

**BIBLIOGRAPHY OF SELECTED WATER-RESOURCES PUBLICATIONS BY THE  
U.S. GEOLOGICAL SURVEY FOR NORTH CAROLINA, 1886-1995**

**By**

**M.D. Winner, Jr.**

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# **BIBLIOGRAPHY OF SELECTED WATER-RESOURCES PUBLICATIONS BY THE U. S. GEOLOGICAL SURVEY FOR NORTH CAROLINA, 1886-1995**

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## **ABSTRACT**

More than 660 selected publications, written by scientists, engineers, and technicians of the U.S. Geological Survey during the period 1886-1995, compose the bulk of information about North Carolina's water resources. The bibliography includes interpretive reports on water resources, ground water, surface water, water quality, and public-water supply and water use, as well as data reports on the same subjects. The interpretive reports are organized by geographic areas of the State. These areas include statewide, physiographic province, major river basin, and county.

The data reports are listed by water-resource topic, and the introduction to each topic provides historical notes for data-collection and publication activities. Summary tables list Water-Supply Paper numbers for reports containing ground-water, surface-water, and water-quality data by calendar year or water year. A concluding section discusses the availability of U.S. Geological Survey publications.

## **INTRODUCTION**

This bibliography brings together for the first time most of the important water-resources publications for North Carolina authored by scientists, engineers, and technicians of the U.S. Geological Survey (USGS), Water Resources Division, in the North Carolina District. Included are some early reports prepared by members of the Geologic Division of the USGS that are largely geologic in content, but also contain hydrologic data or observations. Several reports by other USGS authors who used hydrologic data in the State to prepare work on a national scale also are included. The early data reports were compiled by hydrographers in Washington, D.C., from data furnished by resident engineers and hydrographers in the State.

Water-resources reports for North Carolina come in a variety of formats. Most are in a single book form, but some are presented as map reports, booklets, brochures, abstracts, and individual fact sheets, or as part of larger reports; some are contained in scientific journals. This bibliography is a compilation of more than 660 reports that were published from 1886 through 1995, and is organized according to two general types of reports--those that are interpretive in nature and those that primarily contain data.

This compilation is not intended to be an exhaustive literature review. Not all papers and abstracts prepared for meetings or scientific journals, for example, are included here. Likewise, a search for theses and dissertations by USGS personnel was not done. Work initially published

in the USGS Open-File Report series that was later published in the formal USGS report series (Water-Supply or Professional Papers) is not included.

Cooperative support for most of the water-resources data and investigative reports was furnished by the North Carolina Department of Environment, Health, and Natural Resources (DEHNR) and its predecessor agencies; the North Carolina Department of Transportation; other State agencies; and many county and city governments. A number of other Federal agencies cooperatively supported some of the investigations.

## **BIBLIOGRAPHY OF INTERPRETIVE WATER-RESOURCES PUBLICATIONS**

The bibliography of interpretive water-resources publications is organized by four geographic areas in the State: (1) statewide, (2) physiographic province, (3) major river basin, and (4) county. Reports are listed in descending chronological order, and are repeated if applicable to another area. For example, a report for a multicounty area is repeated for each county represented in that report.

Statewide reports are those for which the results or techniques are generally applicable throughout North Carolina, or the results are based on data collected at sites throughout the State. Ground-water, surface-water, or water-quality studies that include the State as part of a national or regional study also are included in the statewide category.

North Carolina is divided into the Blue Ridge, Coastal Plain, and Piedmont physiographic provinces (fig. 1). The hydrology of the State is influenced by the geology and topography represented in these provinces; consequently, many water-resources investigations of less than statewide scale were designed with this influence in mind. Similarly, some studies have focused on particular hydrologic problems within large areas of the Coastal Plain. For purposes of this report, these are the Albemarle-Pamlico studies region, the central Coastal Plain studies region, and the Outer Banks studies region (fig. 2).

Some water-resources investigations were conducted within the boundaries of river basins. The major river basins in North Carolina in which studies were undertaken include the Cape Fear, Catawba-Broad, French Broad, Little Tennessee-Hiwassee, Neuse, New, Roanoke-Chowan, Tar-Pamlico, Tennessee, and Yadkin-Peedee Basins (fig. 3).

Hydrologic studies in North Carolina also are structured on a county or multicounty basis. This bibliography includes water-resources reports pertinent to each of North Carolina's 100 counties (fig. 4); the counties are listed in alphabetical order for a convenient reference. For completeness of county coverage, reports for several counties that were prepared by the North Carolina Department of Water Resources and successor agencies are included.

For the convenience of the reader, additional key words follow some citations. These are shown as one or more words in brackets to supplement informational content of the title, as well as to aid computer searches. An index of authors is provided in the Appendix.

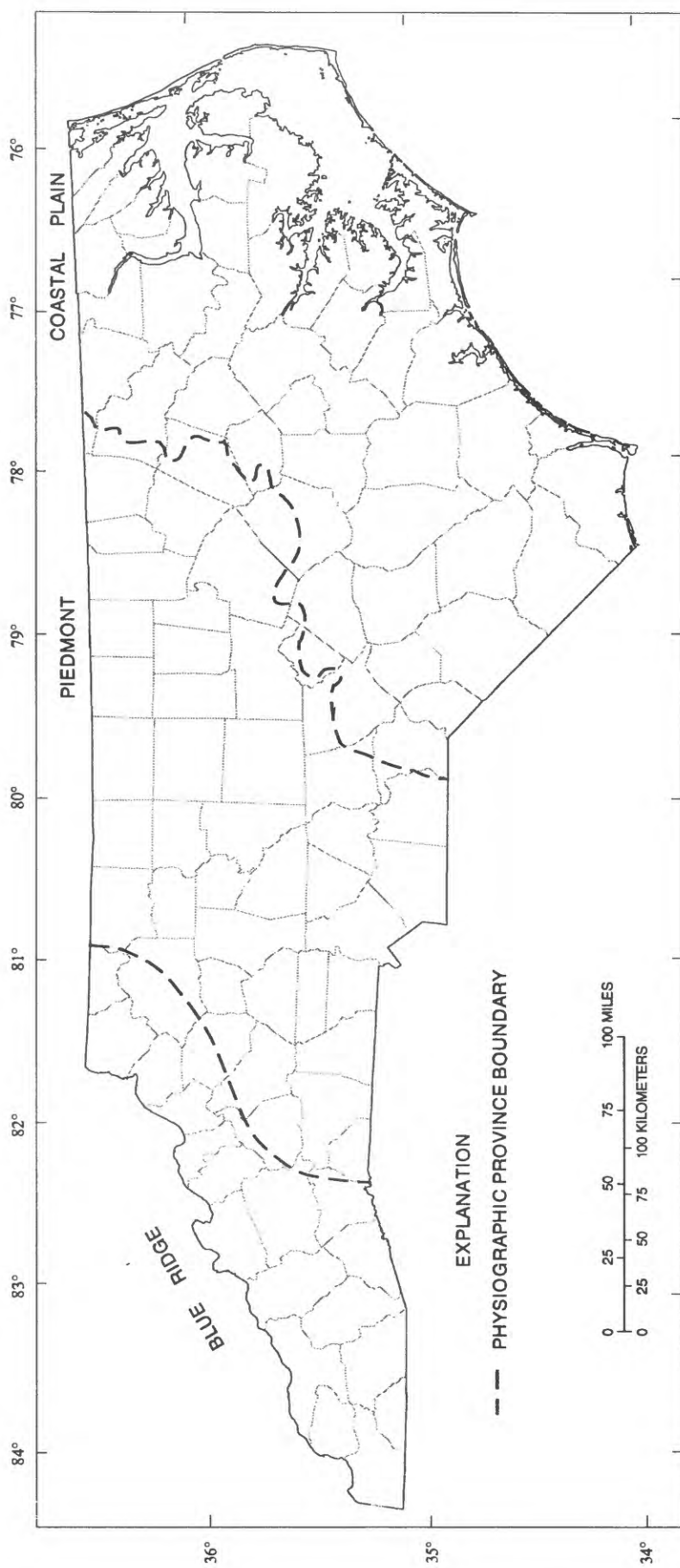


Figure 1.--Physiographic provinces in North Carolina.

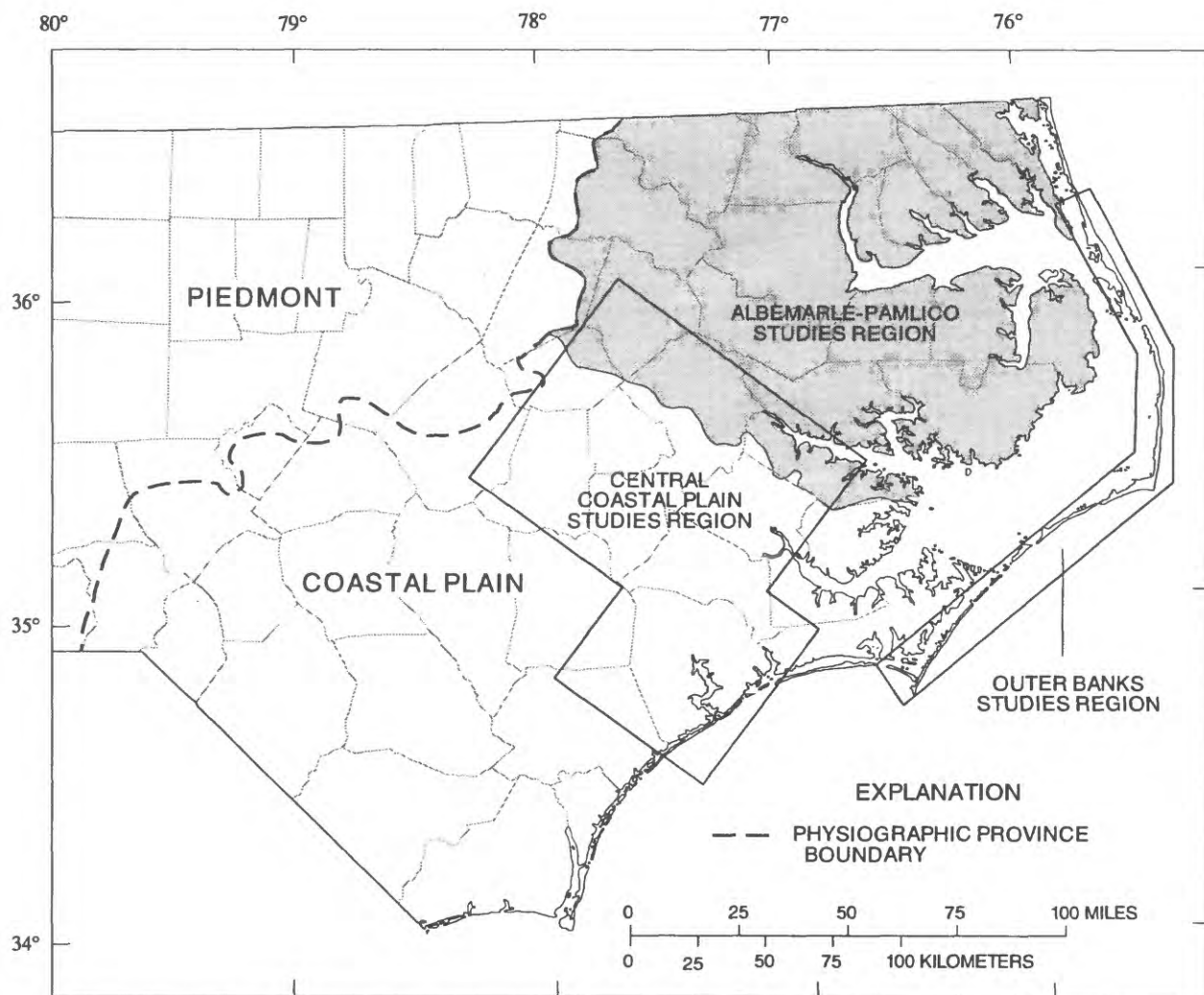


Figure 2.--Study regions in the Coastal Plain of North Carolina.



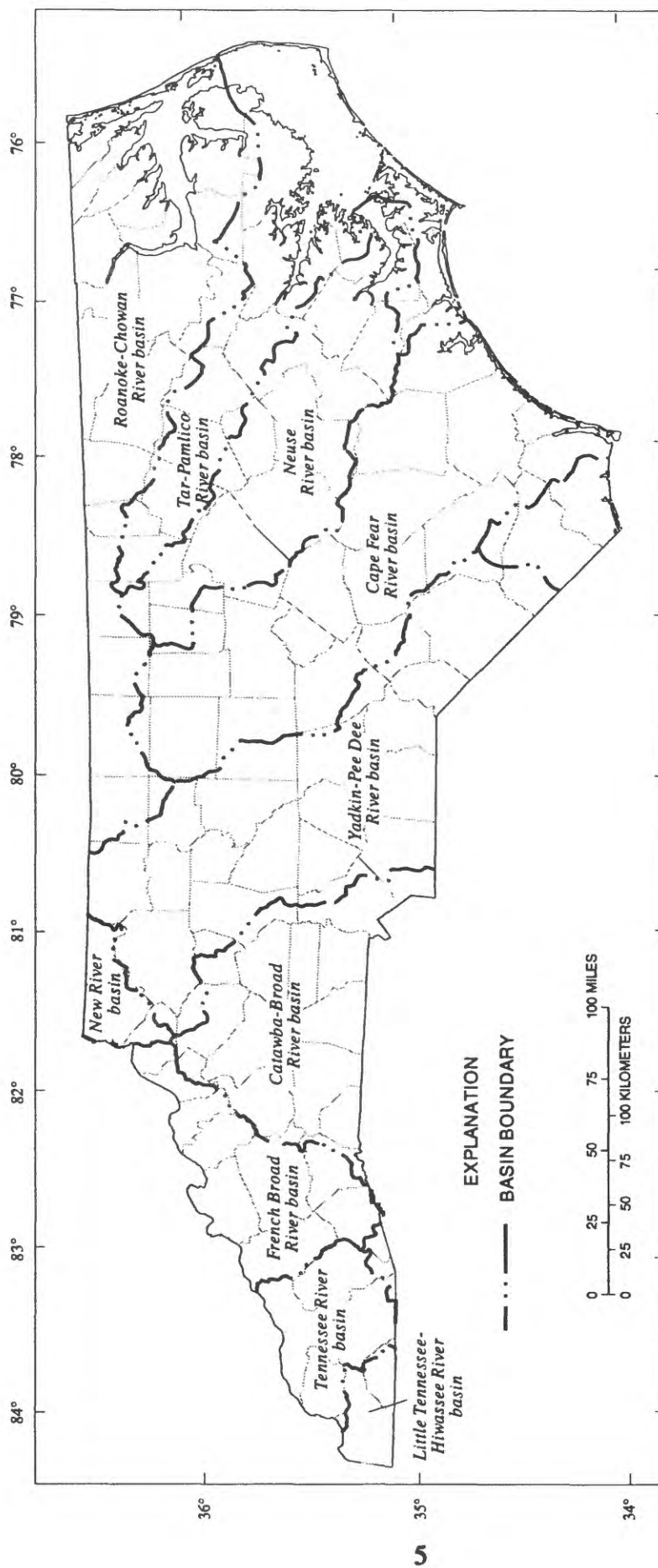


Figure 3.--Major river basins in North Carolina.

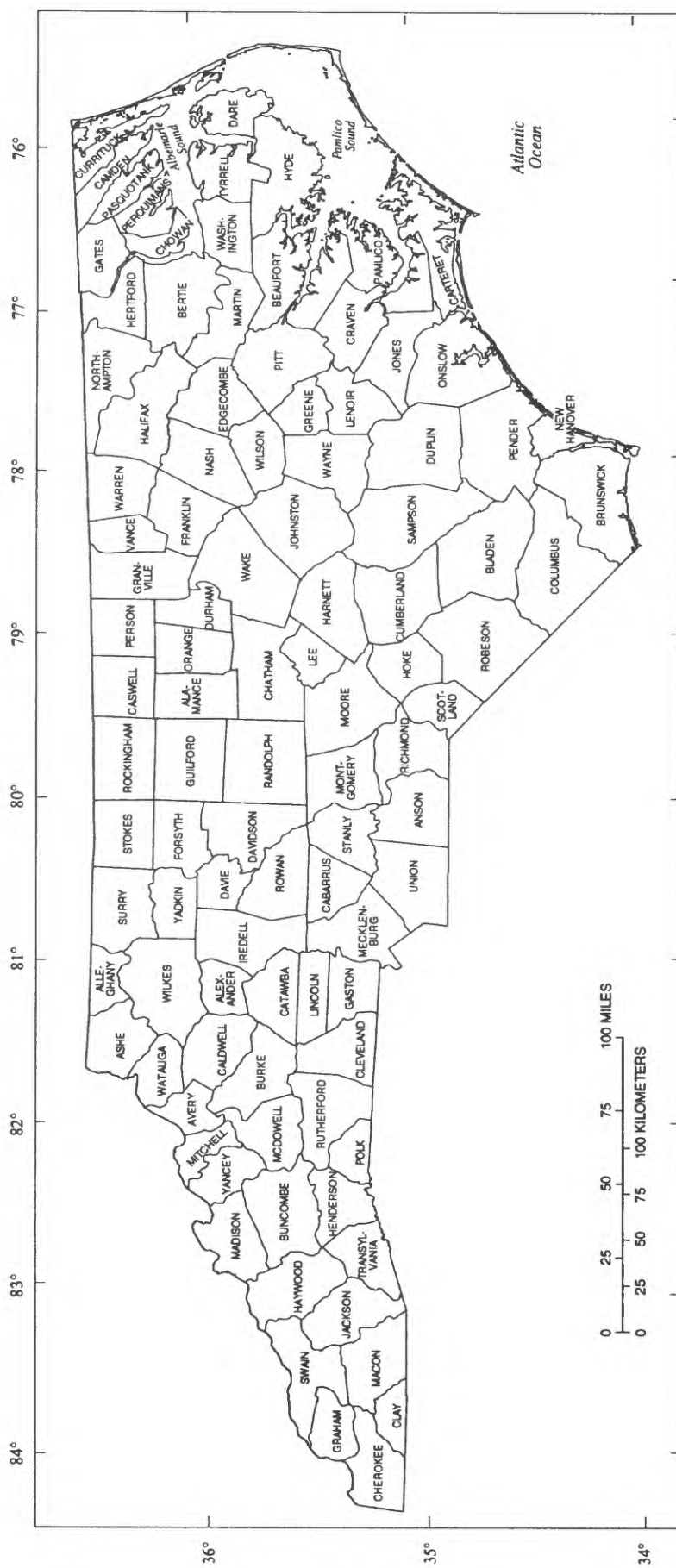


Figure 4.--North Carolina counties.

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## **Graham County**

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### **Polk County**

- LeGrand, H.E., and Mundorff, M.J., 1952, Geology and ground water in the Charlotte area, North Carolina: North Carolina Dept. of Conservation and Development, Div. of Mineral Resources Bull. 63, 88 p.[data, well records, geologic map]

### **Randolph County**

- Bain, G.L., and Thomas, J.D., 1966, Geology and ground water in the Durham area, North Carolina: North Carolina Dept. of Water Resources, Div. of Ground Water Bull. 7, 147 p.[data, well records, hydrographs, water quality, geologic map]

### **Richmond County**

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### **Stanly County**

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### **Stokes County**

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Dodson, C.L., and Laney, R.L., 1968, Geology and ground-water resources of the Murphy area, North Carolina: North Carolina Dept. of Water and Air Resources, Div. of Ground Water Bull. 13, 113 p.[data, well records, hydrographs, water quality, geologic map]

## **Transylvania County**

Trapp, Henry, Jr., 1970, Geology and ground-water resources of the Asheville area, North Carolina: North Carolina Dept. of Water and Air Resources, Div. of Ground Water Bull. 16, 127 p.[data, well records, hydrographs, water quality, geologic map]

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## **Tyrrell County**

Nelson, P.F., 1964, Geology and ground-water resources of the Swanquarter area, North Carolina: North Carolina Dept. of Water Resources, Div. of Ground Water Bull. 4, 79 p.[data, well records]

## **Union County**

Floyd, E.O., 1965, Geology and ground-water resources of the Monroe area, North Carolina: North Carolina Dept. of Water Resources, Div. of Ground Water Bull. 5, 109 p.[data, well records, geologic map]

## **Vance County**

May, V.J., and Thomas, J.D., 1968, Geology and ground-water resources in the Raleigh area, North Carolina: North Carolina Dept. of Water and Air Resources, Div. of Ground Water Bull. 15, 135 p.[data, well records, hydrographs, water quality, geologic map]



## **Wake County**

- Garrett, R.G., Taylor, J.E., and Middleton, T.L., 1994, Water-quality data for selected North Carolina streams and reservoirs in the Triangle Area Water Supply Monitoring Project, 1988-92: U.S. Geological Survey Open-File Report 94-379, 255 p.
- Garrett, R.G., 1990, Water-quality characteristics of inflow to and outflow from Falls Lake, North Carolina, 1982-87: U.S. Geological Survey Water-Resources Investigations Report 90-4097, 56 p.[data, reservoirs]
- Crawford, J.K., and Lenat, D.R., 1989, Effects of land use on the water quality and biota of three streams in the Piedmont Province of North Carolina: U.S. Geological Survey Water-Resources Investigations Report 89-4007, 67 p.[biology]
- Reeder, H.E., 1973, Sediment resulting from construction of an interstate highway in the Piedmont area of North Carolina: Raleigh, N.C., U.S. Geological Survey Open-File Report, 27 p.[water quality]
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- Chemerys, J.C., 1967, Effect of urban development on quality of ground-water, Raleigh, North Carolina: U.S. Geological Survey Professional Paper 575-B, p. B212-B216.[water quality]

## **Warren County**

- May, V.J., and Thomas, J.D., 1968, Geology and ground-water resources in the Raleigh area, North Carolina: North Carolina Dept. of Water and Air Resources, Div. of Ground Water Bull. 15, 135 p.[data, well records, hydrographs, water quality, geologic map]

## **Washington County**

- Nelson, P.F., 1964, Geology and ground-water resources of the Swanquarter area, North Carolina: North Carolina Dept. of Water Resources, Div. of Ground Water Bull. 4, 79 p.[data, well records]

## **Watauga County**

- Haire, W.J., 1968, Floods on Boone and Winkler Creeks at Boone, North Carolina: U.S. Geological Survey Hydrologic Investigations Atlas HA-323, 1 sheet.[surface water]
- Sumsion, C.T., and Laney, R.L., 1967, Geology and ground-water resources of the Morganton area, North Carolina: North Carolina Dept. of Water Resources, Div. of Ground Water Bull. 12, 119 p.[data, well records, hydrographs, water quality, geologic map]

### **Wayne County**

Pusey, R.D., 1960, Geology and ground water in the Goldsboro area, North Carolina: North Carolina Dept. of Water Resources, Div. of Ground Water Bull. 2, 77 p.[data, well records, geologic map]

### **Wilkes County**

Peace, R.R., Jr., and Link, D.R., 1971, Geology and ground-water resources of northwestern North Carolina: North Carolina Dept. of Water and Air Resources, Div. of Ground Water Bull. 19, 135 p.[data, well records, geologic map, hydrographs, water quality]

### **Wilson County**

Winner, M.D., Jr., 1976, Ground-water resources of Wilson County, North Carolina: U.S. Geological Survey Water-Resources Investigations 76-60, 85 p.[well records]

Mundorff, M.J., 1946, Ground water in the Halifax area, North Carolina: North Carolina Dept. of Conservation and Development, Div. of Mineral Resources Bull. 51, 76 p.[data, well records, hydrographs, potentiometric, geologic map]

### **Yadkin County**

Peace, R.R., Jr., and Link, D.R., 1971, Geology and ground-water resources of northwestern North Carolina: North Carolina Dept. of Water and Air Resources, Div. of Ground Water Bull. 19, 135 p.[data, well records, geologic map, hydrographs, water quality]

### **Yancey County**

Sumsion, C.T., and Laney, R.L., 1967, Geology and ground-water resources of the Morganton area, North Carolina: North Carolina Dept. of Water Resources, Div. of Ground Water Bull. 12, 119 p.[data, well records, hydrographs, water quality, geologic map]

## **BIBLIOGRAPHY OF WATER-RESOURCES DATA PUBLICATIONS**

The bibliography of water-resources data publications includes separate lists for ground-water, public water supply and water-use data, surface-water, water-quality, and water-resources reports. Each list is briefly prefaced with historical notes relative to the collection or publication of the data.

### **Ground-Water Data**

A formal program to provide and publish ground-water level records for North Carolina began in 1931 under a cooperative agreement between the USGS and the North Carolina Department of Conservation and Development (predecessor to DEHNR). The data were published in the USGS Water-Supply Paper report series on a calendar year basis beginning with

Water-Supply Paper 777. Water levels in the Kurfee well at Mocksville, Davie County, are the oldest published records under this cooperative program, and date from January 1, 1932. For the convenience of the reader, a table at the end of this section lists by year or years the Water-Supply Paper numbers that contain ground-water data for North Carolina (table 1).

Before 1932 very few published records of wells or ground-water levels exist. Stephenson and Johnson (1912) summarized well records and water-level data for the Coastal Plain counties for the period 1861 to 1907. Selected references containing early ground-water data are included in their report.

Beginning in 1975, ground-water levels were published in annual water-resources data reports for North Carolina, which include surface-water and water-quality data. These reports are listed in the Water-Resources Data section of this bibliography; the ground-water data are organized by water year (October through September of the following year) in these publications.

\* \* \* \* \*

Strickland, A.G., and others, 1992, Ground-water level data for North Carolina, 1988-90: U.S. Geological Survey Open-File Report 92-57, 167 p.

Coble, R.W., and Strickland, A.G., 1989, Ground-water level data for North Carolina--1987: U.S. Geological Survey Open-File Report 89-68, 152 p.

U.S. Geological Survey, 1977, Ground-water levels in the United States, 1974, southeastern states: U.S. Geological Survey Water-Supply Paper 2165, 116 p.

U.S. Geological Survey, 1975, Ground-water levels in the United States, 1969-73, southeastern states: U.S. Geological Survey Water-Supply Paper 2171, 250 p.

U.S. Geological Survey, 1971, Ground-water levels in the United States, 1964-68, southeastern states: U.S. Geological Survey Water-Supply Paper 1978, 258 p.

Hunsucker, J.K., and Shoffner, J.E., Jr., 1970, Ground-water levels in North Carolina in 1963-64: North Carolina Dept. of Water and Air Resources, Div. of Ground Water Circular 13, 56 p.

Hunsucker, J.K., 1965, North Carolina, *in* Hackett, O.M., 1965, Ground-water levels in the United States, 1959-63, southeastern states: U.S. Geological Survey Water-Supply Paper 1803, p. 199-211.

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LeGrand, H.E., and Reid, M.S., 1957, North Carolina, *in* Sayre, A.N., 1957, Water levels and artesian pressure in observation wells in the United States, 1955, Part 2, southeastern states: U.S. Geological Survey Water-Supply Paper 1405, p. 217-225.

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- LeGrand, H.E., and Streicher, M.M., 1956, North Carolina, *in* Sayre, A.N., 1956, Water levels and artesian pressure in observation wells in the United States, 1953, Part 2, southeastern states: U.S. Geological Survey Water-Supply Paper 1266, p. 211-221.
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- LeGrand, H.E., 1953, North Carolina, *in* Sayre, A.N., 1953, Water levels and artesian pressure in observation wells in the United States, 1950, Part 2, southeastern states: U.S. Geological Survey Water-Supply Paper 1166, p. 208-218.
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- Mundorff, M.J., and LeGrand, H.E., 1951, North Carolina, *in* Sayre, A.N., and others, 1951, Water levels and artesian pressure in observation wells in the United States, 1948, Part 2, southeastern states: U.S. Geological Survey Water-Supply Paper 1127, p. 177-193.
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- Mundorff, M.J., 1947, North Carolina, *in* Sayre, A.N., and others, 1947, Water levels and artesian pressure in observation wells in the United States, 1944, Part 2, southeastern states: U.S. Geological Survey Water-Supply Paper 1017, p. 303-323.
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Table 1. Summary of U.S. Geological Survey Water-Supply Papers (WSP) that contain ground-water data for North Carolina, 1932-74

Calendar Year(s)	WSP	Calendar Year(s)	WSP
1932-35	777	1950	1166
1936	817	1951	1192
1937	840	1952	1222
1938	845	1953	1266
1939	886	1954	1322
1940	907	1955	1405
1941	937	1956-58	1538
1942	945	1959-63	1803
1943	987	1964-68	1978
1944	1017	1969-73	2171
1945	1024	1974	2165
1946	1072		
1947	1097		
1948	1127		
1949	1157		

### Public Water Supply and Water-Use Data

This section contains references to publications that deal with public water supplies and the use of water in North Carolina. Although some of the publications contain limited interpretive information, they are treated as data reports for the purpose of this bibliography, rather than being listed separately. Some of the references could be considered water-quality data reports because they contain a large number of water analyses. Where appropriate, these reports are also listed in the Water-Quality Data section.

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Terziotti, Sylvia, Shrader, T.P., and Treece, M.W., Jr., 1994, Estimated water use, by county, in North Carolina, 1990: U.S. Geological Survey Open-File Report 94-522, 102 p.

Treece, M.W., Jr., 1990, Water withdrawals in the Roanoke-Chowan subregion of North Carolina and Virginia, 1983: U.S. Geological Survey Water-Resources Investigations Report 90-4007, 1 sheet.[data, water use]

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- Solly, W.B., Merck, C.F., and Pierce, R.R., 1988, Estimated use of water in the United States in 1985: U.S. Geological Survey Circular 1004, 82 p.
- Winner, M.D., Jr., and Lyke, W.L., 1986, History of ground-water pumpage and water-level decline in the Black Creek and upper Cape Fear aquifers of the central Coastal Plain of North Carolina: U.S. Geological Survey Water-Resources Investigations Report 86-4168, 21 p. [water use]
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- Robison, T.M., 1977, Public water supplies of North Carolina--Part 4, northern Coastal Plain: Raleigh, N.C., North Carolina Dept. of Natural and Economic Resources, 218 p.[water use, data]
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- Jackson, N.M., Jr., 1973, Public water supplies of North Carolina--Part 2, southern Piedmont: Raleigh, N.C., North Carolina Dept. of Natural and Economic Resources, 255 p.[water use, data]
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- Phibbs, E.J., Jr., 1969, Chemical and physical character of municipal water supplies in North Carolina (1960-65): North Carolina Dept. of Water and Air Resources, Water Pollution Control Div. Bull. 3, 191 p.



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- Durfor, C.N., and Becker, Edith, 1964, Chemical quality of public water supplies of the United States and Puerto Rico, 1962: U.S. Geological Survey Hydrologic Investigations Atlas HA-200, 1 sheet.[water quality]
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## Surface-Water Data

The U.S. Geological Survey began systematically collecting and publishing data on the flow of streams in North Carolina in 1895 beginning with Water-Supply Paper 11. Until 1970 these data were published in the USGS Water-Supply Paper Report series. Data were first presented in these reports by calendar year until 1913 (Water-Supply Paper 353) when a transition was begun to publish data in the water year format from October 1 through the following September 30. The data were organized by major river basin which transcended State boundaries, and, in the case of North Carolina, as many as three separate reports were required to publish all the State's data in this format. At the end of this section, a table summarizes by year or years the Water-Supply Paper numbers that contain surface-water data for North Carolina (table 2).

In 1961, surface-water data were published annually, by water year, on a State-boundary basis with the data organized by river basin within the State. These data were published dually in a State data report series and in the Water-Supply Paper series until 1970 when the data were published by the USGS exclusively in annual State surface-water data reports.

Beginning in 1975, surface-water data for North Carolina are included in the annual water-resources data reports. These reports are listed in the Water-Resources Data section of this bibliography. Streamflow records for North Carolina collected by the USGS from 1889 through 1923 are also reproduced in a State report (Saville and Smith, 1925).

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Thomas, N.O., and Bonham, W.G., 1977, Annual maximum stages and discharges of North Carolina streams--Revised 1976: U.S. Geological Survey Open-File Report 77-367, 226 p.

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- U.S. Geological Survey, 1972, Water resources data for North Carolina, water year 1971, Part 1, surface water records: U.S. Geological Survey Water-Data Report, 262 p.
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- U.S. Geological Survey, 1971, Water resources data for North Carolina, water year 1970, Part 1, surface water records: U.S. Geological Survey Water-Data Report, 280 p.
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- Bue, C.D., 1970, Streamflow from the United States into the Atlantic Ocean during 1931-60: U.S. Geological Survey Water-Supply Paper 1899-I, 36 p.
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Table 2. Summary of U.S. Geological Survey Water-Supply Papers (WSP) that contain annual surface-water data for North Carolina, 1896-1970

Calendar year	WSP	Calendar year	WSP
1896	11	1905	167, 168, 169
1897	15	1906	203, 204, 205
1898	27	1907	242, 243
1899	36	1908	242, 243
1900	48	1909	262, 263
1901	65, 75	1910	282, 283
1902	83	1911	302, 303
1903	98	1912	322, 323
1904	126, 127, 128	1913	352

Table 2. Summary of U.S. Geological Survey Water-Supply Papers (WSP) that contain annual surface-water data for North Carolina, 1896-1970--*Continued*

Water year	WSP	Water year(s)	WSP
1913	353	1940	892, 893
1914	382, 383	1941	922, 923
1915	402, 403	1942	952, 953
1916	432, 433	1943	972, 973
1917	452, 453	1944	1002, 1003
1918	472, 472	1945	1032, 1033
1919	502, 503	1946	1052, 1053
		1947	1082, 1083
1920	502, 503	1948	1112, 1113
1921	522, 523	1949	1142, 1143
1922	542, 543		
1923	562, 563	1950	1172, 1173
1924	582, 583	1951	1203, 1205, 1206
1925	602, 603	1952	1233, 1235, 1236
1926	622, 623	1953	1273, 1275, 1276
1927	642, 643	1954	1333, 1335, 1336
1928	662, 663	1955	1383, 1385, 1386
1929	682, 683	1956	1433, 1435, 1436
		1957	1503, 1505, 1506
1930	697, 698	1958	1553, 1555, 1556
1931	712, 713	1959	1623, 1625, 1626
1932	727, 728		
1933	742, 743	1960	1703, 1705, 1706
1934	757, 758	1950-60	1723, 1725, 1726
1935	782, 783	1960-65	1904, 1908, 1910
1936	802, 803	1966-70	2104, 2108, 2110
1937	822, 823		
1938	852, 853		
1939	872, 873		

### Water-Quality Data

Prior to 1943, there was no formal program to collect and publish water-quality data for North Carolina. However, a report published by the State of North Carolina (Ray and Randolph, 1943) provides an important summary of all USGS water-quality analyses between 1906 and 1927. As part of various USGS investigations, a number of streamwater samples in the State were collected, analyzed, and published in a few USGS reports. The most important of these are



included in this section. For analyses of ground water, the reader is referred to the list of interpretive reports for ground-water publications, many of which contain partial and complete analyses. Also, see the Public Water Supply and Water-Use Data section for publications that contain analyses of water for public and industrial supplies.

In 1943, the U.S. Geological Survey began collecting water-quality data for North Carolina streams on a systematic basis, and published these records annually in the Water-Supply Paper series, beginning with Water-Supply Paper 1022. Starting in 1961, water-quality data were also published for each State, similar to surface-water data, and in 1971 publication in the Water-Supply series was discontinued. A table at the end of this section lists by year the Water-Supply Paper numbers containing streamwater-quality data for North Carolina (table 3).

Between 1947 and 1973, water-quality data collected by the USGS were compiled in a biennial report and published by the State. Although they are a duplication of published records, these reports are included in this bibliography as an alternative source for the reader.

Water-quality data for North Carolina have been included in the annual water-resources data reports since 1976. These publications are listed in the Water-Resources Data section of this bibliography.

\* \* \* \* \*

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Table 3. Summary of U.S. Geological Survey Water-Supply Papers (WSP) containing annual water-quality data for North Carolina, 1944-70

Water year	WSP	Water year	WSP
1944	1022	1957	1520
1945	1030	1958	1571
1946	1050	1959	1641, 1642
1947	1102		
1948	1132	1960	1741, 1742
1949	1162	1961	1881, 1882
		1962	1941, 1942
1950	1186	1963	1947, 1948
1951	1197	1964	1954, 1955
1952	1250	1965	1961, 1962
1953	1290	1966	1991, 1992
1954	1350	1967	2011, 2012
1955	1400	1968	2092, 2093
1956	1450	1969	2142, 2143
		1970	2152, 2153

### Water-Resources Data

Water-resources data for North Carolina consist of records of stage, discharge, and water quality of streams; stage and volumes of lakes and reservoirs; ground-water levels; and ground-water quality. These data have been incorporated in one or two annual report volumes since 1975, and are listed in the water year format. Additional water data can be included in some of these reports for various sites not part of the systematic data-collection program, and are published as miscellaneous measurements. For other data reports before the 1975 water year, see individual sections for ground water, surface water, and water quality data in this bibliography.

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### **AVAILABILITY OF PUBLICATIONS**

This bibliography contains references to publications of organizations in addition to those of the U.S. Geological Survey. These reports may be obtained from the appropriate agency or publishing organization. Some publications are out of print and available only from libraries, such as the North Carolina State Library or the University of North Carolina Libraries. Many USGS reports, including unnumbered open-file reports, are available for inspection at the North Carolina District office in Raleigh.

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## APPENDIX--AUTHOR INDEX

The following is an indexed list of authors and coauthors of the reports contained in this bibliography. Some authors were affiliated with other agencies while working cooperatively with the USGS.

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