

BASIN 14 ROANOKE

BASIN DESCRIPTION

The Roanoke Basin in North Carolina comprises 3,530 square miles of the nearly 10,000 square mile Roanoke River Basin that straddles the North Carolina-Virginia border. The mainstem of the Roanoke begins in the Blue Ridge Mountains of Virginia and flows generally southeasterly to Albemarle Sound. The Dan and Hyco Rivers drain a stretch of land along the Virginia state line from northeastern Surry County to Kerr Lake in Granville County before they join the Roanoke. Leaving Kerr Lake the river flows into Lake Gaston and then Roanoke Rapids Lake. The water releases from all three lakes are used to generate electricity. Releases from Roanoke Rapids Lake are also managed to protect water quality and maintain aquatic habitat downstream as well as power generation. Below Roanoke Rapids the river regains its riverine characteristics and becomes a meandering coastal plain waterway.



WATER USE

Factors Affecting Water Demand

This basin has about 4% of the state's residents and contains all or part of 24 municipalities in 16 counties. One of the state's 12 major metropolitan areas overlaps with the headwaters of this basin. From 1990 to 1997 year-round population in three counties in this basin grew by 10% or more. Over the same period, three counties in the lower basin had zero or declining population changes.

Total Water Use in Basin

Total water use in the basin was estimated at 77.6 million gallons per day (mgd), with about 56% coming from surface water sources. The U.S. Geological Survey's (USGS) 1995 summary of water use estimated total basin population at 283,410, with total residential demand estimated at 17.3 mgd. Fifty-one percent of the residential demand was served by public water systems. Overall, public water systems supplied 25.8 mgd from surface water and 6.5 mgd from ground water for both residential and non-residential uses. The remaining residential water demand was met by 8.5 mgd of self-supplied ground water. An additional 36.7 mgd of self-supplied water was used for non-residential uses.

Local Water Supply Plans (LWSPs)

Units of local government that supply or plan to supply water to the public are required to develop a LWSP. The Division of Water Resources (DWR) reviews LWSPs and maintains a database of the LWSP information. This summary is based on data contained in the 1997 LWSPs.

LWSPs were submitted by 36 public water systems using water from this basin. These systems supplied 29 mgd of water to 124,389 persons. The following discussion and table summarize the LWSP population served with water from the Roanoke basin and its water use for 1997.

Sub-basin	LWSP Population	Residential Use	Non-residential Use	Total Use*
Roanoke River	124,389	8.49	16.30	29.0

*Total Use includes unaccounted-for water and system process water.

Residential uses accounted for 29% of water use in these systems while non-residential water use accounted for 56% and 12% was unaccounted-for water.

Considerable growth in population and water use is expected in this basin. LWSP systems expect to supply water to 171,132 persons by the year 2020, a 38% increase over 1997 levels. Their water demand is projected to increase from 29 mgd to 45 mgd by 2020, a 55% increase.

In the 1997 LWSPs, two of the 36 systems using water from this basin reported that their peak demands will exceed their water treatment capacity by 2010.

Water systems should maintain adequate water supplies and manage water demands to ensure that average daily use does not exceed 80% of their available supply. Data for 1997 indicated that five of the 36 LWSP systems in this basin had average demand above this threshold. By 2020, four systems project demand levels that will exceed 80% of their available supply.

Self-supplied Water

Not everyone gets water from a public water system. Many households and some commercial and industrial operations supply their own water. The USGS estimated that self-supplied users, excluding power generating facilities, accounted for 45 mgd of the 78 mgd total of water used from this basin, as shown in the table below. Industrial uses comprised 37% of self-supplied water used, followed by irrigation (32%), domestic (19%), livestock (11%), and commercial (1%) uses.

Sub-basin	Domestic	Livestock	Industrial	Commercial	Irrigation	Total
Roanoke River	8.52	5.00	16.72	0.46	14.54	45.24

Registered Water Withdrawals

Anyone withdrawing 1.0 mgd or more of surface or ground water for agricultural uses or 100,000 gallons per day for other uses is required to register that withdrawal with DWR. Registered withdrawals in this basin are summarized in the table below.

Registered Water Withdrawals for 1999						
Sub-basin	Agricultural		Non-agricultural		Total	
	#	mgd	#	mgd	#	mgd
Roanoke River	18	36.5	20	103	38	13945

*Excludes water use for power generation.

All of the registered agricultural water use in this basin is for crop irrigation. The non-agricultural waterusers include one golf course, three mining operations, seven industries, and nine private water systems. The two largest industries used an average of 65 and 26 mgd of water.

Three of the industrial users and the golf course are permittees in the existing Capacity Use Area #1.

WATER AVAILABILITY

Surface water is used to meet the majority of overall water needs in the Roanoke River Basin, especially in the upper basin. LWSPs indicate that eight water systems in this basin withdraw about 28 mgd of surface water. Surface water will continue to be the primary source of water for most of the residents of the basin. Local water supply plans show that six systems rely on reservoirs for all or part of their water supply. The combined demand on these reservoirs averaged about 14 mgd in 1997. The estimated available supply from these reservoirs is 64 mgd.

Five of the surface water systems submitting local water supply plans have run-of-river intakes that supplied about 13.7 mgd of water in 1997. The available supply from these intakes, based on information reported in local water supply plans, is about 49 mgd.

Ground water is an important water source for systems in the lower Roanoke Basin, which extends into the coastal plain. Sixteen LWSP systems supplied 2.7 mgd of ground water to their customers in 1997. The combined 12-hour yield reported by these systems is 7.2 mgd.

The water-bearing geologic deposits of the coastal plain form a regional aquifer system that has historically provided plentiful, high-quality, low-cost water. However, ground water levels in some of the major aquifers have been declining because of over-pumping.

To ensure that ground water remains a reliable long-term water source in the Coastal Plain, the Environmental Management Commission adopted rules in December 2000 establishing a Capacity Use Area for 15 counties in the Central Coastal Plain, including Martin and Washington. If approved by the legislature in 2002, permits would be required for all ground water withdrawals over 100,000 gallons per day within these counties. Pumping from the Black Creek and Upper Cape Fear aquifers would be limited or reduced in some areas. Affected water users will need to manage water demand and develop alternative sources of supply to offset these reductions.

INTERBASIN TRANSFERS OF SURFACE WATER

Across the state many waterusers and systems move water between sub-basins to meet their needs. Regulatory approval is generally needed for transfers of 2.0 mgd or more. The table below summarizes the identified interbasin transfers in 1997 associated with this basin.

Estimated Interbasin Transfers based on 1997 data			
Sub-basin	Number	mgd OUT	mgd IN
Roanoke River	9	1.97	0.39

The most significant interbasin transfer out of the basin is not reflected in this table—the 60-mgd withdrawal from Lake Gaston by Virginia Beach, Virginia. Virginia Beach began pumping in 1998 following a very lengthy and contested Federal Energy Regulatory Commission approval process, during which North Carolina opposed the withdrawals.

SUMMARY OF INFORMATION FROM 1997 LWSPs

! Total per capita water use for the basin was 234 gallons per day (gpd) in 1997 and is projected to increase to 237 gpd by 2010.

! 24 systems are not connected to another water supply system capable of supply water in an emergency.

! 15 water systems purchased a total of 5.265 mgd of water from this basin. Two of these systems had no purchase contract.

! Nine systems rely on purchase water as their sole supply.

! The systems used 28 mgd from surface water and 2.7 mgd of ground water.

! The reported raw water supply was 113 mgd of surface water and a 12-hour groundwater supply of 7.2 mgd.

! There are five county-wide systems and two regional water supply systems.

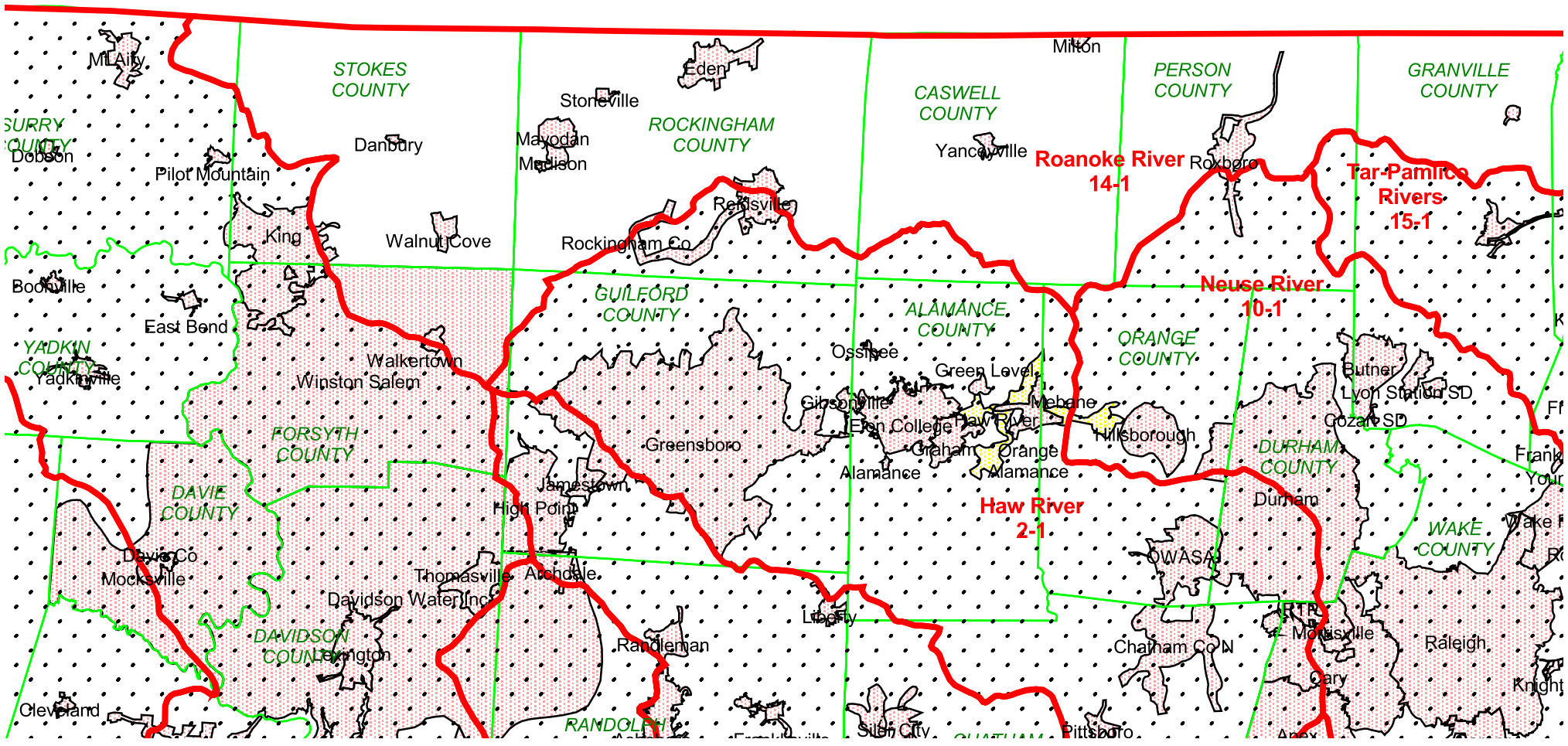
! Nine systems were planning additional supplies totaling 11 mgd in the 1997 LWSPs.

! The systems are projecting significant growth, 38% in population and 55% in demand, by 2020.

! About 0.4 mgd of additional water supply will be needed by water systems to ensure that water demands in 2010 do not exceed 80% of available supply.

! Systems reporting high Demand-to-Supply Ratios:

	1997	2010
Demand exceeds available supply	1	1
Demand exceeds 80% of available supply	5	4



Basin 14 Roanoke River (West)

(unshaded basin)



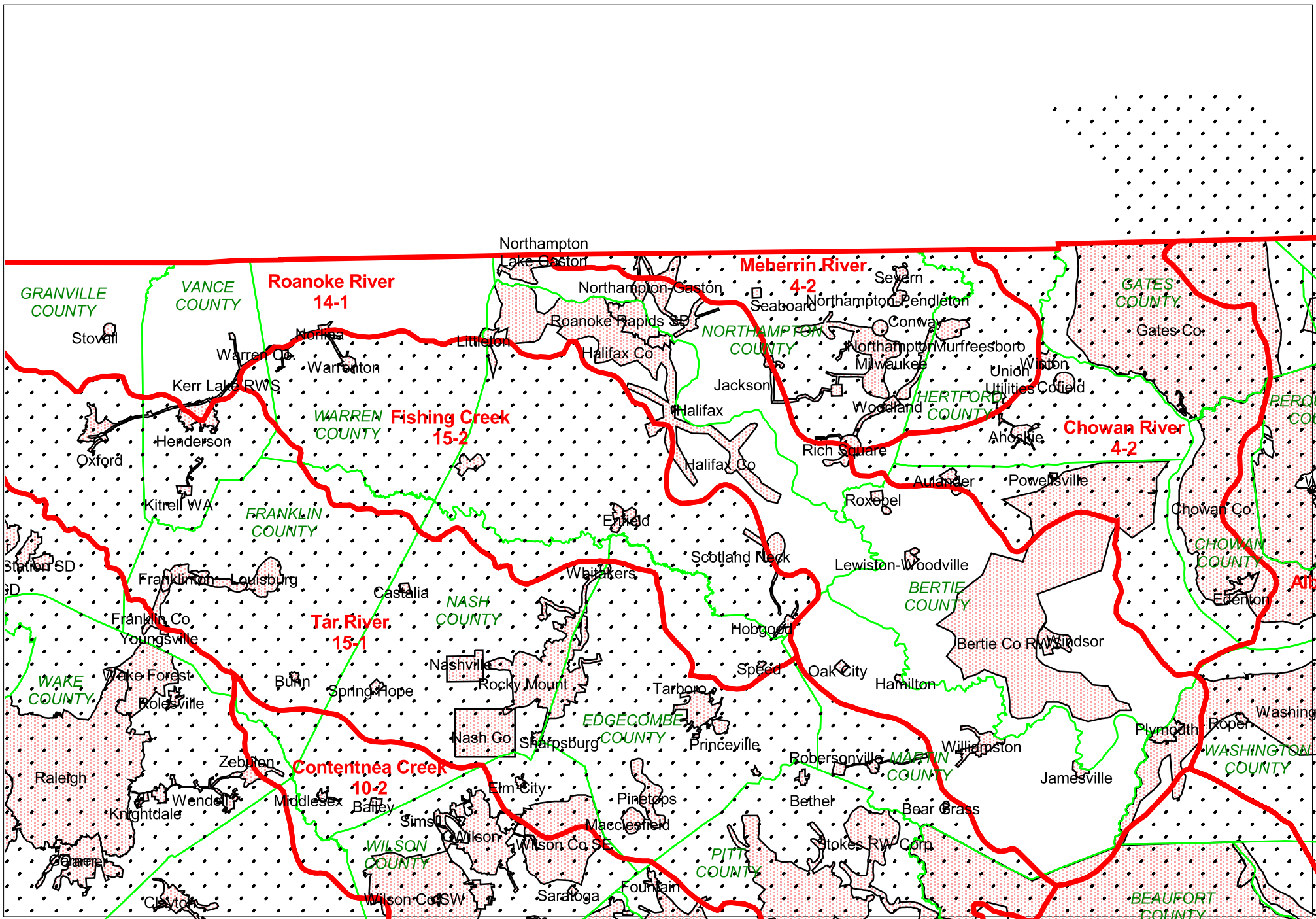
LWSP service area



County Boundary



Basin Boundary



Basin 14 Roanoke River (East)

(unshaded basin)

- LWSP service area
- County Boundary
- Basin Boundary

ROANOKE RIVER BASIN (14)									
1997 and 2010 Population and Water Use as reported by LWSP systems using water from this basin.									
Water systems showing "Demand as % of Supply" above 80% should be actively managing demand and pursuing additional supplies.									
mgd = million gallons per day									
Water Systems by County	Water Source or Supplier	Year-round Service Population		Average Daily Demand (mgd)		Available Supply (mgd)		Demand as % of Supply	
		1997	2010	1997	2010	1997	2010	1997	2010
BERTIE									
BERTIE CO RWS	Upper Cape Fear Aquifer	6076	8870	0.294	0.539	1.131	2.139	26%	25%
KELFORD	Upper Cape Fear & Beaufort Aquifers	189	210	0.014	0.021	0.058	0.058	24%	36%
LEWISTON-WOODVILLE	Upper Cape Fear Aquifer	1022	980	0.121	0.119	0.216	0.216	56%	55%
ROXBEL	Upper Cape Fear Aquifer	290	315	0.023	0.024	0.043	0.043	53%	56%
WINDSOR	Upper Cape Fear & Black Creek Aquifers	2450	2800	0.387	0.477	0.9	0.9	43%	53%
CASWELL									
MILTON	Bedrock Wells	179	189	0.017	0.017	0.108	0.108	16%	16%
YANCEYVILLE	County Line Cr. Res.	2421	2540	0.231	0.55	6.3	6.3	4%	9%
GRANVILLE									
OXFORD	KERR LAKE RWS	10000	15000	0	0	2	3	67%	66%
STOVALL	Bedrock Wells	500	700	0.026	0.053	0.092	0.092	28%	58%
HALIFAX									
ROANOKE RAPIDS SD	Roanoke Rapids Lake	22271	23492	5.517	6.3	12.5	12.5	44%	50%
WELDON	Roanoke River	1508	1588	0.786	1.197	14	14	6%	9%
MARTIN (in proposed Central Coastal Plain Capacity Use Area)									
HAMILTON	Upper Cape Fear Aquifer	544	618	0.05	0.061	0.324	0.324	15%	19%
JAMESVILLE	Black Creek Aquifer	632	645	0.055	0.062	0.252	0.252	22%	25%
MARTIN CO WSD 1	HAMILTON, Ground water, WILLIAMSTON	0	2535	0	0.183	0	0.81	0%	23%
MARTIN CO WSD 2	Ground water, BEAR GRASS, WILLIAMSTON	0	3619	0	0.432	0	1.15	0%	32%
WILLIAMSTON	Black Creek, Beaufort, & UCape Fear Aquifers	6274	9477	0.923	1.788	1.674	2.394	55%	75%
NORTHAMPTON									
JACKSON	Lower Cape Fear Aquifer	664	620	0.097	0.12	0.216	0.216	45%	56%
NORTHAMPTON-GASTON	ROANOKE RAPIDS SD	900	1050	0.132	0.204	0.142	0.292	93%	70%
NORTHAMPTON-LAKE GASTON	Lower Cape Fear Aquifer	1800	2400	0.087	0.082	0.191	0.191	46%	43%
NORTHAMPTON-PROGRESSIVE	Upper Cape Fear Aquifer / WELDON	684	875	0	0	0.151	0.151	37%	44%
PERSON									
ROXBORO	Stories, Satterfield, S.Hyco Creeks & Lake Roxboro	10847	11625	3.464	4.18	11	11	32%	38%
ROCKINGHAM									
EDEN	Dan River	15500	17310	12.544	13.322	24.17	24.17	52%	55%
MADISON	Dan River	2482	2678	0.512	0.704	15	15	3%	5%
MAYODAN	Mayo River	2553	2900	1.665	3.566	10	10	17%	36%
STONEVILLE	MAYODAN	1107	1200	0.184	0.209	1.008	1.008	18%	21%
STOKES									
DANBURY	Bedrock Wells	175	220	0.029	0.041	0.072	0.072	41%	56%
STOKES CO SE	MADISON	0	0	0	0	0	0	0%	0%
WALNUT COVE	Bedrock Wells	1147	2000	0.203	0.399	0.198	0.198	106%	202%
VANCE									
HENDERSON	KERR LAKE RWS	16639	19256	2.66	6.09	6	9	44%	68%
KERR LAKE RWS	Kerr Lake	0	0	4.628	11.137	20	20	23%	56%
KITRELL WA	KERR LAKE RWS	1000	1200	0.078	0.093	0.079	0.116	100%	80%
WARREN									
NORLINA	WARREN CO	1034	1100	0.19	0.198	0.2	0.2	95%	99%
WARREN CO	KERR LAKE RWS	500	4900	0.708	1.301	2	2	35%	65%
WARRENTON	WARREN CO	2650	2757	0.346	0.37	0.4	0.4	87%	93%
WASHINGTON (in proposed Central Coastal Plain Capacity Use Area)									
PLYMOUTH	Castle Hayne & Yorktown Aquifer	4328	4921	0.471	0.405	1.675	1.675	28%	24%
WASHINGTON CO	CRESWELL / ROPER / PLYMOUTH	5523	7070	0.353	0.468	0.532	1	66%	47%