CHAPTER 2

GENERAL BASIN DESCRIPTION WITH WATER QUALITY STANDARDS AND CLASSIFICATIONS

2.1 CAPE FEAR RIVER BASIN OVERVIEW

The Cape Fear River Basin is the largest river basin in the state covering 9,149 square miles. It is one of just four basins located entirely within the state's boundaries. It flows southeast from the north central piedmont region of the state, near Greensboro, to the Atlantic Ocean. (Figure 2.1)

The Cape Fear River is formed at the confluence of the Haw and Deep Rivers on the border of Chatham and Lee Counties, just below the B. Everett Jordan Reservoir dam. From there, the river flows across the coastal plain past Fayetteville, through three locks and dams, and past Wilmington before entering the Atlantic Ocean near Cape Fear. Along the way it is fed by the Black and Northeast Cape Fear Rivers (two major blackwater systems) (Figures 2.2 to 2.4).

There are 27 counties and 114 municipalities located in whole or in part in the basin . Based on 1990 census data, the population of the basin was 1,467,984 people. The most populated areas are in and near the Triad area (Greensboro-Burlington-High Point), the Durham-Chapel Hill area and in and around Fayetteville. The overall population density is 160 persons per square mile versus a statewide average of 123 persons per square mile. The percent population growth over the ten-year period from 1980 to 1990 was 11.5 % versus a statewide increase of 12.7%

Over half of the land in the river basin is forested. Statistics provided by the US Department of Agriculture, Natural Resources Conservation Service (NRCS) indicate that during the 10-year period from 1982 to 1992, there had been an increase in the amount of developed land and a decrease in the amount of cropland. Major industries in the basin include silviculture and agriculture (hog farms, poultry, soybeans, sweet potatoes, tobacco).

The basin includes three coastal Outstanding Resource Waters (Stump Sound, Middle and Topsail Sounds and Masonboro Sound) and one inland ORW (a portion of the Black River basin).

2.2 Basin Hydrology

The Cape Fear River Basin is the largest river basin in North Carolina and its watershed is contained entirely within the state. The mainstem of the river is formed by the confluence of the Deep and Haw Rivers just downstream of the B. Everett Jordan Reservoir Dam. The Deep River originates near High Point, and the Haw originates near Greensboro. The mainstem of the river flows in a generally southeastern direction until it empties into the Atlantic Ocean at Cape Fear, south of Wilmington.

The watershed is divided into 6 major hydrologic areas (*8-digit hydrologic units*) by the U.S. Water Resources Council and the U.S. Geologic Survey (USGS). These include the Haw River/Jordan Reservoir watershed, the Deep River, the Upper Cape Fear, the Black River, the Northeast Cape Fear and the lower Cape Fear and coastal waters. These major hydrologic areas are further subdivided by DWQ for management purposes into 24 subbasins denoted by 6-digit numbers (03-06-01 to 03-06-24) as shown in figure 2.2. Table 2.1 shows the breakdown of USGS hydrologic units and DWQ's corresponding subbasins.

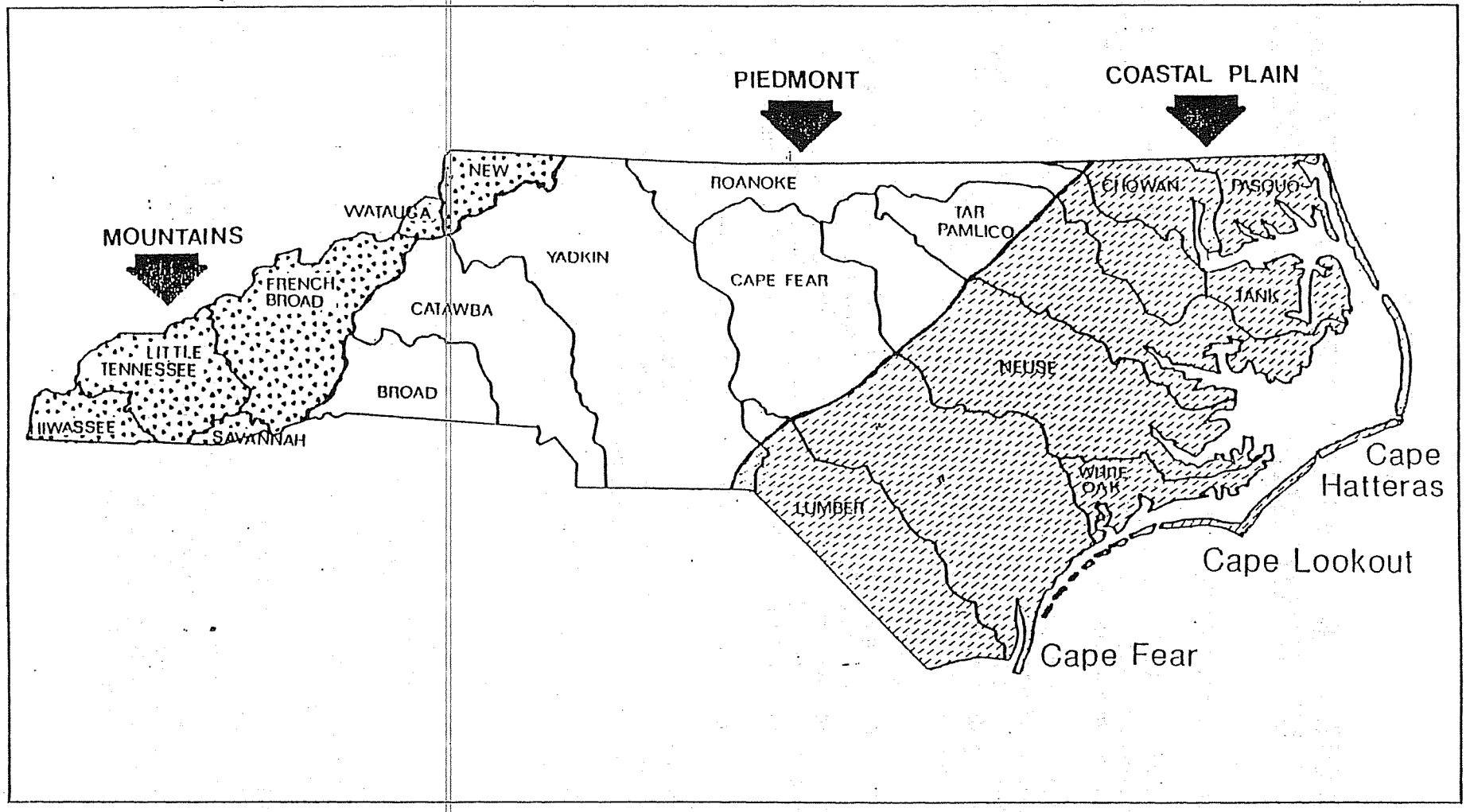
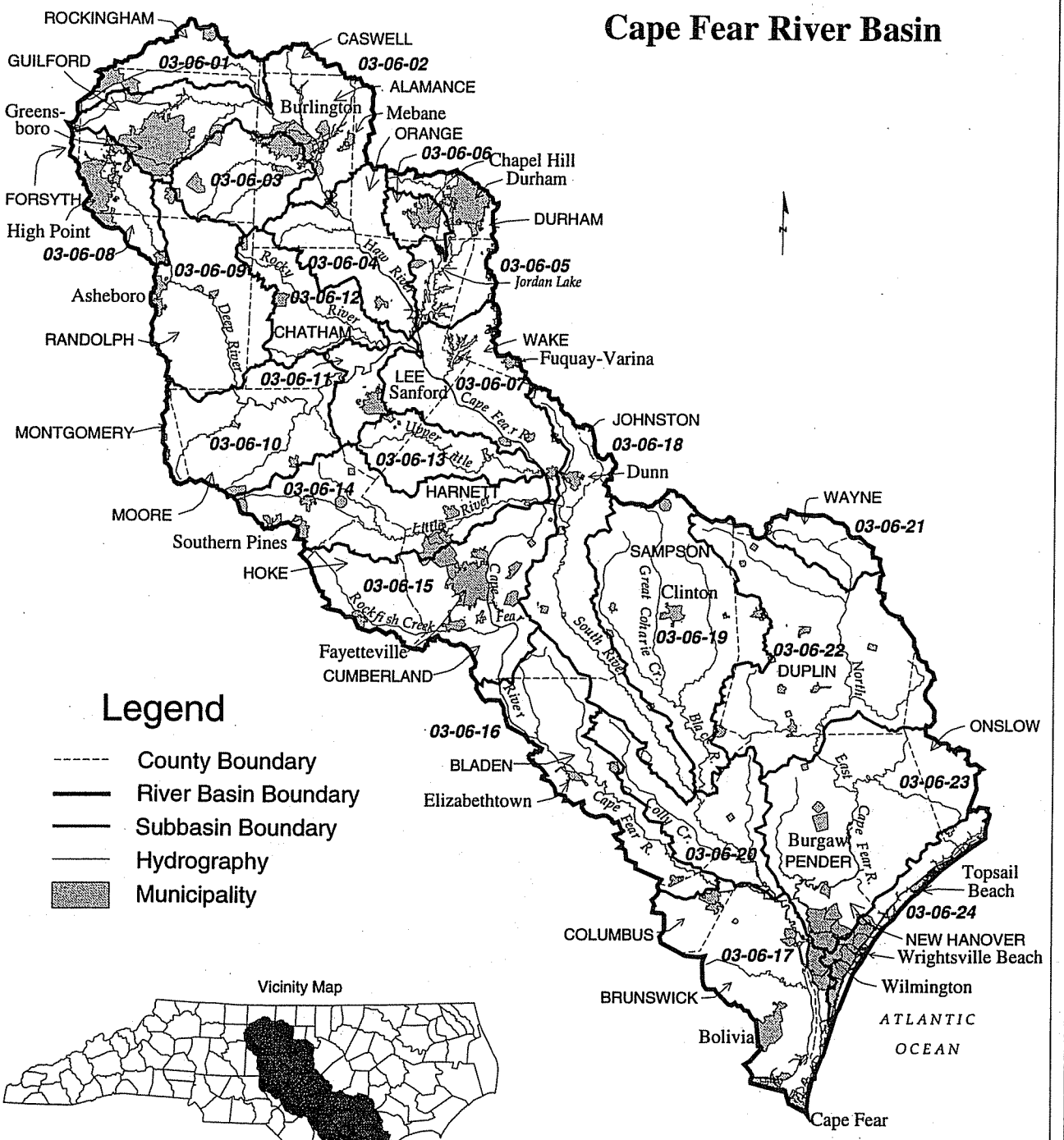


Figure 2.1 Physiographic Regions and Major River Basins in North Carolina

General Map of the Cape Fear River Basin



Legend

- County Boundary
- River Basin Boundary
- Subbasin Boundary
- Hydrography
- Municipality

Vicinity Map

DEHNR

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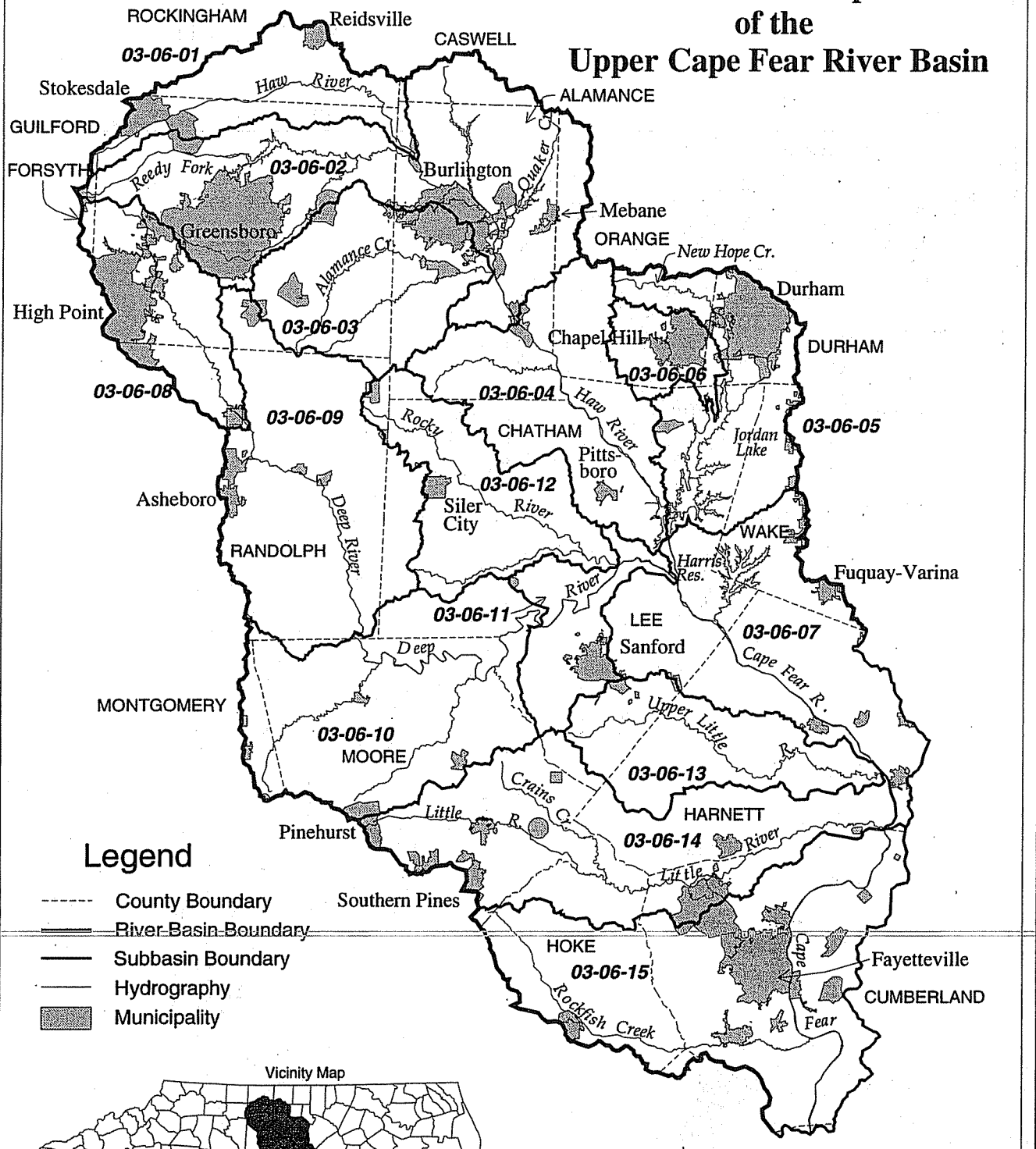
April, 1995

Cape Fear River Basin

1:1,600,000

0 20 40 60 miles

General Map of the Upper Cape Fear River Basin



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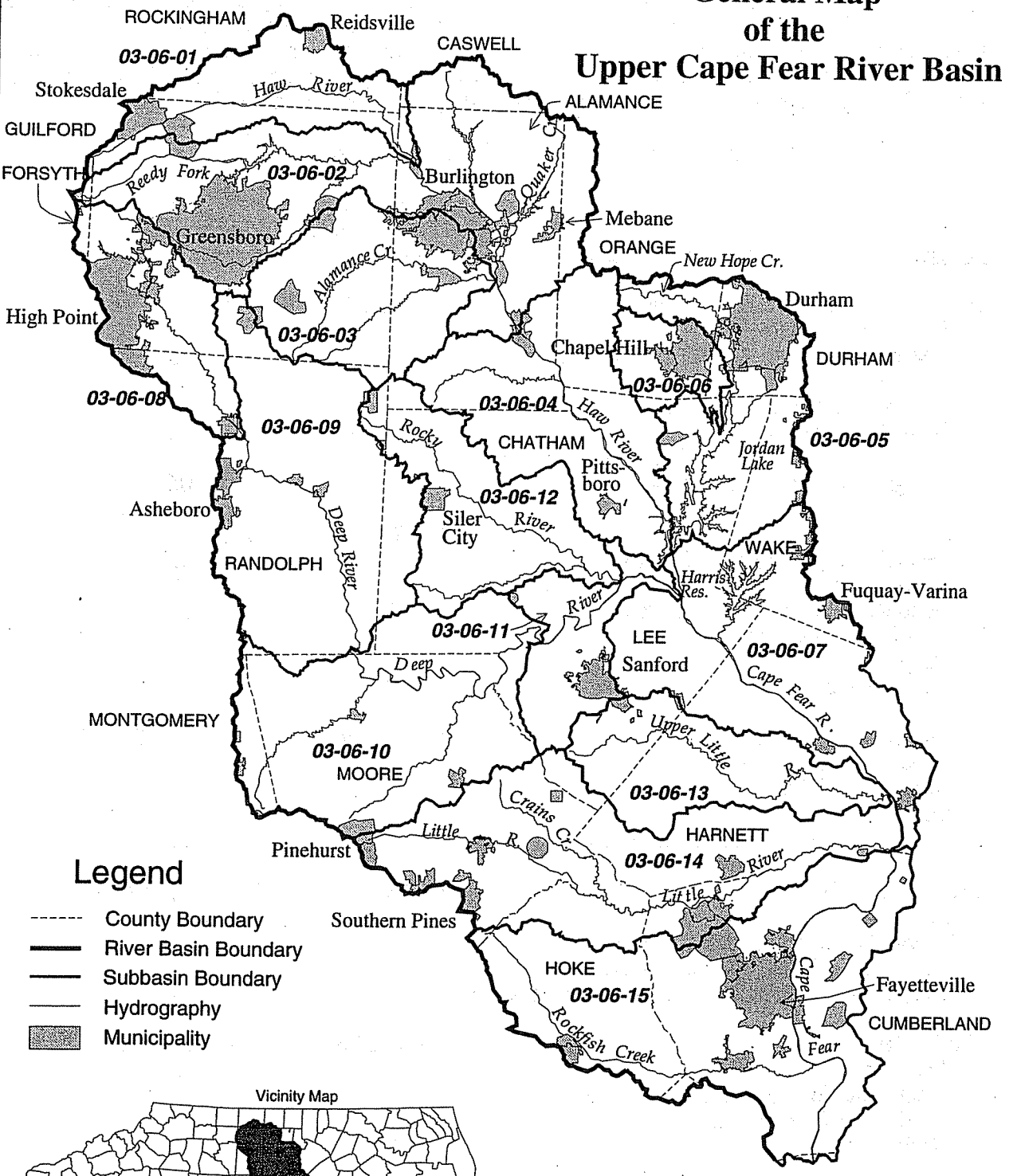
General Map of the Upper Cape Fear River Basin



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April, 1995

There are 36 lakes in the Cape Fear River Basin that are monitored by DWQ, only five of which are natural. Over half of the total number of lakes are located in the upper portion of the basin (subbasins 01 through 08). These artificial impoundments serve as water supplies for communities in the piedmont such as Greensboro, Burlington, Durham and Chapel Hill. The natural lakes are Carolina bays that are concentrated in the lower portion of the basin.

Table 2.1 Hydrologic Divisions in the Cape Fear River Basin

Watershed Name and Major Tributaries	USGS 8-digit Hydrologic Units Figure 2.2	DWQ Subbasin 6-digit codes Figure 2.3
Haw River and Jordan Reservoir	**03030002**	**030601 - 06**
Upper Haw River	"	01
Reedy Fork, Stony Creek, and Haw River (middle)	"	02
Big and Little Alamance Creeks	"	03
Haw River (lower)	"	04
New Hope Creek and Jordan Reservoir	"	05
Morgan Creek and University Lake	"	06
Deep River	**03030003**	**030608 - 12**
Deep River (upper) and Muddy Creek	"	08
Deep River (middle) and Richland Creek	"	09
Deep River (middle), Cabin Creek and McLendons Creek	"	10
Deep River (lower)	"	11
Rocky River	"	12
Upper Cape Fear River	**03030004**	**030607, 13-15**
Cape Fear River (upper)	"	07
Upper Little River	"	13
Little River	"	14
Rockfish Creek and Cape Fear River	"	15
Lower Cape Fear River	**03030005**	**030616, 17, 24**
Cape Fear River	"	16
Town Creek, Brunswick River and Cape Fear River (extreme lower)	"	17
Topsail, Middle, Masonboro and Stump Sounds	"	24
Black River	**03030006**	**030618 - 20**
South River	"	18
Great Coharie Creek, Six Runs Creek and upper Black River	"	19
Black River	"	20
Northeast Cape Fear River	**03030007**	**030621 - 23**
upper Northeast Cape Fear River	"	21
middle Northeast Cape Fear River, Goshen Swamp, Rockfish Creek	"	22
lower Northeast Cape Fear River	"	23

The Cape Fear River Basin, which has a total land area of 9,149 square miles and 6,282 stream miles, has an average drainage area of 1.5 square miles per stream mile. A variety of aquatic systems are represented in the basin as the terrain changes from the piedmont to the coastal plain, including large freshwater rivers, blackwater swamps and estuaries.

2.3 LOCAL GOVERNMENT AND PLANNING JURISDICTIONS

The basin encompasses all or part of the following 27 counties and 114 municipalities presented in Table 2.2. Also included in the table are abbreviations for the Lead Regional Organizations (Councils of Government) and Districts of the North Carolina League of Municipalities.

Table 2.2 Local Governments and Local Planning Units within the Cape Fear River Basin

County	*% of county in basin	Region	League District	Municipality
Alamance	100%	G	VI	Alamance Burlington Elon College Gibsonville Graham Green Level Haw River Mebane
Bladen	70%	N	III	Dublin East Arcadia Elizabethtown Tar Heel White Lake
Brunswick	40%	O	III	Bald Head Is. Belville Boiling Spring Lk Caswell Beach Leland Long Beach Navassa Sandy Creek Southport Yaupon Beach
Caswell	15%	G	VI	
Chatham	100%	J	VI	Goldston Pittsboro Siler City
Columbus	15	O	III	
Cumberland	98%	M	VII	Falcon Spring Lake Fayetteville Stedman Godwin Wade Hope Mills Linden

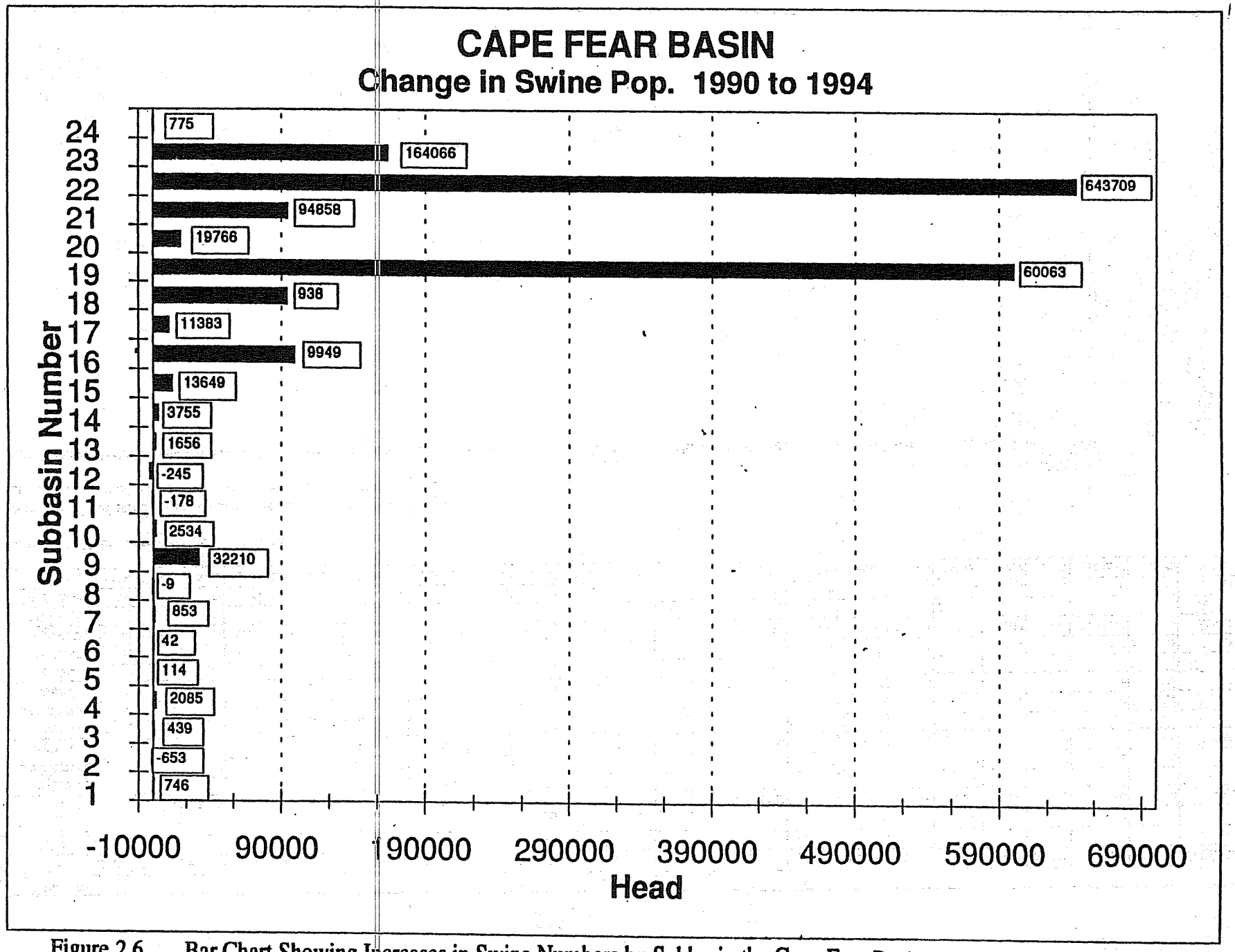


Figure 2.6 Bar Chart Showing Increases in Swine Numbers by Subbasin the Cape Fear Basin from 1990 to 1994

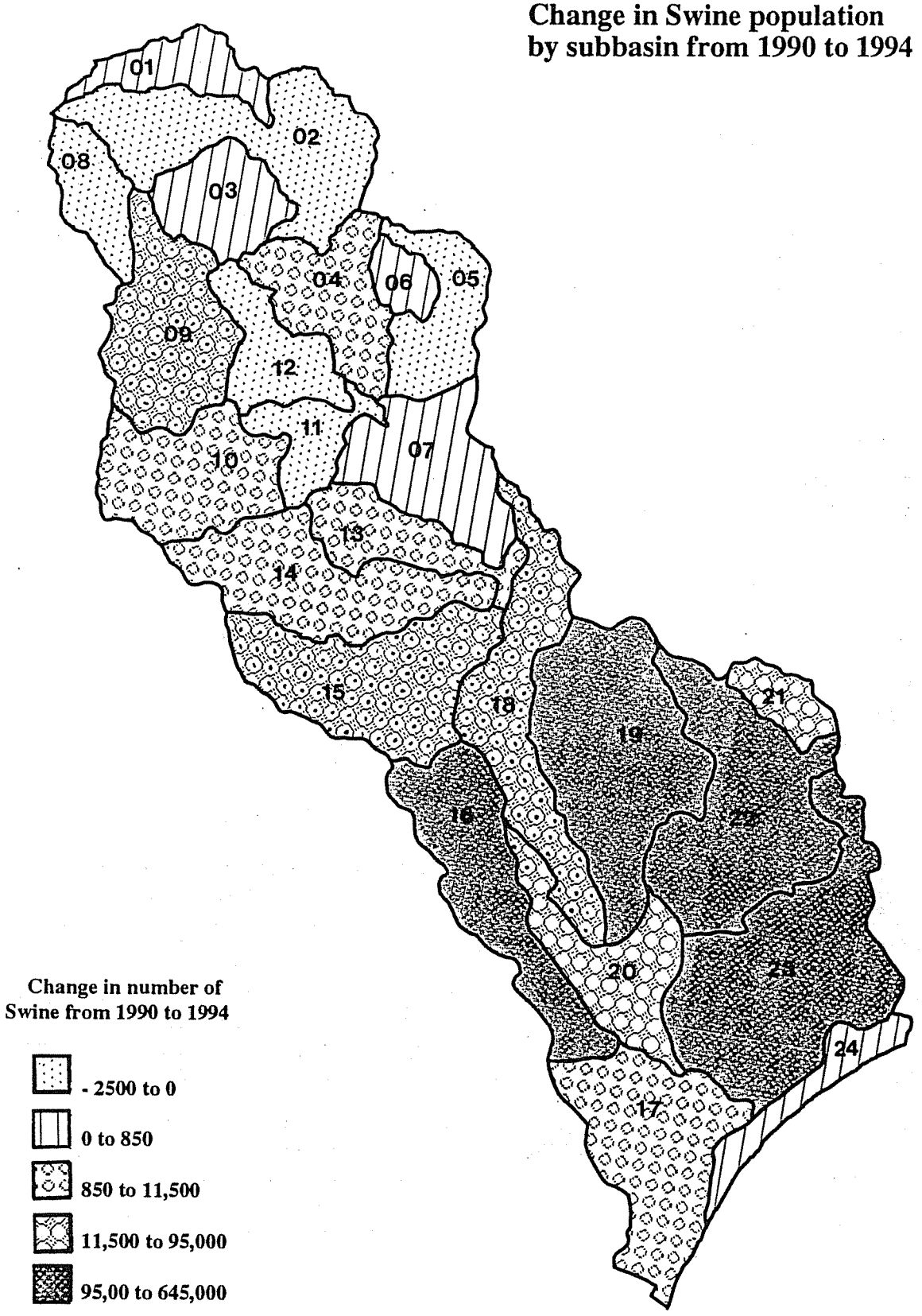


Figure 2.7 Map of Swine Population Increases by Subbasin from 1990 to 1994

2.6 THREATENED AND ENDANGERED AQUATIC FAUNAL SPECIES

The Cape Fear River Basin provides habitat for seven, state and/or federally listed, threatened and endangered freshwater mussel species. In addition, the state and federally listed Cape Fear Shiner and Shortnose Sturgeon occur in this basin. There are also seven fish species of special concern: the Highfin Carpsucker, the Carolina Darter, the Least Killifish, the Thinlip Chub, the Bluefin Killifish, the Broadtail Madtom, and the Sandhills Chub (Wilson, 1994). Table 2.7 lists the endangered and threatened mussel and fish species along with the subbasins where they are found and their listing status. Factors in their continued survival at these locations would appear to be the minimal amount of urban development that has occurred in these subbasins and the relatively low number of wastewater treatment plants.

Table 2.7 Threatened and Endangered Freshwater Mussel and Fish Species in the Cape Fear River Basin (Source: NC Wildlife Resources Commission)

Common Name	Scientific Name	Subbasins where found	Listing Status: State	Federal
Triangle Floater	(Alasmidonta undulata)	12	T	
Atlantic Pigtoe	(Fusconia masoni)	18, 19, 20	T	(E)
Yellow Lamp Mussel	(Lampsilis cariosa)	07, 09, 10, 11 13, 15, 18, 19, 20	T	(E)
Squawfoot Mussel	(Strophitus undulatus)	04, 09, 10, 11 12	T	
Cape Fear Shiner	(Notropis mekistocholas)	07, 09, 10, 11 12	E	E
Brook Floater	(Alasmidonta varicosa)	12	T	
Magnificent Rams-horn	(Planorbella magnifica)	17	E	
Savannah Lilliput	(Toxolasma pullus)	06	T	
Shortnose Sturgeon	(Acipenser brevirostrum)	17	E	E

Listing abbreviations: E = Endangered, T = Threatened, (E) = Candidate for Federal Listing

There are three specific watersheds in the Cape Fear River Basin that are of particular importance to threatened and endangered species (Alderman, 1995). The Deep River upstream of its confluence with the Haw River contains good populations of the federally listed Cape Fear Shiner. This area also contains a variety of listed mussel species, although they are not strong populations.

The Black River watershed contains the only good populations of the Atlantic Pigtoe in the state. While found elsewhere in the state, it is almost extirpated in the other areas. Another important characteristic of the Black River watershed with regard to mussels is the abundance of the organisms found. The watershed has a relatively large number of a variety of animals.

Finally, Town Creek near Wilmington contains a generally good variety and number of threatened species. A freshwater mussel species that was once believed to be extinct was also recently rediscovered in this creek and is called the Greenfield Rams-horn. (Alderman, 1995).

2.7 SURFACE WATER CLASSIFICATIONS AND STANDARDS

2.7.1 Program Overview

North Carolina has established a water quality classification and standards program pursuant to G.S. 143-214.1. Classifications and standards are developed pursuant to 15A NCAC 2B.0100 - Procedures for Assignment of Water Quality Standards. Waters were classified for their "best

usage" in North Carolina beginning in the early 1950's, with classification and water quality standards for all the state's river basins adopted by 1963. The effort to accomplish this included identification of water bodies (which included all named water bodies on USGS 7.5 minute topographic maps), studies of river basins to document sources of pollution and appropriate best uses, and formal adoption of standards/classifications following public hearings.

The Water Quality Standards program in North Carolina has evolved over time and has been modified to be consistent with the Federal Clean Water Act and its amendments. Water quality classifications and standards have also been modified to promote protection of surface water supply watersheds, high quality waters and the protection of unique and special pristine waters with outstanding resource values.

2.7.2 Statewide Classifications and Water Quality Standards

All surface waters in the state are assigned a primary water classification, and they may also be assigned one or more supplemental classifications (Table 2.8). As noted above, classifications are assigned to protect uses of the waters such as swimming, aquatic life propagation or water supplies. For each classification, there is a set of water quality standards that must be met in order to protect the uses. Appendix I provides a more detailed summary of the state's primary and supplemental classifications including, for each classification, the best usage, water quality standards, stormwater controls and other protection requirements as appropriate. This information is derived from 15A NCAC 2B .0200 - Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina.

Table 2.8 Primary and Supplemental Classifications Applicable to the Cape Fear River Basin (Primary classifications beginning with an "S" are assigned to salt waters)

PRIMARY FRESHWATER AND SALTWATER CLASSIFICATIONS

Class	Best Uses
C and SC	Aquatic life propagation/protection and secondary recreation
B and SB	Primary recreation and class C uses
WS	Water Supply watershed and class C uses. There are five WS classes, I through V. WS classifications are assigned to watersheds based on land use characteristics of the area. Each water supply classification has a set of management strategies to protect the surface water supply. A Critical Area (CA) designation is also listed for watershed areas within a half-mile and draining to the water supply intake or reservoir where an intake is located.

SUPPLEMENTAL CLASSIFICATIONS

Class	Best Uses
Sw	Swamp Waters: recognizes waters that will naturally be more acidic (have lower pH values) and have lower levels of dissolved oxygen
HQW	High Quality Waters: waters possessing special qualities including excellent water quality, Native or Special Native Trout Waters, Critical Habitat areas, or WS-I and WS-II water supplies
ORW	Outstanding Resource Waters: unique and special surface waters which are unimpacted by pollution and have some outstanding resource values.
NSW	Nutrient Sensitive Waters: areas with water quality problems associated with nutrient enrichment.

Some of the classifications, particularly for HQW, ORW and WS waters, outline protective management strategies aimed at controlling point and nonpoint source pollution. These strategies are summarized in Appendix I and are discussed briefly below.

Special HQW protection management strategies are presented in 15A NCAC 2B.0201(d), which is included in its entirety in Appendix I under Antidegradation Policy. These measures are intended to prevent degradation of water quality below present levels from both point and nonpoint sources. HQW requirements for new wastewater facilities and for existing facilities which expand beyond their currently permitted loadings address oxygen-consuming wastes, total suspended solids, disinfection, emergency requirements, volume, nutrients (in nutrient sensitive waters) and toxic substances. For oxygen-consuming wastes, for example, effluent limitations for new or expanding facilities are as follows: BOD_5 = 5 mg/l; NH_3-N = 2 mg/l; DO = 6 mg/l (except for those expanding discharges which expand with no increase in permitted pollutant loading).

The requirements for ORW waters are more stringent than those for HQWs. Special protection measures that apply to North Carolina ORWs are set forth in 15A NCAC 2B .0216 (most of which is included in Appendix I). For freshwater ORWs, at a minimum, no new discharges or expansions of existing discharges are permitted, and stormwater controls for most development needing an Erosion and Sedimentation Control Plan are required. In saltwater ORWs, new development must comply with the low density option specified in the coastal stormwater rules (15A NCAC 2H .1000), new non-discharge permits must meet reduced loading rates and increased buffer zones, dredging in areas with significant shellfish or submerged aquatic vegetation is not allowed unless it is maintenance dredging, and a public hearing is required for any proposed wastewater discharges. All ORWs may be subject to unique management strategies developed on a case-by-case basis. These strategies are listed in the ORW rule.

The requirements for WS waters vary significantly from WS-I to WS-V, and these are often a reflection of the level of development within the watershed of a water intake. See Appendix I for further details. The WS-I classification carries the most stringent requirements for dischargers and surrounding land use activities while WS-V carries the least. A WS-1 water supply requires a completely undeveloped watershed. There are few of these in the state and all are located in the mountains (none in the Cape Fear Basin). There are a number of waters classified as WS-11 in the Cape Fear Basin including Cane Creek Reservoir. These are listed in Table 6.1b in Chapter 6. WS-IV and V watersheds are typically established for run-of-the-river water supply intakes for water intakes in mutlti-use reservoir such as Jordan Reservoir.

2.7.3 Surface Water Classifications in the Cape Fear River Basin

Table 2.9 presents statistics for classifications found in the Cape Fear River Basin. Some classifications in Table 2.9 show both mileages and acreages. Acreage figures for water supplies (WS-II through WS-V), HQW and ORW waters include the watershed land areas draining to these waters that are subject to protection regulations. The figures for acres that are in ***italics,*** represent open water areas.

The waters of the Cape Fear River Basin have a variety of surface water quality classifications applied to them. The upper portion of the basin has been designated Nutrient Sensitive Waters in order to control nutrient input into Jordan Reservoir, one of the most eutrophic lakes in North Carolina. Isolated areas throughout the basin have been classified High Quality Waters where Excellent water quality has been identified. Stump Sound, Masonboro Sound and Topsail and Middle Sound are saltwaters that have been designated as Outstanding Resource Waters. A lower portion of the Black River basin was recently designated Outstanding Resource Waters. There are several classified water supplies in the basin that are used to serve the more populated areas.

Table 2.9 Water Quality Classification Statistics for the Cape Fear River Basin

PRIMARY CLASSIFICATIONS

Class	C	B	SC	SB	SA	WS-II	WS-III	WS-IV	WS-V
Miles	8,060	272	68	0	70	266	1,092	1,639	100
% of Miles	70	2	1	0	1	2	9	14	1
Acres	NA	NA	*14,767*	*806*	*17,050*	147,910	500,136	750,576	NA
% of Acres	NA	NA	NA	NA	NA	2	8	13	NA

SUPPLEMENTAL CLASSIFICATIONS

Class	Sw	NSW	HQW*	ORW
Miles	4,127	2,186	313	243
% of Miles	36	19	3	2
Acres (land)	NA	1,087,456	168,389	150,500
Acres (water)			*389*	*3,727*
% of Acres	NA	18	4	<1

* Calculations for HQW miles and acres of water includes only those waters assigned an HQW classification in the schedule of classifications. It does not include waters that are classified as WS-II and SA, although these waters are HQW by definition.

A complete listing of classifications for all surface waters in the basin can be found in a DWQ publication entitled "Classifications and Water Quality Standards Assigned to the Waters of the Cape Fear River Basin". Figure 2.8 depicts the locations of WS, HQW and ORW waters throughout for the basin as a whole. Figures 2.9, 2.10 and 2.11 depict the locations and major water body names of WS, HQW and ORW waters for the upper, middle and coastal portions of the basin. Figure 2.12 depicts that general extent of swamp and salt waters in the basin. It also shows the area of the basin classified as NSW (Jordan Reservoir watershed). Figure 2.13 depicts primary nursery areas and closed shellfish waters in the coastal portion of the basin.

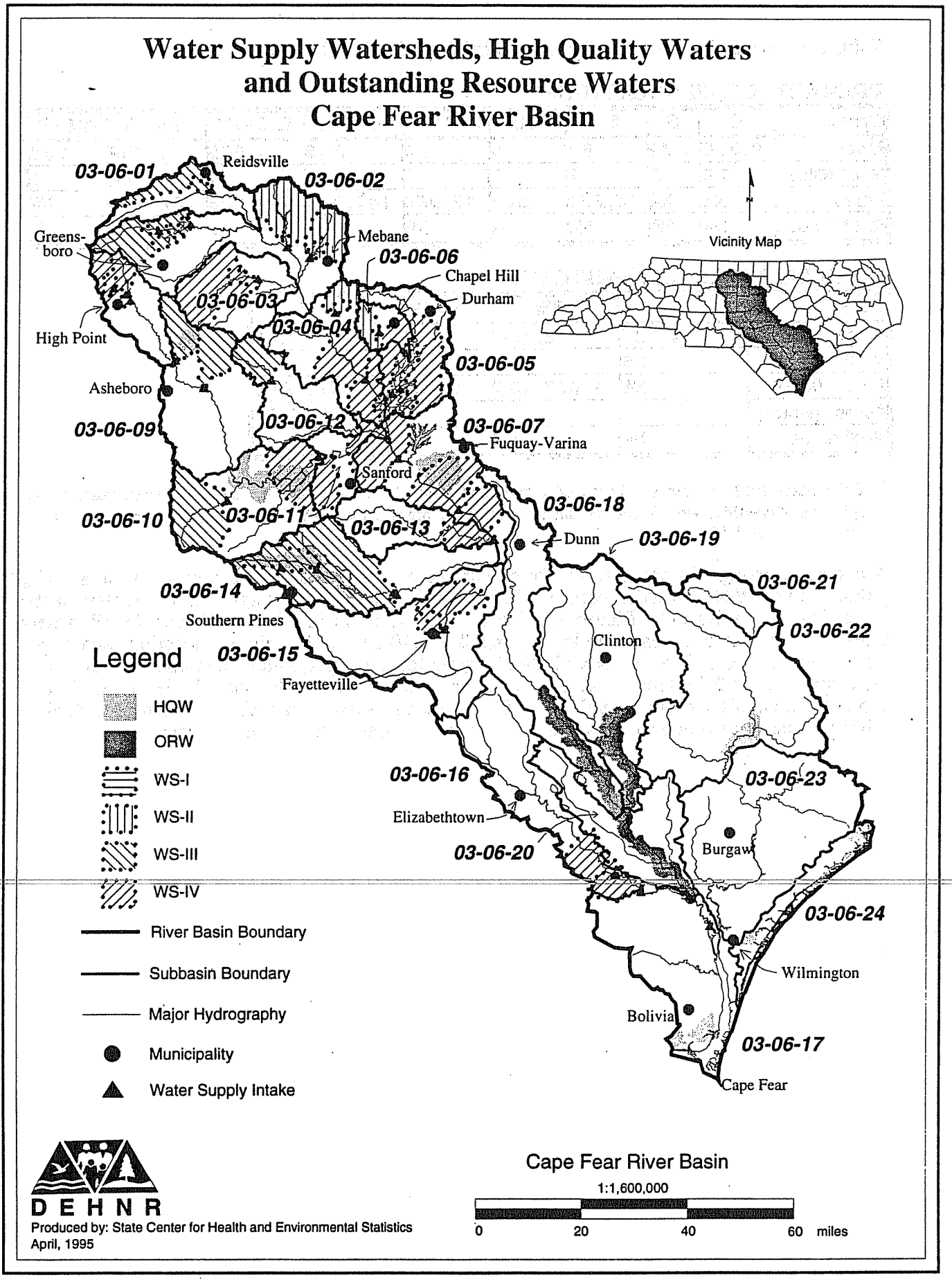


Figure 2.8 Water Supply Watersheds, High Quality Waters and Outstanding Resource Waters in the Cape Fear River Basin

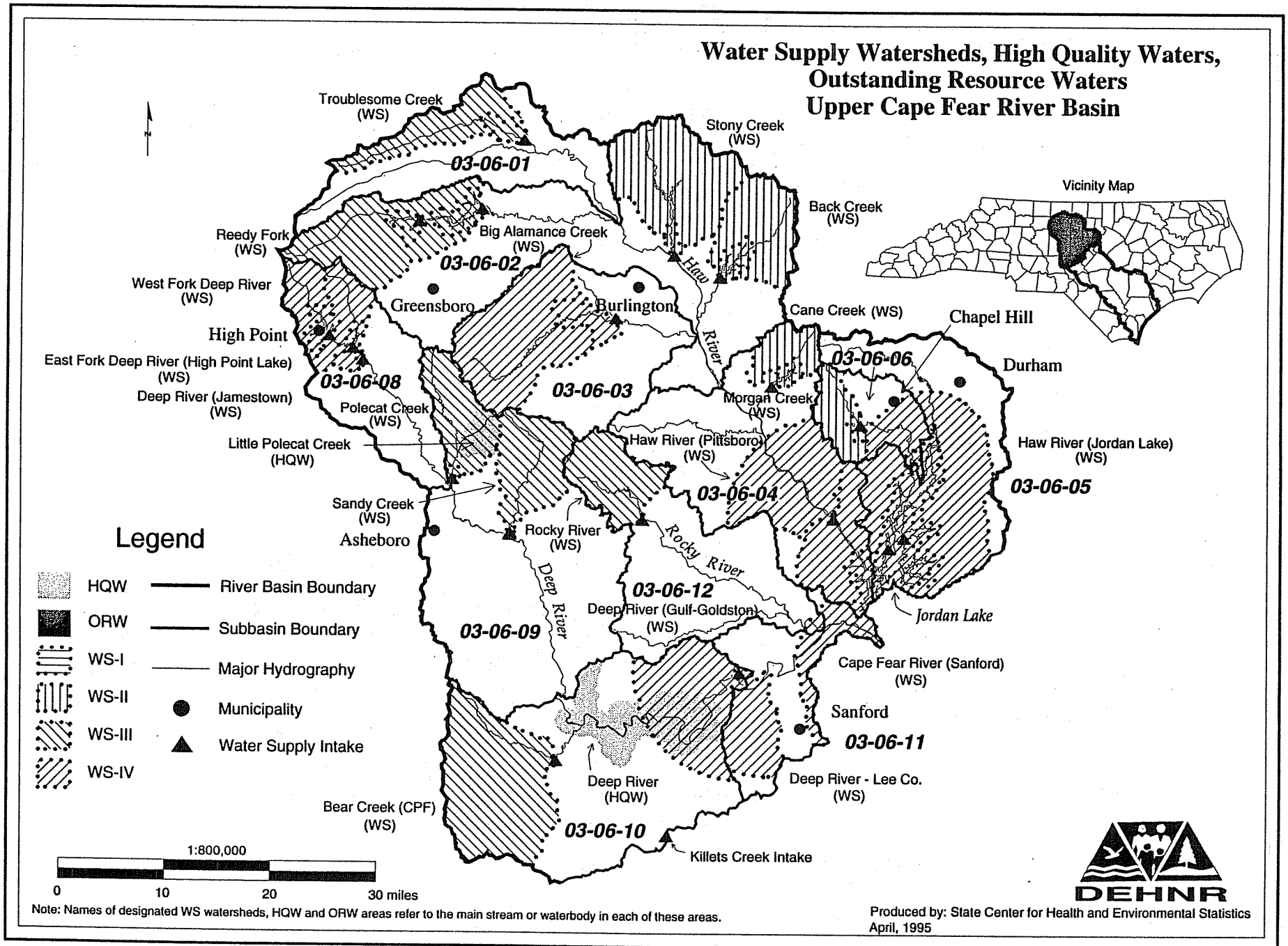


Figure 2.9 Water Supply Watersheds, High Quality Waters (HQW) and Outstanding Resource Waters (ORW) in the Upper Cape Fear River Basin

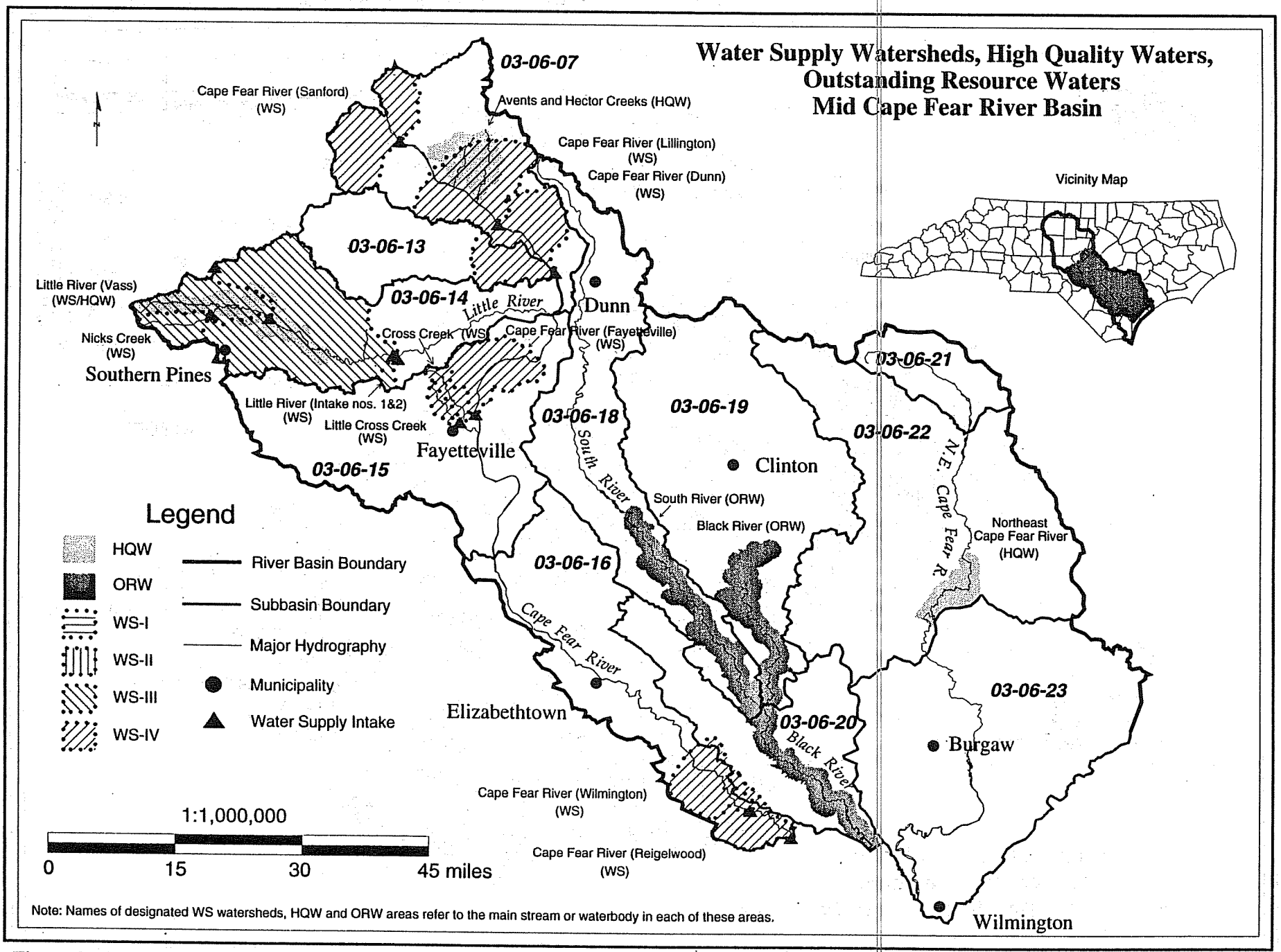


Figure 2.10 Water Supply Watersheds and HQW/ORW Waters in the Mid Cape Fear River Basin

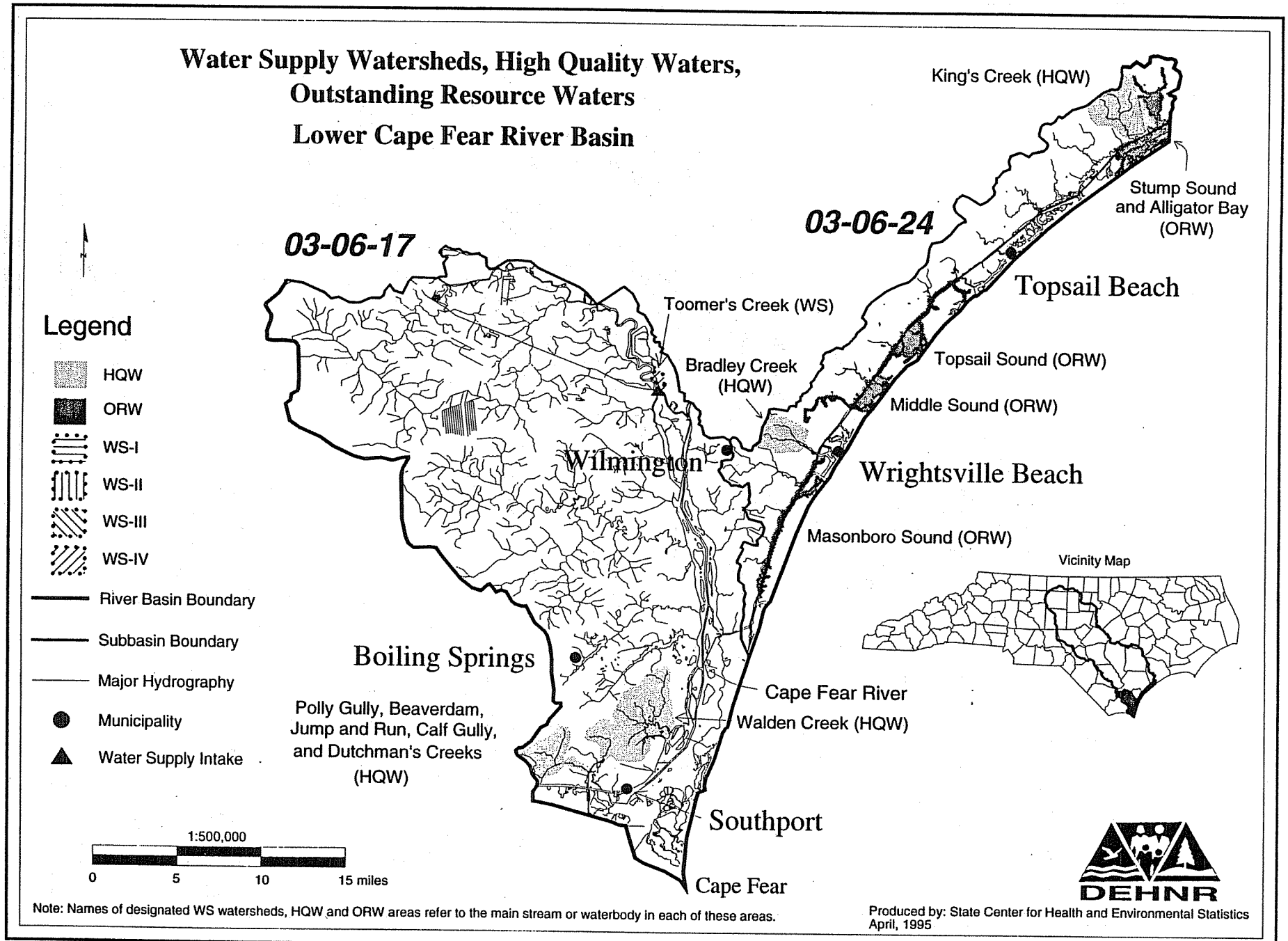


Figure 2.11 Water Supply Watersheds and HQW/ORW Waters in the Coastal Portion of the Cape Fear River Watershed

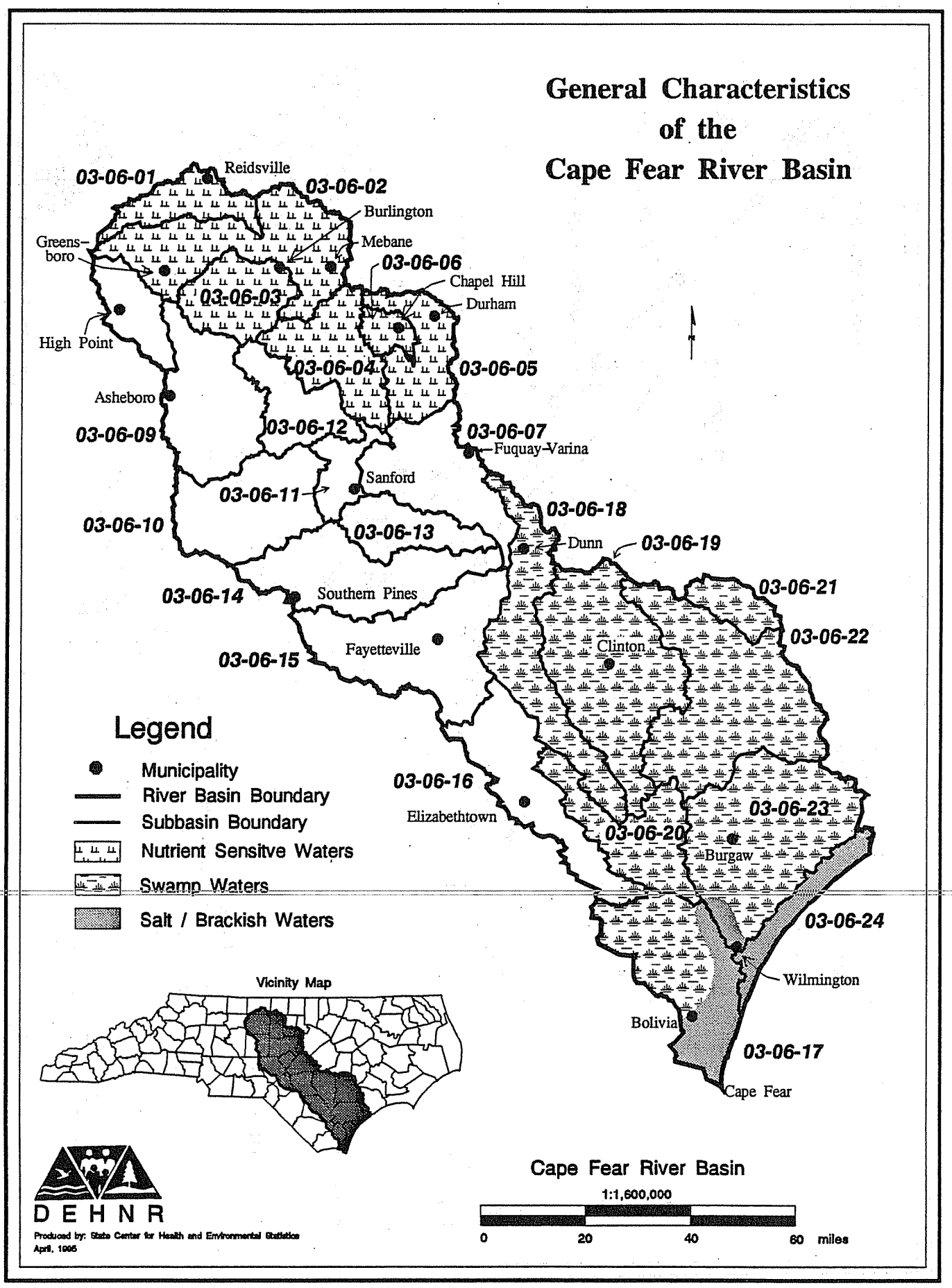


Figure 2.12 Swamp, Salt and Nutrient Sensitive Waters in the Cape Fear Basin

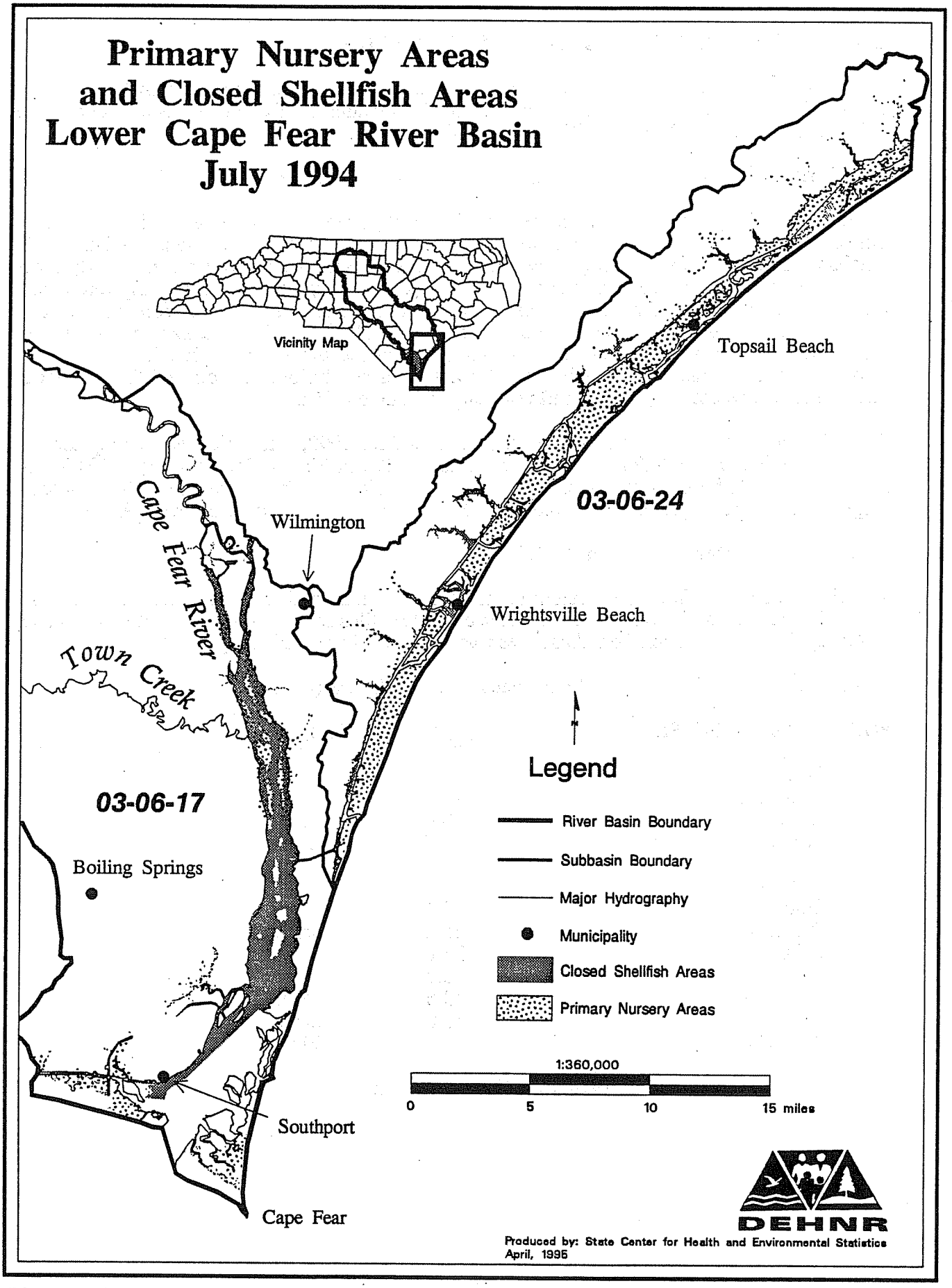


Figure 2.13 Primary Nursery Waters and Closed Shellfish Waters in the Cape Fear Basin

2.8 WATER USE IN THE CAPE FEAR RIVER BASIN

Maintaining an adequate supply of clean water will be critical to future economic growth and maintaining a healthy and productive environment. Information in this section was provided by the NC Division of Water Resources (Kuchen and Watts, 1995).

2.8.1 1992 Water Use Reported by Local Governments in the Cape Fear Basin

DWR is compiling water use data as reported by local governments in their local water supply plans. This data will be used in the development of the State Water Supply Plan. To date, DWR database contains (among others) present and projected water use information from fifty local governments located in the Cape Fear River basin (Table 2.10). An additional fifty-three draft plans have been submitted by local governments within the basin. The information in these draft plans are subject to verification and are not considered official until DWR has determined the information is reasonable and meets the requirements of the water supply planning law and the local government has approved its plan by a formal resolution. A total of thirteen local governments have not submitted a draft water supply plan to DWR.

According to Water Supply System Reports submitted for 1992, these fifty systems represent a service population of 981,702. A total water use of 125 million gallons per day (MGD) was reported for 1992 by these systems. Total water use projections for the year 2020 is 262 MGD (Figure 2.14). The projected use for the year 2020 represents a 110% increase over 1992 use.

2.8.2 1990 Water Use from USGS

The U.S. Geological Survey (Terziotti et. al., 1994) summarized water use from 1990 (Table 2.11). USGS staff reviewed reported water use in DWR files for agriculture, industry and public water supplies. Information from those files was further analyzed and interpolated.

Table 2.11 1990 Surface and Groundwater Use from USGS (MGD)

PUBLIC WATER SUPPLY	MGD	PERCENT
Domestic	72.6	3%
Commercial	31.9	1%
Industrial	79.5	4%
Other	0.4	<1%
Subtotal	**184.4**	**9 %**
SELF-SUPPLIED		
Commercial	2.3	<1%
Domestic	15.2	<1%
Industrial	97.6	4.6%
Mining	3.2	<1%
Agriculture	43.5	8 %
Power	1,781.0	84 %
Subtotal	**1,942.8**	**91%**
Total Water Use in 1990	**2,127.2**	**100%**

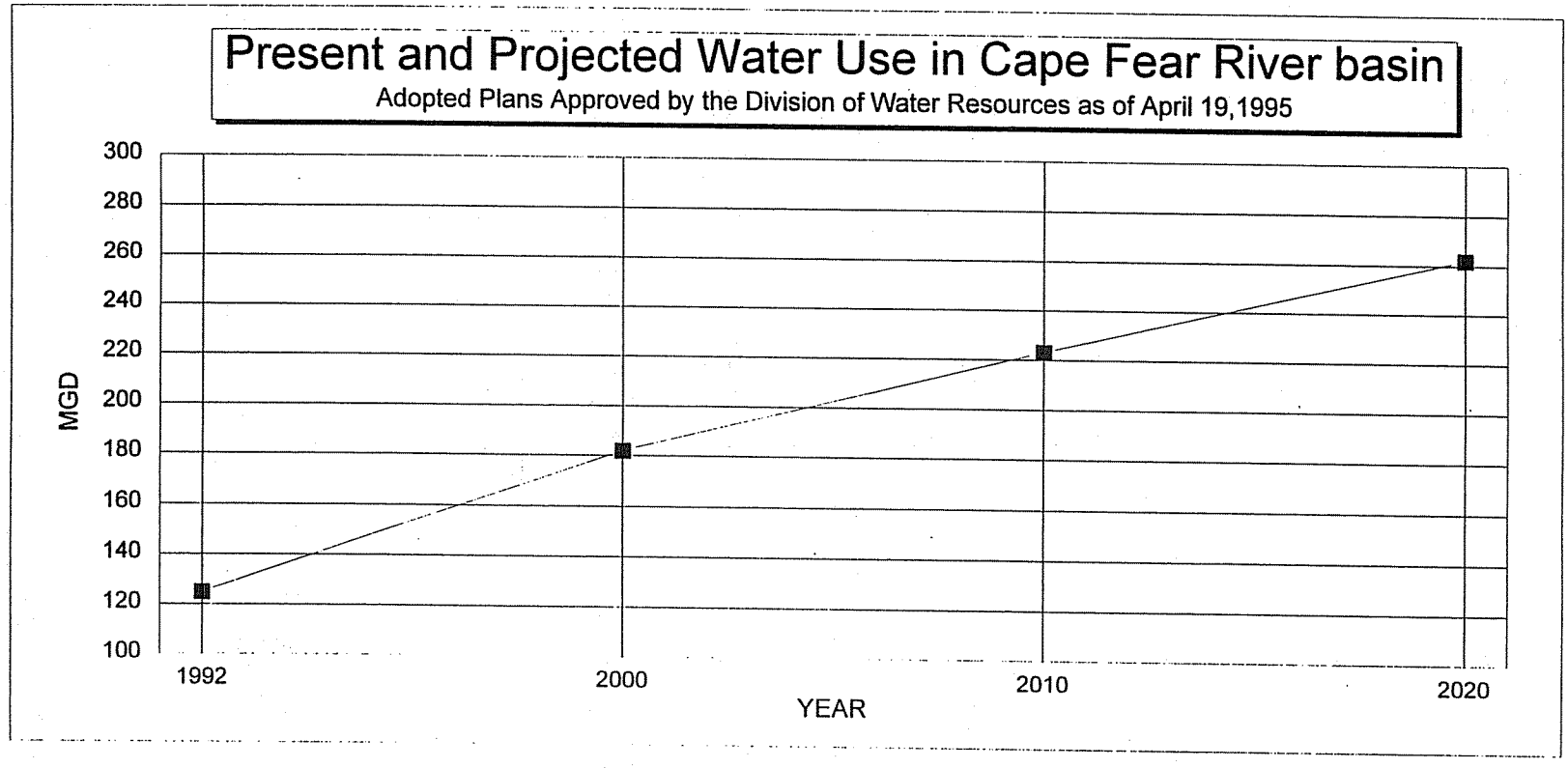


Figure 2.14 Present and Projected Water Use in the Cape Fear River Basin

Table 2.10 Present and Projected Water Use of Local Governments in the Cape Fear River basin (Adopted Plans Approved by the Division of Water Resources as of April 19, 1995).

PWSID	BASIN	SYSTEM NAME	USE				POPULATION				TOTAL USE
			1992 MGD	2000 MGD	2010 MGD	2020 MGD	1992	2000	2010	2020	
03-82-045	CAPE FEAR (2-3)	AUTRYVILLE	0.025	0.023	0.022	0.020	314	287	271	253	
04-10-045	CAPE FEAR (2-3)	BRUNSWICK CO	8.600	13.710	15.983	18.436	45748	67791	77452	88910	3147.490
04-10-055	CAPE FEAR (2-3)	CASWELL BEACH	0.101	0.294	0.350	0.400	500	980	1167	1332	36.970
03-43-020	CAPE FEAR (2-3)	COATS	0.146	0.176	0.210	0.252	1958	2346	2811	3368	53.570
03-09-010	CAPE FEAR (2-3)	ELIZABETHTOWN	0.805	1.746	1.851	1.972	4000	4260	4899	5633	284.625
03-26-010	CAPE FEAR (2-3)	FAYETTEVILLE	21.552	25.000	33.000	40.000	130000	154000	185000	213000	7866.000
03-92-055	CAPE FEAR (2-3)	FUQUAY-VARINA	0.542	1.320	2.220	3.090	4300	9153	14133	19319	
03-43-045	CAPE FEAR (2-3)	HARNETT CO	2.505	6.275	7.807	9.460	26000	40981	58676	73671	925.779
02-01-020	CAPE FEAR (2-3)	HAW RIVER	0.836	0.864	0.883	0.902	1928	2204	2297	2385	306.020
03-47-035	CAPE FEAR (2-3)	HOKE CO. AIRPORT	0.061	0.816	1.023	1.224	1112	8880	9642	10318	
03-26-025	CAPE FEAR (2-3)	HOPE MILLS	0.666	0.857	1.156	1.480	8809	11348	15316	19599	243.690
04-10-070	CAPE FEAR (2-3)	LELAND SD	0.393	0.471	0.561	0.617	3464	4200	5000	5500	143.788
03-26-045	CAPE FEAR (2-3)	LINDEN	0.028	0.036	0.040	0.047	465	575	640	750	
04-10-015	CAPE FEAR (2-3)	LONG BEACH	0.544	0.890	1.130	1.410	3280	5419	6797	8526	199.200
04-65-999	CAPE FEAR (2-3)	LOWER CAPE FEAR	7.820	26.000	41.000	56.000	292178	310320	346618	358512	
04-65-510	CAPE FEAR (2-3)	NEW HANOVER AIRPORT	0.019	0.020	0.024	0.029	0	0	0	0	
03-47-030	CAPE FEAR (2-3)	ROCKFISH	0.030	0.292	0.408	0.523	733	2565	2774	2968	
03-26-020	CAPE FEAR (2-3)	SPRING LAKE	0.783	0.937	1.167	1.517	10500	11660	12600	13600	
03-26-040	CAPE FEAR (2-3)	WADE	0.027	0.035	0.064	0.164	438	448	479	507	9.990
04-65-010	CAPE FEAR (2-3)	WILMINGTON	9.610	19.300	19.400	19.700	57213	84500	85000	86500	
04-10-020	CAPE FEAR (2-3)	YAUPON BEACH	0.105	0.107	0.109	0.111	785	800	815	830	38.399
02-76-030	DEEP (2-2)	ARCHDALE	0.663	0.900	1.430	1.900	7100	8500	10200	12250	242.658
03-83-025	DEEP (2-2)	CARTHAGE	0.201	0.256	0.271	0.000	1810	1900	2200	2400	73.377
02-41-020	DEEP (2-2)	HIGH POINT	11.290	12.160	13.040	14.210	70258	76492	80113	83155	4134.640
02-41-030	DEEP (2-2)	JAMESTOWN	0.370	0.445	0.625	0.700	3000	3600	4300	5000	135.381
02-76-020	DEEP (2-2)	RAMSEUR	0.476	0.622	0.650	0.676	2300	2680	2970	3240	173.800
02-76-015	DEEP (2-2)	RANDLEMAN	0.980	1.036	1.077	1.116	3200	3484	3857	4209	358.718
03-83-150	DEEP (2-2)	ROBBINS	0.686	2.000	3.000	0.000	1400	2300	3500	0	250.330
03-53-010	DEEP (2-2) CAPE FEAR (2-3)	SANFORD	4.563	4.980	5.330	5.630	17540	20173	21585	22880	
02-01-010	HAW (2-1)	BURLINGTON	11.088	12.600	13.300	14.200	40369	46000	49000	52200	4058.300
02-01-030	HAW (2-1)	GREEN LEVEL	0.107	0.114	0.119	0.124	1536	1636	1705	1770	39.218
02-41-010	HAW (2-1)	GREENSBORO	30.620	34.750	41.140	49.330	194300	204000	214000	222000	
03-68-020	HAW (2-1)	ORANGE-ALAMANCE WTR. SYS.	0.722	0.910	1.201	1.599	11000	13800	17300	20800	264.360
03-19-015	HAW (2-1)	PITTSBORO	0.610	1.080	1.540	2.000	2200	2350	2500	2660	222.500
02-79-020	HAW (2-1)	REIDSVILLE	3.289	4.500	4.900	5.400	14011	14825	15200	15400	1201.650
04-71-020	NEW (2-6)	TOPSAIL BEACH	0.150	0.190	0.230	0.270	8000	9876	10000	10000	56.000
04-31-999	NORTHEAST CAPE FEAR (2-5)	DUPLIN CO WATER DIST G	0.000	0.196	0.269	0.258	0	1879	2573	2471	0.000
04-31-995	NORTHEAST CAPE FEAR (2-5)	DUPLIN CO WATER DIST B	0.000	0.357	0.430	0.413	0	1275	1536	1475	0.000
04-31-996	NORTHEAST CAPE FEAR (2-5)	DUPLIN CO WATER DIST D	0.000	0.325	0.510	0.490	0	3106	4885	4690	0.000
04-31-997	NORTHEAST CAPE FEAR (2-5)	DUPLIN CO WATER DIST E	0.000	0.286	0.412	0.396	0	2742	3945	3787	0.000
04-31-998	NORTHEAST CAPE FEAR (2-5)	DUPLIN CO WATER DIST F	0.000	0.318	0.382	0.366	0	3045	3653	3505	0.000
04-65-191	NORTHEAST CAPE FEAR (2-5)	FLEMINGTON	0.210	0.217	0.258	0.308	108	110	114	118	
04-31-030	NORTHEAST CAPE FEAR (2-5)	KENANSVILLE	0.189	0.271	0.230	0.259	861	814	787	756	
04-31-035	NORTHEAST CAPE FEAR (2-5)	MAGNOLIA	0.070	0.075	0.078	0.080	747	800	825	850	25.695
04-31-010	NORTHEAST CAPE FEAR (2-5)	WALLACE	2.810	3.030	3.360	3.680	3304	3437	3683	3951	1027.200
03-43-015	SOUTH (2-4)	ANGIER	0.231	0.242	0.271	0.302	2265	2283	2504	2711	84.960
03-82-025	SOUTH (2-4)	SALEMBURG	0.100	0.097	0.094	0.091	650	610	576	539	36.756
03-26-035	SOUTH (2-4)	FALCON	0.050	0.053	0.057	0.061	695	747	797	845	
03-82-020	SOUTH (2-4)	GARLAND	0.075	0.128	0.193	0.261	746	789	842	895	
03-26-030	SOUTH (2-4)	STEDMAN	0.085	0.940	0.100	0.108	777	896	957	1014	
		TOTAL -	124.833	182.247	222.905	261.582	981702				

2.8.3 Allocations for Jordan Reservoir and Proposed Randleman Reservoir

Jordan Reservoir Allocation
Thirty-three percent of Jordan Reservoir's water supply storage is allocated to four systems. Originally, Hillsborough and Orange-Alamance also requested allocations, but they have since dropped their requests. If growth exceeds projections, applicants may request additional allocations at 5-year intervals. Allocation amounts are included in Table 2.12

Table 2.12 Summary of Jordan Reservoir Allocations (MGD)

Applicant	LEVEL 1	LEVEL 2
Cary-Apex Joint Request	16.0	0.0
Chatham Co.	4.0	2.0
Orange Water and Sewer Authority		10.0
Orange County		1.0
Totals	**20.0**	**13.0**

* These figures, while expressed in terms of water supply yield, actually represent the percentage of the water supply pool allocated. For example, a 12 MGD allocation means that the applicant would purchase 12 percent of the total water supply storage pool.

Randleman Reservoir (Proposed)
Randleman Lake is a proposed 3,000-acre reservoir with a 200-foot protective buffer strip around it that will provide 48 MGD of water supply. The reservoir will serve as a regional water supply for the Piedmont Triad Water Authority, which consists of Greensboro, High Point, Randolph County, Randleman, Jamestown and Archdale. The current raw water allocations are shown in Table 2.13. The project should be completed in 1998 and operational by the year 2000.

The Authority in 1988 requested certification for an interbasin transfer and for the power of eminent domain from the Environmental Management Commission. In late 1991, the EMC approved the certificates in a close vote. Landowners appealed the EMC decision in Superior Court, which ruled in the landowners' favor. The EMC appealed that decision to the N.C. Court of Appeals, and a decision has not yet been made. This fall, a draft Environmental Impact Statement is planned for release as part of the application procedure for the 404 permit from the U.S. Army Corps of Engineers.

Table 2.13 Current Raw Water Allocations for Randleman Lake

	Yield (MGD)	Percent
Greensboro	28.512	59.4
High Point	10.08	21.0
Randolph County	6.0	12.5
Randleman	1.008	2.1
Jamestown	1.2	2.5
Archdale	1.2	2.5
Totals	**48.0**	**100.0**

2.8.4 Interbasin Transfers Between the Cape Fear and Adjoining Basins

Water systems in North Carolina are required to register their water withdrawals and transfers with the Division of Water Resources if the amount is one million gallons per day or more, according to G.S. 143-215.22H. Under this law, the major Cape Fear River Basin is comprised of the

following smaller basins: Haw River, Deep River, Cape Fear River, South River, Northeast Cape Fear River, and New River (see Figure 2.15). (Note: the New River is not considered part of the Cape Fear River Basin under the basinwide management approach which utilizes basin definitions adopted by the Department of Water and Air Resources in 1974. The New River will be addressed as part of the White Oak Basin in 1996).

In addition, any unit of local government that supplies water is required to prepare a local water supply plan that documents its current (1992) and projected water use and supplies, plus much other water supply planning information. All of the registered interbasin transfers either into or out of the Cape Fear River Basin are listed below in Table 2.14. The average annual 1992 transfer amount and the projected average annual 2010 transfer amount are based on information provided in each system's local water supply plan unless otherwise noted.

Table 2.14 Registered Interbasin Transfers (as of March 1, 1992) in Millions of Gallons per Day (MGD)

FACILITY	RIVER BASIN FROM	>	TO	1992 TRANSFER (MGD)	PROJECTED 2010 TRANSFER (MGD)	
Transfers out of Cape Fear Basin:						
High Point	Deep		Yadkin	3.47	4.00	
Cary-Apex	Haw		Neuse	0.00	12.38	(*)
Benson	South		Neuse	0.968	1.230	
Total Transfer Out:				**4.438**	**17.610**	
Transfer into Cape Fear Basin						
Durham (**)	Neuse		Haw	11.640	20.800	(***)
Asheboro	Uwharrie		Deep	4.655	11.500	
Montgomery County	Yadkin		Deep	0.927	1.050	
Total Transfer In:				**17.222**	**33.350**	

* Source: Cary Public Works (2/12/96)

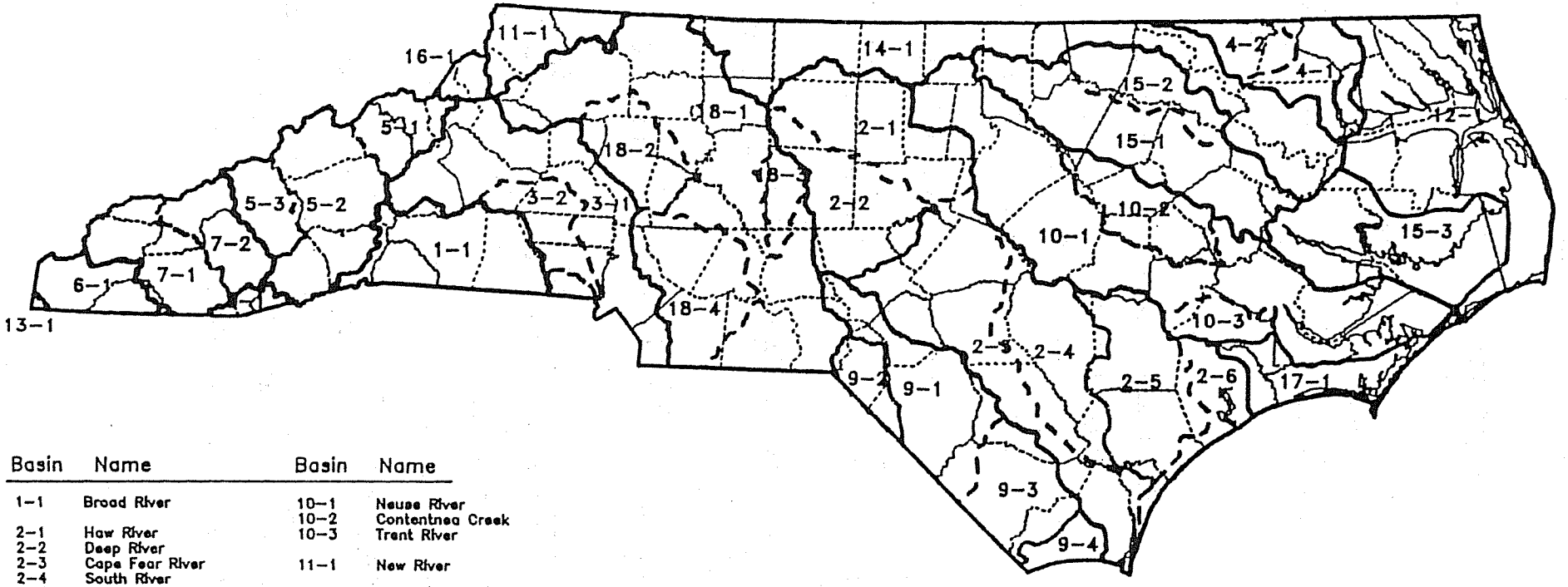
** Includes Durham County's wastewater discharge

*** Sources: Durham Dept. of Water Resources; Durham County Env. Eng. Dept. - Utilities Div. (2/12/96)

Based on the above information, there was a net transfer of 12.784 MGD *into* the Cape Fear River Basin in 1992. For 2010, the projected transfer amounts result in a *net* transfer of 15.74 MGD *into* the Cape Fear River Basin. This assumes that Cary-Apex's current 16 MGD Jordan Reservoir allocation is increased to meet its estimated 2010 demand of 24.55 MGD and that the West Cary WWTP is on-line and discharging 12.17 MGD back into the Cape Fear River Basin. (These projections are based on the current plans of the Cary Public Works Department). Neither the Cary-Apex withdrawal from Jordan Reservoir nor their transfer out of the Cape Fear River Basin can exceed 16 MGD without prior approval by the Environmental Management Commission.) The 2010 transfer estimate for Durham includes a 14.8 MGD wastewater discharge to the Cape Fear River Basin by the City of Durham (Durham Department of Water Resources) and an estimated 6 MGD discharge to the basin by Durham County (Durham County Environmental Engineering Department -Utilities Division).

A 1995 approximation of transfer amounts has also been made, since the 1993 amounts do not adequately represent Cary-Apex's current situation. This is because Cary-Apex's water use has increased significantly over 1992 levels and, in 1992, Cary-Apex had not yet begun using its

Figure 2.15 Map Defining River Basin and Subbasins for Purposes of Regulating Interbasin Transfers in North Carolina



Basin	Name	Basin	Name
1-1	Broad River	10-1	Neuse River
		10-2	Contentnea Creek
2-1	Haw River	10-3	Trent River
2-2	Deep River		
2-3	Cape Fear River	11-1	New River
2-4	South River		
2-5	Northeast Cape Fear River	12-1	Albemarle Sound
2-6	New River		
		13-1	Ocoee River
3-1	Catawba River		
3-2	South Fork Catawba River	14-1	Roanoke River
4-1	Chowan River	15-1	Tar River
4-2	Meherrin River	15-1	Fishing Creek
		15-3	Pamlico River & Sound
5-1	Nolichucky River		
		16-1	Watauga River
5-2	French Broad River		
5-3	Pigeon River	17-1	White Oak River
6-1	Hiwassee River	18-1	Yadkin River
		18-2	South Yadkin River
7-1	Little Tennessee River	18-3	Uwharrie River
7-2	Tuskasegee River	18-4	Rocky River
8-1	Savannah River		
9-1	Lumber River		
9-2	Big Shoe Heel Creek		
9-3	Waccamaw River		
9-4	Shallotte River		

Jordan Reservoir allocation. Pumping records indicate that Cary-Apex transferred an average of about 10.27 MGD in 1995. By assuming 1992 levels for the other systems, this results in a net transfer *into* the basin of approximately 2.5 MGD for 1995.

Since transfers less than one MGD are not required to be registered with the Division of Water Resources, there are a few systems not listed here that nod have minor transfers involving the Cape Fear River Basin. Also, there are some systems, such as the Orange Water and Sewer Authority, that have only emergency or supplemental connections that involve a transfer, making it difficult to project these uses. Both of these would affect the transfer amounts slightly. The Division of Water Resources is in the process of better documenting these additional transfers.

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