

BRIEFING PAPER

PROPOSED CAPACITY USE DESIGNATION
NORTHEASTERN NORTH CAROLINA

DRAFT

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INTRODUCTION

The purpose of this briefing paper is to inform the public and the members of the Environmental Management Commission of the general background and current and expected water resource situation in the region under study. In addition, the purpose is also to inform interested parties of the possible Capacity Use Area Designation, possible ramifications, the reasons for recommending this action, and the expected sequence of events for the consideration of the designation.

The area under study, the Northeastern and North Central portions of the State, includes most of the area in North Carolina that drains into Albemarle Sound. We call this area the Greater Albemarle Basin. The Greater Albemarle Basin can be divided into the Roanoke River Basin, the Chowan River Basin, and the Pasquotank Basin (see Figure 1). All or part of the following counties are in this study area: Bertie, Camden, Caswell, Chowan, Currituck, Gates, Granville, Halifax, Hertford, Martin, Northampton, Pasquotank, Perquimans, Person, Rockingham, Stokes, Vance, and Warren. (See Appendix B for a detailed delineation of this area.

During World War II, pumping facilities and pipelines were installed so that the Norfolk Water System could take water from both the Blackwater River and the Nottaway River (tributaries of the Chowan River) to supplement their increasing demand. Over the years, the amount of water pumped has increased. Plans have been developed which will allow much larger amounts to be taken from the Chowan Basin and pumped to the Norfolk System, which is in the Chesapeake Bay Basin.

In the 1970's, the City of Chesapeake (Virginia) constructed facilities on the Northwest River, a tributary to the Greater Albemarle Sound Drainage Area, and began diverting water out of the Albemarle Basin for their use in another basin.

In recent years, proposals have been developed for pumping about 60 million gallons per day (MGD) from Lake Gaston to southeastern Virginia, primarily for the use of the City of Virginia Beach, which is now the largest city in the Commonwealth of Virginia. Officials in Virginia are unwilling to guarantee that the 60 MGD will be the limit on their withdrawal. Construction of this large pipeline and pumping facilities appears imminent.

For many years large ground water withdrawals from deep wells in Virginia have caused an enormous cone of depression in the Cretaceous aquifer system. The largest ground water user is the Union Camp Corporation near Franklin, Virginia. This cone of depression is continuing to expand and is now extending further into North Carolina.

In the early 1970's, excessive algae blooms began occurring in the Chowan River. In spite of continuous studies and efforts to identify and control pollution sources, severe water quality problems continue. Problems now appear to be also developing in the Albemarle Sound. The Roanoke River below Roanoke Rapids Dam must be managed wisely if water quality problems are to be avoided.

Northeastern North Carolina is, for the most part, rural and undeveloped. Its major water resources, the Roanoke River and its reservoirs, the Chowan River and the Albemarle Sound, are threatened

by both interbasin transfers and deteriorating water quality. A number of actions may be needed. One action could be the designation of a Capacity Use Area under the Water Use Act of 1967. This action would directly involve the State in water use management in the region. The designation alone would not solve our problems, but would put the State in a better position to address them.

The North Carolina Environmental Management Commission, by a resolution adopted January 12, 1984, directed the Department of Natural Resources and Community Development to complete its ongoing investigation of the Northeastern North Carolina Region, including affected portions of the Roanoke, Chowan, and Pasquotank River Basins, utilizing all available resources in accordance with the requirements of G.S. 143-215.13, to determine the desirability of declaring a capacity use area and report such findings to the Commission. A copy of the Commission's resolution is attached as Appendix A.

The purpose of the investigation will be to ascertain and consider the facts relevant to conservation and use of water in the region, with the objective of determining whether or not the aggregate uses of water are such that the region should be declared a "capacity use area" within the meaning and under the provisions of the Water Use Act of 1967 (G.S. 143, Article 21, part 2).

The investigation will be conducted and the report prepared in accordance with instructions contained in Section 3 (c)(2) of the 1967 Water Use Act. A copy of the Act is in Appendix C.

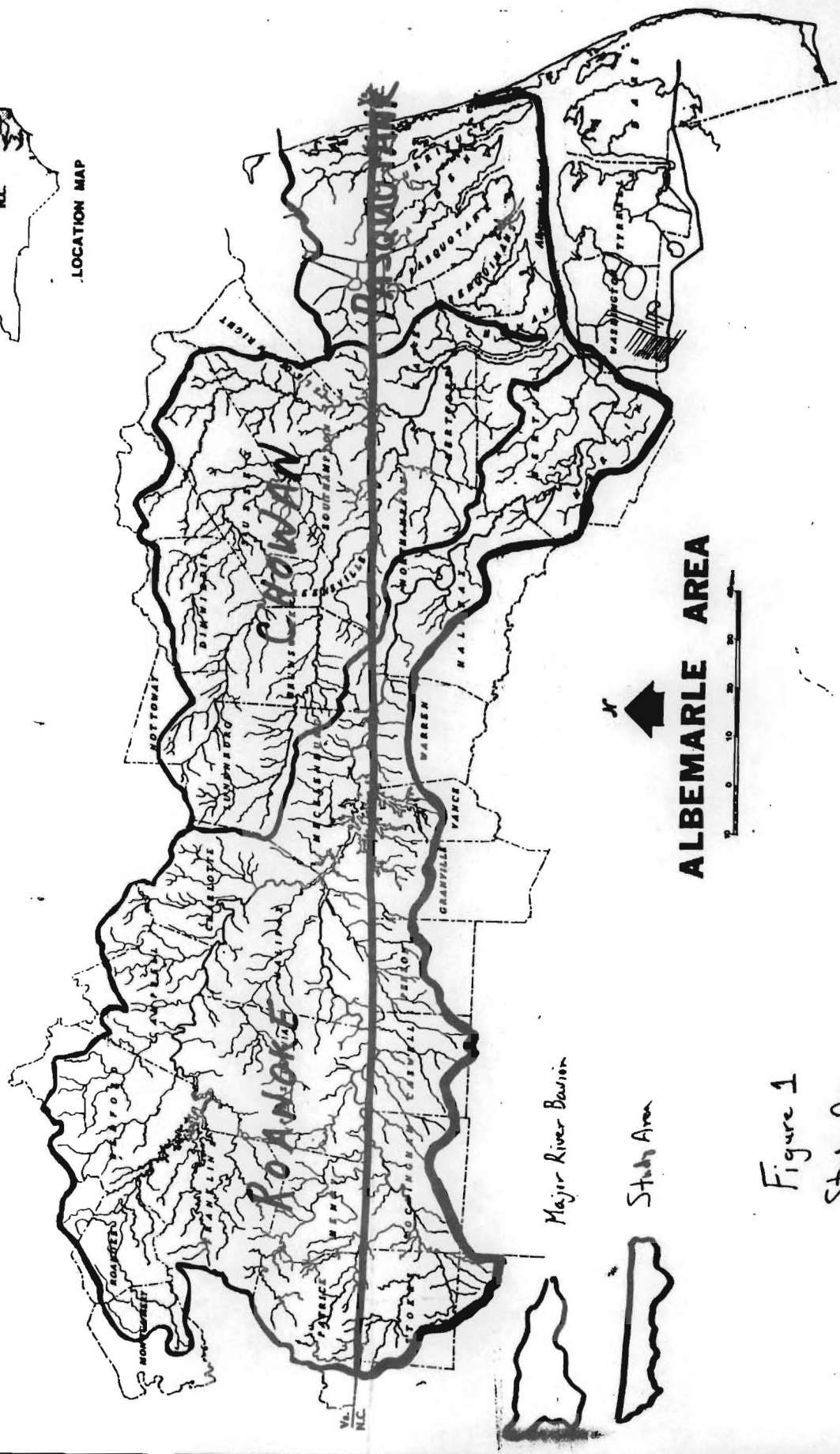
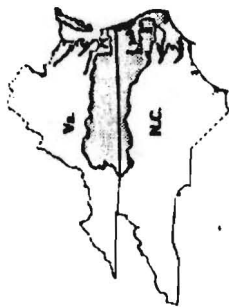


Figure 1
Study Area

WATER RESOURCES

Water Quantity - Surface Water

The study area includes the North Carolina portion of the Roanoke, Chowan, and Pasquotank River Basins, as well as adjacent coastal areas along the Outer Banks. The area covers approximately 6,364 square miles, extends along the North Carolina - Virginia border a distance of about 260 miles, and varies in width from 7 to 62 miles.

The Roanoke River Basin covers a drainage area of 9,666 square miles, 3,506 square miles of which are in North Carolina (55 percent of the study area). The North Carolina portion is a relatively narrow strip, extending through the Piedmont Region to the Coastal Plain. The land surface along the eastern Coastal Plain is generally flat and contains numerous shallow meandering streams. The Roanoke River, which is the principal stream in the region, empties into Albemarle Sound near the Town of Plymouth.

The development of reservoir projects in the basin has been extensive, and the construction of three reservoirs along the North Carolina - Virginia border has had a particularly profound effect on streamflows in the lower Roanoke. The John H. Kerr Reservoir is the oldest and most upstream of the three lakes. The U.S. Army Corps of Engineers began construction of the dam in 1950, and full pool was reached in 1953. The primary purposes of the project are flood control and electric power generation. The lake also provides extensive recreation opportunities. Since Kerr Lake was constructed, the extreme range of lake fluctuations has been from elevation 318.85 to 280.23 feet msl. The normal yearly fluctuations of lake levels

is much less, usually from 295 to 314.

Downstream from Kerr Lake, the Virginia Electric and Power Company operates two reservoirs. Lake Gaston was completed in 1962 and is operated primarily for hydroelectric generation. The water level at Lake Gaston is held relatively constant. Lake Gaston has become a valuable recreation resource, and considerable recreation development has occurred and is occurring around the lake. Below Lake Gaston, Roanoke Rapids Lake was completed in 1955 for electric power generation. Water levels at Roanoke Rapids Lake fluctuate approximately 4 feet.

The Corps of Engineers has developed joint operating rules for these lakes which attempt to minimize flood damage downstream and maximize power production, while not causing any unacceptable problems for recreation users. These rules also include the minimum release requirements for water use below Roanoke Rapids specified in the Federal Energy Regulatory Commission (FERC) license. These uses include water quality, water supply, and fish habitat. Appendix D presents a discussion of current reservoir operating rules and the FERC minimum flows.

Regulation by these and other reservoir projects in the basin has had a significant effect on streamflows in the lower Roanoke. The USGS streamflow gaging station at Roanoke Rapids (02.0805.00) provides the best data for determining these effects. Table 1 shows how the seven-day, ten-year flow (7Q10) has increased as a result of regulation.

TABLE 1. STREAMFLOW STATISTICS FOR ROANOKE RIVER
AT ROANOKE RAPIDS, N.C.

<u>Time Period</u>	<u>Description</u>	<u>7Q10 (cfs)*</u>
4/1912 - 3/1950	pre-impoundment	1018
4/1953 - Present	post-impoundment	1423
1912 - Present	average discharge	8065

* As estimated by USGS.

The portion of the study area lying in the Chowan River Basin contains approximately 1,315 square miles (20.7 percent of the total). The Chowan River itself is formed by the confluence of the Blackwater and Nottoway Rivers, just north of the North Carolina - Virginia State line. From here, the river becomes an estuary which flows generally south and empties into the western end of Albemarle Sound near Edenton. Two tributaries, the Meherrin and the Wiccacon Rivers, enter the estuary from the west.

While lunar tide variations are generally less than 1 foot in most locations, they affect the estuary throughout its 50-mile length and also influence the lower parts of all tributaries to the Chowan, including the Blackwater and Nottoway Rivers. Wind tides are much more important in affecting water levels and short-term circulation, causing as much as 4 feet of variation at irregular time intervals.

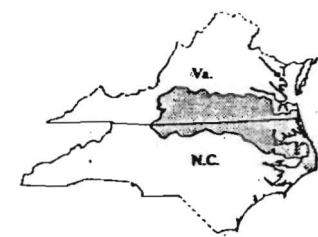
Nearly all of the Chowan lies in the Coastal Plain and, as such, is characterized by flat, low-lying areas with little relief.

Because these streams have little, if any, slope and are affected by wind and ocean tides, the usual procedures for measuring streamflow are not reliable in most areas. Streamflow data are available, however, for many of the interior streams which drain higher ground. Table 2 summarizes streamflow data from two USGS gage stations. Based on discharge records at gaged points throughout the basin, the average flow of the Chowan River at the mouth is estimated at about 4,600 cubic feet per second (cfs), or about 0.94 cubic feet per second per square mile (cfsm) of drainage area.

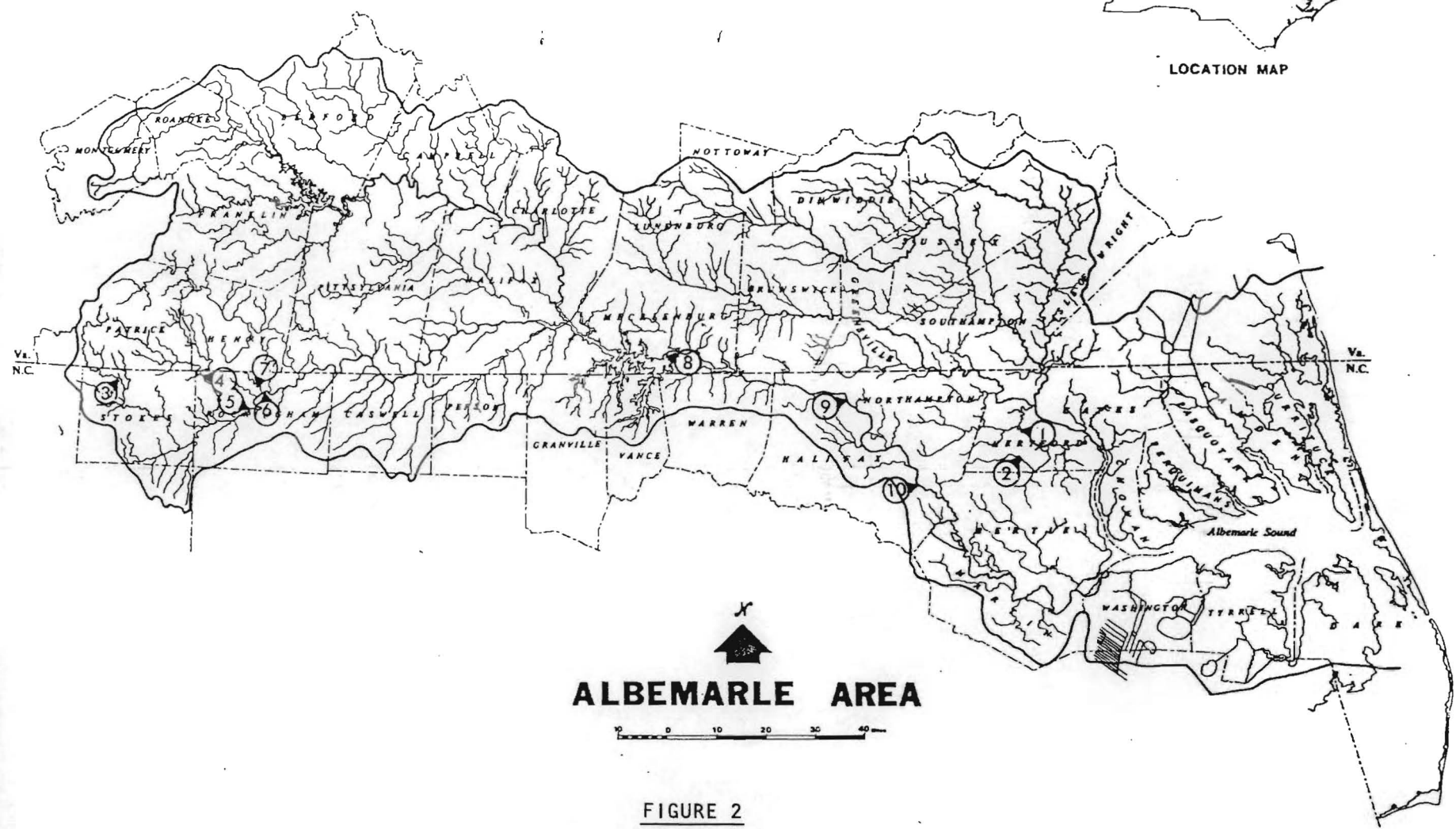
The Pasquotank River Basin, which covers approximately 1,543 square miles, is the third major river basin in the study area. The basin is characterized by flat, low-lying swampy areas which have a poorly defined drainage pattern. Numerous short stream reaches and channels drain into the larger rivers and sounds. Major streams include the North, Pasquotank, and Perquimans Rivers.

TABLE 2. SELECTED U.S. GEOLOGICAL SURVEY STATIONS IN STUDY AREA

MAP NUMBER	STATION NUMBER	STATION LOCATION	DRAINAGE AREA (mi ²)	AVERAGE FLOW (cfs)	7Q10 LOW FLOW (cfs)	PERIOD OF RECORD
		<u>Chowan</u>				
1	532.00	Potecasi Creek near Union, NC	225	234	1.2	4/1958 - Present
2	535.00	Ahoskie Creek at Ahoskie, NC	63.3	63.4	0	2/1950 - Present
		<u>Roanoke</u>				
3	685.00	Dan River near Francisco, NC	129	190	43.4	9/1924 - Present
4	705.00	Mayo River near Price, NC	260	314	64	8/1929 - 10/1971
5	710.00	Dan River near Wentworth, NC	1053	1212	200	12/1939 - Present
6	715.00	Dan River at Leaksville, NC	1150	1303	209	8/1929 - 9/1949
7	740.00	Smith River at Eden, NC	538	617	158	10/1939 - Present
8	795.00	Roanoke River at Buggs Island, NC	7780	7490	1161	4/1947 - 9/1962
9	805.00	Roanoke River at Roanoke Rapids, NC	8386	8065	1135	1/1912 - Present
10	810.00	Roanoke River near Scotland Neck, NC	8700	8087	1241	10/1940 - 9/1956



LOCATION MAP




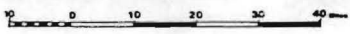

ALBEMARLE AREA


FIGURE 2
 LOCATION OF SELECTED USGS GAGING STATIONS
 WITHIN THE STUDY AREA

Groundwater

Groundwater is the principal source of drinking water supply in the part of the study area lying in the Coastal Plain Province. In this area; all but one municipal water system and all self-supplied domestic water systems are dependent upon groundwater as a source.

West of the Fall line, where residual soils overly massive crystalline bedrock, well productivity is a function of the size, number, and interconnection of fractures in the bedrock. The replenishment of these fractures is dependent upon the storage capacity and permeability of the overlying residual material.

In the Coastal Plain of the study area, the hydrogeology is quite different. Here, layers of sediment overlie the crystalline bedrock and form a wedge of porous and permeable granular material (aquifers) in which all the pore spaces below the water table are filled with groundwater. Interbedded with the aquifers are poorly permeable silt and clay sediments which restrict the movement of groundwater. The aquifers of the northeastern North Carolina Coastal Plain may be divided into three major systems: the shallow surficial aquifer; the tertiary aquifer system at an intermediate depth; and the basal Cretaceous aquifer system (Figure 3).

Relative characteristics and use of groundwater in these aquifer systems is shown in the attached chart (Table 3).

FIGURE 3

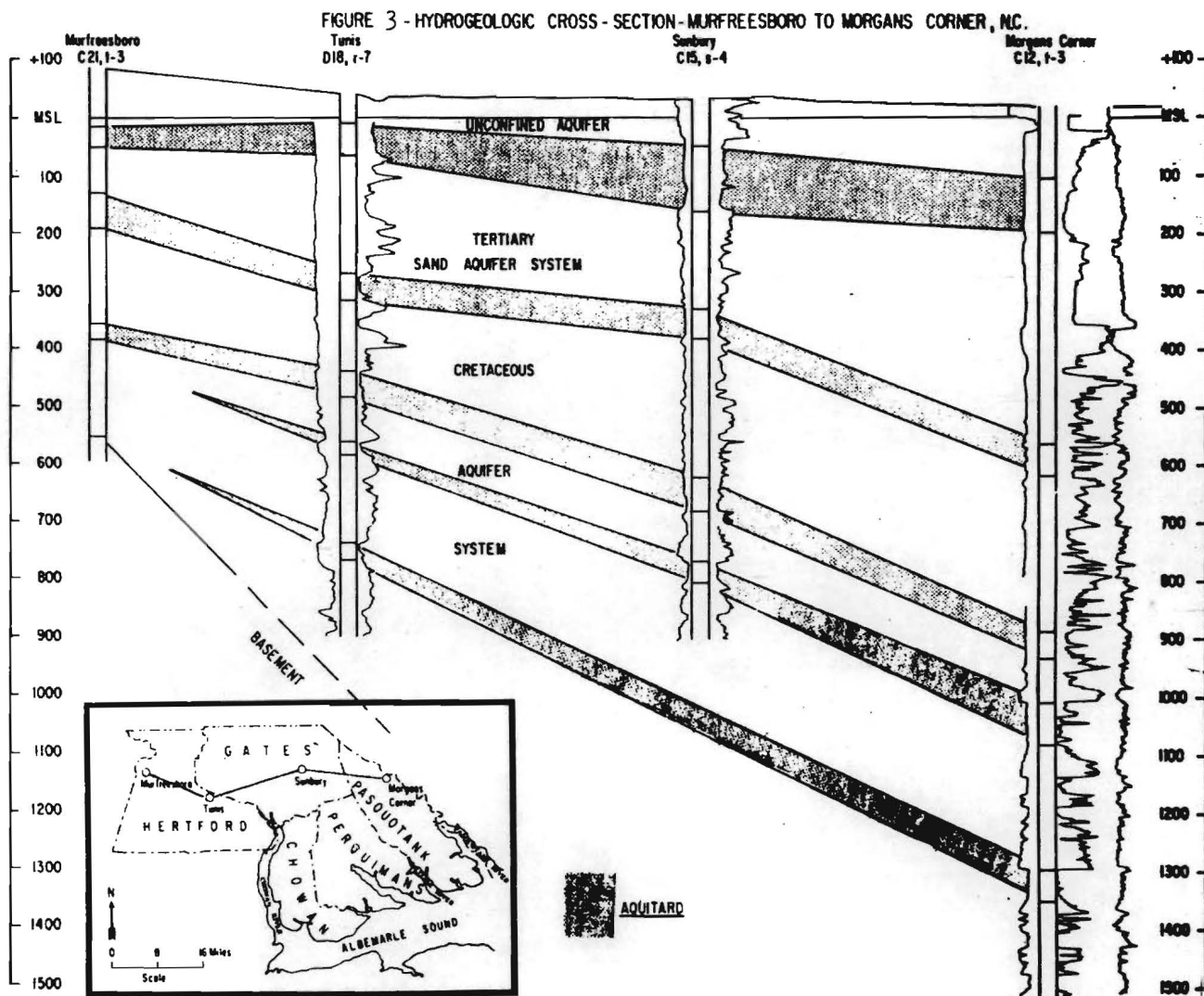


TABLE 3

AQUIFER CHARACTERISTICS IN NORTHEASTERN N. C.

Aquifer System	PIEDMONT			COASTAL PLAIN					
	Productivity	Quality	Current Usage (MGD)	Productivity	Quality	Current Usage (MGD)	Productivity	Quality	Current Usage (MGD)
SURFICIAL	Not normally Utilized	-----	-----	yield 5-50 gpm	variable - typically high iron - low pH -	.58 mg	5-100 gpm	variable - high iron - may be moderately hard locally - brackish in lower part	1.74
TERTIARY (Intermediate Sedimentary)	N/A	N/A	N/A	100-500 gpm	neutral to slightly alkaline - low hardness - low iron - low chloride -	2.58	100-500 gpm	normally low in chloride - less permeable beds may be saline - low iron - neutral pH - low hardness -	3.31
CRETACEOUS (Deep Sedimentary)	N/A	N/A	N/A	200-1000 gpm	alkaline - low iron - soft - locally high fluoride - chloride normal - (250 mg/l)	9.24	200-1000 gpm	salinity increases with depth - low iron - neutral to alkaline pH - low hardness - may contain high fluoride	.194
BEDROCK	0-30 gpm	variable - may be locally hard, high in iron - neutral to slightly acidic	Supplies most rural domestic users	0-50 gpm	variable - soft to moderately hard - low in dissolved solids -	not utilized	Unknown	not utilized	

Water Quality

Groundwater - Good quality groundwater is generally available throughout the study area. However, in the Chowan-Pasquotank portion of the area, deeper groundwaters are typically brackish and shallow sources may contain undesirable concentrations of iron. Some wells in Gates County (and most likely in some other coastal plain areas) are being polluted by septic tanks.

Surface Water - In the Dan River Basin (above John H. Kerr Reservoir), the quality of surface water is generally good, except in the Smith River. There, the combination of regulated flows from Philpot Dam (in Virginia) and effluent from the City of Martinsville's wastewater treatment plant produces water with such high conductivity that Fieldcrest Mills, in Eden, is forced to shut down their water intake each Tuesday. Water quality in Kerr Lake, Lake Gaston, and Roanoke Rapids Lakes is also generally good. Water quality in the lower Roanoke is generally good, except during drought periods. At that time, the minimum releases from Kerr Lake are barely sufficient to maintain dissolved oxygen concentrations. Indeed, the D.O. concentration has dropped below State standards under certain flow conditions. In the Chowan-Pasquotank portion of the area, most streams have acceptable water quality. A few bodies of water, such as the Lower Chowan River and parts of Albemarle Sound, have had damaging algal blooms, caused by excessive concentrations of nutrients.

Water-Based Recreation

Kerr Lake - Numerous water-based recreational facilities are available along the shores of Kerr Lake in North Carolina and in Virginia. These facilities are heavily used, as shown by an attendance of nearly 1.4 million visitors in 1983 at the facilities operated by the State of North Carolina alone. The most popular activities are fishing, swimming, and boating, with May through September being the months of highest visitation. The Division of Parks and Recreation (N.C. DNRCD) operates 16 boat ramps on the lake. Nine of these ramps are essentially unusable at lake elevations below 294 feet. The minimum preferred lake level for the peak recreation season is 297 feet. There are also three marinas located on the lake. Kerr Lake is especially popular with sailboat owners because of its large size. In addition to boating, there are popular swimming beaches, picnic areas, and campgrounds.

Gaston Lake and Roanoke Rapids Lake - Recreational activities at Lake Gaston and Roanoke Rapids Lake include fishing, boating, and other water sports. While there are no major public facilities on these lakes, there are numerous vacation home developments, and the potential for many more.

Lower Roanoke River - Recreational activities on the Roanoke River downstream of the three lakes are less concentrated than at the lakes, but are still significant. The major activities are fishing, boating, and hunting. The river from the Roanoke Rapids Dam to Albemarle Sound has been recommended for consideration as a water trail. The section of the river from Williamston to Albemarle Sound has especially good fishing in the backwater cove areas.

Chowan River and Estuary - A significant amount of recreation occurs both on and alongside the waters of the Chowan. While algae blooms have curtailed some of the growth of second homes along the Chowan, fishing, boating, and swimming are still enjoyed by many people.

Pasquotank/Albemarle Sound - The waters of the Pasquotank River Basin and Albemarle Sound provide an excellent resource for all types of water-based recreation. Fishing, boating, hunting, and swimming are the most popular.

Fish and Wildlife

Roanoke River Basin - The enjoyment of fish and wildlife resources is a major part of the recreation activity on the Roanoke River and the three upstream lakes. The three lakes have good populations of warm-water fish species, including striped bass, largemouth bass, bream, catfish, and crappie. The Roanoke River itself is classified as a carp-catfish stream and has a good population of the warm-water species mentioned above. The spring spawning runs of striped bass and herring offer special opportunities for angling.

The bottomland forests in the Roanoke River corridor support populations of turkey, deer, and small game which are enjoyed by hunters. The potential for waterfowl is rated high in Northampton and Halifax Counties. Normal, but not excessive, high spring flows in the river actually help maintain deer and turkey habitat by depositing nutrients and keeping the understory relatively open.

Chowan-Pasquotank - The Chowan-Pasquotank portion of the study area supports a variety of warm-water fish. The dominant game fish include largemouth bass, bluegill, flier, warmouth, redbfin pickerel, channel catfish, black crappie, and redbreast. Non-game fish include bullheads, longnose gar, and suckers. The estuarine areas provide spawning grounds for croaker, spot, mullet, and summer flounder.

White-tailed deer are common-to-abundant throughout the Chowan-Pasquotank Basin, with somewhat greater abundance in the northern half. Habitat for black bear is found along the upper Chowan River, North River, and Dismal Swamp. Small game, such as rabbit, squirrel, quail, dove,

fox, and raccoon are plentiful throughout the area. There are a number of endangered and threatened species concentrated in the Dismal Swamp area,

Commercial Fisheries

The spring spawning run of striped bass in the Roanoke River is essential for maintaining the commercial fishery in Albemarle Sound. The critical spawning period is from March 15 through May 15. When sufficient waters can be stored in Kerr Lake prior to the spring spawning season, releases from Kerr are increased to draw the fish upstream and keep the eggs in suspension prior to their hatching. The fact that striped bass populations along the East Coast have noticeably decreased in the last decade makes the spawning habitat of the Roanoke River that much more important.

The most recent information from the NRC Marine Fisheries Division indicates that striped bass account for 30 percent of the economic value of the fin fish catch in Albemarle Sound. When shellfish are included, striped bass are 16 percent of the value of the 1982 total catch for the Sound. Only crab exceeds the striped bass in economic value.

In terms of pounds, rather than dollars, the striped bass catch is exceeded by the harvest of alewives, catfish, and white perch in Albemarle Sound. These important species also depend on the river for the freshwater inflow which maintains brackish water nursery areas.

The Chowan River supports the largest river herring fishery in the State and on the East Coast. This river, along with others, has anadromous fish runs of American shad, hickory shad, and river herring. Over the last 10 years the river herring catch has declined from an annual catch of over 10 million pounds to one of about 5 million. The water quality of the river has been blamed for this reduction. Other species of commercial importance are white perch, catfish, striped bass, eels, crabs, and yellow perch.

WATER USE

An approximate annual average of 14.8 billion gallons of water per day was used in the study area for municipal, self-supplied industry, hydroelectric generation, and agricultural irrigation, based on available data covering the period 1980-83. Approximately 20.5 million gallons a day of groundwater is being utilized. Figures on use in individual counties are presented in Table 4.

More surface water than groundwater is used for public water supply. Surface water was more widely used for industries and agriculture than groundwater sources. Use and projected use by each major category are discussed individually and summarized in Table 5.

TABLE 5
WATER USE IN THE STUDY AREA IN MILLION GALLONS PER DAY

<u>Type</u>	<u>Estimated 1983</u>	<u>2030 Projected Range</u>
Public Supply	32.	60 - 100
Hydro-electric	11,996	11,000 - 16,000
Thermo-electric	2,628	3,500 - 6,000
Other self-supplied Industry	101	200 - 400
Agricultural Irrigation (6-month average)	<u>38</u>	<u>150 - 200</u>
TOTALS	14,795	14,910 - 22,700

TABLE 4. STUDY AREA SURFACE AND GROUNDWATER USE

In Million Gallons Per Day*

COUNTY	PUBLIC SUPPLY		INDUSTRIAL WITHDRAWALS		AGRICULTURAL IRRIGATION		HYDRO-ELECTRIC	TOTAL USE
	Surface	(GW)	Surface	(GW)	Surface	(GW)		
Bertie	-	(.5)	-	(1.7)	1.2	(1.0)		4.4
Camden	-	(.2)	-	-	0.2	-		.4
Caswell	.1	(.1)	.5	-	4.1	-		4.8
Chowan	-	(1.2)	.8	-	-	(0.2)		2.2
Currituck	-	(.1)	-	-	-	(0.5)		0.6
Gates	-	(.3)	-	-	0.3	(0.1)		.7
Granville	3.1	(.1)	-	-	5.2	-		8.4
Halifax	4.7	(.5)	29.4	-	3.8	(0.2)	11,822	11,860.6
Hertford	-	(1.3)	1.2	(.1)	2.2	(0.5)		5.3
Martin	-	(1.7)	59.6	(1.6)	0.2	(1.0)		64.1
Northampton	-	(.9)	-	(.2)	0.8	(0.1)		2.0
Pasquotank	1.2	(.8)	-	(.1)	-	(0.7)		2.8
Perquimans	-	(.6)	-	-	0.2	-		.8
Person	2.8	-	1621.1	-	1.4	(2.6)		1627.9
Rockingham	6.5	(.1)	5.0	-	6.4	-	174.	192.0
Stokes	-	(.2)	1007.	-	.5	-		1007.7
Vance	3.9	(.2)	-	(.5)	3.4	(0.1)		8.1
Warren	.2	(.1)	-	-	1.5	(0.1)		1.9
Washington	-	(.6)	-	-	-	-		.6
Totals	22.5	(9.5)	2724.6	(4.2)	31.4	(7.1)	11,996.	14,795.3

*Using most recent data available, years 1980-83; totals rounded to nearest 100,000 gpd, and based on yearly average use except agricultural irrigation, which is based on a 6-month use.

Municipal

As shown in Table 6, public water systems in the study area supplied approximately 31.7 MGD in 1980. This use is projected to reach 79 MGD by 2030. Generally, the area is typified by slow population growth and most of the increase in demands on public systems is due to an increase in the share of the population served by public systems that were once served by individual wells. The major exception is Currituck County where water use is expected to grow by over 1,000 percent over the next 50 years, largely due to development of the Outer Banks.

Per capita demands were calculated at 100 gallons per person per day for all non-industrial purposes. This includes domestic, public, and commercial uses, as well as an allowance for leakage. Although there is some system-by-system variation, the current overall average use in the study area is approximately at this level.

Electric Generation

Use of surface water for electrical generation is, by far, the dominant use of water in the study area, with a yearly average use of over 14.6 billion gallons per day. Of this amount, almost 12 billion gallons a day is used for hydro-power production, and is not actually withdrawn before use. Because much of the same water is used several times in hydropower production as it moves downstream, the average use exceeds the average total flow of the Roanoke River. Since hydro-electric use is dependent on average yearly flows in the river, the amount of this use varies widely each year, making yearly comparisons difficult. Over 70 years of record, the Roanoke River's average flow

TABLE 6

PRESENT AND PROJECTED WATER USE
PUBLIC SYSTEMS - BY COUNTY
(in MGD)

	<u>1980</u>	<u>1990</u>	<u>2000</u>	<u>2010</u>	<u>2020</u>	<u>2030</u>
Bertie	.5	.7	1.0	1.3	1.5	1.6
Camden	.2	.2	.3	.4	.4	.4
Caswell	.2	.4	.6	.7	.9	1.0
Chowan	1.2	1.4	1.6	1.7	1.7	1.8
Currituck	.1	.2	.3	.5	.8	1.1
Gates	.3	.4	.5	.7	.8	.9
Granville	3.2	3.7	4.6	5.7	6.9	7.8
Halifax	5.2	6.4	7.4	8.5	9.6	10.8
Hertford	1.3	1.5	1.6	1.7	1.8	1.9
Martin	1.7	2.2	2.5	2.9	3.3	3.6
Northampton	.9	1.1	1.3	1.5	1.7	1.8
Pasquotank	2.0	2.2	2.5	2.7	3.0	3.3
Perquimans	.6	.7	.8	.8	.9	1.0
Person	2.8	3.5	4.2	4.9	5.7	6.6
Rockingham	6.4	7.8	9.4	11.0	13.1	15.4
Stokes	.2	.2	.3	.3	.4	.5
Vance	4.1	5.0	5.8	6.5	7.2	8.0
Warren	.3	.4	.6	.7	.8	.9
Washington	<u>.6</u>	<u>.7</u>	<u>.9</u>	<u>1.0</u>	<u>1.2</u>	<u>1.3</u>
	31.8	42.3	51.3	59.7	69.4	79.0

at Roanoke Rapids has been about 5.3 billion gallons per day. The addition of another hydro-electric facility in the study area could increase average use by approximately this amount, and is the basis for the 2030 projected range shown on Table 5.

Approximately 2.6 billion gallons of water per day was withdrawn for cooling and wash water at thermo-electric generation facilities in the study area. This total may again be misleading, due to the fact that this water is largely recycled in lakes as cooling water. The anticipated enlargement of one facility and the construction of a new facility could double the existing thermo-electric use of water by 2030.

Other Industrial Uses

Over 100 million gallons of water per day is currently used by self-supplied industries for purposes other than electric generation. The addition of at least one new paper mill in the study area is anticipated, along with a number of other industries having somewhat smaller requirements for water by the year 2030.

Agricultural Irrigation

Over 44,000 acres of farmland was irrigated in 1981 in the study area. The major crops irrigated were corn, peanuts, and tobacco. Water was applied at a rate of approximately 38.5 million gallons per day (MGD) in the 6-month growing season of 1981. This figure may be somewhat misleading, due to the extreme weather variation and monthly needs. For example, water use in June averaged nearly 80 MGD, while use in December was almost zero. Water use on individual days in dry

hot weather periods can easily exceed several hundred million gallons per day.

The majority of the irrigation water came from surface water sources such as impoundments or direct stream or river withdrawals. Dug pits or wells are also important sources, particularly east of Warren County.

Water used for irrigation in the study area in 1981 was approximately one-third larger than use for the same area in 1980. On a long-term basis, growth in total acres irrigated is expected to increase at an annual rate of five to six percent per year. By 2011, projections show that water will be applied at an average rate of 150 to 200 MGD during a 6-month growing season.

Other Types of Uses

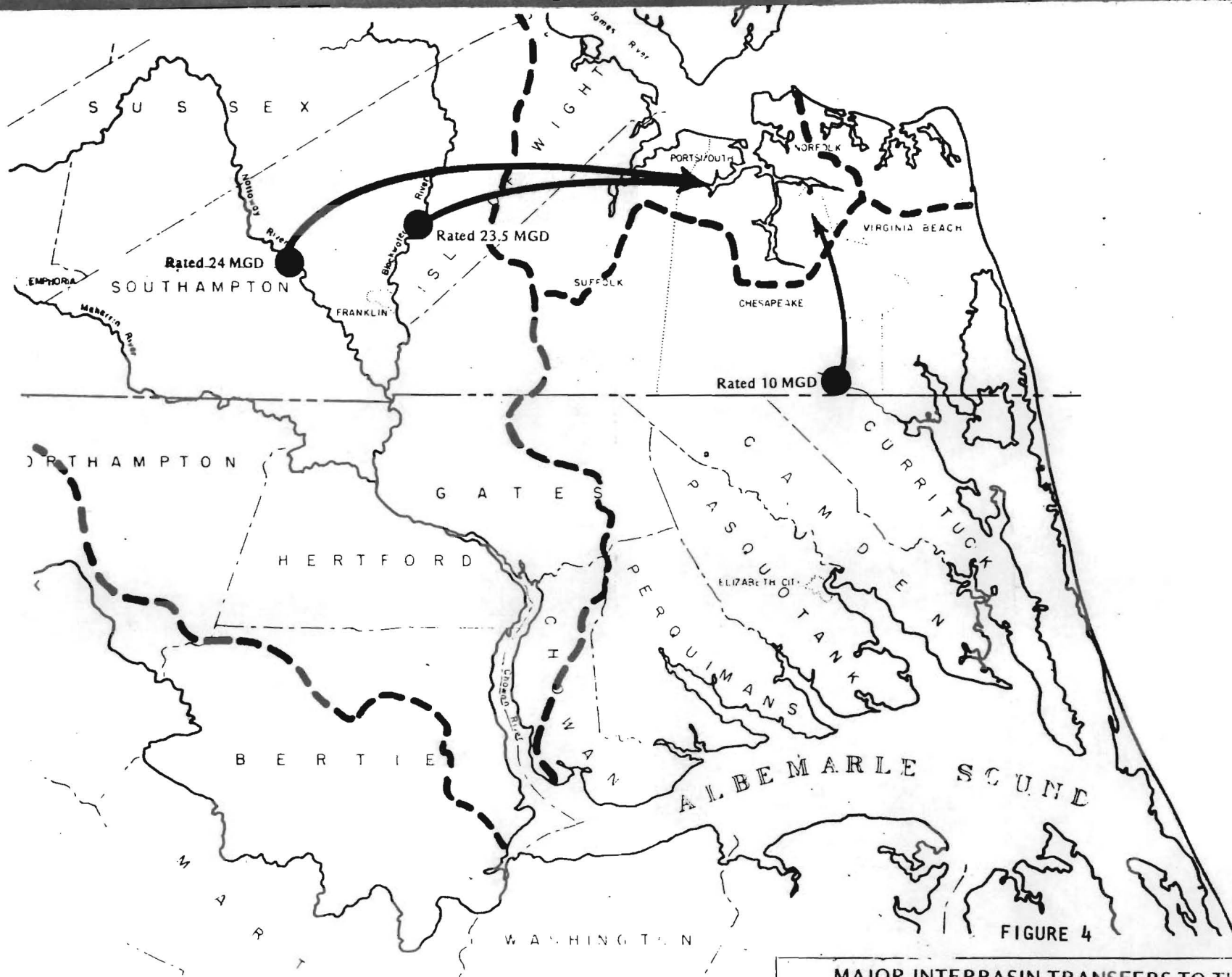
Data is incomplete regarding the use of water for rural domestic purposes, livestock watering, recreational needs, etc. Estimates are currently being developed for these uses.

WATER PROBLEMS

Existing Surface Water

Norfolk augments their major surface water sources by withdrawals from pumping stations on the Blackwater and Nottoway Rivers (see Figure 4). (These water supply sources were developed by the Federal Government during World War II and were purchased by the City of Norfolk in 1946.) The pumping station on the Nottoway River at Courtland, Virginia has a rated capacity of 24 million gallons per day (MGD), although pumping figures as high as 31.0 MGD have been recorded. The Blackwater River pumping station is just above the USGS stream gaging station near Franklin, Virginia. This station has a rated capacity of 23.5 MGD, but pumping rates as high as 33.4 MGD have been recorded. While the amount of water pumped by these stations is small (2 percent) when compared to the average flow in the Chowan River, it is quite significant (40 percent) when compared with the 7 day, 10 year low flow.

In 1975, the City of Chesapeake, Virginia received a permit to construct a water intake and pump station on the Northwest River for withdrawing up to 10 MGD. Pumping records from the City of Chesapeake indicate that withdrawals in excess of 10 MGD were made during the early 1980's. Their water plant has a treatment capacity of 15 MGD. Again, there is concern over the impact of these withdrawals from the Northwest River.



MAJOR INTERBASIN TRANSFERS TO THE VIRGINIA - TIDEWATER METROPOLITAN AREA

FIGURE 4

Impacts on Fish and Wildlife

The Memorandum of Understanding on Re-regulation of Augmentation Flows for Fish from John H. Kerr Reservoir, between VEPCO, U.S. Army Corps of Engineers, and the State of North Carolina (Wildlife Resources Commission) attempts to provide for the protection of the striped bass in the lower Roanoke River: when there is sufficient water stored in John H. Kerr Reservoir, the stage at Weldon is maintained at 13 feet, or a river discharge of approximately 6,000 cfs, from early April through mid June. According to the N.C. Wildlife Resources Commission, this release represents an "absolute minimum" for striped bass spawning activity. At a discharge of 6,000 cfs, the area for spawning is limited to the river reach downstream of U.S. Highway 301 bridge. This reduces the total available spawning habitat and prevents the fish from utilizing the higher quality spawning habitat from the U.S. 301 bridge upstream to Roanoke Rapids Dam. The Wildlife Resources Commission believes that a stage of 16 feet at Weldon, or an approximate discharge of 8,500 cfs would provide improved conditions for spawning. This higher flow would allow full use of spawning habitat from Roanoke Rapids Dam downstream.

Existing-Groundwater

Although groundwater is an abundant resource in the study area, several factors limiting its development should be considered. They are:

Quality - Potable groundwaters east of the Chowan River are limited to relatively shallow aquifers. The most productive aquifers contain brackish or saline groundwaters. Pumping in southeastern Virginia slowly, but inexorably, causes movement of brackish groundwater into aquifers which normally contain fresh water.

Recharge - The geology of the study area is such that direct recharge is impeded over much of the area by layers of poorly permeable clays and silts which blanket the principal aquifer units and limit their replenishment to only a small percentage of the total annual precipitation.

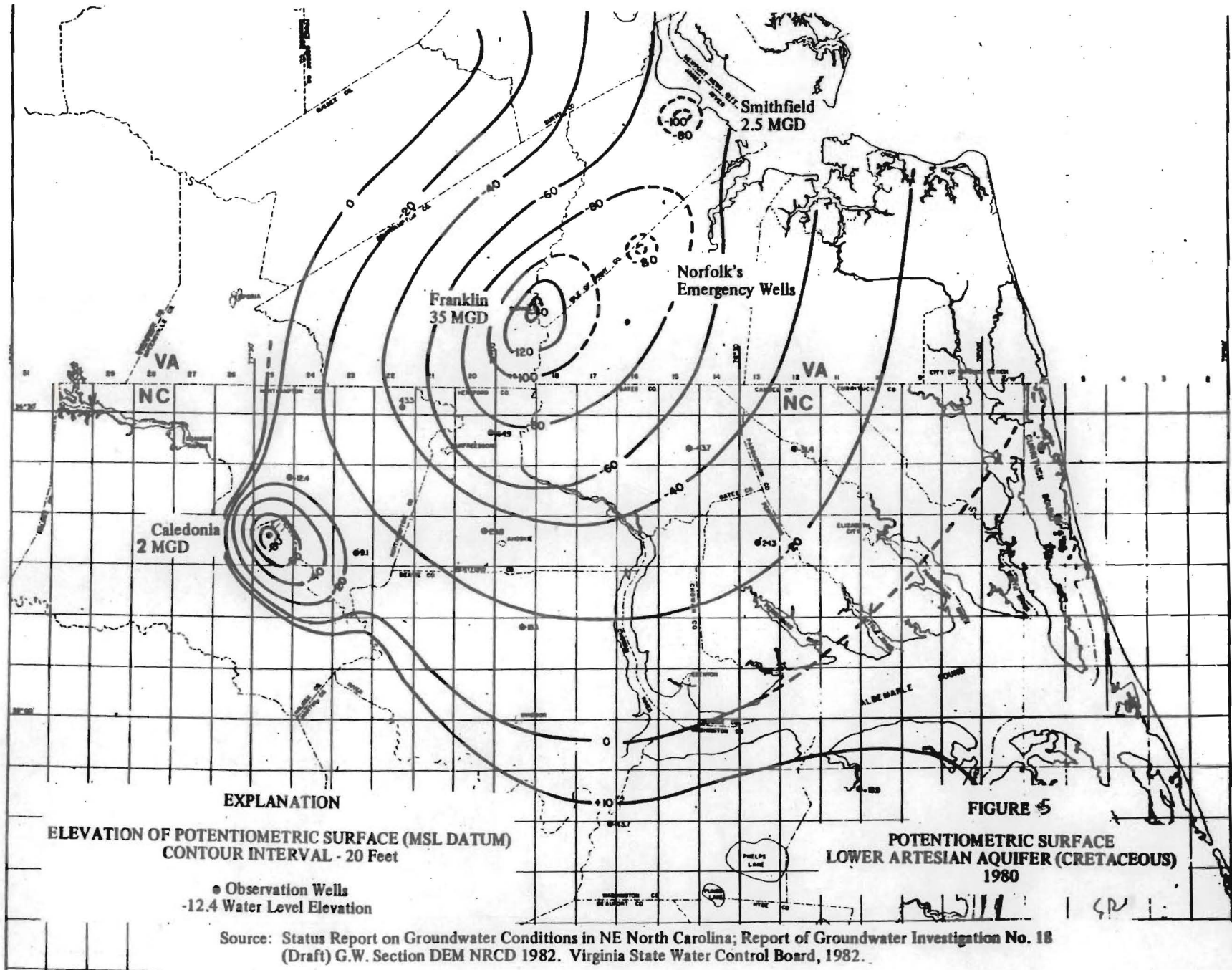
Although it may not be necessary to limit groundwater withdrawals to an amount equal to annual recharge, overdrafts on water resources should be considered as conservatively as overdrafts on fiscal resources. Sooner or later they must be curtailed.

Direct Effects of Regional Pumping

Heavy, concentrated pumping in southeastern Virginia has caused a general decline in artesian head over most of the eastern half of the study area (see Figures 5 and 6). In the western part of the Coastal Plain in the study area, where the principal aquifer is relatively shallow, declining water levels limit the drawdown available to wells and, therefore, limit potential development of individual wells.

Existing Water Quality

The most damaging water quality problem has been the eutrophic (enriched) conditions in the Chowan River (and to some extent, Albemarle Sound). Excessive concentrations of nutrients, combined with a long residence time, have produced extensive algal blooms. These blooms have reduced recreation and recreational values, altered food chains, and adversely affected both sport and commercial fisheries. The nutrient inputs come from many sources: municipal and industrial sewage treatment plants; croplands, pasturelands, and forest lands; animal wastes;



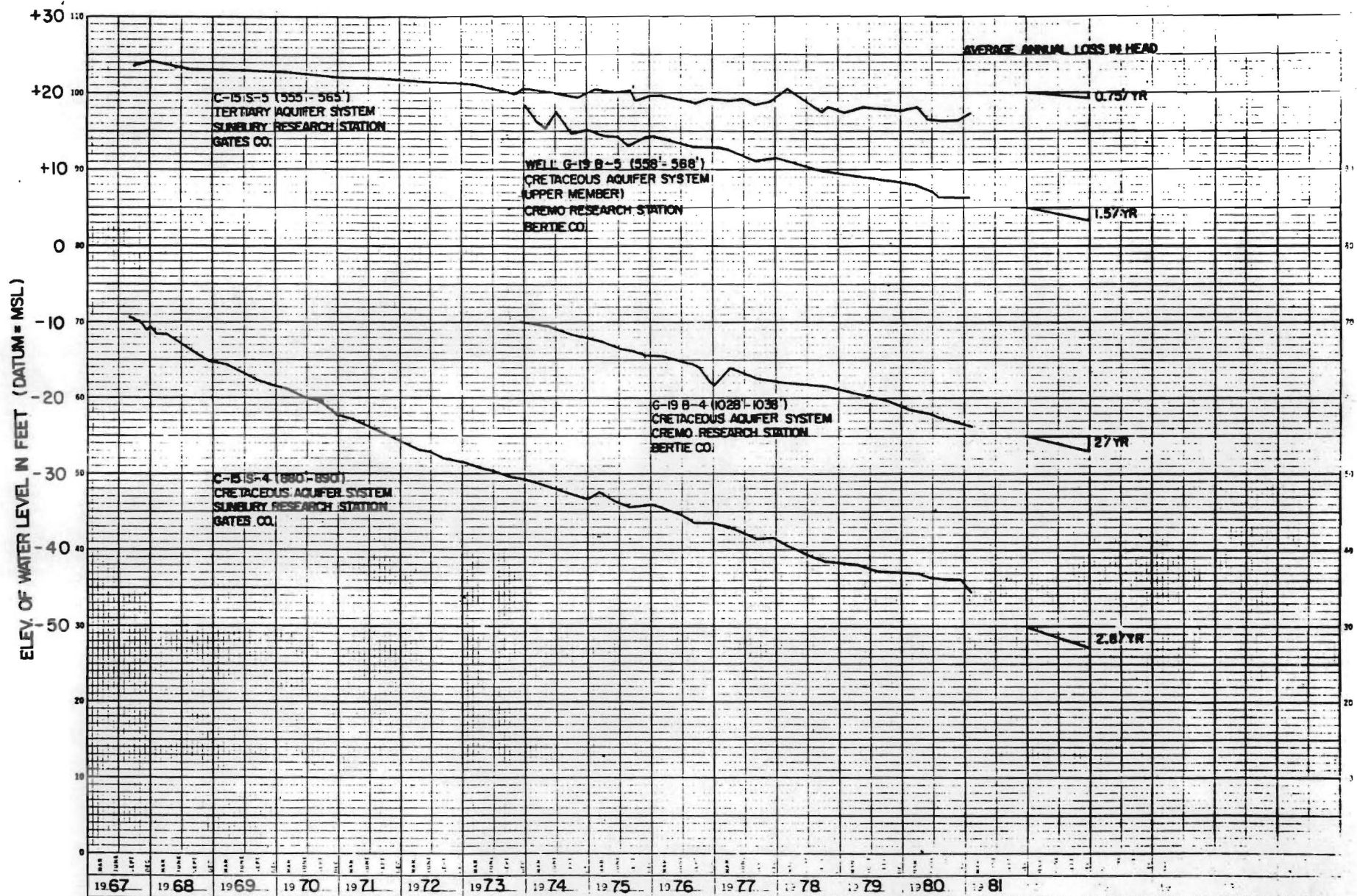


FIGURE 6 HYDROGRAPH OF WELLS IN BERTIE AND GATES COUNTIES

wetlands; and rainfall. The Environmental Management Commission classified the waters of the Chowan River Basin in North Carolina as Nutrient Sensitive in September 1979. Programs are underway in both North Carolina and Virginia to reduce the amount of nutrients entering surface waters.

Recently, the concentration of dissolved oxygen in the waters of the lower Roanoke River, near Plymouth, has fallen below State Standards. The combination of high flow conditions, followed immediately by low flow conditions, is believed to be the cause of these DO depressions. Waters drain from the swamp areas and carry a heavy non-resilient biochemical oxygen demand. These DO levels negatively impact the aquatic biota of this section of the river (which is classified as only "Fair" by the N.C. Division of Environmental Management). These low DO levels have also forced the Weyerhaeuser Company, the owner and operator of a large paper mill near Plymouth, to temporarily adjust their water intake and wastewater discharge facilities.

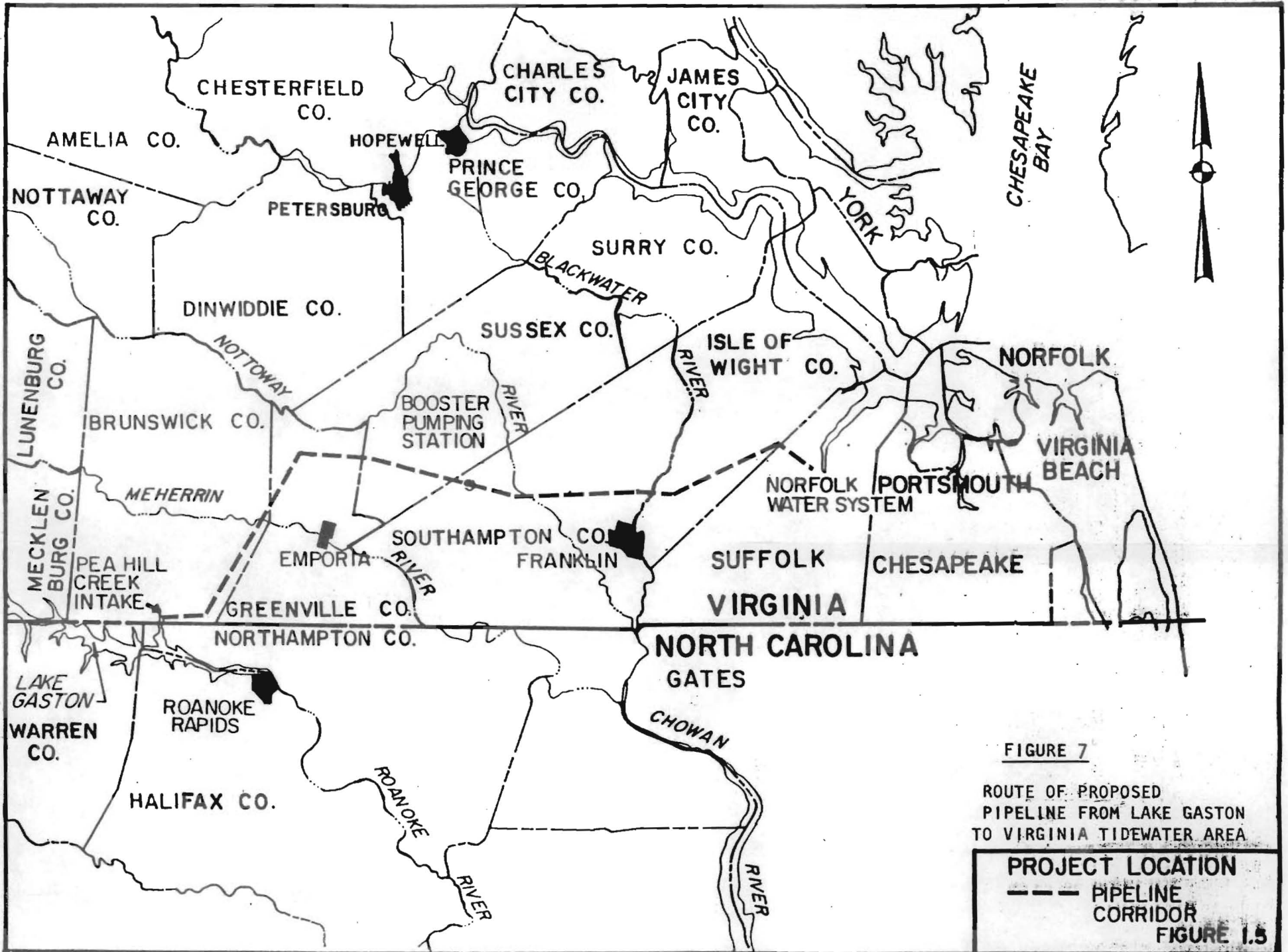
Some areas of Albemarle Sound are closed to shell fishing because of high levels of bacteria in the water; other tributaries of Albemarle Sound (in addition to the Chowan) have shown signs of nutrient enrichment.

Pending Major Out-of-Basin Withdrawals

The City of Virginia Beach proposes to divert 60 million gallons of water per day (MGD from Lake Gaston to Tidewater Virginia by means of an 85-mile pipeline (see Figure 7)). This action would cause increased lake level drawdowns at Kerr Lake, a reduction of flows in the lower Roanoke River, and the extension of low flow periods.

The magnitude of these impacts will be influenced by how Kerr Reservoir is operated, especially during drought periods. In order to both maximize energy production and maintain a guaranteed generating capacity, the Wilmington District Corps of Engineers analyzed flow data during the worst drought on record and concluded that the lake level would remain above 293-foot mean sea level. (However, exceptions to this finding occurred in 1975, 1977, and 1981.) This level guarantees a generating capacity of 225,000 kw.

Modeling studies performed by the Office of Water Resources, DNRC in the fall of 1983 assumed that outflow from Kerr Reservoir would be maintained to satisfy the above mentioned generating capacity and energy production when the lake level was below the target rule curve but above 293-foot mean sea level. The outflow was reduced to the Federal Power Commission minimum requirement when the lake level dropped below 293-feet. (In addition to streamflow, the operation of Kerr Reservoir is dependent on many other factors, including the energy sale contract between the Corps and VEPCO and the demand for power in the region.)



Results of the computer modeling studies indicate that the proposed project would have a considerably greater impact on lake levels at Kerr Lake than that described by the Corps. Table 7 presents the results of a computer study which simulated 25 years of record, from 1951 through 1975, and shows the additional drawdown caused by the withdrawal.

TABLE 7. ADDITIONAL KERR LAKE DRAWDOWN CAUSED BY THE 60 MGD WITHDRAWAL

Additional Drawdown with 60 MGD Withdrawal	Recurrence Interval (Years)					
	2	5	10	20	25	50
Inches	1.1	2.6	3.6	4.6	4.9	5.8

These findings show that a 0.2 foot drawdown caused by the withdrawal would occur every four years. They differ significantly from the Corps' Environmental Assessment which states that an 0.2 foot (2.4 inch) drawdown would be a "worst-case" situation. Even during a moderately dry year, the increased drawdown could amount to 0.30 feet and, under more severe drought conditions, the additional drawdown could be much worse. These drawdowns would aggravate conditions already caused by the drought itself.

The impact of the project on downstream flows would, in general, be to reduce these flows by 93 cfs (60 MGD) when Kerr Lake is above elevation 293. If the lake reaches elevation 293 feet and the lake is operated according to the rules used for the model, power generation will be cut back and minimum flows will be maintained. Table 8 shows the lowest average flows that occurred for various durations during the 25-year simulation.

TABLE 8. REDUCTION IN MINIMUM OUTFLOW CAUSED BY 60 MGD WITHDRAWAL

Length of Duration (days)	Minimum Average Outflow With No Withdrawal (cfs)	Minimum Average Outflow With 60 MGD Withdrawal (cfs)
1	2110	1500
7	2110	1500
15	2120	1857
30	2120	2120
45	2150	2150

These findings show that the lowest one-day and the lowest 7-day average flows for the 25-year simulation were reduced by nearly 30 percent, using the present operating rules and a 60 MGD withdrawal. In this situation, the withdrawal caused the lake level to drop below 293 feet, which, in turn, caused power generation to be stopped and minimum flow releases to be instituted. If the withdrawal had not been made, the release from Kerr would not have been reduced from 2110 cfs to 1500 cfs. The reduced flow lasted for 7 days, whereas, without the withdrawal, the flow would have been 2110 cfs.

Bass Fishery Below Roanoke Rapids Dam

The striped bass spawning season lasts from April 26 through June 15. In order to assure that spawning occurs sufficiently upstream, the Wilmington District Corps of Engineers has reserved two feet of storage (300 to 302 feet mean sea level) in Kerr Reservoir for fish spawning. As long as the lake level is between these two elevations, flow releases will be maintained at a minimum of 2,000 cfs or up to 6,000 cfs at the request of the North Carolina Wildlife Resources Commission.

Table 9 shows the number of days each year that Kerr Reservoir discharged a sufficient quantity of water for the benefit of fish spawning, to maintain a stage of 13 feet in the Roanoke River below Weldon (approximately 6,000 cfs).

TABLE 9. DURATION OF FISH SPAWNING RELEASES FROM JOHN H. KERR RESERVOIR, 1955-1982

<u>Year</u>	<u>No. of Days</u>	<u>Year</u>	<u>No. of Days</u>	<u>Year</u>	<u>No. of Days</u>
1955	22	1964	29	1973	50
1956	22	1965	29	1974	47
1957	29	1966	14	1975	49
1958	50	1967	18	1976	31
1959	35	1968	29	1977	31
1960	40	1969	36	1978	50
1961	49	1970	42	1979	49
1962	50	1971	50	1980	46
1963	45	1972	47	1981	9
				1982	50

As can be seen from the information presented, in 6 years out of 28, spawning flows were released for the entire spawning season. During the other years, the spawning flows were released for shorter periods during the spawning season. The diversion of 60 MGD of water from Lake Gaston would reduce the duration of the spawning flows by at least one to two days each year. This would negatively impact the striped bass fisheries.

Future - Surface Water

There are no restrictions or limitations which would prevent Virginia Beach, or some other community, from requesting permission to withdraw additional amounts of water from Lake Gaston, over and above the 60 MGD already proposed. More water could probably be pumped through the proposed pipeline or through additional transmission facilities constructed at some future date. In examining the impacts of this possibility, a withdrawal of 127 MGD was analyzed. The impacts of a diversion of this magnitude on Kerr Lake and on flows in the lower Roanoke would be much more severe. Table 10 presents the results of a computer analysis which simulated 25-years of record, from 1951 through 1975, and shows the additional drawdown caused by a 127 MGD withdrawal.

TABLE 10. ADDITIONAL DRAWDOWN CAUSED BY A 127 MGD WITHDRAWAL

Additional Drawdown with 127 MGD Withdrawal	Recurrence Interval (Years)					
	2	5	10	20	25	50
Inches	2.6	5.3	6.8	8.4	9.0	10.3

In general, the additional drawdown caused by this diversion is approximately double that of the 60 MGD withdrawal. Reduced water levels would create a hazard to water-based recreation through reduced water depths, reduced coverage of underwater obstructions, such as stumps, and exposure of tree stumps in shallow areas. These conditions would mean an increased risk to those engaged in water-skiing, swimming, or sailing.

The impact of diverting 127 MGD on downstream flows would be more severe than the impact on lake levels. Table 11 shows the reduction in average low flows of a specified duration, occurring over the 25-year period which was modeled in performing the simulation.

TABLE 11. REDUCTION IN MINIMUM OUTFLOW CAUSED BY 127 MGD WITHDRAWAL

Length of Duration (days)	Minimum Average Outflow With No Withdrawal (cfs)	Minimum Average Outflow With 127 MGD Withdrawal (cfs)
1	2110	1000 *
7	2110	1500 *
15	2120	1500 *
30	2120	1915
45	2150	1946
60	2185	2002
75	2339	2121
90	2471	2288
105	2566	2410
120	2638	2501
135	2694	2572
150	2738	2628

*FERC minimum

These findings show that the lowest daily flow for the 25-year simulation was reduced from 2110 cfs to 1000 cfs, or nearly 53 percent. The minimum average outflow having a duration of 15 days was reduced 29 percent. Not only are minimum flows of a specified duration reduced, but the length of those low flow periods is increased. For example, the minimum 30-day average outflow was 2120 cfs with no withdrawal. With the 127 MGD withdrawal, the minimum average outflow of 2120 cfs was extended to 75 days.

Pending and Future Water Quality

Scenario -- The lower portion of the Roanoke River is a multiple-use resource. The river water is used for water supply, for assimilation of domestic and industrial waste, for industrial processing, for fisheries propagation, and for navigation. By the year 2030, under normal growth, surface water withdrawals in the Roanoke Basin below Roanoke Rapids Dam are expected to be between 84 and 431 MGD more than current usage. Of this projected withdrawal, between 49 and 249 MGD of water will be consumed and not returned to the Roanoke River system. This consumptive use, plus the out-of-basin transfer of up to 60 MGD by Virginia Beach, poses a serious threat to water quality in the Roanoke River.

Specific Impacts -- Greater consumptive water use and possible out-of-basin water transfers will adversely affect water quality in the lower Roanoke River, especially in the May-to-September time period. First, lowering flows in the Roanoke River would mean larger and more frequent violation of dissolved oxygen standards. The minimum flow release at Roanoke Rapids Dam is now set at 2,000 cfs for the May-to-September time period, but this can be reduced to 1,600 cfs under certain circumstances. Table 12 shows the dissolved oxygen concentration in the Roanoke River at different low flows. In addition to impacts on aquatic biota, these conditions would force major dischargers to treat to higher levels or store some of their wastewaters for release at higher flow periods.

TABLE 12. DEM D.O. MODEL PREDICTIONS

<u>Flow at Dam*</u> (cfs)	<u>D.O. Minimum</u> (mg/l)	<u>Degraded Zone**</u> (miles)
1800	5.0	--
1500	4.2	6.1 mi. beginning 1.2 mi. downstream of Weyerhaeuser
1200	3.9	6.3 mi. segment before entering Albemarle Sound beginning 1.1 mi. below Weyerhaeuser
1000	3.3	7.7 mi. segment before entering Albemarle Sound beginning 0.8 mi. below Weyerhaeuser

Also:
35 mi. segment beginning 115 mi.
upstream of Albemarle Sound with
D.O. minimum of 4.6 mg/l

* D.O. concentration of releases from dam assumed to be at saturation level (F.8 mg/l at 29° C).

** Refers to zone of standard violation (i.e., D.O. < mg/l)

Note: This model only roughly calculates the minimum D.O. A more refined model needs to be developed to incorporate changes in reaction and physical ratios at low flows.

A second major impact would be a change in the average salinity concentrations of Albemarle Sound. The Division of Environmental Management in the North Carolina Department of Natural Resources and Community Development developed a salinity model relating flows in the Roanoke and Chowan Rivers to average salinity in Albemarle Sound. Table 13 shows the changes in salinity for reduction in flow of 100 and 250 cfs (these values are used just for illustration).

TABLE 13. DEM SALINITY MODEL PREDICTIONS

<u>Existing Flow (cfs)</u>	<u>Reduced Flow (cfs)</u>	<u>Net Change</u>	<u>Percent Increase</u>
4000	3900	+ .21 ppt	6%
	3750	+ .55 ppt	16%
3500	3400	+ .32 ppt	7%
	3250	+ .86 ppt	18%
3000	2900	+ .53 ppt	8%
	2750	+1.44 ppt	22%

The results of this model indicate a strong potential for substantial change in salinity, with the greatest tendency for change at the lowest flow rates.

Future - Groundwater

The groundwater resources of northeastern North Carolina are vital to the economic development and general welfare of the area. Groundwater use for municipal, agricultural, and industrial purposes is expected to increase as the area develops. Groundwater is the primary source of drinking water supply for most towns and for individual domestic supplies. Irrigation is important to agricultural production and groundwater is expected to serve an increasing role in providing water for irrigation. In addition, a strong potential for industrial growth exists in the northeastern North Carolina area because of the proximity to highly industrialized southeastern Virginia. Groundwater will be an attractive alternative for future industrial water supply development and expansion because of its availability and relatively low treatment cost.

Increasing groundwater use in the northeastern North Carolina area will magnify the existing impacts of current groundwater withdrawals from the major aquifers. The increased use of groundwater from the Cretaceous aquifer system in the study area will cause further water level drawdowns (see Figures 5 and 6 for existing drawdowns) and excessive drawdowns could cause saline water encroachment into fresh groundwater and also land subsidence.

The existing regional cone of depression, centered around Franklin, Virginia, is expected to stabilize if current groundwater rates are kept constant. Stabilization will occur when current withdrawal rates are approximately equal to recharge to the Cretaceous aquifer system. If groundwater withdrawals are increased, the cone of depression will expand, and groundwater levels will decline throughout the area influenced by the pumping.

Saline water encroachment is thought to be occurring in the Cretaceous aquifer, due to the water flow toward the center of the existing cones of depression. The rate at which the encroachment is occurring is unknown, due to the lack of adequate monitoring and analytical equipment. However, given the existing information about aquifer hydraulic conductivity, it has been estimated that the saline water encroachment rate is very slow and, where measureable, the magnitude of movement would probably be in inches per day. Increased groundwater withdrawals could increase the magnitude of this saline encroachment.

Land subsidence rates, measured by the U.S. Geological Survey in the center of a large well field at Franklin, Virginia, have indicated that some land subsidence has occurred near the site. Recent measurements indicate, however, that no permanent subsidence is now occurring. Increased pumping of groundwater could cause land subsidence to occur again.

THE WATER USE ACT OF 1967
(CAPACITY USE AREA DESIGNATION)

Under the authority of the Water Use Act of 1967 (G.S. 143-215.11-22), the Environmental Management Commission may declare and delineate capacity use areas where it finds that the use of groundwater, surface water, or both require coordination and limited regulation for the protection of interests and rights of residents or property owners or for protection of the public interest. A capacity use area is defined as one where "...the aggregate uses of groundwater or surface water, or both, in or affecting said area (i) have developed or threaten to develop to a degree which requires coordination and regulation, or (ii) exceed or threaten to exceed, or otherwise threaten or impair, the renewal or replenishment of such waters or any part of them." (G.S. 143-215.13 [b]). The EMC may declare and delineate capacity use areas in accordance with a set of seven procedures found in Section 13(c) of the Act. The first procedure describes the situation under which authorization to proceed with a capacity use investigation should be given:

- (1) Whenever the Environmental Management Commission believes that a capacity use situation exists or may be emerging in any area of the State, it may direct the Department to investigate and report to the Environmental Management Commission thereon.

Milton S. Heath, Jr., Associate Director, Institute of Government, Chapel Hill, discussed the Water Use Act of 1967 in a paper presented at a legal conference* at Blacksburg, Virginia in 1978. This excerpt

*Legal and Administrative Systems for Water Allocation and Management, Proceedings of a Regional Conference, April 19-20, 1978, Virginia Polytechnic Institute & State University, Blacksburg, Virginia.

should be especially useful in clarifying capabilities and limitations of the law. Heath's comments are as follows:

"In 1967, the General Assembly made a significant modification in common law water rights doctrines by enacting legislation that empowers EMC to require that large water users in areas of strong water competition or water scarcity (so-called 'capacity use areas') secure water use permits from the Commission. (G.S. 143-215.13 et seq.) The basic provisions of the statute were summarized in the 1967 Legislative Issue of Popular Government as follows:

'A three-step process is contemplated under the Act. First the Board (now, the Commission), after studies and hearings, must find that a 'capacity use area' should be declared. In this phase the Board is specifically directed to pursue all alternatives short of regulation. Second, the Board must conduct a rule-making proceeding. If it finds, after further hearings, that any controls are appropriate, the Board is to choose from a specified group of provisions those that it considers appropriate to the particular area. Third, permits are issued to large water users whose usage is likely to contribute substantially to the problems of water-short areas. In these permits, conditions may be included that carry forward the purposes of the regulations adopted in the second phase of the proceedings. No permit conditions can go beyond the scope of those regulations.

' The range of controls available to the Department in implementing the Act includes provisions on timing of water withdrawals; protection against saltwater encroachment and against unreasonable adverse effects on water users in the area; well-spacing controls; limitations on well-pumping rates or levels; and reporting requirements. To guide the Board in the exercise of these powers, detailed criteria are laid down bearing a marked similarity to the factors that have traditionally been evaluated by the courts in resolving water-use disputes.

'To insure that only the largest users will be brought under regulation, the minimum usage for which a permit is required is fixed at 100,000 gallons per day. To insure that only those users are regulated (even among the 100,000 gpd class) who contribute significantly to the problem, the permits with conditions are required only for "consumptive users" of water-- those who, as defined by the Act, substantially impair water quantity or quality. Finally, to insure that fixed investments are not unfairly impaired, the Board is directed to take into consideration the reasonable needs of existing and certain potential water users, to the extent that their needs do not unreasonably damage others....

' Consistent with the ultimate unity of the hydrologic cycle, the Act treats both surface and ground water in one law that applies equally to both. However, in recognition of the better-developed and more equitable rules of law that now govern the use of surface water (by comparison with ground water), it expresses an intent that the Board operate generally within the framework of the concept of riparian rights with regard to surface streams. '

"The original 1967 Act has been actually applied only to the problem that was the main motivation for its enactment--the hazard of saltwater contamination of groundwater in the phosphate mining region of southeastern North Carolina. In 1976, EMC considered, but finally rejected, a proposal to designate as a capacity use area the entire Yadkin River Basin downstream from the projected Perkins Nuclear Electric Generating Plant in Davie County. Staff proposals concerning other capacity use areas have been before the Commission in earlier years.

"One amendment to the statute should be noted. In 1973, the General Assembly added to the original statute a procedure authorizing EMC to prohibit new or increased water withdrawals (or wastewater discharges) in any area found by the Commission to be facing a generalized condition of water depletion (or water pollution). The immediate purpose of this amendment was to provide a short-cut procedure, or holding action, to temporarily control a problem situation pending the establishment of a capacity use area.

"It is possible that the capacity use procedure could be used as a vehicle for arbitrating competing water uses in an area that might be

affected by diversions. Before declaring a capacity use area for such a purpose, EMC would have to find that

aggregate uses of groundwater or surface water, or both, in or affecting said area (i) have developed or threatened to develop to a degree which requires coordination and regulation, or (ii) exceed or threaten to exceed or otherwise threaten or impair, the renewal or replenishment of such waters or any part of them.

" Of these two alternative findings, the former would probably be easier to make and sustain than the latter. In any event, it is obvious that EMC does not casually or readily utilize this procedure, since only one capacity use area has been declared during the 10 years since enactment of the statute.

"There is no express authority in the statute for EMC to regulate, approve, or deny diversions within a capacity use area. To do so, the Commission would probably have to rely on its residual authority to adopt regulations and impose permit conditions 'not inconsistent' with the Act 'as the Commission finds necessary to implement the purposes' of the Act." [G.S. 143-215.14(a) (4) and 143-215.13(c)].

A copy of the Water Use Law is in Appendix C.

WHY CAPACITY USE DESIGNATION IS BEING CONSIDERED

The State of North Carolina has attempted for many years to achieve sound management of surface and ground water resources in northeastern North Carolina. Because both surface water and ground water in northeastern North Carolina are affected by water use in southeastern Virginia, a major element of the State's effort has been an attempt to establish principles for the management of interstate water resources. Governor Holshouser established a North Carolina-Virginia Water Resources Management Committee by agreement with the Commonwealth of Virginia. Governor Hunt and Governor John N. Dalton, of the Commonwealth of Virginia, renewed this existing agreement in April 1978. The agreement establishes the North Carolina-Virginia Water Resources Management Committee as a forum for discussion of water resources management issues of mutual concern.

In 1982, concern increased about the growing seriousness of interstate water management problems. The primary problems identified by Virginia and North Carolina were the projected water supply shortage in Tidewater Virginia, heavy use of ground water and the resulting lowering of ground water pressure levels over a wide area in North Carolina and Virginia, and the continuing pollution problem and associated algae blooms in the Chowan River. The North Carolina-Virginia Water Resources Management Committee appointed three technical subcommittees to review these issues and make recommendations to the Committee. These technical subcommittees met several times between December 1982 and May 1983.

The Water Quality Technical Subcommittee concentrated on the water quality problems in the Chowan River. The Subcommittee developed a consensus on nutrient reduction targets required to reduce the problem of excessive algae growth. The Subcommittee was not able to reach agreement on all of the specific steps to be taken. North Carolina has developed a five-year Action Plan that is being implemented. Virginia is expected to develop a plan by April, 1984.

The Ground Water Technical Subcommittee reached a consensus that the present level of ground water use in the principal artesian aquifer is at, or exceeding, the recharge rate and that the cone of depression created by large withdrawals is still expanding. The Ground Water Subcommittee reached agreement on several recommendations, including the need for a digital computer model of the aquifer to guide management of this valuable resource and the need for statutory changes in Virginia to allow fuller authority for ground water management. The Ground Water Subcommittee also recommended that North Carolina designate northeastern North Carolina as a capacity use area under the Water Use Act of 1967. This would give North Carolina better ground water management authority in the area affected.

The Water Supply Technical Subcommittee failed to reach a consensus on several important points, including the amount of water available to Tidewater Virginia from its existing sources and the best method for evaluating the alternative water sources available to meet future needs. Following this failure of the Water Supply Technical Subcommittee to reach an agreement on these key issues, the City of Virginia Beach proceeded to file an application for a Corps of Engineers permit to divert 60 million gallons a day of water from Lake Gaston to serve Tidewater Virginia.

The State of North Carolina attempted to persuade the U.S. Army Corps of Engineers to do an environmental impact statement on the permit for the Lake Gaston project. The State believes that an environmental impact statement could be a good forum for studying other choices of water supply sources available to Tidewater Virginia, and evaluating the amount of water already available to the Tidewater region. The Corps of Engineers refused to prepare an environmental impact statement on this permit. North Carolina is seeking a court decision to require the preparation of this environmental impact statement.

During the study of the Roanoke River Basin associated with the evaluation of the Lake Gaston project proposal, North Carolina has identified several other large potential water uses in the Roanoke Basin. These include agricultural irrigation, power plant cooling, and municipal and industrial use. The combination of these potential increases in water use in the Roanoke Basin would be major factors in considering the declaration of a capacity use area under the Water Use Act of 1967.

5th DRAFT

10 FEBRUARY 1984

POSSIBLE SEQUENCE OF EVENTS AND SCHEDULE FOR
NORTHEASTERN NORTH CAROLINA CAPACITY USE AREA STUDIES

- Jan. 12, 1984: EMC Meeting. Study requested on CUA determination.
- Feb. 1, 1984- Prepare Draft Report on Water Use in Region (G.S. 143-215.13(c)(2)
Mar.30, 1984: . Consult with all interested...(Public Notice)
. Consider all factors relevant...
. Include the Department's findings and recommendations...
- Mar. 2, 1984: Conference with Secretary Summers.
- Mar. 8, 1984: EMC Meeting.
- * Draft Briefing Paper on Water Use mailed to EMC.
- * Briefing Paper on Water Use distributed to public.
- Apr. 12, 1984: EMC Meeting.
. Decision to proceed toward CUA Declaration.
. Hearing Officer Appointed.
. EMC gives Written Notice of Hearing (30 day notice required).
- Apr. 30, 1984: Draft Department Report to EMC on Water Use completed.
- May 17, 1984: Hearing on Declaration of CUA. (Record to be left open 30 days).
- May 24, 1984: Final Department Report to EMC on Water Use completed.
- July 12, 1984: EMC Meeting.
. Decision on Declaration of CUA.
. Staff instructed to prepare regulations.
- Aug. 23, 1984: Regulation preparation completed.
- Sep. 12, 1984: EMC Meeting.
. If requested, EMC issues a Statement of Reasons on CUA Declaration
(Potential aggrieved person request judicial review)
. EMC gives Notice of a Hearing (30 day notice required).
- Oct. 18, 1984: CUA Regulation Hearing.
- Dec. 13, 1984: EMC Meeting.
. Final action on Regulations. (Record to be left open 30 days).
. (Assuming no judicial review), designation of April 15, 1985 as
period after which no person can use more than 100,000 gallons
of water per day in the CUA for any purpose without permit.
- Jan. 10, 1985: EMC Meeting. If requested, EMC issues a Statement of Reasons.
(Request can be made within 30 days).
(Potential aggrieved person request judicial review)
- Dec. 13, 1984- . Period of filing for permit.
May 5, 1985: . Notice of receipt by EMC.
. Notice of proposed action by EMC.
. Permits issued, modified, revoked or denied.

On any permit action: Any aggrieved water user is entitled to a hearing.
De novo judicial review available.

*Date to be set by Top Management.

APPENDIX A

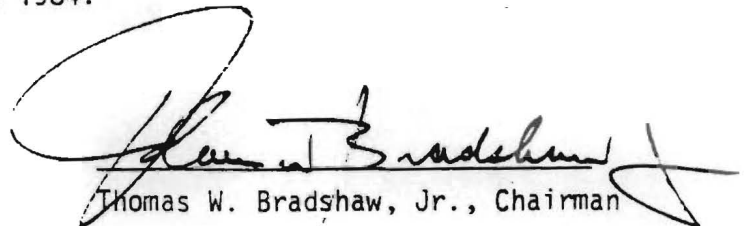
RESOLUTION NO. 84-3 OF THE ENVIRONMENTAL MANAGEMENT
COMMISSION REGARDING THE NEED FOR A CAPACITY USE
STUDY IN NORTHEASTERN NORTH CAROLINA.

APPENDIX A

RESOLUTION NO. 84-3 OF THE
ENVIRONMENTAL MANAGEMENT COMMISSION
REGARDING THE NEED FOR A CAPACITY USE STUDY
IN NORTHEASTERN NORTH CAROLINA

- WHEREAS, in accordance with the Water Use Act of 1967 (G. S. 143-215.11, et seq.), the Environmental Management Commission (EMC) is authorized to declare and delineate capacity use areas in those geographical regions where the use of groundwater or surface water, or both, has developed, or threatens to develop to a point where usage exceeds or impairs the renewal of such waters, and may require coordination and regulation to preserve these resources;
- WHEREAS, present and projected usage and diminution of water resources in Northeastern North Carolina, including portions of the Roanoke, Chowan, and Pasquotank River Basins, are developing at a rate which may exceed and impair the renewal and availability of such waters for the public's use; and
- WHEREAS, the Environmental Management Commission, has recognized a chronic water resource problem, which continues to deplete the quantity of water available for development in Northeastern North Carolina.
- NOW, THEREFORE, BE IT RESOLVED THAT the Environmental Management Commission hereby directs the North Carolina Department of Natural Resources and Community Development to complete its ongoing investigation of the Northeastern North Carolina Region, including affected portions of the Roanoke, Chowan, and Pasquotank River Basins, utilizing all available resources in accordance with the requirements of G. S. 143-215.13, to determine the desirability of declaring a capacity use area, and report such findings to the Commission.

This the 12th day of January, 1984.


Thomas W. Bradshaw, Jr., Chairman

APPENDIX B

SPECIFIC DELINEATION OF AREA UNDER STUDY

APPENDIX B
SPECIFIC DELINEATION OF AREA UNDER STUDY

SURRY COUNTY

Begin with the N.C. - VA. line in Surry County at Highway 103; proceed with 103, 2.1 miles southwest to junction with SR 1787; proceed with 1787 3.2 miles to Hwy NC 89; proceed with NC 89, 2.9 miles southeast to junction with SR 1809 at Westfield; go with 1809 southwest 1.1 miles to junction with SR 1810; go with SR 1810 .5 miles to Stokes/Surry County line.

STOKES COUNTY

Beginning at the Stokes/Surry County line on SR 1210, go southeast 2.3 miles to junction with SR 1199; go with SR 1199 south 2.2 miles to junction with NC 268; go .6 mile east with NC 268 to junction with SR 1182; go with SR 1182 .6 mile south to junction with SR 1183; go .3 miles southeast with SR 1183 to junction with SR 1175; go 1.8 miles south to junction with SR 1173; go its full length of 2.5 miles to junction with SR 1136; go 2.2 miles southeast to junction with SR 1164; go north 3.2 miles to junction with SR 1166; go north 2.6 miles to junction with SR 1168; go north .8 miles to junction with SR 1220; go east .2 miles to junction with NC 66; go north 1.0 mile to junction with SR 2008; go .8 mile south to junction with SR 2019; go with SR 2019 west .8 mile to junction with NC 66; go with NC 66 south to Forsyth/Stokes County line, 6.7 miles.

FORSYTH COUNTY

Beginning at Forsyth/Stokes County line, on NC 66, proceed southeast to Kernersville; at Kernersville, leave on NC 150 north 2.8 miles to junction with SR 2018; go north 2.2 miles to junction with SR 2017; go east with SR 2017 .1 mile to Guilford/Forsyth County line.

GUILFORD COUNTY

Beginning on the Guilford/Forsyth County line at SR 2028, proceed northeast 3.0 miles to NC 68, then north with NC 68 3.0 miles to junction with NC 65; go north with NC 65 .4 miles to Rockingham/Guilford County line.

ROCKINGHAM COUNTY

Beginning on Rockingham/Guilford County line on NC 65, go to junction of NC 65 and SR 1001; go north on SR 1001 to junction with NC 87; go east on NC 87 to junction with SR 2413; go southeast to rejoin NC 87 and US 158; go east to departure of US 158; stay with NC 87 southeast to Williamsburg; at Williamsburg, leave on SR 2619 east 2.1 miles to junction with SR 2614; go northeast 1.1 miles to junction with NC 87, go 1.7 miles southeast to junction with SR 2616; go east .3 miles to County line.

CASWELL COUNTY

Begin on the Rockingham/Caswell County line on SR 1114; go .5 miles east to junction with SR 1133; go 12.6 miles to junction with SR 1001; go east with SR 1001, 3.2 miles to junction with SR 1764; go east to junction with SR 1765; go south .7 miles to County line.

ALAMANCE COUNTY

Begin on the Caswell/Alamance County line on SR 1901, go south .6 miles to junction with SR 1902, go 1.4 miles to County line.

ORANGE COUNTY

Beginning on the Orange/Alamance County line at SR 1367, go east 1.0 miles to junction with SR 1004, go south on SR 1004, 1.7 miles to junction with NC 49; go north with NC 49 1.1 miles to junction with SR 1371; go east with SR 1371 1.3 miles to junction with NC 86; go north to junction with SR 1502; go east with SR 1502 0.8 miles to junction with SR 1501, go south 1.0 miles to junction with SR 1576; go .6 miles to junction with SR 1504; go .7 north to junction with SR 1577; go .9 miles east to junction with SR 1506; go with SR 1506 to junction with SR 1505; go north .6 miles to County line.

PERSON COUNTY

Begin on the Orange/Person County line at SR 1100; go north 2.2 miles to junction with SR 1102; go north 1 mile to junction with NC 49; go northeast 7.8 miles to junction with SR 1152; go east 1.7 miles to junction with US 158; go south .6 miles to junction with SR 1541; go northeast 2.2 miles to junction with SR 1536; go east .6 miles to junction with SR 1544; go 3.1 miles to junction with SR 1717; go south .6 miles to junction with SR 1573; go 1.4 miles east to junction with SR 1571; go 1.3 miles north to junction with ST 1536; go .5 miles east to junction with SR 1574; go north 1.3 miles to junction with SR 1542; go northeast 1.4 miles to junction with SR 1561; go east 1.8 miles to County line.

GRANVILLE COUNTY

Beginning at the Granville/Person County line on SR 1317, go east 7.9 miles to junction with NC 96; go southeast 3.7 miles to junction with SR 1423; go east 3.1 miles to junction with US 15; go north 1.6 miles to junction with SR 1514; go 2.3 miles to junction with SR 1515; go south .6 miles to junction with SR 1519; go east 1.0 miles to junction with SR 1520; go .8 miles to junction with Southern Coastline RR; go with Southern Coastline RR to County line.

VANCE COUNTY

Beginning on the Granville/Vance County line at Southern Coastline RR, go .3 miles to SR 1304; go 3 miles to junction with SR 1326 at Harris Crossroads; go south 3.3 miles to junction with US Bus.158 in Henderson, then northeast to junction with NC 39 Andrews Avenue; go .25 miles to SR 1518 Vance Street; go east .8 miles to junction with US 1 BYP; go 1.58 miles northeast to junction with SR 1507; go 1.4 miles to Southern Coastline RR; go 3.3 miles northeast to County line.

WARREN COUNTY

Beginning at the Warren/Vance County line on Southern Coastline RR, go east 6.1 miles to Norlina; from Norlina go east on Southern Coastline RR 16 miles to Littleton on the County line.

HALIFAX COUNTY

Beginning on the Warren/Halifax County line at crossing of Southern Coastline RR and SR 1001, go 3.3 miles to junction with SR 1415; go east 4.4 miles to junction with NC 48; go northeast 1 mile to junction with NC 903; go 5.8 miles southeast to Pierces Crossroads; go south with SR 1618 3.6 miles to junction with NC 561; go 3.1 miles northeast to junction with NC 903/US 301 combined; go south 9.1 miles to junction with NC 481, then 3.6 miles to junction with SR 1114, and staying with this road its full length 5.0 miles to rejoin NC 481; go northeast 1 mile to junction with SR 1117; go southeast 6.9 miles to junction with US 258; go through Scotland Neck 1.9 miles south to junction with NC 125; go south to Hobgood and Martin County line, 8.1 miles.

MARTIN COUNTY

Beginning on the Halifax/Martin County line at NC 125, go southwest with the Martin County line 3.4 miles to junction of Edgecombe and Martin County; go southeast with the Martin County line; go 7.8 miles to SR 1318; go east 1.0 miles to junction of NC 42; go 6.5 miles east to junction with NC 125 and NC 903; go southeast .8 miles to junction with SR 1315; go southeast 4.4 miles to junction with SR 1407; go southwest 1.2 miles to Everetts; leave Everetts on US 6413 East for .3 miles to junction of SR 1139; go south 1.8 miles to junction with SR 1106; go south .4 miles to junction with SR 1130; go east .7 miles to junction with SR 1131; go south .1 miles to junction with SR 1129; go east .2 miles to junction with SR 1132; go south .5 miles to junction with SR 1133; go east .6 miles to junction with SR 1001; go southwest .6 miles to Bear Grass. At Bear Grass leave on SR 1106 southeast 1.1 miles to junction with SR 1104, go southwest 1.8 miles to junction with SR 1100 southeast 1.0 miles to county line; go southeast and then northeast with the county line; stop at Washington County line.

WASHINGTON COUNTY

Beginning at the Martin/Beaufort/Washington County line, go east 3.0 miles to NC 32; go 13.1 miles north to junction with SR 1111; go east 2.5 miles to junction with US 64; go east 1.9 miles to junction with SR 1329; go north 2.4 miles to junction with Norfolk Southern RR; go 8.0 miles to County line in Albemarle Sound; thence with County lines of Washington Tyrrell Dare Chowan Perquimans Pasquotank Camden Currituck east to Atlantic Ocean.

APPENDIX C

GENERAL STATUTES OF NORTH CAROLINA
CHAPTER 143, ARTICLE 21, PART 2:
REGULATION OF USE OF WATER RESOURCES.

GENERAL STATUTES OF NORTH CAROLINA-CHAPTER 143, ARTICLE 21

Part 2. Regulation of Use of Water Resources.

Repeal of Part. — This Part is repealed, effective July 1, 1981, by Session Laws 1977, c. 712, s. 3. The 1977 act also repeals, with postponed effective dates, numerous other Chapters and Articles creating licensing and regulatory agencies, and sets up a Government Evaluation Commission whose function is to conduct a performance evaluation of the

programs and functions of each such agency and report to General Assembly whether the program or function in question should be terminated, reconstituted, reestablished or continued. The Commission will go out of existence June 30, 1983. The 1977 act is codified as § 143-34.10 et seq.

§ 143-215.11. **Short title.** — This Part shall be known and may be cited as the Water Use Act of 1967. (1967, c. 933, s. 1.)

§ 143-215.12. **Declaration of purpose.** — It is hereby declared that the general welfare and public interest require that the water resources of the State be put to beneficial use to the fullest extent to which they are capable, subject to reasonable regulation in order to conserve these resources and to provide and maintain conditions which are conducive to the development and use of water resources. (1967, c. 933, s. 2.)

§ 143-215.13. **Declaration of capacity use areas.** — (a) The Environmental Management Commission may declare and delineate from time to time, and may modify, capacity use areas of the State where it finds that the use of groundwater or surface water or both require coordination and limited regulation for protection of the interests and rights of residents or property owners of such areas or of the public interest.

(b) Within the meaning of this Part "a capacity use area" is one where the Environmental Management Commission finds that the aggregate uses of groundwater or surface water, or both, in or affecting said area (i) have developed or threatened to develop to a degree which requires coordination and regulation, or (ii) exceed or threaten to exceed, or otherwise threaten or impair, the renewal or replenishment of such waters or any part of them.

(c) The Environmental Management Commission may declare and delineate capacity use areas in accordance with the following procedures:

- (1) Whenever the Environmental Management Commission believes that a capacity use situation exists or may be emerging in any area of the State, it may direct the Department to investigate and report to the Environmental Management Commission thereon.
- (2) In conducting its investigation the Department shall consult with all interested persons, groups and agencies; may retain consultants; and shall consider all factors relevant to the conservation and use of water in the area, including established or pending water classifications under the Stream Sanitation Law and the criteria for such classifications. Following its investigation the Department shall render a written report to the Environmental Management Commission. This report shall include the Department's findings and recommendations as to whether the water use problems of the area involve surface waters, groundwaters or both; whether effective measures can be employed limited to surface water or to groundwater; and whether timely action by any agency or person may preclude the need for additional regulation at that time. The report shall also include such other findings and recommendations as the Department deems appropriate, including recommended boundaries for any capacity use area that may be proposed.
- (3) If the Environmental Management Commission finds, following its review of the departmental report (or thereafter following its evaluation of measures taken falling short of regulation) that a capacity use area should be declared, it may adopt an order declaring said capacity use area. Prior to adopting such an order the Environmental Management Commission shall give notice of its proposed action and shall conduct one or more public hearings with respect to such proposed action.
- (4) Such notice shall be given not less than 30 days before the date of such hearing and shall state the date, time, and place of hearing, the subject of the hearing, and the action which the Environmental Management Commission proposes to take. The notice shall either include details of such proposed action, or where such proposed action is too lengthy for

publication the notice shall specify that copies of such detailed proposed action shall be obtained on request from the Department of Natural Resources and Community Development in sufficient quantity to satisfy the requests of all interested persons.

- (5) Any such notice shall be published at least once in one newspaper of general circulation circulated in each county of the State in which the water area affected is located, and a copy of such notice shall be mailed to each person on the mailing list required to be kept by the Department of Natural Resources and Community Development pursuant to the provisions of G.S. 143-215.15.
 - (6) Any person who desires to be heard at any such public hearing shall give notice thereof in writing to the Environmental Management Commission on or before the first date set for the hearing. The Environmental Management Commission is authorized to set reasonable time limits for the oral presentation of views by any one person at any such public hearing. The Environmental Management Commission shall permit anyone who so desires to file a written argument or other statement with the Environmental Management Commission in relation to any proposed action of the Environmental Management Commission any time within 30 days following the conclusion of any public hearing or within any such additional time as the Environmental Management Commission may allow by notice given as prescribed in this section.
 - (7) Upon completion of hearings and consideration of submitted evidence and arguments with respect to any proposed action by the Environmental Management Commission pursuant to this paragraph, the Environmental Management Commission shall adopt its final action with respect thereto and shall publish such final action as part of its official regulations. The Environmental Management Commission is empowered to modify or revoke from time to time any final action previously taken by it pursuant to the provisions of this section, any such modification or revocation, however, to be subject to the procedural requirements of this Part, including notice and hearing. If the Environmental Management Commission finds and orders that a capacity use area shall be declared, its order shall include a delineation of the boundary of said area, and the Department of Natural Resources and Community Development shall instruct the Secretary of the Department to prepare proposed regulations consistent with the provisions of this Part and commensurate with the degree of control needed from among the classes of permissible regulations set forth in G.S. 143-215.14.
- (d) The Environmental Management Commission may conduct a public hearing pursuant to the provisions of G.S. 143-215.4 in any area of the State, whether or not a capacity use area has been declared, when it has reason to believe that the withdrawal of water from or the discharge of water pollutants to the waters in such area is having an unreasonably adverse effect upon such waters. If the Environmental Management Commission determines, pursuant to hearing, that withdrawals of water from or discharge of water pollutants to the waters within such area has resulted or probably will result in a generalized condition of water depletion or water pollution within the area to the extent that the availability or fitness for use of such water has been impaired for existing or proposed uses and that injury to the public health, safety or welfare will result if increased or additional withdrawals or discharges occur, the Environmental Management Commission may issue an order.

- (1) Prohibiting any person withdrawing waters in excess of 100,000 gallons per day from increasing the amount of the withdrawal above such limit as may be established in the order.
- (2) Prohibiting any person from constructing, installing or operating any new well or withdrawal facilities having a capacity in excess of a rate established in the order; but such prohibition shall not extend to any new well or facility having a capacity of less than 10,000 gallons per day.
- (3) Prohibiting any person discharging water pollutants to the waters from increasing the rate of discharge in excess of the rate established in the order.
- (4) Prohibiting any person from constructing, installing or operating any facility that will or may result in the discharge of water pollutants to the waters in excess of the rate established in the order.
- (5) Prohibiting any agency or political subdivision of the State from issuing any permit or similar document for the construction, installation, or operation of any new or existing facilities for withdrawing water from or discharging water pollutants to the waters in such area in excess of the rates established in the order.

The determination of the Environmental Management Commission shall be supported by detailed findings of fact and conclusions set forth in the order and based upon competent evidence of record. The order shall describe the geographical area of the State affected thereby with particularity and shall provide that the prohibitions set forth therein shall continue pending a determination by the Environmental Management Commission that the generalized condition of water depletion or water pollution within the area has ceased.

Notice setting forth the time, place and purpose of the hearing and a description by geographical or political boundaries of the area affected shall be given:

- (1) By publication at least once a week for two successive weeks in a newspaper or newspapers having general circulation within the area, the date of the first publication to be at least 20 days prior to the date of hearing;
- (2) By mailing copies of the notice by registered or certified mail at least 20 days in advance of hearing to the governing body of every county, city, town, and affected political subdivision lying in whole or in part within the area and to every affected or interested State and federal agency; and
- (3) By posting a copy of the notice at the courthouse in every county lying in whole or in part, within the area.

The Environmental Management Commission is also authorized, in the exercise of its discretion, to mail copies of notice by first-class mail to any person who it believes will or may be interested in or affected by the hearing.

Upon issuance of any order by the Environmental Management Commission pursuant to this subsection, a certified copy of such order shall be mailed by registered or certified mail to the governing body of every county, city, town, and affected political subdivision lying, in whole or in part, within the area and to every affected or interested State and federal agency. A certified copy of the order shall be posted at the courthouse in every county lying, in whole or in part, within the area, and a notice setting forth the substantive provisions and effective date of the order shall be published once a week for two successive weeks in a newspaper or newspapers having general circulation within the area. After publication of notice is completed, any person violating any provision of such order after the effective date thereof shall be subject to the penalties and proceedings set forth in G.S. 143-215.17.

Any person who is adversely affected by an order of the Environmental Management Commission issued pursuant to this subsection may seek judicial review of the order pursuant to the provisions of G.S. 143-215.5; and the order shall not be stayed by the appeal. (1967, c. 933, s. 3; 1973, c. 698, s. 14; c. 1262, s. 23; 1977, c. 771, s. 4.)

Editor's Note. — The 1977 amendment substituted "Natural Resources and Community Development" for "Natural and Economic Resources" in subdivisions (4), (5), and (7) of subsection (c).

Session Laws 1977, c. 771, s. 22, contains a severability clause.

Informal Rule-Making Procedure Is Not Subject to Review under § 150A-43 et seq. — An informal hearing conducted by the Commission to consider whether to initiate a proceeding to declare the Yadkin River Basin a capacity use area was no more than the rule-making type procedure under subsection (c) of this section, and thus the plaintiffs were not entitled to judicial review under § 150A-43 et seq. *High Rock Lake Ass'n v. North Carolina Environmental Mgt. Comm'n*, 39 N.C. App. 699, 252 S.E.2d 109 (1979).

Subsection (d) of this section operates as a statutory limitation on the standing of parties interested in or affected by the action to seek judicial review. *High Rock Lake Ass'n v. North Carolina Environmental Mgt. Comm'n*, 39 N.C. App. 699, 252 S.E.2d 109 (1979).

Where No Order Was Issued Which Could Adversely Affect Plaintiff No Judicial Review Was Possible. — A hearing held by the

Commission to serve the function of a general information gathering tool to inject public participation at a stage of decision-making generally reserved to staff participation, was an informal stage of the decision-making process with respect to this section's considerations, and the use of evidence presented at that hearing to consider whether to initiate a proceeding under this section was purely within the discretion of the Commission. Since no order was issued by the Commission which in turn could have adversely affected the plaintiffs, they were not entitled to judicial review under this section. *High Rock Lake Ass'n v. North Carolina Environmental Mgt. Comm'n*, 39 N.C. App. 699, 252 S.E.2d 109 (1979).

§ 143-215.14. Regulations within capacity use areas; scope and procedures.

— (a) Following the declaration of a capacity use area by the Environmental Management Commission, it shall prepare proposed regulations to be applied in said area, containing such of the following provisions as the Environmental Management Commission finds appropriate concerning the use of surface waters or groundwaters or both:

- (1) Provisions requiring water users within the area to submit reports not more frequently than at 30-day intervals concerning quantity of water used or withdrawn, sources of water and the nature of the use thereof.
- (2) With respect to surface waters, groundwaters, or both: provisions concerning the timing of withdrawals; provisions to protect against or abate salt water encroachment; provisions to protect against or abate unreasonable adverse effects on other water users within the area, including but not limited to adverse effects on public use.
- (3) With respect to groundwaters: provisions concerning well-spacing controls; and provisions establishing a range of prescribed pumping levels (elevations below which water may not be pumped) or maximum pumping rates, or both, in wells or for the aquifer or for any part thereof based on the capacities and characteristics of the aquifer.
- (4) Such other provisions not inconsistent with this Part as the Environmental Management Commission finds necessary to implement the purposes of this Part.

(b) The Environmental Management Commission shall conduct one or more hearings upon the proposed regulations, upon notice, in accordance with the requirements of subdivisions (4)-(6) of G.S. 143-215.13(c). Upon completion of the hearings and consideration of submitted evidence and arguments with respect to any proposed regulation, the Environmental Management Commission shall adopt its final action with respect thereto, and shall publish such final action as part of its official regulations. The Environmental Management Commission is empowered to modify or revoke from time to time any final action previously taken by it pursuant to the provisions of this section, any such modifications or revocations, however, to be subject to the procedural requirements of this Part, including notice and hearing. (1967, c. 933, s. 4; 1973, c. 1262, s. 23.)

Applied in *High Rock Lake Ass'n v. North Carolina Environmental Mgt. Comm'n*, 39 N.C. App. 699, 252 S.E.2d 109 (1979).

- who is a party to the proceedings with respect to which such hearing is to be held, unless a shorter notice is agreed upon by all such parties.
- (2) All hearings under this Part shall be before the Environmental Management Commission, or before one or more of its own members or before one or more qualified employees of the Department, and shall be open to the public. Any member of the Commission or employee of the Department of Natural Resources and Community Development to whom a delegation of power is made to conduct a hearing shall report the hearing with its evidence and record to the Commission for decision.
 - (3) A full and complete record of all proceedings at any hearing under this Part shall be taken by a reporter designated by the Department or by other method approved by the Attorney General. Any party to a proceeding shall be entitled to a copy of such record upon the payment of the reasonable cost thereof as determined by the Department of Natural Resources and Community Development.
 - (4) The Environmental Management Commission and its duly authorized agents shall follow generally the procedures applicable in civil actions in the superior court insofar as practicable, including rules and procedures with regard to the taking and use of depositions, the making and use of stipulations, and the entering into of agreed settlements and consent orders.
 - (5) The Environmental Management Commission, or the duly authorized agent of such Environmental Management Commission, may administer oaths and may issue subpoenas for the attendance of witnesses and the production of books, papers, and other documents belonging to the said person.
 - (6) Subpoenas issued by the Environmental Management Commission, in connection with any hearing under this Part shall be directed to any officer authorized by law to serve process, and the further procedures and rules of law applicable with respect thereto shall be prescribed in connection with subpoenas to the same extent as if issued by a court of record. In case of a refusal to obey a subpoena issued by the Environmental Management Commission, application may be made to the superior court of the appropriate county for enforcement thereof.
 - (7) The burden of proof at any hearing under this Part shall be upon the person or the Environmental Management Commission, as the case may be, at whose instance the hearing is being held.
 - (8) No decision or order of the Environmental Management Commission shall be made in any proceeding unless the same is supported by competent, material and substantial evidence upon consideration of the whole record.
 - (9) Following any hearing, the Environmental Management Commission shall afford the parties thereto a reasonable opportunity to submit within 30 days or within such additional time as prescribed by the Environmental Management Commission, proposed findings of fact and conclusions of law and any brief in connection therewith.
 - (10) All orders and decisions of the Environmental Management Commission shall set forth separately the Environmental Management Commission's findings of fact and conclusions of law and shall, wherever necessary, cite the appropriate provision of law or other source of authority on which any action or decision of the Environmental Management Commission, is based.
 - (11) The Department of Natural Resources and Community Development shall have the authority to adopt a seal which shall be the seal of said Environmental Management Commission and which shall be judicially noticed by the courts of the State. Any document, proceeding, order,

§ 143-215.15. Permits for water use within capacity use areas — procedures. — (a) In areas declared by the Environmental Management Commission to be capacity use areas no person shall (after the expiration of such period, not in excess of six months, as the Environmental Management Commission may designate) withdraw, obtain, or utilize surface waters or groundwaters or both, as the case may be, in excess of 100,000 gallons per day for any purpose unless such person shall first obtain a permit therefor from the Environmental Management Commission.

(b) When sufficient evidence is provided by the applicant that the water withdrawn or used from a stream or the ground is not consumptively used, a permit therefor shall be issued by the Environmental Management Commission without a hearing and without the conditions provided in subsection (c) of this section. Applications for such permits shall set forth such facts as the Environmental Management Commission shall deem necessary to enable it to establish and maintain adequate records of all water uses within the capacity use area.

(c) In all cases in which sufficient evidence of a nonconsumptive use is not presented the Department of Natural Resources and Community Development shall notify each person required by this Part to secure a permit of the Environmental Management Commission's proposed action concerning such permit, and shall transmit with such notice a copy of any permit it proposes to issue to such persons, which permit will become final unless a request for a hearing is made within 15 days from the date of service of such notice. The Environmental Management Commission shall have the power: (i) to grant such permit with conditions as the Environmental Management Commission deems necessary to implement the regulations adopted pursuant to G.S. 143-215.14; (ii) to grant any temporary permit for such period of time as the Environmental Management Commission shall specify where conditions make such temporary permit essential, even though the action allowed by such permit may not be consistent with the Environmental Management Commission's regulations applicable to such capacity use area; (iii) to modify or revoke any permit upon not less than 60 days' written notice to any person affected; and (iv) to deny such permit if the application therefor or the effect of the water use proposed or described therein upon the water resources of the area is found to be contrary to public interest. Any water user wishing to contest the proposed action shall be entitled to a hearing upon request therefor.

(d) In any proceeding pursuant to this section or G.S. 143-215.16 the Environmental Management Commission shall give notice with respect to all steps of the proceeding only to each person directly affected by such proceeding who shall be made a party thereto. In all proceedings pursuant to G.S. 143-215.13 or 143-215.14 the Environmental Management Commission shall give notice as provided by these sections, and it shall also give notice of all its official acts (such as the adoption of regulations or rules of procedure) which have, or are intended to have, general application and effect, to all persons on its mailing list on the date when such action is taken. It shall be the duty of the Department of Natural Resources and Community Development to keep such a mailing list on which it shall record the name and address of each person who requests listing thereon, together with the date of receipt of such request. Any person may, by written request to the Department of Natural Resources and Community Development ask to be permanently recorded on such mailing list.

(e) All notices which are required to be given by the Environmental Management Commission or the Department or by any party to a proceeding shall be given by registered or certified mail to all persons entitled thereto, including the Environmental Management Commission. The date of receipt or refusal for such registered or certified mail shall be the date when such notice is deemed to have been given. Notice by the Environmental Management Commission or the Department may be given to any person upon whom a summons may be served in accordance with the provisions of law covering civil actions in the superior courts of this State. The Environmental Management Commission may prescribe the form and content of any particular notice.

(f) The following provisions shall be applicable in connection with hearings pursuant to this Part:

- (1) Any hearing held pursuant to this section or G.S. 143-215.16, whether called at the instance of the Environmental Management Commission or of any person, shall be held upon not less than 30 days' written notice given by the Environmental Management Commission to any person

decree, special order, rule, regulation, rule of procedure or any other official act or records of the Environmental Management Commission or its minutes may be certified by the Secretary of the Department under his hand and the seal of the Department of Natural Resources and Community Development and when so certified shall be received in evidence in all actions or proceedings in the courts of the State without further proof of the identity of the same if such records are competent, relevant and material in any such action or proceeding. The Environmental Management Commission shall have the right to take judicial notice of all studies, reports, statistical data or any other official reports or records of the federal government or of any sister state and all such records, reports and data may be placed in evidence by the Environmental Management Commission or by any other person or interested party where material, relevant and competent.

(g) Any person against whom any final order or decision has been made except where no appeal is allowed as provided by G.S. 143-215.2(j) shall have a right of appeal to the Superior Court of Wake County or of the county where the order or decision is effective within 30 days after such order or decision has become final. Upon such appeal the Department of Natural Resources and Community Development shall send a certified transcript of all testimony and exhibits introduced before the Environmental Management Commission, the order or decision, and the notice of appeal to the superior court. The matter on appeal shall be heard and determined de novo on the transcript certified to the court and any evidence or additional evidence as shall be competent under rules of evidence then applicable to trials in the superior court without a jury upon any question of fact; provided, the court shall allow any party to introduce evidence or additional evidence upon any question of fact. At the conclusion of the hearing, the judge shall make findings of fact and enter his decision thereto. Appeals from the judgment and orders of the superior court shall lie to the appellate division. No bond shall be required of the Environmental Management Commission to the appellate division.

(1) Upon appeal filed by any party, the Department of Natural Resources and Community Development shall forthwith furnish each party to the proceeding with a copy of the certified transcript and exhibits filed with the Environmental Management Commission. A reasonable charge shall be paid the Department of Natural Resources and Community Development for said copies.

(2) Within 15 days after receipt of copy of certified transcript and exhibits, any party may file with the court exceptions to the accuracy or omissions of any evidence or exhibits included in or excluded from said transcript.

(h) In adopting any regulations pursuant to the provisions of G.S. 143-215.14, and in considering permit applications, revocations or modifications under this section, the Environmental Management Commission shall consider:

- (1) The number of persons using an aquifer or stream and the object, extent and necessity of their respective withdrawals or uses;
- (2) The nature and size of the stream or aquifer;
- (3) The physical and chemical nature of any impairment of the aquifer or stream, adversely affecting its availability or fitness for other water uses (including public use);
- (4) The probable severity and duration of such impairment under foreseeable conditions;
- (5) The injury to public health, safety or welfare which would result if such impairment were not prevented or abated;
- (6) The kinds of businesses or activities to which the various uses are related;

- (7) The importance and necessity of the uses claimed by permit applicants (under this section), or of the water uses of the area (under G.S. 143-215.14) and the extent of any injury or detriment caused or expected to be caused to other water uses (including public use);
- (8) Diversion from or reduction of flows in other watercourses or aquifers; and
- (9) Any other relevant factors. (1967, c. 933, s. 5; 1973, c. 108, s. 89; c. 698, s. 15; c. 1262, s. 23; 1977, c. 771, s. 4.)

Editor's Note. — The 1977 amendment substituted "Natural Resources and Community Development" for "Natural and Economic Resources" in subsections (c) and (d), subdivisions (2), (3) and (11) of subsection (f), and in the introductory paragraph and subdivision (1) of subsection (g).

Session Laws 1977, c. 771, s. 22, contains a severability clause.

The reference in subsection (g) to § 143-215.2(j) is to that section as it stood before its amendment in 1973. Present § 143-215.2 contains no subsection (j).

Applied in *High Rock Lake Ass'n v. North Carolina Environmental Mgt. Comm'n*, 39 N.C. App. 699, 252 S.E.2d 109 (1979).

§ 143-215.16. **Permits for water use within capacity use areas — duration, transfer, reporting, measurement, present use, fees and penalties.** — (a) No permit under G.S. 143-215.15 shall be issued for a longer period than the longest of the following: (i) 10 years, or (ii) the duration of the existence of a capacity use area, or (iii) the period found by the Environmental Management Commission to be necessary for reasonable amortization of the applicant's water-withdrawal and water-using facilities. Permits may be renewed following their expiration upon compliance with the provisions of G.S. 143-215.15.

(b) Permits shall not be transferred except with the approval of the Environmental Management Commission.

(c) Every person in a capacity use area who is required by this Part to secure a permit shall file with the Environmental Management Commission in the manner prescribed by the Environmental Management Commission a certified statement of quantities of water used and withdrawn, sources of water, and the nature of the use thereof not more frequently than 30-day intervals. Such statements shall be filed on forms furnished by the Department of Natural Resources and Community Development within 90 days after the adoption of an order by the Environmental Management Commission declaring a capacity use area. Water users in a capacity use area not required to secure a permit shall comply with procedures established to protect and manage the water resources of the area. Such procedures shall be adapted to the specific needs of the area, shall be within the provisions of this and other North Carolina water resource acts, and shall be adopted after public hearing in the area. The requirements embodied in the two preceding sentences shall not apply to individual domestic water use.

(d) If any person who is required to secure a permit under this Part is unable to furnish accurate information concerning amounts of water being withdrawn or used, or if there is evidence that his certified statement is false or inaccurate or that he is withdrawing or using a larger quantity of water or under different conditions than has been authorized by the Environmental Management Commission, the Environmental Management Commission shall have the authority to require such person to install water meters, or some other more economical means for measuring water use acceptable to the Environmental Management Commission. In determining the amount of water being withdrawn or used by a permit holder or applicant the Environmental Management Commission may use the rated capacity of his pumps, the rated capacity of his cooling system, data furnished by the applicant, or the standards or methods employed by the United States Geological Survey in determining such quantities or by any other accepted method.

(e) In any case where a permit applicant can prove to the Environmental Management Commission's satisfaction that the applicant was withdrawing or using water prior to the date of declaration of a capacity use area, the Environmental Management Commission shall take into consideration the extent to which such prior use or withdrawal was reasonably necessary in the judgment of the Environmental Management Commission to meet its needs, and shall grant a permit which shall meet those reasonable needs. Provided, however, that the granting of such permit shall not have unreasonably adverse effects upon other water uses in the area, including public use, and including potential as well as present use.

(f) The Environmental Management Commission shall also take into consideration in the granting of any permit the prior investments of any person in lands, and plans for the usage of water in connection with such lands which plans have been submitted to the Environmental Management Commission within a reasonable time after June 27, 1967. Provided, however, that the granting of such permit shall not have unreasonably adverse effects upon other water uses in the area, including public use, and including potential as well as present use.

(g) It is the intention of the General Assembly that if the provisions of subsection (e) or subsection (f) of this section are held invalid as a grant of an exclusive or separate emolument or privilege, within the meaning of Article I, Sec. 7 of the North Carolina Constitution, the remainder of this Part shall be given effect without the invalid provision or provisions.

(h) Pending the issuance or denial of a permit pursuant to subsection (e) or (f) of this section, the applicant may continue the same withdrawal or use which existed prior to the date of declaration of the capacity use area. (1967, c. 933, s. 6; 1973, c. 1262, s. 23; 1977, c. 771, s. 4.)

Editor's Note. — The 1977 amendment substituted "Natural Resources and Community Development" for "Natural and Economic Resources" in the second sentence of subsection (c).

Session Laws 1977, c. 771, s. 22, contains a severability clause.

Applied in *High Rock Lake Ass'n v. North Carolina Environmental Mgt. Comm'n*, 39 N.C. App. 699, 252 S.E.2d 109 (1979).

The reference to the Constitution in subsection (g) is to the Constitution adopted in 1868, as amended. See now N.C. Const., Art. I, § 32.

§ 143-215.17. **Enforcement procedures.** — (a) **Criminal Penalties.** — Any person who shall be adjudged to have violated any provision of this Part shall be guilty of a misdemeanor and shall be liable to a penalty of not less than one hundred dollars (\$100.00) nor more than one thousand dollars (\$1,000) for each violation. In addition, if any person is adjudged to have committed such violation willfully, the court may determine that each day during which such violation continued constitutes a separate violation subject to the foregoing penalty.

(b) **Civil Penalties.** —

- (1) The Environmental Management Commission may assess a civil penalty of not less than one hundred dollars (\$100.00) nor more than two hundred fifty dollars (\$250.00) against any person who violates any provisions of, or any order issued pursuant to this Part, or who violates any duly adopted regulations of the Commission implementing the provisions of this Part.
- (2) If any action or failure to act for which a penalty may be assessed under this Part is willful, the Commission may assess a penalty not to exceed two hundred fifty dollars (\$250.00) per day for each day of violation.
- (3) In determining the amount of the penalty the Commission shall consider the degree and extent of harm caused by the violation and the cost of rectifying the damage.

(4) Any person assessed shall be notified of the assessment by registered or certified mail, and the notice shall specify the reasons for the assessment. If the person assessed fails to pay the amount of the assessment to the Department of Natural Resources and Community Development within 30 days after receipt of notice, the Commission may request the Attorney General to institute a civil action in the superior court of the county or counties in which the person assessed resides or has his or its principal place of business, to recover the amount of the assessment. In any such civil action, the scope of the court's review of the Commission's action (which shall include a review of the amount of the assessment) shall be as provided in G.S. 150A-51.

(c) Injunctive Relief. — Upon violation of any of the provisions of, or any order issued pursuant to this Part, or duly adopted regulation of the Commission or its predecessor implementing the provisions of this Part, the Secretary of the Department of Natural Resources and Community Development may, either before or after the institution of proceedings for the collection of the penalty imposed by this Part for such violations, request the Attorney General to institute a civil action in the superior court of the county or counties where the violation occurred in the name of the State upon the relation of the Department of Natural Resources and Community Development for injunctive relief to restrain the violation or require corrective action, and for such other or further relief in the premises as said court shall deem proper. Neither the institution of the action nor any of the proceedings thereon shall relieve any party to such proceedings from the penalty prescribed by this Part for any violation of same. (1967, c. 933, s. 7; 1973, c. 698, s. 16; c. 1262, s. 23; 1975, c. 842, s. 2; 1977, c. 771, s. 4.)

Editor's Note. — The 1975 amendment substituted "Criminal Penalties" for "Penalties for Violations" at the beginning of subsection (a), rewrote subsection (b) and added subsection (c), which is similar to subsection (b) as it was before the amendment.

The 1977 amendment substituted "Natural Resources and Community Development" for

"Natural and Economic Resources" in subdivision (b)(4) and in two places in subsection (c).

Session Laws 1977, c. 771, s. 22, contains a severability clause.

§ 143-215.18. Map or description of boundaries of capacity use areas. —

(a) The Environmental Management Commission in designating and the Department in recommending the boundaries of any capacity use area may define such boundaries by showing them on a map or drawings, by a written description, or by any combination thereof, to be designated appropriately and filed permanently with the Department. Alterations in these lines shall be indicated by appropriate entries upon or additions to such map or description. Such entries shall be made under the direction of the Secretary of Natural Resources and Community Development. Photographic, typed or other copies of such map or description, certified by the Secretary of Natural Resources and Community Development, shall be admitted in evidence in all courts and shall have the same force and effect as would the original map or description. If the boundaries are changed pursuant to other provisions of this Part, the Department may provide for the redrawing of any such map. A redrawn map shall supersede for all purposes the earlier map or all maps which it is designated to replace.

(b) The Department shall file with the Secretary of State a certified copy of the map, drawings, description or combination thereof, showing the boundaries of any capacity use area designated by the Environmental Management Commission; and a certified copy of any redrawn or altered map or drawing, and of any amendments or additions to written descriptions, showing alterations to

said boundaries. The filings required by this subsection shall constitute compliance with the requirements of Article 18 of Chapter 143 of the General Statutes. (1967, c. 933, s. 8; 1973, c. 1262, s. 23; 1977, c. 771, s. 4.)

Editor's Note. — The 1977 amendment substituted "Natural Resources and Community Development" for "Natural and Economic Resources" in the second and third sentences of subsection (a). Session Laws 1977, c. 771, s. 22, contains a severability clause.

§ 143-215.19. Rights of investigation, entry, access and inspection. — The Environmental Management Commission shall have the right to direct the conduct of such investigations as may reasonably be necessary to carry out its duties prescribed in this Part, and for this purpose to enter at reasonable times upon any property, public or private, for the purpose of investigating the condition, withdrawal or use of any waters, investigating water sources, or investigating the installation or operation of any well or surface water withdrawal or use facility, and to require written statements or the filing of reports under oath, with respect to pertinent questions relating to the installation or operation of any well or surface water withdrawal or use facility; provided, that no person shall be required to disclose any secret formula, processes or methods used in any manufacturing operation or any confidential information concerning business activities carried on by him or under his supervision. No person shall refuse entry or access to any authorized representative of the Environmental Management Commission or Department who requests entry for purposes of a lawful inspection, and who presents appropriate credentials, nor shall any person obstruct, hamper or interfere with any such representative while in the process of carrying out his official duties consistent with the provisions of this Part. (1967, c. 933, s. 9; 1973, c. 1262, s. 23.)

§ 143-215.20. Rules and regulations. — The Environmental Management Commission may adopt and modify from time to time rules and regulations consistent with the provisions of this Part to implement the provisions of this Part. All such rules and regulations, and modifications thereof, shall be filed with the Attorney General as required by Chapter 150A of the General Statutes. (1967, c. 933, s. 10; 1973, c. 1262, s. 23; 1975, 2nd Sess., c. 983, s. 72.)

Editor's Note. — The 1975, 2nd Sess., amendment substituted, in the second sentence, "Attorney General as required by Chapter 150A of the General Statutes" for "Secretary of State as required by Article 18 of Chapter 143 of the General Statutes."

§ 143-215.21. Definitions. — Unless the context otherwise requires, the following terms as used in this Part are defined as follows:

- (1) "Area of the State" means any municipality or county or portion thereof or other substantial geographical area of the State as may be designated by the Environmental Management Commission.
- (2) "Commission" means the Environmental Management Commission, or its successor.
- (3) "Consumptive use" means any use of water withdrawn from a stream or the ground other than a "nonconsumptive use," as defined in this Part.
- (4) "Department" means the Department of Natural Resources and Community Development or its successor.
- (5) "Nonconsumptive use" means (i) the use of water withdrawn from a stream in such a manner that it is returned to the stream without

substantial diminution in quantity at or near the point from which it was taken; or, if the user owns both sides of the stream at the point of withdrawal, the water is returned to the stream upstream of the next property below the point of diversion on either side of the stream; (ii) the use of water withdrawn from a groundwater system or aquifer in such a manner that it is returned to the groundwater system or aquifer from which it was withdrawn without substantial diminution in quantity or substantial impairment in quality at or near the point from which it was withdrawn; (iii) provided, however, that (in determining whether a use of groundwater is nonconsumptive) the Environmental Management Commission may take into consideration whether any material injury or detriment to other water users of the area by reason of reduction of water pressure in the aquifer or system has not been adequately compensated by the permit applicant who caused or substantially contributed to such injury or detriment.

- (6) "Person" shall mean any and all persons, including individuals, firms, partnerships, associations, public or private institutions, municipalities or political subdivisions, governmental agencies, or private or public corporations organized under the laws of this State or any other state or country.
- (7) "Waters" shall mean any stream, river, brook, swamp, lake, sound, tidal estuary, bay, creek, reservoir, waterway or any other body or accumulation of water, surface or underground, public or private, natural or artificial, which is contained within, flows through, or borders upon this State or any portion thereof, including those portions of the Atlantic Ocean over which this State has jurisdiction. (1967, c. 933, s. 11; 1973, c. 1262, s. 23; 1977, c. 771, s. 4.)

Editor's Note. — The 1977 amendment substituted "Natural Resources and Community Development" for "Natural and Economic Resources" in subdivision (4).

Session Laws 1977, c. 771, s. 22, contains a severability clause.

§ 143-215.22. Law of riparian rights not changed. — Nothing contained in this Part shall change or modify existing common or statutory law with respect to the relative rights of riparian owners concerning the use of surface water in this State. (1967, c. 933, s. 12.)

APPENDIX D

CURRENT RESERVOIR OPERATING RULES

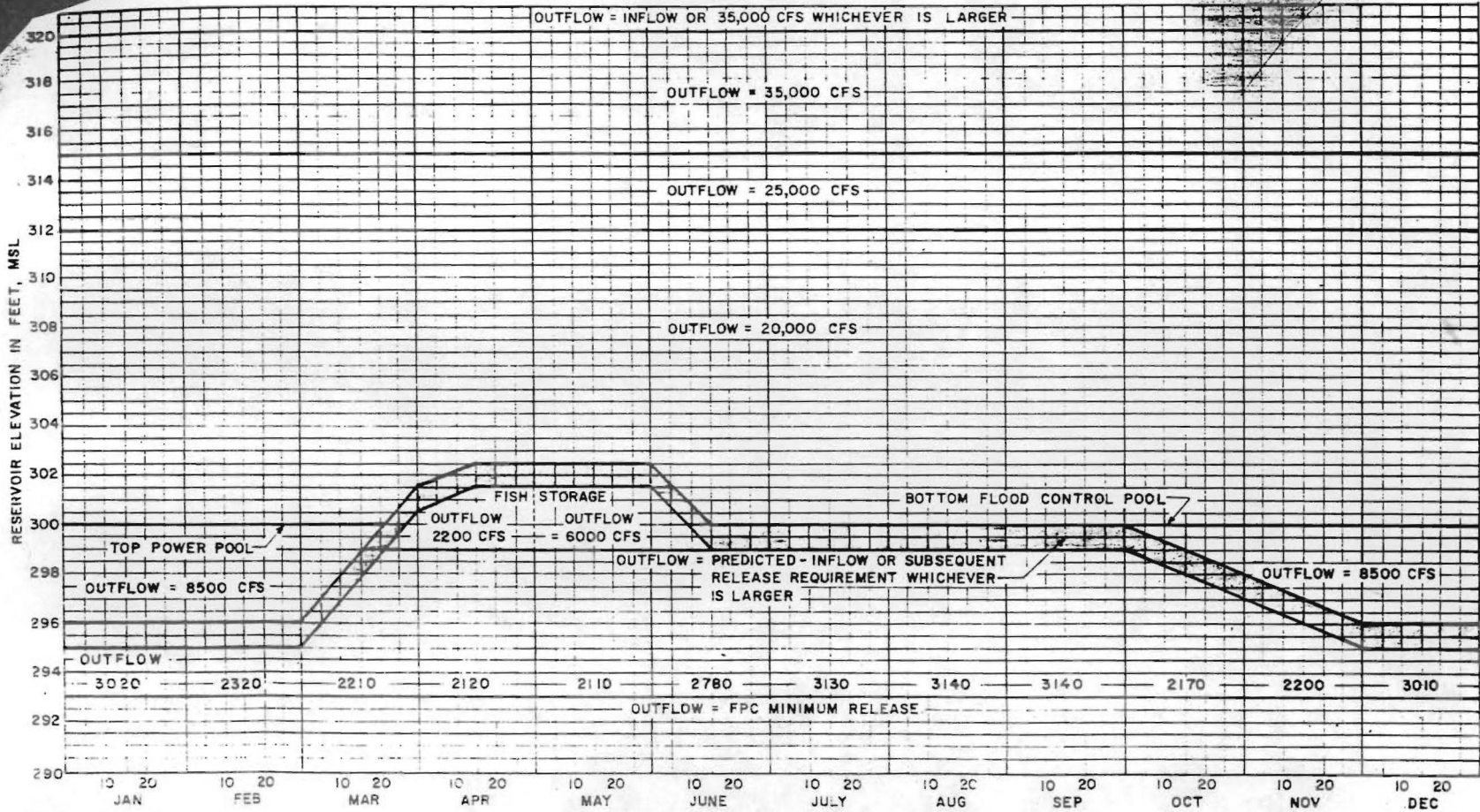
APPENDIX D

CURRENT RESERVOIR OPERATING RULES

Hydroelectric generation from Kerr Reservoir has been guided generally by rule curves which depend on lake elevation and, in some cases, the time of year. Flow releases through the turbines are modified as the lake level crosses these curves. The rule curves (see Figure 1) were developed under the jurisdiction of the Corps of Engineers and have been modified twice since 1956, when they were first used. Some of the changes were made to better serve the recreation users of the lake and to improve the minimum instantaneous flows below Roanoke Rapids Reservoir during striped bass spawning season.

Water uses below Roanoke Rapids Dam include maintaining an instream flow for fish propagation, wastewater assimilation and navigation, and providing an adequate quantity for irrigation, self-supplied industrial and municipal needs. The Federal Energy Regulatory Commission (FERC) has issued License 2009 to Virginia Electric Power Company for the Roanoke Rapids and Gaston hydroelectric projects. Article 25 of this license specifies the minimum instantaneous flows and pounds of oxygen that are to be provided in the Roanoke River below the Roanoke Rapids Reservoir. (See Article 25 of License 2009 below.)

JOHN H. KERR RESERVOIR SIMULATED OPERATION RULES
 ROANOKE RIVER BASIN, VA. - N. C.



ARTICLE 25 OF LICENSE 2009

"Article 25. Effective with commencement of operation of the Gaston development, the Licensee shall release sufficient water from the Roanoke Rapids Reservoir to maintain minimum flows and pounds of oxygen in the Roanoke River as measured at the point of project discharge to meet the following requirements:

Requirement A: Minimum Instantaneous Flows

<u>Month</u>	<u>Cubic feet per second</u>
January, February, March - - - - -	1,000
April - - - - -	1,500
May, June, July, August, September - -	2,000
October - - - - -	1,500
November, December - - - - -	1,000

The above flows are subject to the following special provisions:

- (1) These flows may be reduced on weekdays, Monday through Friday, during off-peak hours by not more than 20 percent, but such reduction shall not dispense with compliance with Requirement B.
- (2) The average flow for any day shall equal or exceed the minimum instantaneous flow specified for that month.
- (3) A minimum instantaneous flow of 2,000 cubic feet per second will be furnished by the Licensee for the period requested by the North Carolina Wildlife Resources Commission, to begin as early as April 1, but not later than April 15, and to continue for at least 60 days, but not longer than 75 days in any one year, in accommodation to annual variations in the time and duration of spawning activities of the striped bass.
- (4) The reduction in instantaneous flows permitted above shall not apply when special spawning flows are being passed for the benefit of striped bass.

Requirement B: Minimum Oxygen

Discharge from the Roanoke Rapids development shall be maintained to provide dissolved oxygen at an instantaneous rate of not less than 78,000 pounds per calendar day during the months May through October, except as is permitted under the following conditions:

- (1) A reduction not in excess of 34 percent of the instantaneous rate of 78,000 pounds per day will be permitted for periods not exceeding 14 consecutive hours.
- (2) Any oxygen deficit so created shall be offset by greater discharges so that a cumulative average rate of discharge of 78,000 pounds per day will be attained within a period up to but not exceeding 16 hours from the beginning of the oxygen deficient flows, and this condition (2) shall again begin to operate as soon as the instantaneous rate again falls below 78,000 pounds per day.

The Licensee shall not be required to compensate through increased flows or other changes in operations for any lessening in the quality of water entering the Gaston development which may after the effective date of this article be created by Acts of God, or through acts of others than the Licensee, and beyond its reasonable control.

Requirement C:

In the event of temporary emergency conditions arising in performance of Requirements A and B, the Licensee will cooperate in good faith with the North Carolina State Department of Conservation and Development, North Carolina State Stream Sanitation Committee, and/or North Carolina Wildlife Resources Commission to take such reasonable steps in regard to the reductions permitted by item (1) under Requirement B as may be proper to meet the emergency conditions and in the interest of maintaining during such emergency conditions water quality in keeping with the standards required of class "C" waters by order of the North Carolina State Stream Sanitation Committee effective September 1, 1957. But nothing herein is intended to compel the Licensee to correct conditions which it has not created, and no permanent change of operations shall be made without the approval of the Federal Power Commission."