

BASIN 5 FRENCH BROAD

Basin Description

The French Broad Basin is one of six basins in North Carolina that drain the western slope of the Eastern Continental Divide and flow into the Mississippi River System emptying into the Gulf of Mexico. The basin is divided into the French Broad River, the Nolichucky River, and the Pigeon River sub-basins, none of which merge in North Carolina. The French Broad River begins in the mountains of Transylvania County and flows north entering Tennessee north of Hot Springs, NC. The Pigeon River drains Haywood County paralleling Interstate 40 north of Canton, NC, and flows into Tennessee. The Nolichucky River is formed by the convergence of the North Toe River and Cane River north of Burnsville, NC. This sub-basin drains the western slope of the Blue Ridge north from Mount Mitchell to the Tennessee state line. The Nolichucky and Pigeon rivers merge with the French Broad in Douglas Lake, east of Knoxville, Tennessee. These three sub-basins drain 2816 square miles in North Carolina and about 1500 square miles in Tennessee upstream of Douglas Lake. Extensive portions of this basin lie within the boundaries of the Pisgah and Cherokee National Forests.

WATER USE

Factors Affecting Water Demand

This basin has about 5% of the state's residents and contains all or part of 25 municipalities in 10 counties. Asheville, one of the state's 12 major metropolitan areas, gets its water supply from this basin. From 1990 to 1997 year-round population in three counties in this basin grew by 10% or more. Over half of the land in the basin is forested.

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 169 million gallons per day (mgd), with just over two-thirds coming from surface water sources. USGS estimated total basin population at 385,590. Residential demand was estimated at 24.5 mgd with about two-thirds of this demand being supplied by public water systems. Overall, public water systems supplied 36.6 mgd from surface water and 2.6 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. In addition, about 43.3 mgd of self-supplied water was withdrawn for non-residential water uses.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 23 public water systems using water from this basin. These systems supplied about 41 mgd of water to 223,402 persons.



1997 LWSP System Water Use from Basin (mgd)				
Sub-basin	LWSP Population	Residential Use	Non-residential Use	Total Use*
Nolichucky R.	2,875	0.24	0.27	0.8
French Broad R.	189,871	13.48	11.91	34.5
Pigeon R.	30,656	2.68	1.22	5.8
Total	223,402	16.4	13.4	41

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

For the local plan systems residential use accounted for 40% of overall water use while non-residential use was 32% of overall use and unaccounted-for water was 25%.

LWSP systems expect to supply water to 341,792 persons by the year 2020, a 53% increase over 1997 levels. By 2020 demand is projected to grow 40% to 57.5 mgd by 2020.

In the 1997 LWSPs, only one of the 23 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 nine of the 23 LWSP systems in this basin had average demand above this threshold. By 2020, eight 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 52 mgd of the 169 mgd total of water used from this basin, as shown in the table below. Industrial use comprised 60% of the self-supplied uses, followed by irrigation (19%), domestic (16%), livestock (4%), and commercial (1%).

1995 USGS Estimated Self-supplied Water Use in mgd						
Sub-basin	Domestic	Livestock	Industrial	Commercial	Irrigation	Total
Nolichucky R.	1.65	0.21	0.00	0.18	2.21	4.3
French Broad R.	6.18	1.11	4.85	0.46	6.72	19.3
Pigeon R.	0.62	0.52	26.17	0.08	0.76	28.2
Basin Total	8.5	1.8	31.0	0.7	9.7	51.7

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
Nolichucky River	0	0	13	5.7	13	5.7
French Broad River	10	18.5	16	21.3	26	39.8
Pigeon River	0	0	3	2.5	3	2.5
Total	10	18.5	32	5.2	42	70.5

*Excludes water use for power generation

Nine of the 10 agricultural water users in the French Broad sub-basin are aquaculture operations. Industrial water use accounts for 49 mgd of the nearly 52 mgd of registered non-agricultural water use.

WATER AVAILABILITY

Surface water is the primary source of water for most of the residents of the basin. LWSPs indicate that 12 water systems in these sub-basins withdrew about 40 mgd of surface water in 1997.

LWSPs show that four systems have reservoirs that are used for all or part of their water supply. The combined demand on these reservoirs averaged about 27 mgd in 1997. The estimated available supply from these reservoirs is 42 mgd. Hendersonville's Bradley Creek Reservoir and North Fork Mills River Reservoir both have minimum releases of eight cubic feet per second (cfs). Hendersonville's Mills River intake is always allowed withdrawals of 12 mgd, but when downstream flows are 30 cfs or greater, withdrawals of up to 24 mgd are allowed. Waynesville's Allen Creek Reservoir has a minimum release requirement of 3.5 cfs.

Eight of the surface water systems submitting LWSPs have run-of-river intakes. These intakes supplied about 12 mgd of water in 1997. The available supply from these sources is about 33 mgd. Maggie Valley Sanitary District has a three mgd withdrawal limit from Campbell and Jonathan Creeks set by DWR based on instream flow requirements. Brevard has an instream flow requirement stating the withdrawal will not reduce the streamflow below the 7Q10 flow (7.8 cfs). Burnsville is allowed to withdrawal 1.0 mgd from the Cane River, but must cease withdrawals when downstream flows drop below 12.2 cfs. Weaverville's intake can withdraw a maximum of four mgd from the combined Madison County and Buncombe County forks of the Ivy River.

In late 1999, Asheville completed an intake and water treatment plant on the Mills River with an initial capacity of five mgd and a planned capacity of 20 mgd.

There are eight systems in this basin with wells. They have an overall capacity to pump 1.7 mgd of ground water based on the 12-hour yields supplied in their LWSPs. Since 1997, Hot Springs has discontinued surface water use and is now supplied by two wells.

Asheville/Buncombe/Henderson Regional Supply

In 1997, nearly 166,000 people were supplied wholly or in part by Asheville and Hendersonville's intakes. This includes Asheville's sales to Biltmore Forest, Weaverville, and Woodfin and Hendersonville's sales to Laurel Park and Saluda. By 2020 the population served by these intakes is projected

grow to more than 252,000 or about 74% of the basin LWSP population.

The combined LWSP demand on these intakes averaged over 29 mgd in 1997 or about 71% of the basin's LWSP average daily demand. This demand is projected to grow to nearly 42 mgd by 2020.

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
Nolichucky River	0	0	0
French Broad River	3	0.15	0
Pigeon River	1	0	0

The transfers out of the French Broad River Basin are largely Hendersonville's sale to Saluda in the Broad Basin. Canton transfers a small unquantified amount of water (less than 0.1 mgd) from the Pigeon to the French Broad Basin.

SUMMARY OF INFORMATION FROM 1997 LWSPs

! Total per capita water use for the basin was 184 gallons per day in 1997 and is projected to decrease to 171 gpd in 2010.

! Seven water systems purchased a total of 1.2 mgd of water from this basin in 1997. Five of these systems had no purchase contract.

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

! In 1997, these systems used about 40 mgd of surface water and only about 1.33 mgd of ground water.

! The reported raw water supply was 75 mgd surface water and a 12-hour groundwater supply of 1.7 mgd.

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

! Asheville, Buncombe County and Henderson County have formed a regional water system.

! 10 systems were planning additional supplies totaling more than 20 mgd in the 1997 LWSPs.

! The systems are projecting significant growth, 53% in population and 40% in demand, through 2020.

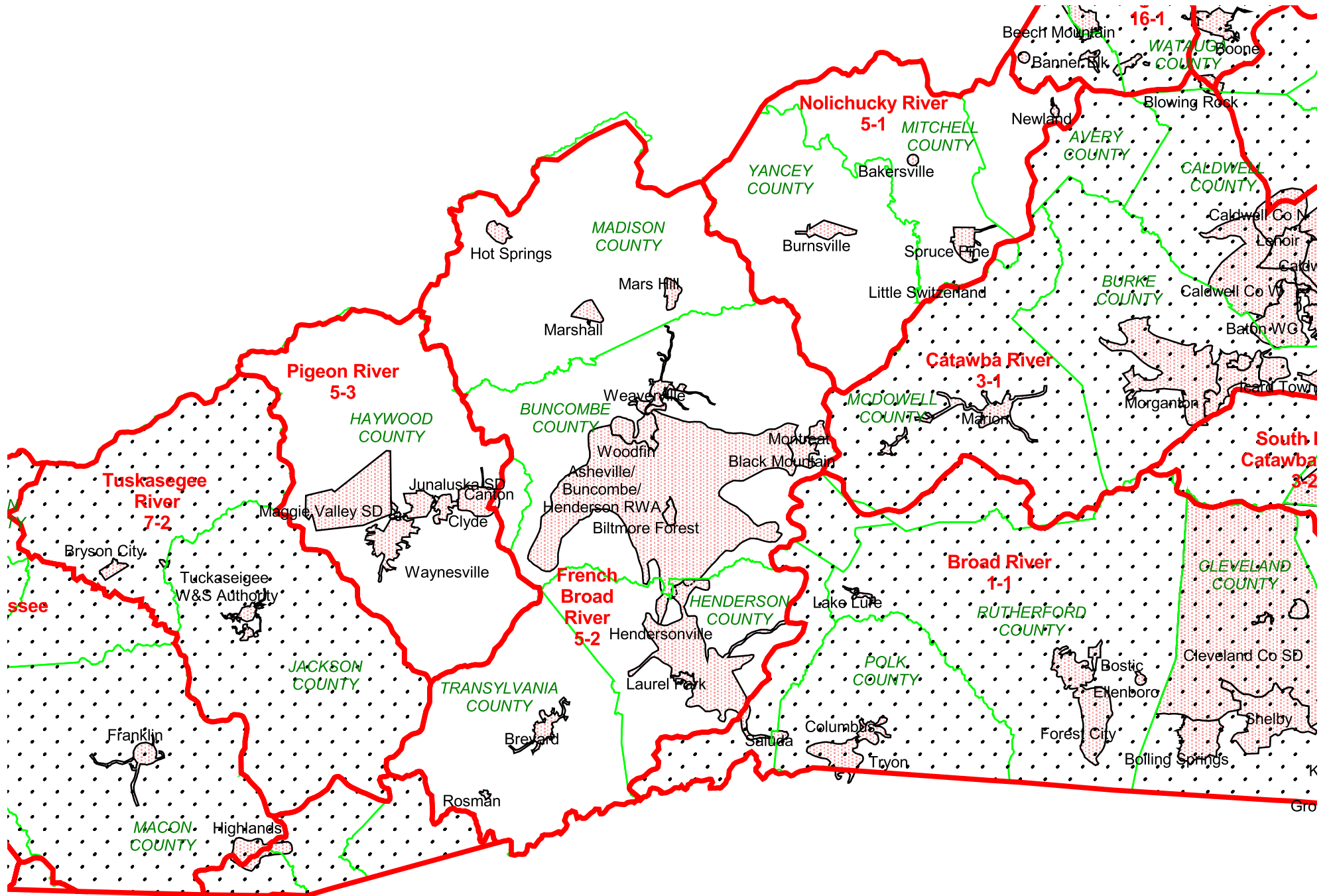
! About 1.5 mgd of additional water supply will be needed by water systems in the basin to ensure that water demands in 2010 do not exceed 80% of available supply.

! Systems reporting high Demand-to-Supply Ratios:

	1997	2010
Demand exceeds available supply	3	5
Demand exceeds 80% of available supply	9	6

January 2001

State Water Supply Plan
Division of Water Resources, DENR



Basin 5 French Broad

(unshaded basin)

- LWSP service area
- County Boundary
- Basin Boundary

FRENCH BROAD RIVER BASIN (5)

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
AVERY									
NEWLAND	Bedrock Wells	750	900	0.158	0.2	0.257	0.257	61%	78%
BUNCOMBE									
ASHEVILLE/BUNCOMBE/HENDERSON (ABHRWA)	Burnette / Bee Tree Reservoirs	111100	167200	21.385	28.5	25	35	86%	81%
BILTMORE FOREST	ABHRWA	1359	1489	0.223	0.244	0.223	0.306	100%	80%
BLACK MOUNTAIN	Bedrock Wells	5750	6878	0.669	0.8	0.401	0.491	167%	163%
MONTREAT	Bedrock Wells	725	750	0.194	0.238	0.398	0.398	48%	60%
WEAVERVILLE	Ivy River / ABHRWA	3525	4808	0.421	0.625	1.63	1.63	26%	38%
WOODFIN	Sugar Camp Fork / ABHRWA / Bedrock Wells	7200	8010	1.003	1.16	0.897	1.477	112%	79%
HAYWOOD									
CANTON	Pigeon River	6000	6829	2.217	2.384	6.8	6.8	33%	35%
CLYDE	CANTON	1611	1700	0.187	0.221	1	1	19%	22%
JUNALUSKA SD	WAYNESVILLE / MAGGIE VALLEY SD	4995	7327	0.378	0.537	0.378	0.482	99%	111%
MAGGIE VALLEY SD	Jonathan Cr./Campbell Cr.	5750	8435	0.822	1.19	3	3	28%	40%
WAYNESVILLE	Allens Creek	12300	14100	3.726	3.71	12.8	12.8	28%	28%
HENDERSON									
HENDERSONVILLE	Mills River, N. Fork Mills River	40000	44731	7.68	8.78	17.5	17.5	44%	50%
LAUREL PARK	HENDERSONVILLE	1565	1725	0.136	0.149	0.136	0.186	100%	80%
MADISON									
HOT SPRINGS	Cascade Branch	600	700	0.089	0.174	0.04	0.234	222%	74%
MARS HILL	Poplar Cove	2980	3700	0.277	0.375	0.278	0.356	100%	105%
MARSHALL	Bedrock Wells	1300	1333	0.146	0.158	0.195	0.241	75%	66%
MITCHELL									
BAKERSVILLE	Bedrock Wells	325	300	0.084	0.12	0.114	0.114	74%	105%
SPRUCE PINE	Beaver Creek Res./N.Toe R./Bedrock Wells	5153	6233	1.244	1.527	3.073	3.073	41%	50%
POLK									
SALUDA	HENDERSONVILLE	624	717	0.151	0.181	0.167	0.167	90%	108%
TRANSYLVANIA									
BREVARD	Cathey's Creek	7520	11539	1.08	1.554	2.6	2.6	41%	60%
ROSMAN	Bedrock Wells	470	525	0.062	0.069	0.113	0.171	55%	40%
YANCEY									
BURNSVILLE	N.Fork Bowlens Cr./S.Fork Bowlens Cr./Cane R.	1800	1874	0.538	0.605	1.98	1.98	27%	31%