

# BASIN 10 NEUSE

## BASIN DESCRIPTION

The Neuse Basin covers 6,225 square miles entirely within North Carolina. The basin is divided into three sub-basins shown on the accompanying map. The upper third of the basin is located in the Piedmont with the remainder draining the central coastal plain. The Eno and Flat Rivers converge to form the Neuse River. The first 22 miles of the river are impounded by Falls Lake, a multipurpose reservoir completed in 1983. Falls Lake provides flood control storage, water quality releases, and water supply storage. It is the primary water source for the City of Raleigh. Below Falls Lake the river flows southeasterly past Smithfield, Goldsboro, Kinston, and New Bern on its way to Pamlico Sound. The Contentnea Creek sub-basin drains 1,024 square miles. Above Wilson the sub-basin lies in the Piedmont, but below Wilson it lies in the Coastal Plain. Contentnea Creek joins the Neuse east of Grifton at the junction of Pitt, Lenoir, and Craven Counties. The Trent River sub-basin drains 434 square miles, mostly in Jones and Lenoir counties. The Trent River joins the Neuse near New Bern where the river becomes a wide, tidally influenced estuary on its way to Pamlico Sound.



## WATER USE

### Factors Affecting Water Demand

This basin is home to about 16% of the state's residents and contains all or part of 73 municipalities in 22 counties. Portions of four of the state's 12 major metropolitan areas depend on water from this basin. From 1990 to 1997 year-round population in eleven counties in this basin grew by 10% or more. Wake County was ranked first (30.6%) and Johnston County ranked fourth (26.9%) in population growth over this period.

### Total Water Use in Basin

The U.S. Geological Survey's (USGS) 1995 summary of water use estimated total water use in the basin at 191 million gallons per day (mgd), with almost two-thirds coming from surface water sources. USGS estimated total basin population at 1,144,820. Residential demand was estimated at 79 mgd with about 83% of this demand being supplied by public water systems. Overall, public water systems supplied 82 mgd from surface water and 30 mgd from ground water for both residential and non-residential uses. The remaining residential water demand was met by 13.3 mgd of self-supplied ground water. In addition, about 63.3 mgd of self-supplied water were withdrawn for non-residential water uses. Ground water is a major source of water for residents of this basin, especially for communities in the coastal plain.

### Local Water Supply Plans (LWSPs)

All 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. The current database reflects water use information for 1997.

LWSPs were submitted by 68 public water systems using water from this basin. (Whitley Heights SD has not submitted a 1997 LWSP, so its 1992 LWSP data was used in these summaries.) These systems supplied 131 mgd of water to 896,791 persons. The following discussion and table summarize the LWSP population served with water from this basin and its water use for 1997.

1997 LWSP System Water Use from Basin (mgd)				
Sub-basin	LWSP Population	Residential Use	Non-resid. Use	Total Use*
Neuse River	820,310	57.65	37.06	118.3
Contentnea Creek	65,176	4.79	4.33	11.3
Trent River	11,305	0.82	0.07	1.0
Total	896,791	63.26	41.46	130.6

\*Total Use also includes unaccounted-for water and system process water

For these systems non-residential water use accounted for 32% of total use with residential use accounting for 48% and 16% unaccounted-for water.

The Neuse Basin supplies water to some of the state's fastest growing areas. LWSP systems expect to supply water to over 1.5 million persons by the year 2020, a 70% increase over 1997 levels. Their demand for water is projected to also grow 70% to 222 mgd by 2020.

In the 1997 LWSPs, 12 of the 68 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 22 of the 68 LWSP systems using water from this basin had average demand above this threshold. By 2020, 21 systems project demand levels that will exceed 80% of their available supply.

### Self-supplied Use

The USGS estimated that self-supplied users, excluding power generating facilities, accounted for 77 mgd of the 191 mgd total of water used from this basin, as shown in the table below. Irrigation use comprised 42% of the self-supplied uses, followed by industrial (23%), domestic (17%), livestock (16%), and commercial (<1%).

1995 USGS Estimated Self-supplied Water Use in mgd						
Sub-basin	Domestic	Livestock	Industrial	Commercial	Irrigation	Total
Neuse River	10.54	7.32	14.12	0.52	22.80	55.3
Contentnea Cr.	2.68	3.99	3.73	0.09	5.86	16.4
Trent River	0.09	1.07	0.04	0.07	3.84	5.1
Basin Total	13.3	12.4	17.9	0.7	32.5	76.8

### 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
Neuse River	15	16.159	229	38.126	244	54.285
Contentnea Creek	25	15.571	7	0.735	32	16.306
Trent River	0	0	0	0	0	0
Total	40	31.73	236	38.861	276	70.591

\*Excludes water use for power generation.

All of the registered agricultural users in the basin are irrigators except for aquaculture operations in the Neuse River sub-basin. Most of the registered non-agricultural users in the basin are private water supply systems (204 total), but these also include 14 mining operations, six industrial users, and five golf courses. Thirteen of non-agricultural water users in the Neuse River sub-basin are Capacity Use Area #1 permittees.

### WATER AVAILABILITY

LWSPs indicate that 12 water systems in these sub-basins withdraw about 103.4 mgd of surface water. Local plans show that eight systems in the basin use reservoirs as water supply sources. The available supply from these reservoirs is about 133 mgd. Four LWSP systems using surface water have run-of-river intakes that supplied about 12 mgd of water in 1997. The available supply from these sources, based on information reported in local water supply plans, is about 52 mgd.

Ground water is also a major source of water for residents of this basin, especially for communities in the coastal plain. Forty systems using ground water in this basin submitted a LWSP. They have an overall available supply of 47 mgd of ground water based on the 12-hour yields supplied in their local plans.

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 Carteret, Craven, Greene, Jones, Lenoir, Pamlico, Pitt, Wayne, and Wilson. 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 water users 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
Neuse River	15	19.18	10.7
Contentnea Cr.	3	0	0.68
Trent River	0	0	0

Durham's discharge to the Haw River Basin accounted for almost 18 mgd of the transfer out of the Neuse River Sub-basin. Over 9 mgd of the transfer into the Neuse River sub-basin is Cary and Apex's transfer from Jordan Lake.

### SUMMARY OF INFORMATION FROM 1997 LWSPs

! Total per capita water use for the basin was 146 gallons per day (gpd) in 1997 and is projected to be 147 gpd by 2010.

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

! 49 water systems purchased a total of 13.26 mgd of water from this basin. 20 of these systems had no purchase contract.

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

! The systems used 103.4 mgd from surface water and 26.7 mgd ground water.

! The reported raw water supply was 185 mgd of surface water and a 12-hour groundwater supply of 47.2 mgd.

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

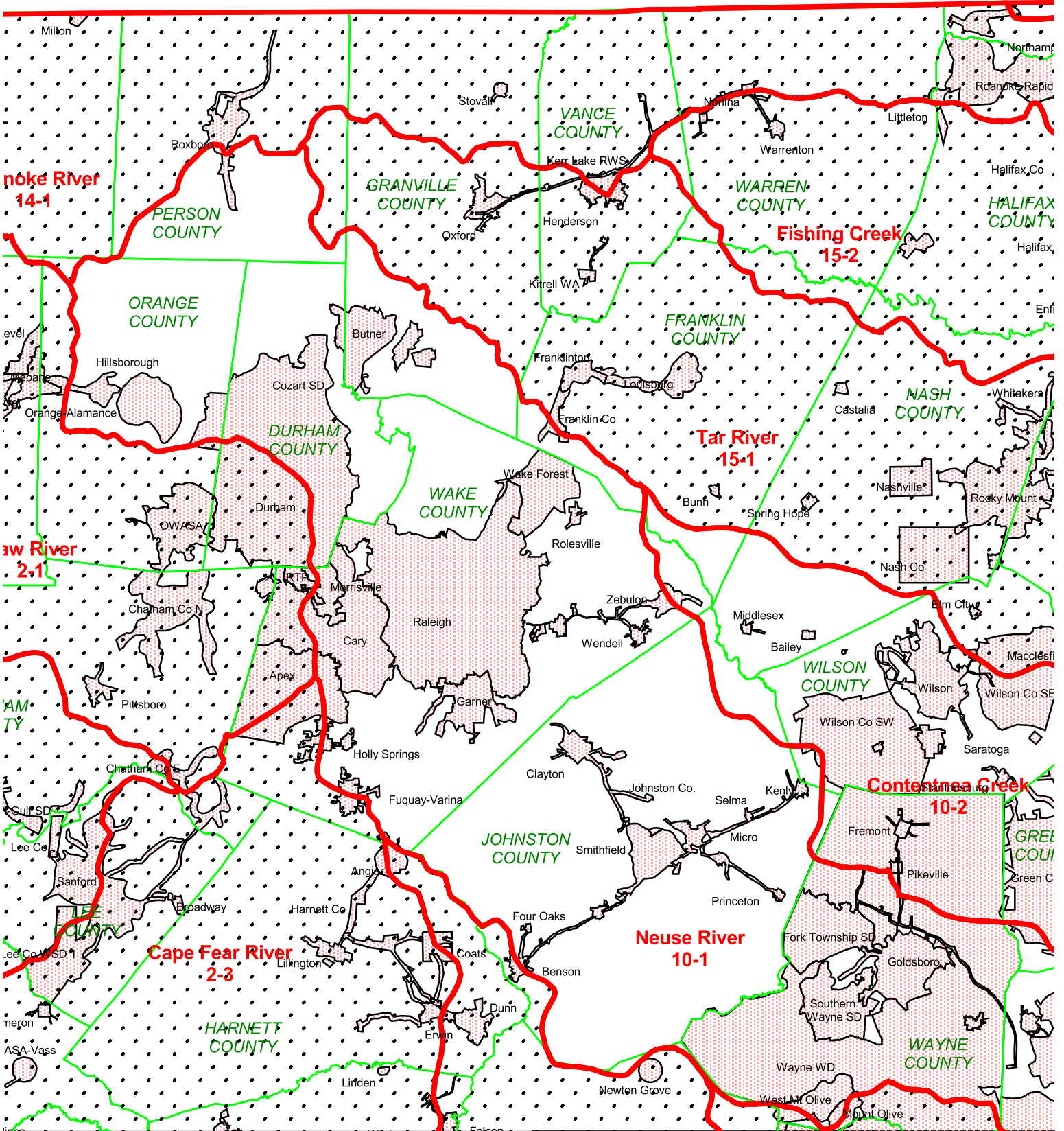
! 26 systems were planning additional supplies totaling 114 mgd in the 1997 LWSPs.

! The systems are projecting significant growth, 70% in population and 70% in demand, by 2020.

! About 6.2 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.

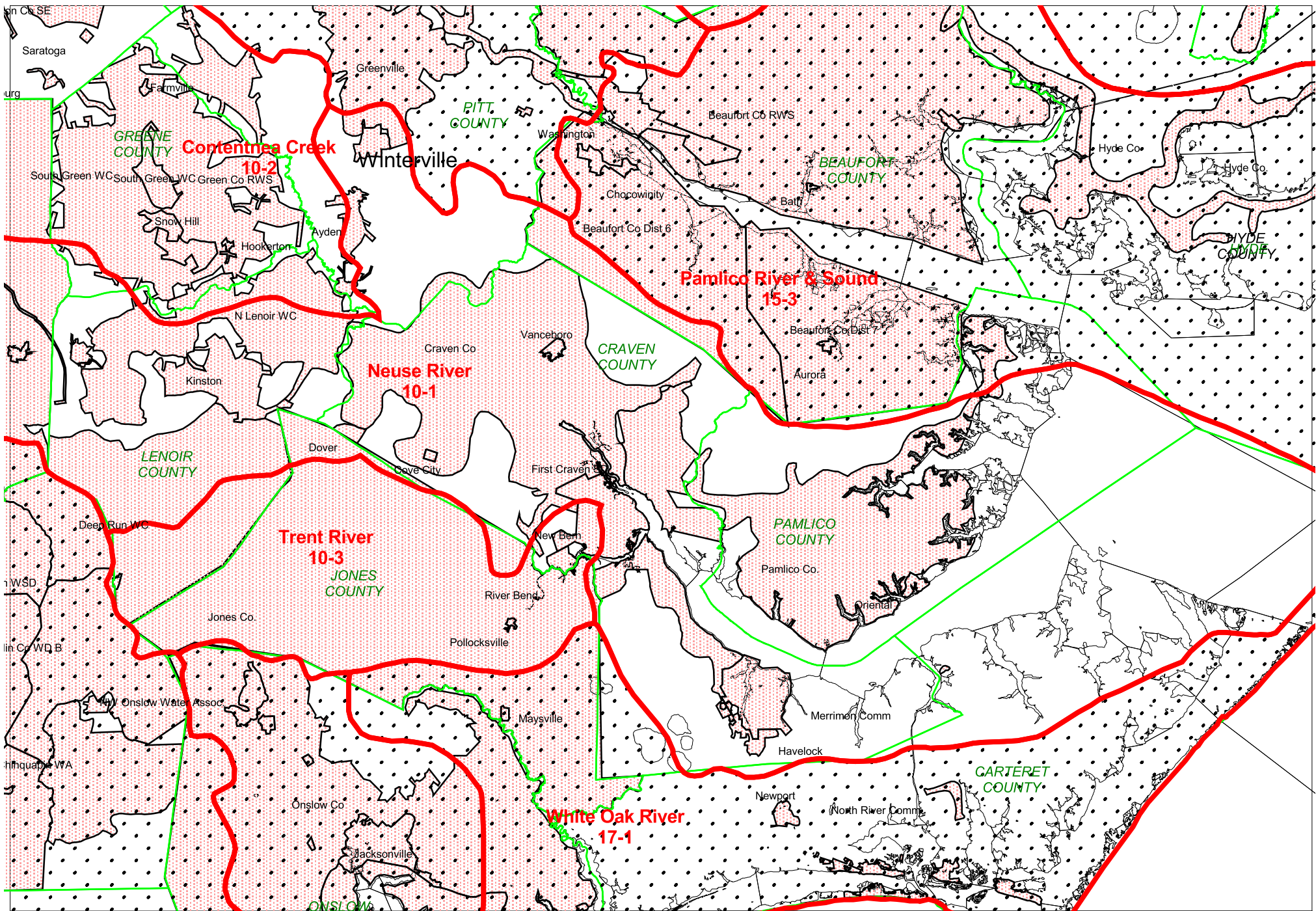
### ! Systems reporting high Demand-to-Supply Ratios:

	1997	2010
Demand exceeds available supply	6	10
Demand exceeds 80% of available supply	22	16



**Basin 10 Neuse River (West)**  
(unshaded basin)

LWSP service area
  County Boundary
  Basin Boundary



# Basin 10 Neuse River (East)

(unshaded basin)



<b>NEUSE RIVER BASIN (10)</b>									
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
CARTERET (in Central Coastal Plain Capacity Use Area)									
MERRIMOM COMM	Castle Hayne Aquifer	72	89	0.007	0.01	0.064	0.064	11%	16%
CRAVEN (in Central Coastal Plain Capacity Use Area)									
CHERRY POINT MCAS	Castle Hayne & Yorktown Aquifers	21525	21525	3.265	3.28	4.74	6.2	69%	53%
COVE CITY	NEW BERN / CRAVEN CO	608	717	0.038	0.062	0.098	0.098	38%	63%
CRAVEN CO	Black Creek & Upper Cape Fear Aquifers	18567	25786	1.924	2.515	2.268	2.268	85%	111%
DOVER	Black Creek Aquifer	475	500	0.027	0.037	0.183	0.183	15%	20%
FIRST CRAVEN SD	Castle Hayne Aquifer	4572	5358	0.465	0.586	0.506	0.938	92%	63%
HAVELOCK	Surficial & Yorktown Aquifers	11140	14860	1.196	1.593	2.295	3.015	52%	53%
NEW BERN	Black Creek & Upper Cape Fear Aquifers	21799	27280	4.304	5.03	4.86	8.86	89%	57%
RIVER BEND	Surficial Aquifer	2100	4500	0.26	0.513	0.815	0.815	32%	63%
VANCEBORO	Castle Hayne Aquifer	1616	2016	0.125	0.157	0.432	0.432	29%	36%
DURHAM									
DURHAM	Little River Lake/Lake Michie(Flat River)	157600	212900	28.341	35	37	45.5	77%	77%
GRANVILLE									
BUTNER	R.D. Hot Reservoir	7500	9372	2.42	2.756	13.8	13.8	18%	20%
COZART SD	BUTNER	997	0	0.044	0	0.14	0.14	31%	0%
CREEDMOOR	Lake Rogers(Ledge Creek)	2159	2573	0.251	0.288	0.8	0.8	31%	36%
LYON STATION SD	BUTNER	190	220	0.106	0.148	0.3	0.3	35%	49%
GREENE (in Central Coastal Plain Capacity Use Area)									
GREENE CO	Black Creek & Upper Cape Fear Aquifers HOOKERTON / ARBA WC / SNOW HILL / JASON WC	8195	8792	1.113	1.171	0.644	1.184	173%	99%
HOOKERTON	Upper Cape Fear Aquifer	570	657	0.046	0.065	0.374	0.374	13%	17%
SNOW HILL	U Cape Fear & L Cape Fear Aquifers	2606	2796	0.641	0.672	1.101	1.101	58%	61%
WALSTONBURG	GREENE CO	240	240	0.03	0.033	0.03	0.033	100%	100%
JOHNSTON									
*WHITLEY HEIGHTS SD	JOHNSTON CO	180	220	0.014	0.014	0.017	0.017	82%	82%
CLAYTON	JOHNSTON CO	7346	14736	1.378	2.261	1.517	1.517	91%	149%
FOUR OAKS	JOHNSTON CO	1750	2125	0.166	0.202	0.182	0.182	91%	110%
JOHNSTON CO	Neuse River / BENSON / WENDELL	3000	36000	3.031	7.707	12.03	14.53	25%	53%
KENLY	JOHNSTON CO	1900	2300	0.275	0.337	0.3	0.3	92%	112%
MICRO	Bedrock Wells / JOHNSTON CO	450	512	0.041	0.047	0.218	0.218	19%	22%
PINE LEVEL	Bedrock Wells / JOHNSTON CO	1350	1536	0.125	0.147	0.217	0.217	58%	68%
PRINCETON	JOHNSTON CO	1400	1593	0.119	0.135	0.117	0.117	102%	115%
SELMA	Bedrock Wells / JOHNSTON CO	5600	7240	0.836	1.015	1.452	1.582	58%	64%
SMITHFIELD	Neuse River / JOHNSTON CO	11097	14355	2.129	4.626	6.087	6	35%	77%
JONES (in Central Coastal Plain Capacity Use Area)									
JONES CO	Peedee, Black Creek, UCape Fear Aquifers	7740	7654	0.557	0.553	0.54	0.9	103%	61%
POLLOCKSVILLE	Castle Hayne Aquifer	700	710	0.086	0.1135	0.086	0.086	100%	132%
LENOIR (in Central Coastal Plain Capacity Use Area)									
DEEP RUN WC	Black Creek & Upper Cape Fear Aquifers	10403	13196	1.02	1.288	1.456	1.888	70%	68%
KINSTON	Black Creek & Upper Cape Fear Aquifers	29632	32994	5.383	10.08	6.25	19.87	86%	51%
LA GRANGE	Black Creek & Upper Cape Fear Aquifers	3558	3850	0.393	0.424	0.774	0.774	51%	55%
N LENOIR WC	Black Creek & Upper Cape Fear Aquifers	10697	12839	1.581	1.781	2.384	3.14	66%	57%
PINK HILL	Black Creek Aquifer	765	830	0.093	0.1	0.115	0.23	81%	43%
NASH									
BAILEY	Bedrock Wells	561	1012	0.082	0.128	0.097	0.277	84%	46%
MIDDLESEX	Bedrock Wells	933	1154	0.073	0.106	0.125	0.305	58%	35%
ORANGE									
HILLSBOROUGH	Lake Orange/Lake Ben Johnson	10500	14800	1.801	1.568	0.68	3.68	265%	43%
ORANGE-ALAMANCE	Corporation Lake/Bedrock Wells	11500	17300	1.093	1.597	0.47	0.47	233%	340%

\* 1997 LWSP not submitted -1992 data used in analysis



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<b>PAMLICO</b> (in Central Coastal Plain Capacity Use Area)									
ORIENTAL	Pungo Riv, Castle Hayne, Yorktown Aquifers	867	1050	0.121	0.143	0.421	0.421	29%	34%
PAMLICO CO	Castle Hayne Aquifer	12891	18823	0.849	1.301	2.872	3.304	30%	39%
<b>PITT</b> (in Central Coastal Plain Capacity Use Area)									
AYDEN	Black Creek & Upper Cape Fear Aquifers	5478	6606	0.549	0.634	1.022	1.238	54%	51%
FARMVILLE	Black Creek & Upper Cape Fear Aquifers	6147	7413	1.612	1.7895	2.513	2.513	64%	71%
FOUNTAIN	FARMVILLE	615	710	0.06	0.0682	0.096	0.096	62%	71%
GRIFTON	Black Creek & Upper Cape Fear Aquifers	2557	3374	0.233	0.299	0.63	0.95	37%	31%
WINTERVILLE	Black Creek & Upper Cape Fear Aquifers	4281	5569	0.433	0.527	0.712	1.144	61%	47%
<b>WAKE</b>									
GARNER	RALEIGH	18000	36000	2.91	5.11	5.2	5.2	56%	98%
KNIGHTDALE	RALEIGH	3846	7726	0.497	0.997	1	1	50%	100%
RALEIGH	Falls Lake	293888	421300	55.243	69.636	72	89	77%	78%
ROLESVILLE	WAKE FOREST / Bedrock Wells	850	2000	0.072	0.203	0.173	0.473	42%	43%
WAKE FOREST	Smith Creek Res./ RALEIGH	9880	19703	1.26	2.1	1.8	2.8	70%	75%
WENDELL	KNIGHTDALE / RALEIGH	3950	4985	0.411	0.492	0.75	0.75	55%	66%
ZEBULON	Little River / KNIGHTDALE / WENDELL	4800	6874	0.662	0.904	3	4	22%	23%
<b>WAYNE</b>									
FORK TOWNSHIP SD	Black Creek & Upper Cape Fear Aquifers GOLDSBORO / WAYNE WD	8000	9500	0.863	1.067	1.032	1.134	89%	94%
FREMONT	WAYNE WD / FORK TOWNSHIP	1983	2430	0.2	0.24	0.22	0.22	90%	109%
GOLDSBORO	Little River/Neuse River	46590	56898	6.229	8.657	32	32	20%	27%
PIKEVILLE	WAYNE WD / FREMONT	766	943	0.09	0.116	0.097	0.097	93%	120%
SOUTHERN WAYNE SD	Black Creek & Upper Cape Fear Aquifers	7973	9200	0.471	0.677	0.738	1.026	64%	66%
WALNUT CREEK	Upper Cape Fear Aquifer	751	1085	0.147	0.22	0.216	0.36	68%	61%
WAYNE WD	Black Creek, UCFear Aquifers / FREMONT	33747	43091	3.136	4.256	4.598	6.178	68%	69%
<b>WILSON</b> (in Central Coastal Plain Capacity Use Area)									
BLACK CREEK	Bedrock Wells	1615	1710	0.125	0.132	0.144	0.432	87%	31%
LUCAMA	Bedrock Wells	983	1023	0.103	0.1299	0.199	0.271	52%	48%
SIMS	Bedrock Wells	300	325	0.021	0.024	0.098	0.098	21%	24%
STANTONSBURG	Upper Cape Fear Aquifer	972	1047	0.092	0.098	0.296	0.296	31%	33%
WILSON	Buckhorn, Wiggins Mill, Toisnot Reservoirs Lake Wilson	41500	48210	8	14.7	7	30	114%	51%
WILSON CO SE	WILSON	0	3150	0	0.206	0.2	0.392	0%	53%
WILSON CO SW	BLACK CREEK	0	4467	0	0.29	0.25	0.25	0%	116%

\* 1997 LWSP not submitted -1992 data used in analysis