

# BASIN 18 YADKIN-PEE DEE

## BASIN DESCRIPTION

The Yadkin-Pee Dee Basin is the northern portion of a large river system that drains central North Carolina and northeastern South Carolina. The basin is divided into four sub-basins. The headwaters of the Yadkin River drain the eastern slope of the Blue Ridge Mountains, northeast of Blowing Rock. In the upper part of the basin the Yadkin flows generally northeasterly for about 100 miles before turning south. It continues flowing southeasterly and merges with the Uwharrie River east of Albemarle to form the Pee Dee River. The Rocky River flows into the mainstem below Lake Tillery. The Pee Dee continues flowing southeastward through South Carolina, where it is known as the Great Pee Dee River, and flows into the Atlantic Ocean near Georgetown, SC.

There are series of impoundments on the river in North Carolina, beginning with W. Kerr Scott Lake west of Wilkesboro. The mainstem is impounded for about 50 miles by a chain of lakes consisting of High Rock Lake, Tuckertown Reservoir, Badin Lake, and Lake Tillery. The South Yadkin River drains 909 square miles north and west of Salisbury. It flows into the Yadkin above High Rock Lake. The Uwharrie River drains 374 square miles west of Asheboro. The Uwharrie joins the Yadkin below Badin Lake and the river flows into Lake Tillery as the Pee Dee River. The Rocky River drains 1440 square miles south of Kannapolis between Charlotte and Albemarle. It flows into the Pee Dee where Richmond and Stanly counties meet. Below Lake Tillery is one more major impoundment, Blewett Falls Lake, before the Pee Dee flows into South Carolina.

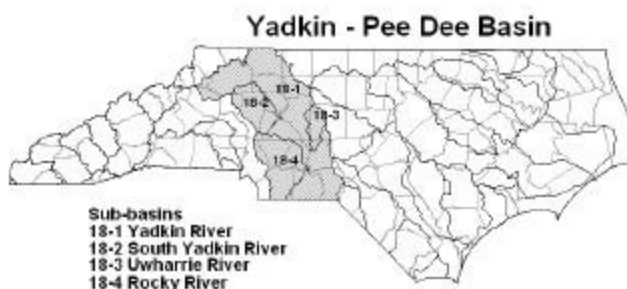
## WATER USE

### Factors Affecting Water Demand

This basin is home to about 17% of the state's residents and contains all or part of 86 municipalities in 23 counties. Three of the state's 12 major metropolitan areas depend on this basin for water supply. From 1990 to 1997 year-round population in 13 counties in this basin grew by 10% or more. One county, Union, grew by 26% over that period. This basin supplies water to the rapidly growing Piedmont Crescent, a corridor of urban development roughly following interstates 40 and 85 from Raleigh to Charlotte.

### Total Water Use in Basin

The USGS's 1995 summary of water use estimated total water use in the basin at 306 million gallons per day (mgd), with almost 80% coming from surface water sources. USGS estimated total basin population at 1,251,240. Residential water demand was estimated at 76 mgd with about 70% of this demand being supplied by public water systems. Overall, public water systems supplied 146 mgd from surface water and six mgd from ground water for both residential and non-residential uses. The remaining residential water demand was met by 22 mgd of self-supplied ground water. In addition, about 130 mgd of self-supplied water was withdrawn for non-residential water 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, unless otherwise noted.

LWSPs were submitted by 69 public water systems using water from this basin. (Dobson has not submitted a 1997 LWSP, so its 1992 LWSP data was used in these summaries.) These systems supplied about 149 mgd of water to 803,281 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-residential Use	Total Use*
Yadkin River	625,542	45.32	52.90	111
South Yadkin River	39,682	2.61	3.28	6.8
Uwharrie River	20,222	1.66	2.60	4.7
Rocky River	117,835	10.04	11.20	26.2
<b>Total</b>	<b>803,281</b>	<b>59.6</b>	<b>70</b>	<b>149</b>

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

Residential use accounted for 39% of total water use in these systems. Non-residential use accounted for 47% of total water used and 9% was unaccounted-for water.

The Yadkin Basin supplies water to some of the state's fastest growing areas. LWSP systems expect to supply water to 1,147,329 persons by the year 2020, a 43% increase over 1997 levels. Their service area demand is projected to increase 36%, from 163 mgd to 221 mgd, by 2020.

In the 1997 LWSPs, 11 of the 70 systems using water from this basin reported that their peak demands will exceed their water treatment capacity by 2010.

DWR encourages systems to begin planning to manage and meet future water demands before average daily water use reaches 80% of a system's available supply. Data for 1997 indicated that 17 of the 69 LWSP systems in 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 152 mgd of the 306 mgd total of water used from this basin, as shown in the table below. Industrial use accounted for 46% of the self-supplied uses, followed by livestock (21%), irrigation (17%), domestic (15%), and commercial (1%) uses.

1995 USGS Estimated Self-supplied Water Use in mgd						
Sub-basin	Domestic	Livestock	Industrial	Commercial	Irrigation	Total
Yadkin River	13.00	20.94	39.36	0.67	19.31	93.3
So. Yadkin	0.06	3.47	5.49	0.08	2.77	11.9
Uwharrie R.	**	**	**	**	**	**
Rocky River	9.34	7.29	25.88	0.23	4.43	47.2
Basin Total	22.4	31.7	70.7	1.0	26.5	152.3

\*\* included in Yadkin River figures

### 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
Yadkin River	0	0	56	11.478	56	11.48
South Yadkin River	1	0	12	0.132	13	0.13
Uwharrie River	0	0	2	0.016	2	0.016
Rocky River	0	0	39	3.777	39	3.78
Total	1	0	109	15.403	110	15.4

\*Thermoelectric note

The majority of the registered non-agricultural withdrawals are private ground water systems. A total of 81 private water systems in the basin used a combined 2.7 mgd in 1999. Registered mining use in the basin totaled 5.6 mgd in 1999. Industries made up the largest portion of the registered use, approximately 6.9 mgd.

### WATER AVAILABILITY

Surface water is the primary source of water for most of the residents of the basin. LWSPs indicate that 33 water systems in these sub-basins withdraw about 151 mgd of surface water. Nineteen of these systems rely on reservoirs for all or part of their water supply. The combined demand on these reservoirs averaged about 72 mgd in 1997. The estimated available supply from these reservoirs is 232 mgd. The Coddle Creek Reservoir used by Concord and Kannapolis has a minimum release of six cubic feet per second (cfs). Mount Airy's Stewarts Creek Reservoir has a minimum release of 19 cfs.

Eighteen of the surface water systems submitting local water supply plans have run-of-river intakes. These intakes supplied over 75 mgd of water in 1997. The available supply

from these intakes, based on information reported in local water supply plans, is about 512 mgd. For this report Mount Airy's, Mount Pleasant's and Winston-Salem's withdrawals from the Yadkin River were assumed to be run-of-river intakes augmented by upstream reservoirs.

In some cases, the available supply is limited based on withdrawal limits set by DWR based on instream flow needs. Yadkinville is limited to 1.1 mgd when flows downstream of the intake are less than 8.4 cfs. Winston-Salem's intakes on the Yadkin River are limited to 50 mgd plus any water supply releases from its W. Kerr Scott Reservoir storage when flows downstream of the intake drop below 554 cfs. Pilot Mountain is limited to 1.6 to 2.25 cfs, depending on the volume of off stream storage remaining, when flows downstream of the intake are less than 7.6 cfs.

The abundant surface water supplies in this basin are due in part to the storage and releases from the dams along the Yadkin River. For instance, Winston-Salem has as much as 10,800 million gallons of storage in Kerr Scott Reservoir for use as water supply. Anson County, Albemarle, Denton, Montgomery County and Norwood have intakes in the power production lakes along the Yadkin River. Also, Richmond County is downstream of Blewett Falls Reservoir and has a contractual agreement for water purchases with the dam owner.

A small amount of ground water is used by LWSP systems. Local water supply plans indicate that 12 systems have a combined 12-hour ground water supply of 2.6 mgd in these sub-basins. Eleven systems used 1.4 mgd of ground water in 1997, while one system was still a planned system in 1997.

### 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
Yadkin River	40	11.4	5.0
So. Yadkin	11	5.5	0.41
Uwharrie R.	8	4.6	1.1
Rocky River	20	0	28.3

The Yadkin Basin is one of the most affected basins in terms of the number of transfers and the amount of surface water transferred. As a result of 40 transfers, over 11 mgd of water was transferred out of the Yadkin sub-basin in 1997 and 5 mgd was transferred in.

Nineteen of the 20 transfers involving the Rocky River sub-basin were transfers of surface water into the Rocky River sub-basin, totaling over 28 mgd in 1997.

The City of Statesville is planning to install an intake in Lookout Shoals Lake in the Catawba River Basin resulting in a large transfer into the South Yadkin sub-basin.

As water use and transfer amounts increase, some water systems in the basin will eventually need to obtain

interbasin transfer certifications from the Environmental Management Commission.

**SUMMARY OF INFORMATION FROM 1997 LWSPs**

! Total per capita water use for the basin was 184 gallons per day (gpd) in 1997 and is projected to increase to 189 gpd in 2010.

! 36 systems report they are not connected to another water supply system that can provide water in an emergency.

! 31 water systems purchased 7.8 mgd of water from the Yadkin sub-basin. Eighteen of these systems had no purchase contract.

! Seven water systems purchased 2.7 mgd from the Rocky sub-basin. Four of these systems had no purchase contract.

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

! The reported raw water supply was 744 mgd of surface water and a 12-hour groundwater supply of 2.6 mgd.

! 33 systems used over 147 mgd of surface water and 11 systems used 1.4 mgd of ground water.

! There are eight county-wide systems. Yadkin County is planning to provide water in the future on a county-wide basis. The water systems in Cabarrus County are members of the Cabarrus County Water and Sewer Authority. Union County is supplied from the Catawba River Basin and supplies water on a county-wide basis, which includes a large service area in the Rocky River Basin.

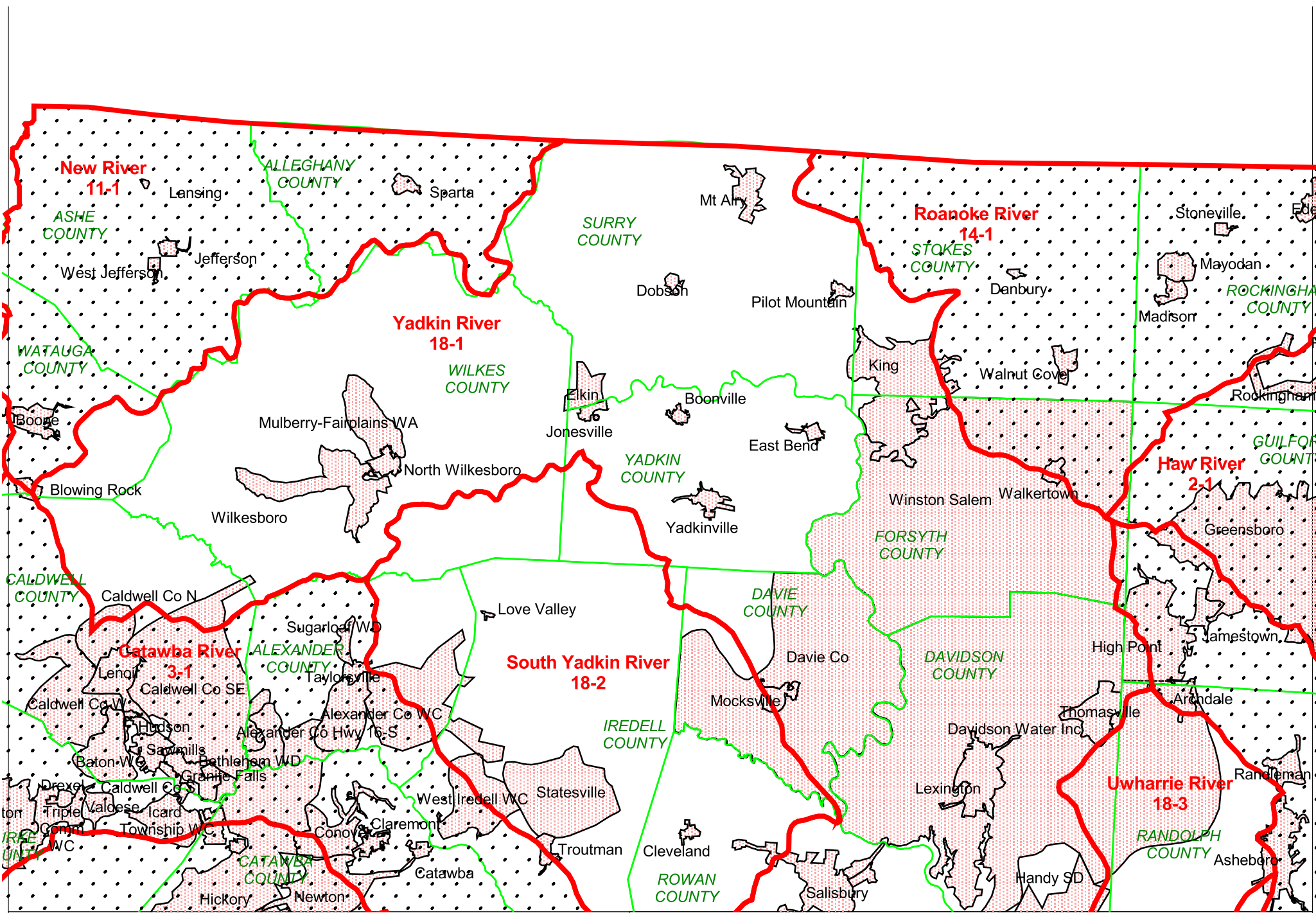
! 18 systems were planning additional supplies totaling 36 mgd in the 1997 LWSPs.

! The systems are projecting significant growth, 43% in population and 36% in demand, by 2020.

! About 2.8 mgd of additional water will be needed by water systems to ensure that demands in 2010 do not exceed 80% of available supply. About 1.9 mgd will be needed in the South Yadkin sub-basin and 0.8 mgd will be needed in the Yadkin sub-basin.

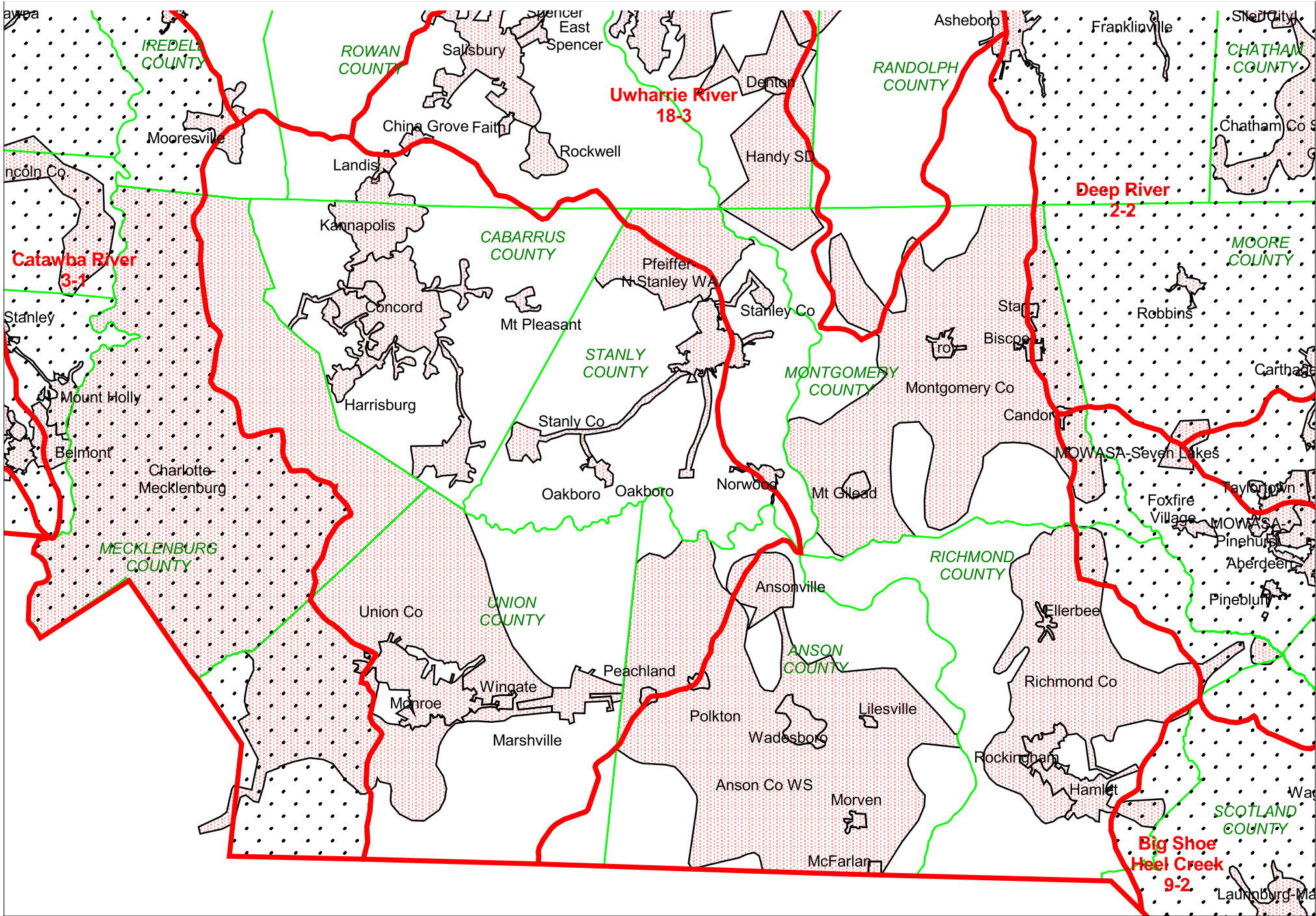
**! Systems reporting high Demand-to-Supply Ratios:**

	<b>1997</b>	<b>2010</b>
Demand exceeds available supply	1	6
Demand exceeds 80% of available supply	17	17



**Basin 18 Yadkin River (Upper)**  
 (unshaded basin)

LWSP service area
  County Boundary
  Basin Boundary



# Basin 18 Yadkin River (Lower)

(unshaded basin)

- LWSP service area
- County Boundary
- Basin Boundary

**YADKIN-PEEDEE RIVER BASIN (18)**

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
ALEXANDER									
ALEXANDER CO WC	South Yadkin River	8095	10200	1.463	1.75	2	2	73%	88%
ANSON									
ANSON CO	Blewett Falls Lake	11200	13700	11.757	12.9	16	16	74%	81%
ANSONVILLE	ANSON CO	1823	1925	0.113	0.124	0.113	0.113	100%	110%
LILESVILLE	ANSON CO	908	868	0.058	0.056	0.058	0.058	100%	97%
MCFARLAN	ANSON CO	90	90	0.009	0.01	0.009	0.009	100%	111%
MORVEN	ANSON CO	750	766	0.06	0.068	0.06	0.06	100%	113%
PEACHLAND	ANSON CO	615	630	0.04	0.0453	0.04	0.04	100%	113%
POLKTON	ANSON CO	649	1000	0.059	0.076	0.059	0.059	100%	129%
WADESBORO	ANSON CO / Jones Creek	6388	6470	1.4	1.408	1.79	1.79	78%	79%
CABARRUS									
HARRISBURG	CONCORD	3000	5000	0.32	0.605	0.32	0.756	100%	80%
KANNAPOLIS	Second Cr./Coddle Cr. Res./Kannapolis Lake	35288	44000	7.247	10.12	13.15	13.15	60%	77%
MT. PLEASANT	Dutch Buffalo Creek/Black Run Res./Bedrock Wells	1205	2300	0.269	0.528	1.072	1.072	25%	49%
CONCORD	Coddle Cr. Res./Lake Fisher Res.	50985	72500	10.139	14.556	21.6	21.6	47%	67%
DAVIDSON									
DAVIDSON WATER	Yadkin River/WINSTON-SALEM	116079	155079	9.559	12.259	83.277	83.277	12%	15%
DENTON	Tuckertown Res.	1377	1600	1.452	1.535	2.3	2.3	63%	67%
HANDY SD	DENTON	8400	14165	0.45	0.746	1	1	45%	75%
LEXINGTON	Lake Tom-A-Lex	19173	21000	3.884	4.21	6.75	6.25	58%	67%
THOMASVILLE	Lake Tom-A-Lex	17543	26000	3.156	3.6	6.75	6.25	47%	58%
DAVIE									
DAVIE CO	Yadkin River/South Yadkin River	16980	24572	2.152	2.922	90	90	2%	3%
MOCKSVILLE	Hunting Creek	3795	4256	0.759	0.866	5	5	15%	17%
FORSYTH									
WALKERTOWN	Bedrock Wells/WINSTON-SALEM	1300	1340	0.113	0.119	0.143	0.143	79%	84%
WINSTON-SALEM	W Kerr Scott Res./Yadkin River/Salem Lake	233000	273300	44.726	56.845	134	134	33%	43%
IREDELL									
LOVE VALLEY	Bedrock Wells	75	86	0.01	0.012	0.047	0.1	21%	12%
STATESVILLE	South Yadkin River	21868	23487	7.885	8.562	9	9	88%	95%
TROUTMAN	Bedrock Wells/STATESVILLE	1819	2822	0.297	0.518	1.31	1.44	23%	36%
WEST IREDELL WC	STATESVILLE	3263	5000	0.303	0.511	1.4	1.4	21%	35%
MONTGOMERY									
BISCOE	MONTGOMERY CO	1643	1978	0.364	0.443	0.364	0.554	100%	80%
CANDOR	MONTGOMERY CO	750	780	0.126	0.116	0.126	0.145	100%	80%
MONTGOMERY CO	Lake Tillery	4829	5405	2.628	3.283	6	6	44%	55%
MT. GILEAD	MONTGOMERY CO	1362	1414	0.16	0.165	0.16	0.206	100%	80%
STAR	MONTGOMERY CO	862	1115	0.446	0.643	0.446	0.804	100%	80%
TROY	MONTGOMERY CO	3632	3765	0.734	0.768	0.734	0.96	100%	80%
RANDOLPH									
ASHEBORO	Lake Reese/Lake Lucas	20222	22852	6.65	8.26	19.5	19.5	34%	42%

**YADKIN-PEEDEE RIVER BASIN (18) (continued)**

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
<b>RICHMOND</b>									
ELLERBE	RICHMOND CO	1500	1500	0.157	0.16	0.2	0.2	79%	80%
HAMLET	City Water Lake	11027	11558	1.464	1.689	3	3	49%	56%
RICHMOND CO	Peedee River/ANSON CO/HAMLET	14149	15000	4.459	4.96	7.65	7.65	59%	65%
ROCKINGHAM	City Pond/Roberdel Lake/RICHMOND CO/HAMLET	10153	13965	3.679	5.77	10.55	10.55	35%	55%
<b>ROWAN</b>									
CHINA GROVE	Bedrock Wells/LANDIS	3810	4900	0.618	0.86	0.613	0.613	100%	140%
CLEVELAND	Bedrock Wells	767	844	0.107	0.139	0.207	0.207	52%	67%
EAST SPENCER	SALISBURY	2312	3010	0.262	0.319	1	1	26%	32%
FAITH	Bedrock Wells	760	866	0.068	0.077	0.086	0.144	79%	53%
LANDIS	Lake Corriher/Wright Lake	2824	3144	0.821	1.151	1.33	1.33	62%	87%
ROCKWELL	Bedrock Wells	1716	2368	0.272	0.434	0.398	0.468	68%	93%
ROWAN CO	SALISBURY / CLEVELAND	4	3500	0.118	0.663	1	1	12%	66%
SALISBURY	Yadkin River	28077	33992	9.708	9.87	90	90	11%	11%
SPENCER	SALISBURY	3241	3750	0.404	0.431	0.5	0.5	81%	86%
<b>STANLY</b>									
ALBEMARLE	Badin Lake/Tuckertown Res	24105	25938	8.63	9.02	18	18	48%	50%
NORWOOD	Lake Tillery	2372	3051	0.44	1.01	2	2	22%	51%
OAKBORO	STANLY CO / Bedrock Wells	1482	1698	0.449	0.552	1.054	1.133	43%	49%
PFEIFFER-NORTH STANLY WA	ALBEMARLE	2794	2962	0.284	0.387	0.5	0.5	56%	77%
STANLY CO	ALBEMARLE / NORWOOD	7198	11238	1.93	2.21	3.029	3.029	64%	73%
<b>STOKES</b>									
KING	Yadkin River	18295	21500	1.628	2.984	90	90	2%	3%
<b>SURRY</b>									
ELKIN	Elkin Creek	3789	4100	1.5	1.51	5.8	5.8	26%	26%
MT. AIRY	Lovills Cr./Stewart's Cr.	7872	17071	5.01	6.8	8.5	8.5	59%	80%
PILOT MOUNTAIN	Toms Creek	1379	1635	0.916	0.403	1.6	1.6	57%	25%
<b>UNION</b>									
MARSHVILLE	ANSON CO	3210	4128	0.249	0.346	1	1	25%	35%
MONROE	Lake Twitty/Lake Lee/Lake Monroe	23051	29136	7	9.45	12.7	12.7	55%	74%
WINGATE	UNION CO	3026	3419	0.287	0.344	0.287	0.404	100%	85%
<b>WILKES</b>									
MULBERRY-FAIRPLAINS WA	NORTH WILKESBORO	6702	8119	1.158	1.404	1.5	2	77%	70%
NORTH WILKESBORO	Reddies River/MULBERRY-FAIRPLAINS WA	3855	4475	3.341	2.103	15	16.88	22%	14%
RONDA	Bedrock Wells	0	435	0	0.044	0	0.137	0%	32%
WILKESBORO	Yadkin River	3072	3480	4.386	5.89	16	16	27%	37%
<b>YADKIN</b>									
*DOBSON	FISHER RIVER	1394	1581	0.659	0.732	2.1	2.1	31%	35%
ARLINGTON	JONESVILLE	900	1000	0.055	0.065	0.2	0.2	28%	33%
BOONVILLE	Bedrock Wells	2200	2444	0.184	0.389	0.504	0.504	37%	77%
EAST BEND	Bedrock Wells	1055	1259	0.064	0.073	0.272	0.272	24%	27%
JONESVILLE	Yadkin River	1818	1996	0.458	0.506	45	45	1%	1%
YADKINVILLE	South Deep Creek	4404	5359	1.037	1.577	1.1	6	94%	26%

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