

BASIN 4 CHOWAN

BASIN DESCRIPTION

The Chowan Basin in North Carolina is the lower quarter of a larger basin that drains 4,973 square miles, mostly in southeastern Virginia. The Chowan Basin is divided into the Meherrin River and Chowan River sub-basins. The Chowan River is formed by the merging of the Nottoway and Blackwater Rivers at the Virginia-North Carolina state line. These two rivers drain 2,460 square miles of land south and southeast of Petersburg, Virginia and are the water supply sources for Norfolk, Virginia. The lower 487 square miles of the total 1,637 square miles of the Meherrin River sub-basin are in North Carolina. The Meherrin River joins the Chowan River north of Winton, NC and then continues south to merge with the Albemarle Sound near Edenton, NC. The Chowan Basin is part of the Albemarle-Pamlico estuarine system, the second largest estuarine system in the United States.



1997 LWSP, so its 1992 LWSP data was used in these summaries.) These systems supplied 5.4 mgd of water to 41,851 persons. The following discussion and table summarize the LWSP population served with water from this basin and water use for 1997.

WATER USE

Factors Affecting Water Demand

This basin has less than 1% of the state’s residents. It contains all or part of 19 municipalities and five counties. From 1990 to 1997 only two of the five counties had a population increase (Chowan and Gates). The basin is sparsely developed with only 3% of land area classified as “urban/build up” in the 1997 Natural Resource Conservation Service assessment. This assessment classified 87% of the area of the basin as cultivated cropland or forest. Overall demand for water increases during the growing season, especially in agricultural areas and in communities where irrigated residential landscaping is popular. Development of the Nucor steel recycling mill in the basin is expected to increase demand for water for industrial and residential use.

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 12.6 million gallons per day (mgd), with about one quarter coming from surface water sources. Total basin population was estimated at 54,250, with total residential water demand estimated at 3.9 mgd. About half of the residents were served by public water systems. Overall, public water systems supplied 3.1 mgd from ground water for both residential and non-residential uses. The remaining residential water demand was met by 1.5 mgd of self-supplied ground water. No surface water was used to meet residential demand.

Local Water Supply Plans

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 21 water systems using water from this basin. (Chowan County has not submitted a

1997 LWSP System Water Use from Basin (mgd)				
Sub-basin	LWSP Population	Residential Use	Non-residential Use	Total Use*
Chowan River	30,790	2.50	0.80	3.6
Meherrin River	11,061	1.03	0.56	1.6
Total	41,851	3.5	1.4	5.3

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

Residential demands dominated water use in these systems requiring 67% of total demand while non-residential use accounted for 26% of total demand and 7% was unaccounted-for water.

Water systems that get water from this basin are expecting their service populations to grow by about 16% to 48,580 by 2020. Water demand for these systems is projected to grow about 21% to 6.4 mgd over the same period.

In the 1997 LWSPs, only one of the 20 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 two of the 20 LWSP systems in this basin had average demand above this threshold. By 2020, three 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 9.4 mgd of the 12.6 mgd total of water used from this basin, as shown in the table below. Agriculturally associated uses dominated the self-supplied water use. Irrigation (50%) and livestock (33%) together accounted for 83% of self-supplied water. Domestic uses accounted for 15% while commercial and industrial uses each accounted for about 1% of self-supplied water use.

1995 USGS Estimated Self-supplied Water Use in mgd						
Sub-basin	Domestic	Livestock	Industrial	Commercial	Irrigation	Total
Chowan River	0.78	1.85	0.03	0.02	3.47	6.15
Meherrin River	0.68	1.30	0.02	0.03	1.26	3.29
Basin Total	1.46	3.15	0.05	0.05	4.73	9.44

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
Chowan River	24	24.942	2	2.1	26	27.042
Meherrin River	12	16.494	0	0	12	16.494
Total	36	41.436	2	2.1	38	43.536

Both registered non-agricultural water withdrawals in the basin were for industrial uses. All of the 36 registered agricultural water withdrawals were for irrigation purposes.

WATER AVAILABILITY

LWSPs indicate that none of the water systems in these sub-basins withdraw surface water as a source of supply. Eighteen of the LWSP systems in the basin pumped 5.6 mgd of ground water to supply customers in 1997. The total available capacity for these systems, as reflected in their combined 12-hour yields, is 13.6 mgd.

Heavy ground water pumping in southeastern Virginia has caused a decline in water levels over most of the North Albemarle area. Much of this decline in water level is due to withdrawals by Union Camp Corporation in Franklin, Virginia. Gates County has reported a rate of decline of about two feet per year in their water supply wells.

INTERBASIN TRANSFERS OF SURFACE WATER

Across the state many water systems move surface water between sub-basins to meet their needs. However, interbasin transfer is not a significant issue for the Chowan basin. Water sales from the Roanoke Rapids Sanitary District to the Northampton-Gaston water system result in a minor transfer from the Roanoke River Basin into the Meherrin River sub-basin.

SUMMARY OF INFORMATION FROM 1997 LWSPs

! Total per capita water use for the basin was 126 gallons per day (gpd) in 1997 and is projected to increase to 130 gpd by 2010.

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

! Seven water systems purchased a total of 0.102 mgd of water from the basin. Three of these systems had no purchase contract.

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

! Systems in this basin used 5.6 mgd of ground water and no surface water.

! The total reported 12-hour ground water supply from system wells is 13.6 mgd.

! There are three county-wide systems and one regional water system.

! Four systems are planning additional water supplies totaling 1.21 mgd in the 1997 LWSPs.

! The systems are projecting 16% growth in population and 16% growth in demand through 2020.

! About 0.22 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	2
Demand exceeds 80% of available supply	2	3

CHOWAN RIVER BASIN (4)									
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									
AULANDER	Upper Cape Fear Aquifer	1366	1500	0.155	0.163	0.486	0.486	32%	34%
POWELLSVILLE	Upper Cape Fear & Beaufort Aquifers	672	634	0.065	0.063	0.144	0.144	45%	44%
CHOWAN									
*CHOWAN CO	Yorktown & Pungo River Aquifers	8253	9098	0.93	1.02	1.9	1.9	49%	54%
EDENTON	Castle Hayne & Beaufort Aquifers	5475	5941	0.8	0.856	1.04	1.24	77%	69%
GATES									
GATES CO	Upper Cape Fear & Castle Hayne Aquifers	8840	9743	0.812	0.96	1.49	1.49	54%	64%
GATESVILLE	GATES CO	383	450	0.045	0.0457	0.045	0.045	100%	102%
HERTFORD									
AHOSKIE	Beaufort, U Cape Fear, & L Cape Fear Aquifers	4562	5545	0.712	0.8406	0.91	0.91	78%	92%
COFIELD	Lower Cape Fear & Upper Cape Fear Aquifers	417	438	0.04	0.0433	0.137	0.137	29%	32%
HERTFORD CO	L Cape Fear & U Cape Fear Aquifers / AHOSKIE	650	1500	0.194	0.448	1.082	1.082	18%	41%
MURFREESBORO	Lower Cape Fear Aquifer	2300	2795	0.353	0.37	2.19	2.19	16%	17%
WINTON	Lower Cape Fear Aquifer	822	781	0.185	0.186	1.145	1.145	16%	16%
NORTHAMPTON									
CONWAY	Lower Cape Fear Aquifer	772	583	0.394	0.394	1.31	1.31	30%	30%
NORTHAMPTON-JACKSON	JACKSON	330	375	0.022	0.024	0.05	0.41	45%	6%
NORTHAMPTON-MIWAUKEE	Lower Cape Fear Aquifer / CONWAY	2700	2850	0.267	0.301	0.576	0.576	46%	52%
NORTHAMPTON-NORTH WOODLAND	Upper Cape Fear Aquifer	374	400	0.02	0.024	0.158	0.158	13%	15%
NORTHAMPTON-PENDLETON	Lower Cape Fear Aquifer / SEVERN	240	250	0.013	0.019	0.168	0.168	8%	11%
NORTHAMPTON-RICH SQUARE	RICH SQUARE / WOODLAND	750	770	0.045	0.06	0.037	0.01	122%	600%
RICH SQUARE	Lower Cape Fear Aquifer	1050	950	0.142	0.093	0.24	0.24	59%	39%
SEABOARD	Lower Cape Fear Aquifer	825	975	0.113	0.16	0.18	0.33	63%	48%
SEVERN	Lower Cape Fear & Upper Cape Fear Aquifers	325	400	0.034	0.073	0.144	0.644	24%	11%
WOODLAND	Lower Cape Fear Aquifer	745	651	0.078	0.05	0.288	0.288	27%	17%

* 1997 LWSP not submitted -1992 data used in analysis