Rock Lake, and W. Kerr Scott Reservoir are formed by structures on the Yadkin River; this portion of the Yadkin is covered in Report 18. A smaller impoundment, Falls Lake, is downstream of Badin Lake and supplies power for the Alcoa Aluminum plant near Badin, North Carolina.

Four major hydroelectric power dams on the Yadkin River create a succession of continuous impoundments from its mouth at the confluence of the Uwharrie River to above Salisbury, North Carolina. Plates 17-2, 17-3, and 17-4 are detailed maps showing these and other significant physical features in the basin. The towns of Salisbury, Winston-Salem, and Wilkesboro, North Carolina are located in the Yadkin River basin.

The Yadkin River is a steep-sloped river with a 2,000 feet change in elevation from the headwaters to its mouth (198 mile length). The mean discharge of the Yadkin River, where it forms the Great Pee Dee River, is 5,590 cfs from a 4,300 square mile drainage area. There is no tidal effect on the Yadkin River.

Table 1 presents selected physical characteristics of the river basin. Included are approximate values for drainage area, mean water flow, and elevation change. Methodology for determining the numerical values of physical characteristics is defined in the Summary Report.

The location of key stream gaging stations on the Yadkin River is presented in Table 2. Also shown are the mean, minimum, and maximum stream flows at each gaging station.

TABLE 1

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

Length-Mouth to Headwaters[1)]	198.0 miles
Elevation Change[1)]	2,000 feet
Drainage Area	4,300 square miles
Mean Discharge at Mouth	5,590 cfs
Limit of Tidal Influence	None
Length of Present Navigable Waters of the U. S.	None

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1) From the mouth of the Yadkin River (at its confluence with the Uwharrie and Great Pee Dee Rivers) to a remote point in the Yadkin basin where the mean annual flow is five cfs.

* See Bibliography for these references.

TABLE 2

KEY STREAM GAGING STATIONS (1)(4)

Stream	USGS Gaging Station Number	Location Description	Drainage Area (sq.mi.)	Mean Flow (cfs)	Minimum Flow[1] (cfs)	Maximum Flow[2] (cfs)
Yadkin River	02111000	Located at Patterson in Caldwell Co., N. C. on N.C. 268 Highway Bridge	29	49	13	80
Yadkin River	02112000	Located at Wilkesboro in Wilkes Co., N. C. on U. S. 421A Highway Bridge	493	816	337	1,391
Yadkin River	02112250	Located at Elkin in Yadkin Co., N. C. on U. S. 21 Highway Bridge	854	1,423	--	--
Yadkin River	02115360	Located at Enon in Forest Co., N. C. on N.C. Secondary 1525 Highway Bridge	1,680	2,573	--	--
Yadkin River	02116500	Located at Yadkin College in Davidson Co., N. C. on U. S. 64 Highway Bridge	2,280	2,961	1,189	4,876

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

There was one Federal navigation project on the Yadkin River. The project provided for a 2.5 feet deep navigation channel for 33.5 miles above the railroad bridge at Salisbury, North Carolina, but abandonment was recommended in 1926. Table 3 provides a summary of the project. Currently there are no other navigation improvements on the Yadkin River.

TABLE 3

AUTHORIZED FEDERAL NAVIGATION PROJECT (5)

Waterbody	Yadkin River
Work Authorized	2.5 ft deep navigation channel
Date Complete	Abandoned 1926
Project Location	Salisbury, North Carolina, railroad bridge to 33.5 miles upstream
Authorization	Abandon H. Doc. 467, 69th Cong., 1st Session, 1926

Other Navigation Projects

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

SECTION 4 - INTERSTATE COMMERCE

Past

European settlers reached the Yadkin River Valley in the 1740's and 1750's. Little emphasis was placed on water transportation in the area due to the swift and rocky conditions of the streams and the early interest in road building. Although various acts of the General Assembly of North Carolina sought to make the Yadkin a water highway for trade, such efforts were a failure. (6 through 11) Lacking adequate water transportation, the early settlers developed a system of land transportation along the river valleys. The chief markets for the North Carolinians along the Yadkin were Charleston, Camden, and Cheraw in South Carolina. (12)(13)(14)(15)

Commercial activity seems to have lagged even after the Corps of Engineers had commenced improvements authorized in 1879 (and modified in 1887) for a stretch of the river from Salisbury to 33 miles upstream. By 1892, the stream was navigated about 8 months annually by flat and pole boats. This limited commerce activity prompted the Secretary of War to discontinue engineering operations in 1892. (16)(17)

Interest in improving the navigation of the Yadkin revived in 1933, seven years after the Corps had recommended the abandonment of the project first authorized in 1879. In a series of reports, however, it became obvious that, while the area tributary to the Yadkin-Great Pee Dee and Rocky Rivers is a well developed industrial area, neither the raw materials used nor the products manufactured lend themselves to transportation by water. By 1949, the Corps observed that there was an adequate railway and highway system which provided the necessary transportation in the upper Yadkin basin. (18)(19)

Railroad and highway networks, and their reasonably attractive transportation rates, provided more flexible and competitive modes of transportation than did river transportation. Then, too, the construction on the Yadkin River of hydroelectric dams in the 1920's and 1930's

provided a vastly more efficient use of the river than the most ambitious project for navigational improvement in the 19th Century. (18)(19)(20)

Present

Currently the Yadkin River is not being used as an artery of interstate commerce. (2)(5)

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 Yadkin River and its tributaries for interstate commerce in future years is difficult to predict. However, some analyses and judgments have been made concerning future commerce to assist in establishing navigation classifications.

As discussed later in Section 6, the Yadkin River is not recommended as "navigable waters of the U. S." The future potential for the stream to be utilized for shipment of goods into other states is not anticipated. This is due in part to heavy dependence on other forms of transportation including the interstate highway system, railroads, and air transport. In addition, the river is dammed by four major hydroelectric dams from its mouth at the Uwharrie River to Salisbury, North Carolina. Navigation around these dams is not possible and there are no current plans to develop navigation facilities at the dams. The river is shoaly and steeply sloped beyond the impoundment effects of the dams.

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 no decisions which apply specifically to navigation in the Yadkin River basin.

North Carolina State Court Cases

The issue of navigability has arisen in a number of actions in the state courts of North Carolina. However, most of these cases concern coastal areas not within the boundary of the Charleston District.

North Carolina does not follow the English common-law rule that streams are navigable only as far as tidewater extends. Thus, North Carolina conforms to the majority rule within the U. S.

A review indicates no North Carolina state court decisions which relate to navigation in the Yadkin River basin. (21)

Recent Federal Litigation

A review of recent Federal litigation concerning the Charleston District did not reveal any court actions in the Yadkin River basin relating to 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 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.

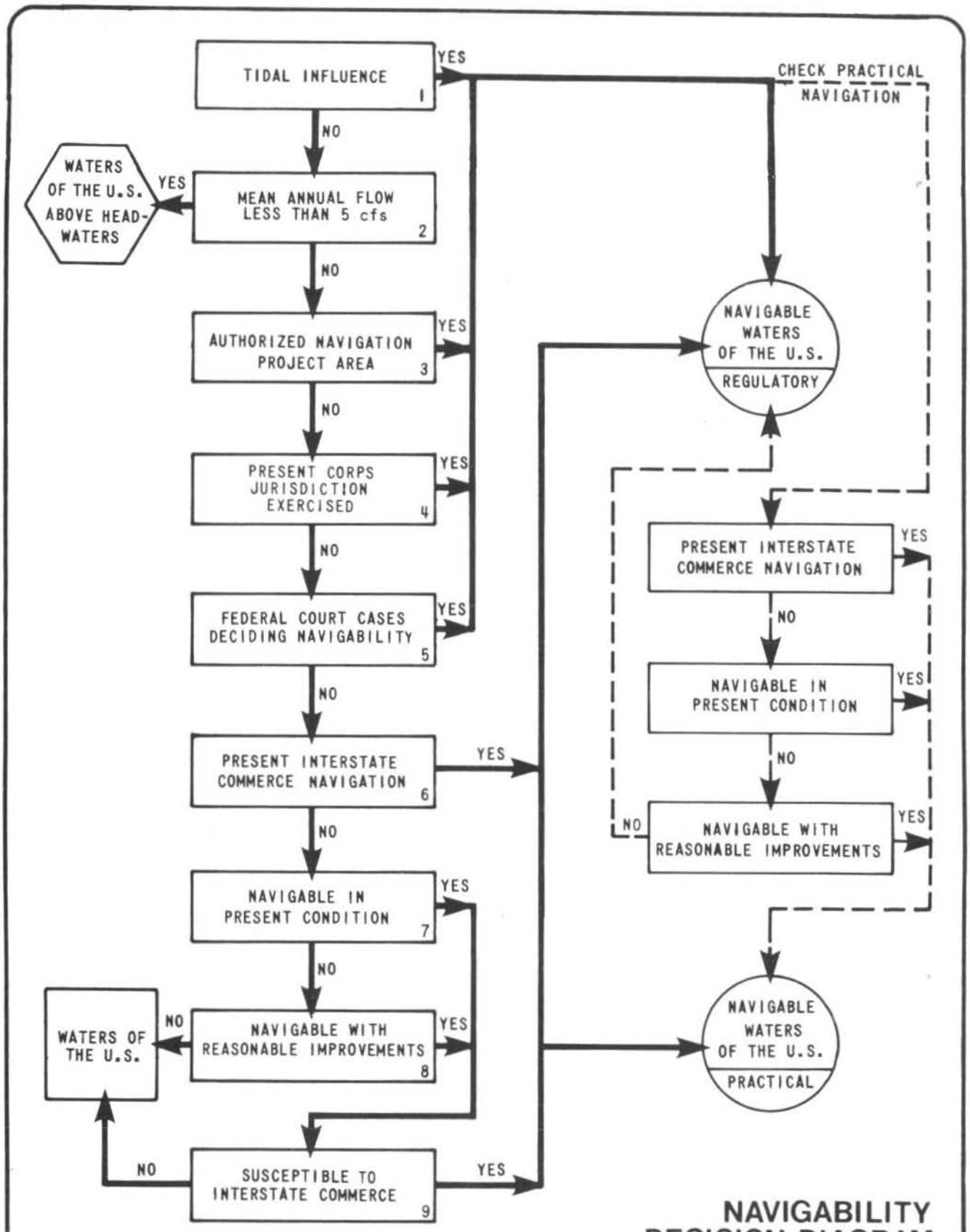
SECTION 6 - NAVIGATION OBSTRUCTIONS AND CLASSIFICATIONS

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

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). (2) 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, neither the Yadkin River nor any of its tributaries are classified as "navigable waters of the U. S." (2)

Historically Navigable Waters

An attempt was made to make the Yadkin River navigable for commercial river traffic from Salisbury, North Carolina to 33 miles upstream (see Plates 17-2 and 17-4 for location). This effort was abandoned although flat and pole boats navigated the river as late as 1892 (see Section 4).

Recommended and Practical Navigable Waters of the U. S.

The Yadkin River and its tributaries are not recommended for classification as "navigable waters of the U. S." because navigation by commercial river traffic is not practical. From its mouth at the Uwharrie and Great Pee Dee Rivers to Salisbury, North Carolina, the river is dammed by four major hydroelectric facilities: Falls, Badin, Tuckertown, and High Rock Lake Dams. Navigation around these major structures is not possible and there are no current plans to develop navigation facilities at the dams. Beyond the impoundment effects of the dams, the river is steeply sloped which precludes navigation. Field

inspection of the Yadkin River in a steep-sloped area verified that navigation is not possible under these conditions because the river, although wide enough, has a low mean water depth (less than 7 feet) and a high velocity. Rock shoals were apparent just under the surface of the water. In addition, as indicated in Report II, the Great Pee Dee River is not recommended as practically navigable or as "navigable waters of the U. S." at its confluence with the Yadkin and Uwharrie Rivers.

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.

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 water flow points associated with the Yadkin River. Each point is located by stream code, stream name, latitude and longitude, and a mileage reference.

Appendix B lists the lakes located in the Yadkin 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.

SECTION 7 - CONCLUSIONS AND RECOMMENDATIONS

Five classifications of navigation on streams in the Yadkin 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 locations 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. Presently there are no streams classified as "navigable waters of the U. S." in the Yadkin River basin.
2. The historical limit of navigation on the Yadkin River is from Salisbury, North Carolina to a point 33 miles upstream.
3. No practical limit of navigation is recommended for the Yadkin River or its tributaries. These streams are all considered to be non-navigable for interstate commerce purposes.
4. No streams in the basin are recommended for classification as "navigable waters of the U. S."
5. All streams in the Yadkin River basin are recommended for classification as "waters of the U. S." throughout their entire length.

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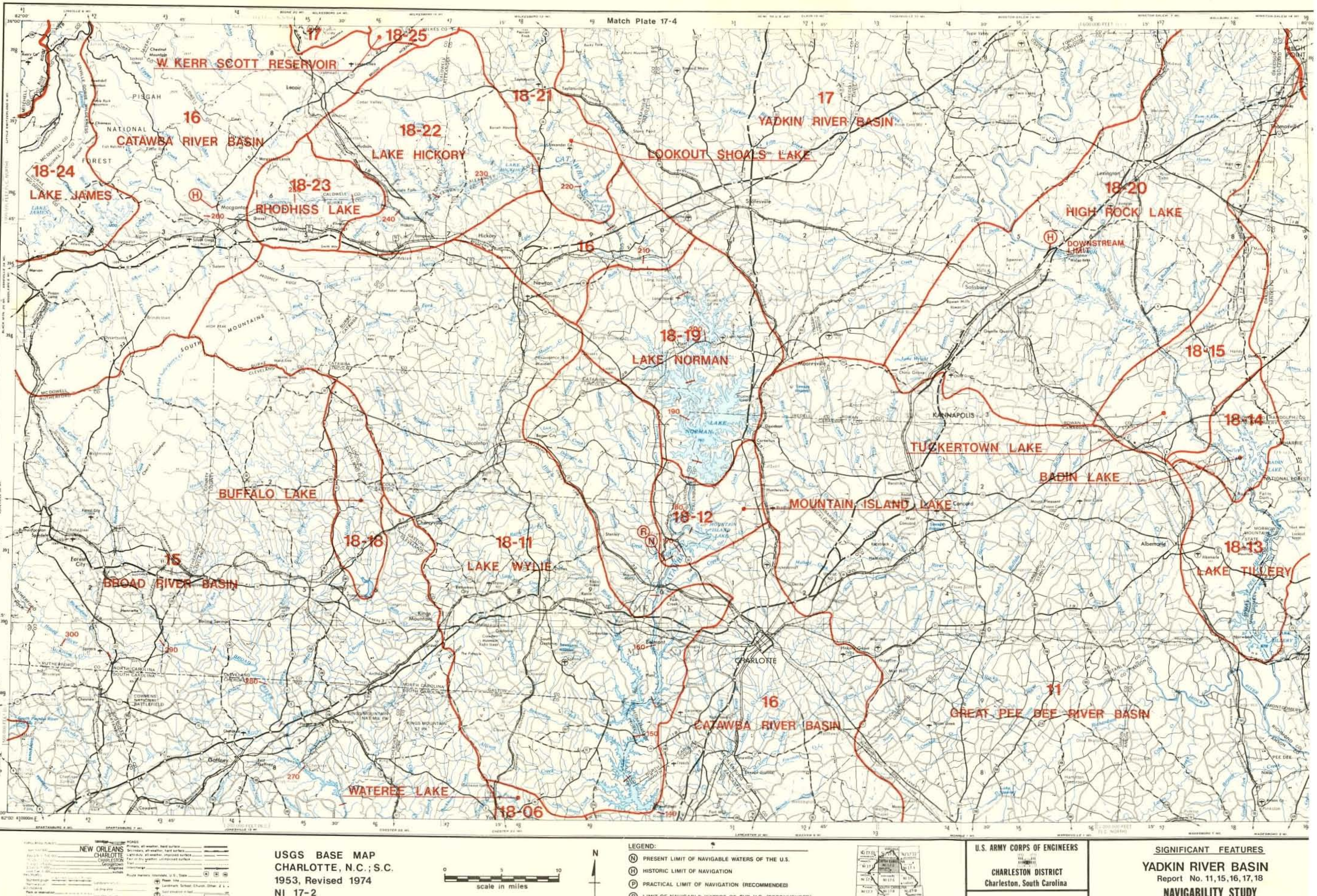

USGS BASE MAP
CHARLOTTE, N.C.; S.C.
1953, Revised 1974
NI 17-2

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

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

STANLEY CONSULTANTS

SIGNIFICANT FEATURES
YADKIN RIVER BASIN
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NAVIGABILITY STUDY
Plate 17-2

Match Plate 17-2

18-13

LAKE TILLERY

GREAT PEE DEE RIVER BASIN

BLEWETT FALLS LAKE

18-09

LUMBER RIVER BASIN

FORT BRAGG MILITARY RESERVATION

HIGH POINT

DURHAM

RALEIGH

Cary

Apex

Pittsboro

Sanford

Siler City

Asheboro

North Asheboro

Troy

Carthage

Southern Pines

Aberdeen

FAYETTEVILLE

Fayetteville

Smithfield

GOLDSBORO

Clinton

UWHARRIE NATIONAL FOREST

NEW ORLEANS
CHARLOTTE
CHARLESTON
Georgetown
Kingstree

USGS BASE MAP
RALEIGH, N.C.
1953, Revised 1969
NI 17-3

scale in miles 0 5 10

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)
- RIVER MILE

1977

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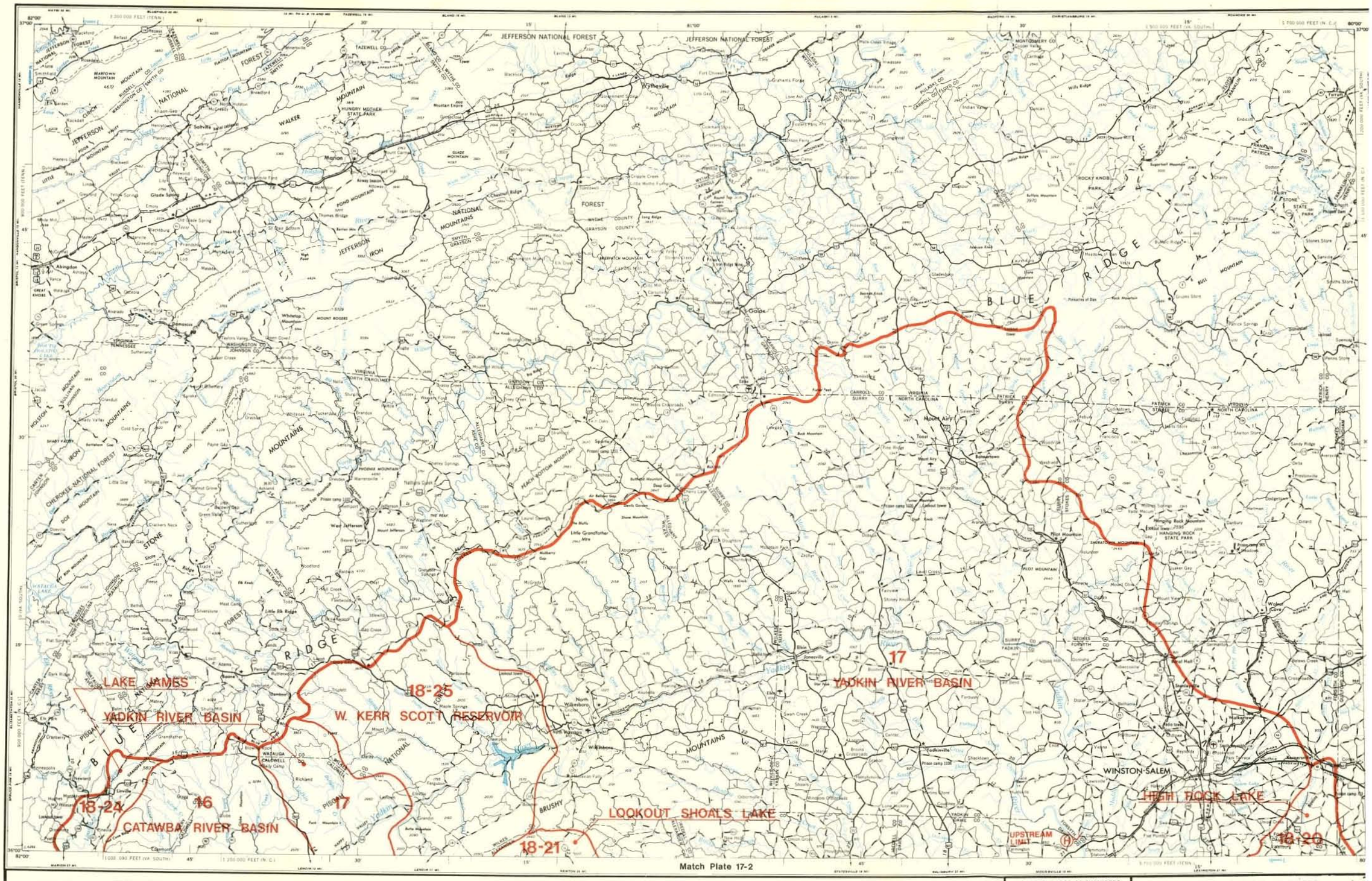
YADKIN RIVER BASIN
Report No. 11, 13, 17, 18
NAVIGABILITY STUDY
Plate 17-3



USGS BASE MAP
WINSTON SALEM, N.C.; VA.; TENN.
1953 Revised 1972
NJ-17-11

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)
- 20 RIVER MILE

1977

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CHARLESTON DISTRICT
Charleston, South Carolina

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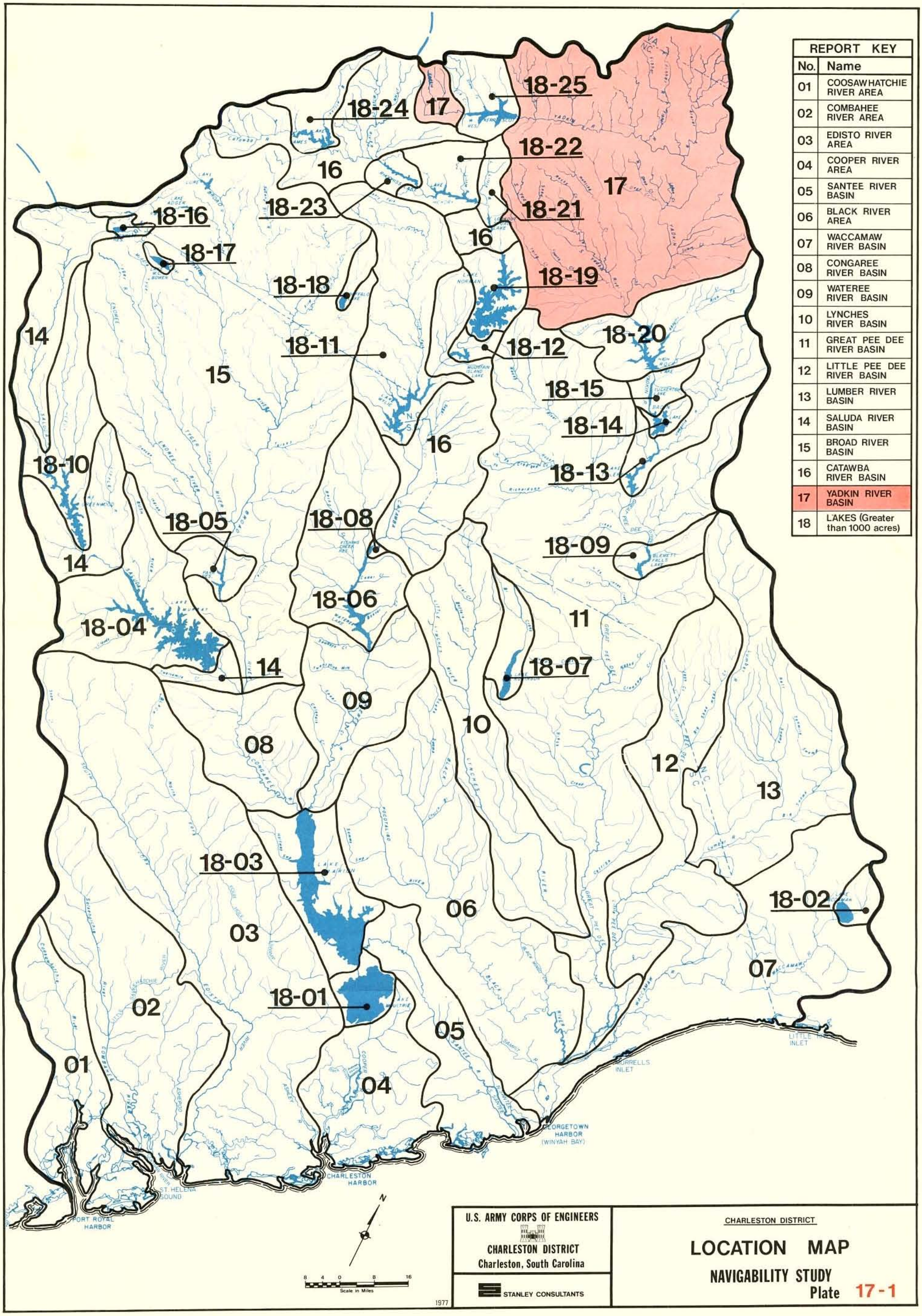
SIGNIFICANT FEATURES

YADKIN RIVER BASIN
Report No. 16, 17, 18

NAVIGABILITY STUDY
Plate 17-4



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)

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

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CHARLESTON DISTRICT

LOCATION MAP

NAVIGABILITY STUDY

Plate 17-1

APPENDIX A
STREAM CATALOG

This appendix presents a coded listing of all streams located in the Yadkin River basin having a mean annual flow greater than or equal to five cfs. This summary does not include secondary streams in the drainage areas for Badin Lake, Tuckertown Lake, High Rock Lake, and W. Kerr Scott Reservoir (18-14, 18-15, 18-20, and 18-25, respectively); these stream codes are presented in Report 18.

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
17	01						Yadkin River ##	36 06 50	81 37 50	1.5		Bailey Camp Creek
		01					Uwharrie River #	35 52 52	79 59 54		0.3	N.C. 62 Highway Bridge
		02					Beaverdam Creek #	35 31 40	80 06 22	1.3		Badin Lake
		03					Riles Creek #	35 31 10	80 17 00	5.1		Curtail Creek
		04					Flat Creek #	35 32 42	80 13 10	1.0		Yadkin River
		05					Cabin Creek #	35 35 00	80 07 40	5.4		Yadkin River
		06					Lick Creek #	35 40 45	80 06 30			Confluence-West Br
		07					Panther Creek #	35 35 08	80 17 25	1.2		High Rock Lake
		08					Secondary Creek #	35 31 45	80 25 35	3.9		U.S. 52 Highway Bridge
		09					Unnamed Tributary #	35 36 25	80 23 35	0.9		N.C. Secondary 1004 Highway Bridge
		10					Crane Creek #	35 36 00	80 28 50	3.5		U. S. 52 Highway Bridge
		11					Town Creek #	35 37 08	80 31 05		2.6	I-85 Highway Bridge
		12					Grants Creek #	35 35 05	80 35 10		0.4	N. C. 152 Highway Bridge

Dual code in Report 18. ## Dual code in Report 11.

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
17	01	13					Deals Creek #	35 44 45	80 26 35	1.1		Yadkin River
		14					South Potts Creek #	35 45 40	80 22 40	1.9		U.S. 52 Highway Bridge
		15					North Potts Creek #	35 47 20	80 20 00	1.2		U.S. 52 Highway Bridge
		16					Swearing Creek #	35 51 10	80 16 40	1.6		Weightman Creek
		17					Abbotts Creek #	36 03 10	80 05 30	2.5		U.S. 311 Highway Bridge
		18					Pounder Fork #	35 47 25	80 12 10	0.6		U.S. 64 Highway Bridge
		19					Four Mile Branch #	35 44 40	80 11 05	2.8		Boss Branch
		20					Flat Swamp #	35 44 15	80 06 30	6.2		Dry Branch
		21					South Yadkin River	36 00 10	81 07 15	4.7		Beaverdam Creek
			01				Second Creek					
				01			Withrow Creek	35 39 37	80 48 40	0.4		Shinns Creek
					01		Beaverdam Creek	35 42 50	80 42 25	2.6		Withrow Creek
					02		Weathers Creek	35 39 35	80 48 40	0.4		Shinns Creek
				02			Back Creek	35 37 35	80 45 30	8.2		Sills Creek

Dual code in Report 18.

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
17	01	21	01	02	01		Sills Creek	35 36 25	80 43 05	1.2		N.C. 150 Highway Bridge
				03			Sloan Creek					
					01		Kerr Creek	35 36 35	80 40 25	2.9		N.C. 150 Highway Bridge
			02				Fourth Creek	35 50 30	80 57 30	1.9		N.C. 115 Highway Bridge
				01			Third Creek	35 51 40	81 03 30	6.8		Brady Branch
					01		I-L Creek	35 43 25	80 50 45	1.6		Third Creek
					02		Back Creek	35 44 58	80 56 20	2.2		Third Creek
				02			Morrison Creek	35 49 20	80 55 40	2.4		Gregory Creek
			03				Bear Creek	35 57 15	80 38 30	3.0		Little Bear Creek
			04				Hunting Creek	36 06 50	81 06 25	2.6		N.C. Secondary 2430 Highway Bridge
				01			Long Branch	35 57 45	80 44 45	1.1		Hunting Creek
				02			North Little Hunting Cr	36 08 20	80 54 55	4.9		Dobbins Creek
					01		Dobbins Creek	36 08 55	80 51 20	2.4		North Little Hunting 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
17	01	21	04	03			Osborn Creek	36 04 50	80 53 20	2.6		Hunting Creek
				04			Brushy Creek	36 02 55	80 55 45			Confluence-Pasture Bottom Creek
				05			Little Hunting Creek	36 07 00	80 59 40			Confluence-Bear Br
				06			Brussels Creek	36 04 13	80 59 50	1.2		Hunting Creek
				07			Unnamed Tributary	36 05 25	81 01 35	1.2		Hunting Creek
				08			Unnamed Tributary	36 05 45	81 05 10	2.1		Hunting Creek
			05				Little Creek	35 52 10	80 39 50	2.7		South Yadkin River
			06				Bell Branch	35 50 05	80 43 15	1.5		South Yadkin River
			07				Fifth Creek	35 51 00	80 51 20		0.1	U.S. 21 Highway Bridge
				01			Beaver Creek	35 49 55	80 48 02	2.4		Fifth Creek
			08				Dutchman Creek	35 55 50	80 47 30	0.4		U.S. 21 Highway Bridge
			09				Rocky Creek	36 02 20	80 05 40	2.6		N.C. Secondary 1001 Highway Bridge
				01			Patterson Creek	35 56 45	80 55 25	3.3		Little Rocky Creek
					01		Olin Creek	35 58 15	80 54 00	4.7		I-77 Highway Bridge

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
17	01	21	09	01	02		Little Rocky Creek	35 55 15	80 54 10	1.1		Patterson Creek
				02			Camel Branch	35 58 20	80 50 20	0.5		Rocky Creek
				03			Dishmon Creek	36 01 50	80 59 45	1.5		Rocky Creek
				04			Unnamed Tributary	36 02 45	81 04 40	0.9		Rocky Creek
			10				Snow Creek	35 58 30	81 00 20	1.8		Dripoff Branch
			11				Wallace Creek	35 57 10	81 07 28	1.5		Greasy Creek
			12				Mill Creek	35 58 55	81 04 10	1.4		South Yadkin River
		22					Farabee Creek	35 46 50	80 27 05			Confluence-Frost Cr
		23					Cody Creek	35 50 07	80 29 15			Confluence-Peter Cr
		24					Dutchman Creek	36 02 00	80 40 42	3.1		Steelman Creek
			01				Ellsworth Creek	35 53 25	80 29 40	0.9		Dutchman Creek
			02				Elisha Creek	35 55 07	80 33 00			Confluence-Nelson Cr
			03				Buffalo Creek	35 55 20	80 29 45	0.3		Dutchman Creek
			04				Cedar Creek	36 01 50	80 33 17	1.6		N.C. 801 Highway Bridge
				01			Sugar Creek	35 58 25	80 30 40	1.6		Dutchman Creek
			05				Steelman Creek	36 02 10	80 39 10	1.1		Dutchman Creek
		25					Mill Creek	35 49 40	80 25 37	0.2		Yadkin River

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
17	01	26					Dykers Creek	35 52 15	80 21 45	1.9		Yadkin River
		27					Carter Creek	35 54 30	80 25 20	1.7		Yadkin River
		28					Reedy Creek	35 54 47	80 17 45	2.0		Huffmans Creek
		29					Muddy Creek	36 15 28	80 19 25	3.4		Barkers Creek
			01				Fryes Creek	35 57 35	80 16 05	1.7		N.C. 150 Highway Bridge
			02				Miller Creek	35 59 15	80 18 55	1.1		Yadkin River
			03				South Fork Muddy Creek	36 02 25	80 10 20		0.2	Sawmill Branch
				01			Leak Creek	36 00 35	80 16 00	0.2		South Fork Muddy Cr
				02			Fiddlers Creek	36 03 30	80 10 20		0.9	U.S. 301 Highway Bridge
			04				Salem Creek					
				01			Brushy Fork	36 07 05	80 12 45	0.5		Frazier Creek
					01		Frazier Creek	36 07 05	80 11 45	1.2		Brushy Fork
				02			Lowrey Creek	36 07 30	80 09 45			Confluence-Martin Mill Creek
				03			Kerners Mill Creek	36 07 05	80 07 55			Confluence-Smith Cr

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
17	01	29	05				Little Creek	36 03 25	80 20 00	2.4		Muddy Creek
			06				Silas Creek	36 06 10	80 18 25	0.1		N.C. 150 Highway Bridge
			07				Reynolds Creek					
				01			Tomahawk Creek	36 05 45	80 22 25	0.5		Reynolds Creek
			08				Mill Creek	36 10 55	80 13 35			Confluence-Fivemile Branch
			09				Mill Creek No. 3	36 11 35	80 21 35	1.3		Muddy Creek
		30					Carter Creek					
			01				Bailey Creek	35 58 25	80 25 40	0.1		Smith Creek
		31					Blanket Creek	36 01 47	80 24 35			Confluence-Lasater Lake
		32					Ellison Creek	36 02 47	80 26 55			Confluence-Hauser Cr
		33					Double Creek	36 03 50	80 27 50			Confluence-Panther Creek
		34					Turner Creek	36 03 50	80 32 50	0.4		Roby Creek
		35					Deep 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
17	01	35	01				South Deep Creek	36 10 45	80 48 00			Confluence-Arnold Branch
				01			Harmon Creek	36 05 15	80 36 15			Confluence-Spiker Cr
				02			Unnamed Tributary	36 05 35	80 42 55	1.2		South Deep Creek
				03			Cranberry Creek	36 08 45	80 43 30	0.9		Piney Branch
				04			Unnamed Tributary	36 08 05	80 47 12	0.9		South Deep Creek
			02				North Deep Creek	36 11 25	80 42 50	2.6		U.S. 601 Highway Bridge
				01			Unnamed Tributary	36 12 45	80 42 25	0.9		U.S. 601 Highway Bridge
		36					Forbush Creek	36 10 50	80 36 55	1.9		Siloam Road
			01				Logan Creek	36 11 40	80 32 55	1.7		N.C. Secondary 1578 Highway Bridge
			02				Little Forbush Creek	36 09 25	80 34 05	0.5		Forbush Creek
		37					Bashavia Creek	36 09 35	80 24 30			Confluence-Hunters Creek
		38					Fries Creek	36 10 55	80 25 50	1.1		Yadkin River

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
17	01	39					Unnamed Tributary	36 11 25	80 27 45	1.6		Yadkin River
		40					Old Richmond Creek	36 13 10	80 25 45	0.2		Yadkin River
		41					Little Yadkin River					
			01				Crooked Run Creek	36 15 50	80 25 05	2.0		Little Yadkin River
			02				Danbury Creek	36 18 35	80 22 45	1.4		Little Yadkin River
			03				West Prong Little Yadkin River	36 21 45	80 24 25	0.7		N.C. Secondary 1136 Highway Bridge
			04				East Prong Little Yadkin River	36 20 45	80 20 55	1.3		N.C. Secondary 1168 Highway Bridge
		42					Grassy Creek	36 18 55	80 27 10	2.0		N.C. Secondary 2048 Highway Bridge
		43					Hall Creek	36 15 20	80 30 50	0.3		Yadkin River
		44					Ararat River	36 37 45	80 29 20			Confluence-Thompson Creek
			01				Bull Creek	36 22 35	80 34 35	2.5		Yadkin River
			02				Toms Creek	36 27 30	80 28 15	2.4		N.C. Secondary 1812 Highway Bridge
				01			Chinquapin Creek	36 24 55	80 27 35	1.2		Toms Creek
			03				Flat Shoal Creek	36 25 20	80 32 25	2.0		Ararat 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
17	01	44	04				Stoney Creek	36 26 55	80 34 12	0.5		N.C. Secondary 2015 Highway Bridge
			05				Rutledge Creek	36 28 35	80 33 28	0.9		U.S. 52 Highway Bridge
			06				Stewarts Creek	36 35 00	80 46 10			Confluence-Turkey Creek
				01			Pauls Creek	36 37 50	80 41 55	1.3		Garners Creek
					01		Little Pauls Creek	36 35 15	80 42 50			Confluence-Spring Branch
			07				Lovills Creek	36 38 25	80 38 00	0.1		Elk Spur Branch
				01			Halls Branch	36 35 15	80 39 15	0.6		Lovills Creek
				02			Elk Spur Branch	36 38 45	80 39 05	1.2		Lovills Creek
			08				Johnson Creek	36 37 25	80 36 45	1.2		East Fork Johnson Creek
				01			East Fork Johnson Cr	36 37 45	80 34 45	2.6		Johnson Creek
		45					Hogan Creek	36 19 20	80 35 05	3.9		Yadkin River
		46					West Double Creek	36 17 25	80 38 30	0.8		Yadkin River
			01				East Double Creek	36 18 15	80 37 30	1.6		West Double Creek
		47					Falls Creek	36 14 20	80 38 05	1.7		Yadkin River

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
17	01	48					Fisher River	36 31 55	80 52 00			Confluence-Gully Cr
			01				Cody Creek					
				01			King Creek	36 20 40	80 43 20	0.5		U.S. 601 Highway Bridge
				02			Unnamed Tributary	36 23 00	80 44 20	2.0		Cody Creek
			02				Beaver Creek	36 22 15	80 38 35	0.5		N.C. Secondary 2200 Highway Bridge
			03				Jackson Creek					
				01			Cooks Creek	36 26 35	80 41 40	1.3		Jackson Creek
			04				Little Fisher River	36 32 05	80 47 55	5.5		Ring Creek
				01			Beaverdam Creek	36 28 25	80 46 55	1.1		Wood Fork
				02			Ring Creek	36 30 17	80 45 50	1.6		Little Fisher River
			05				Roaring Fork	36 31 15	80 53 10	2.0		Rainey Creek
				01			Rainey Creek	36 29 55	80 52 45			Confluence-Mill Cr
		49					Mitchell River	36 26 10	80 57 50	1.6		Stewart Fork Mitchell River
			01				Snow Creek	36 21 15	80 47 00	2.0		N.C. Secondary 1122 Highway Bridge
				01			Little Creek	36 20 10	80 47 45	1.4		Snow 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
17	01	49	02				Camp Creek	36 17 50	80 49 00			Confluence-Brendle Branch
			03				South Fork Mitchell R	36 23 20	80 56 15	1.2		N.C. Secondary 1328 Highway Bridge
				01			North Prong Mitchell R	36 23 30	80 55 00	1.7		South Fork Mitchell River
			04				Mill Creek	36 24 05	80 51 45	1.3		Mitchell River
			05				Christian Creek	36 27 45	80 52 40	1.6		Robertson Creek
			06				Bulter Creek	36 26 50	80 54 00	1.3		Mitchell River
			07				Saddle Mountain Creek	36 27 40	80 55 50	2.2		Chadric Creek
			08				Mill Creek	36 27 05	80 56 05	1.1		Mitchell River
		50					Sandyberry Creek					
			01				Jonesville Creek	36 14 10	80 50 00	0.3		Sandyberry Creek
		51					Elkin Creek	36 22 00	80 57 30			At N.C. Secondary 1002 Highway Bridge
			01				Grassy Creek	36 17 10	80 51 35	1.1		Elkin Creek
			02				Grassy Fork	36 18 15	80 55 10	1.1		Elkin Creek
		52					Little Elkin Creek	36 17 10	80 56 35	0.9		N.C. Secondary 1931 Highway Bridge

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
17	01	53					West Swam Creek	36 12 05	80 55 15	1.6		East Swan Creek
			01				East Swan Creek	36 12 05	80 53 55	0.7		West Swan Creek
		54					Grays Creek	36 11 35	80 57 13	0.7		Yadkin River
		55					Big Bugaboo Creek	36 17 15	80 58 40	1.7		N.C. Secondary 1931 Highway Bridge
			01				Little Bugaboo Creek	36 15 00	80 58 45	0.4		N.C. Secondary 2014 Highway Bridge
		56					Briar Creek	36 10 20	81 00 50	2.5		Yadkin River
		57					Roaring River					
			01				East Prong Roaring R					
				01			Camp Branch	36 16 50	81 04 00	0.9		East Prong Roaring River
				02			Little Sandy Creek	36 19 00	81 01 45	0.4		Sparks Creek
					01		Sparks Creek	36 20 35	80 59 45	0.8		York Creek
				03			Big Sandy Creek	36 22 35	81 02 20	2.7		East Prong Roaring River
				04			Bullhead Creek	36 24 50	81 04 10	1.0		Rich Mountain Creek
				05			Stone Mountain Creek	36 23 50	81 03 10	0.5		East Prong Roaring River

APPENDIX A
STREAM CATALOG

STREAM CODE								HEADWATER LOCATION (Mean Flow = 5 cfs)				
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER	STREAM NAME	LATITUDE (° ' ")	LONGITUDE (° ' ")	STREAM MILES UP	STREAM MILES DOWN	FROM
17	01	57	02				Camp Branch	36 16 15	81 05 15	0.7		Roaring River
			03				West Prong Roaring R	36 21 20	81 11 10			Confluence-Pike Cr
			04				Middle Prong Roaring R					
				01			Double Creek					
					01		Harris Creek	36 23 20	81 06 50	2.3		Double Creek
				02			Lovelace Creek	36 23 45	81 08 10	1.1		Longbottom Road
				03			Bell Branch Creek					
					01		Basin Creek	36 24 30	81 09 45			Confluence-Caudill Branch
						01	Cove Creek	36 23 30	81 10 10	0.5		Basin Creek
		58					Fishing Creek	36 08 35	81 05 25			At Old U.S. 421 Highway Bridge
			01				Unnamed Tributary	36 10 00	81 02 30	1.7		Fishing Creek
		59					Rock Creek	36 12 40	81 04 40	0.4		N.C. 268 Highway Bridge
		60					Mulberry Creek					
			01				Joshua Creek	36 20 35	81 13 30			Confluence-Dungeon Creek
		61					Cub Creek	36 05 05	81 10 20	1.5		Country Club Road

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
17	01	61	01				Little Cub Creek	36 08 35	81 08 05	0.6		Cub Creek
		62					Reddies River					
			01				Lousy Creek	36 12 40	81 10 50	1.4		Reddies River
			02				Unnamed Tributary	36 12 50	81 13 10	0.9		Reddies River
			03				North Fork Reddies R					
				01			Darnell Creek	36 19 50	81 18 50	2.6		Wingler Creek
				02			Osborn Creek	36 20 25	81 17 05	1.1		North Fork Reddies R
			04				Middle Fork Reddies R					
				01			Bowlin Creek	36 19 25	81 20 35			Confluence-Bear Den Branch
				02			Roten Creek	36 20 25	81 20 50			Confluence-Stanley Branch
			05				South Fork Reddies R	36 16 20	81 20 10	1.3		Old Taylor Branch
				01			Old Taylor Branch	36 15 20	81 19 45	0.2		South Fork Reddies R
		63					Moravian Creek	36 03 50	81 10 30	0.7		N.C. 16 Highway Bridge
			01				West Prong Moravian Cr	36 03 40	81 14 10	1.0		Falls Road Bridge
		64					Fish Dam Creek	36 08 50	81 14 35	1.5		Yadkin River

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
17	01	65					Warrior Creek #					
		66					Lewis Fork #					
		67					Stony Fork	36 12 05	81 28 05	3.3		Laurel Branch
			01				Left Prong	36 10 50	81 29 30			Confluence-Wildcat Creek
		68					Beaver Creek	36 01 35	81 20 40	5.7		Yadkin River
		69					Elk Creek	36 11 55	81 34 15			Confluence-Cook Br
			01				Dugger Creek	36 07 20	81 30 30			Confluence-Little Dugger Creek
			02				Laurel Creek	36 10 40	81 32 20			Confluence-North & South Fork Laurel Cr
		70					Kings Creek	35 59 40	81 23 50	0.5		Blue Creek
			01				Little Kings Creek	36 01 10	81 26 05	2.1		Zacks Fork Rd Bridge
		71					Laytown Creek	36 04 20	81 28 15	2.1		Yadkin River
		72					Buffalo Creek	36 07 40	81 36 05			Confluence-Hillside Branch
			01				Joes Creek	36 08 05	81 33 30			Confluence-Tonys Br
		73					Preston Creek	36 02 15	81 35 50	0.5		Wolfpen Creek

Dual code in Report 18.

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 Yadkin River basin. This summary does not include the small lakes in the drainage areas for Badin Lake, Tuckertown Lake, High Rock Lake, and W. Kerr Scott Reservoir (18-14, 18-15, 18-20, and 18-25, respectively); they are presented in Report 18.

This inventory was compiled from the following sources:

1. Hydrologic Information Storage and Retrieval System, Register of Dams for North Carolina (computer printout).
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. For consistency with other reports in this navigability study, the small 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 (NORTH CAROLINA)
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
17	01	29	04				Angel Dam 01 (C. S. Angel)	15	--	Forsyth
17	01	29	04				Angel Dam 02 (C. S. Angel)	20	--	Forsyth
17	01	01	10				Asheboro City Lake Dam 02 (McCrary, Charles W.)	14	--	Randolph
17	01	01	10				Asheboro City Lake Dam 03 (Burch, John)	30	--	Randolph
17	01	01	10				Asheboro City Lake Dam 04 (Back Creek Lake-Lucas, Clyde L.)	250	--	Randolph
17	01	01	10				Asheboro Country Club Lake	20	--	Randolph
17	01	21	02				Barium Springs Lake (Third Creek W. S. Dam 20)	28	212	Iredell
17	01	21	02				Barium Springs Lake (Third Creek W. S. Dam 18)	32	208	Iredell
17	01	21	04				Barnard Millpond	15	--	Iredell
17	01	21	03				Baucom Pond	10	56	Davie
17	01	01					Bob Cat Acres Lake	10	--	Randolph
17	01						Burlington Mills Lake	24	--	Davie

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 (NORTH CAROLINA)
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
17	01	17	01				City Lake-City of Lexington (Lexington City Lake)	63	--	Davidson
17	01						Clemons Dam (Duke Power) (Idols Dam)	35	--	Forsyth
17	01						Cloofelters Lake	10	--	Davidson
17	01	16					Cobles Reservoir	27	--	Davidson
17	01	01					Colonial Country Club Lake	18	--	Randolph
17	01	01					Colonial Country Club Lake	12	--	Randolph
17	01						Conrad Pond	10	56	Forsyth
17	01						Dan Nichols Park Lake	10	--	Davidson
17	01	35	01				Deep Creek W. S. Dam 06B	39	443	Yadkin
17	01	35	02				Deep Creek W. S. Dam 10	45	407	Yadkin
17	01	35	01				Deep Creek W. S. Dam 12	24	--	Yadkin
17	01	35	02				Deep Creek W. S. Dam 14	17	178	Yadkin
17	01	35	02				Deep Creek W. S. Dam 15B	24	285	Yadkin
17	01	35	02				Deep Creek W. S. Dam 16A	55	535	Yadkin

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STREAM CODE							LAKE NAME OR OWNER	SURFACE AREA (acres)	GROSS STORAGE (acre-ft)	LOCATION BY COUNTY (NORTH CAROLINA)
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
17	01	35	02				Deep Creek W. S. Dam 18	21	261	Yadkin
17	01	35	01				Deep Creek W. S. Dam 19A	62	661	Yadkin
17	01	35	01				Deep Creek W. S. Dam 21	35	747	Yadkin
17	01	35	01				Deep Creek W. S. Dam 22	33	367	Yadkin
17	01	35	01				Deep Creek W. S. Dam 23	27	--	Yadkin
17	01	35	02				Deep Creek W. S. Dam 24	21	247	Yadkin
17	01	35	02				Deep Creek W. S. Dam 28A	31	300	Yadkin
17	01	35	01				Deep Creek W. S. Dam 30A	34	346	Yadkin
17	01	35	02				Dubbins Pond (Dobbins)	25	--	Yadkin
17	01	24					Dutchmans Creek W. S. Dam 08	151	1,430	Davie
17	01	24					Dutchmans Creek W. S. Dam 15A	178	1,706	Davie
17	01	21	02				Ellis Lake (Third Creek W. S. Dam 10)	33	279	Iredell
17	01	28					Hanes Lake	30	--	Forsyth
17	01	28	09				Hill Lake	10	72	Forsyth
17	01	28	04				Joyner Lake	10	--	Forsyth

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 (NORTH CAROLINA)
17	01	21	02				Lackey Lake (Third Creek W. S. Dam 11)	36	408	Iredell
17	01	01					Lamberts Millpond	15	--	Randolph
17	01	30					Lasater Lake	25	42	Forsyth
17	01	17	01				Lexington-Thomasville City Lake	786	6,522	Davidson
17	01	28	07				Lowery Lake	16	--	Forsyth
17	01	48	05				Lowgap Wildlife Club Pond	14	--	Surry
17	01	28					Mallard Lake Dam 01	10	--	Forsyth
17	01	28					Mallard Lake Dam 02	20	--	Forsyth
17	01	21	02				McKinney Sheet Metal Lake (Third Creek W. S. Dam 37)	195	2,570	Iredell
17	01	28	08				Mock Lake	12	--	Forsyth
17	01	21	03				Mocksville Town Lake	18	248	Davie
17	01	49	04				Phillips & Mackie Pond	22	--	Surry
17	01	28	08				Pineview Lake	13	--	Forsyth
17	01	48					Raven Knob Lake	16	--	Surry

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 (NORTH CAROLINA)
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
17	01	21	02				Raymer Lake (Third Creek W. S. Dam 12C)	98	1,075	Iredell
17	01	49	08				Reynolds Lake	32	--	Surry
17	01	12	01				Rowan Wildlife Assn. Lake	10	--	Rowan
17	01	29	04				Salem Lake	400	356	Forsyth
17	01	29	08				Shattalon Lake	12	--	Forsyth
17	01	21	09				Sloan Mills Lake	10	--	Iredell
17	01	21	02				Smith Lake (Third Creek W. S. Dam 09)	22	--	Iredell
17	01	21					Statesville City Lake	55	--	Iredell
17	01	21	01				Statesville Flour Mills Lake	10	--	Rowan
17	01						Tanglewood Park Lake	13	--	Forsyth
17	01	21	02				Third Creek W. S. Dam 07A	65	876	Iredell
17	01	21	02				Third Creek W. S. Dam 16	27	260	Iredell
17	01	21	02				Third Creek W. S. Dam 17	21	192	Iredell
17	01	21	01				Unnamed Lake	--	--	Iredell

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 (NORTH CAROLINA)
REPORT NUMBER	MAJOR RIVER	PRIMARY	SECONDARY	TERTIARY	FOURTH ORDER	FIFTH ORDER				
17	01	21	02				Third Creek W. S. Dam 19 (Walker Lake)	38	358	Iredell
17	01	21	02				Third Creek W. S. Dam 33	44	531	Iredell
17	01	21	02				Third Creek W. S. Dam 34A	22	163	Iredell
17	01	21	09				Turnersburg Millpond	15	--	Iredell
17	01	01	10				U-Alta Lake	25	--	Randolph
17	01	01	12				Wheatmore Pond	25	--	Randolph
17	01	01	10				White Lake	10	--	Randolph
17	01	21	07				Unnamed Lake	--	--	Iredell
17	01	21	07				Wilson Lake	12	--	Iredell
17	01	21	07				Unnamed Lake	--	--	Iredell
17	01	29	04				Winston Lake (City of Winston-Salem)	75	--	Forsyth
17	01	12					Lake Corriher	--	--	Rowan
17	01	01	11				Scoonbeck Lake	10	--	Randolph