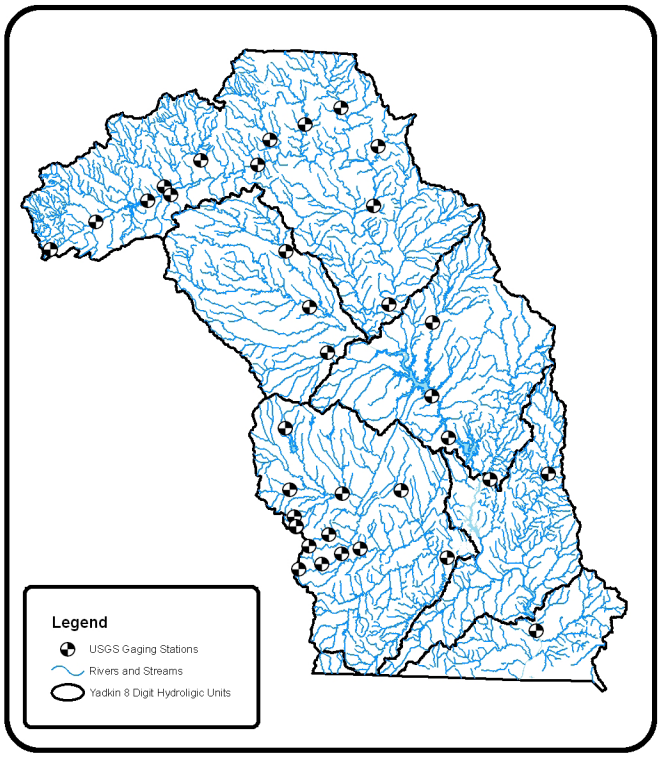
Managing Water Quality & Quantity

Quantity Management in the Yadkin Pee Dee River Basin

Understanding Stream Flow

Stream flow is monitored by U.S. Geological Survey gaging stations (Figure 1) and the 7-day 10-year low flow (7Q10) statistic is calculated to determine minimum flow requirements appropriate for water use activities. Examples of these activities include point source discharger effluent assimilation, water withdrawals, protection of aquatic life, navigation, wetland maintenance, recreation, hydropower and TMDL development. Flows less than the 7Q10 may be the result of drought, but also can be caused by water withdrawals or impoundments. When stream flow falls below the 7Q10, water quality violations may occur. Flow requirements are often thought of as minimum flows or releases, but they can also include maximum flow limits for peaking hydropower dams, seasonal releases for fish spawning, or weekend releases for recreation. Flow often abbreviated as "Q" is measured in terms of volume of water per unit of time, usually cubic feet per second (cfs). For more information about instream flow see DWR website: ***http://www.ncwater.org/About_DWR/Water_Projects_Section/Instream_Flow/welcome.html***

Figure 1. USGS Gaging Station Locations



Water Quality Issues Related to Drought

The recent drought in North Carolina has highlighted natural resource management and the importance of the relationship between water quantity and quality. Droughts and floods are natural processes and their impacts are often amplified by land use activities. Water quality problems associated with rainfall events usually involve degradation of aquatic habitats because high flows may carry increased loadings of substances (e.g., metals, oils, herbicides, pesticides, sand, clay, organic material, bacteria and nutrients). These substances can be toxic to aquatic life (fish and insects) or may result in oxygen depletion or sedimentation. During drought conditions, these pollutants become more concentrated in streams due to reduced flow. Summer months are generally the most critical months for water quality. Dissolved oxygen is naturally lower due to higher temperatures, algae growth increases due to longer periods of sunlight, and stream flows are reduced. In a long-term drought, these problems can be greatly exacerbated and the potential for water quality problems to become catastrophic is increased. This section discusses water quality problems that can be expected during low flow conditions.

The frequency of acute impacts due to nonpoint source pollution (runoff) is actually minimized during drought conditions. However, when rain events do occur, pollutants that have been collecting on the land surface are quickly delivered to streams. When stream flows are well below normal, this polluted runoff becomes a larger percentage of the water flowing in the stream. Point sources may also have water quality impacts during drought conditions even though permit limits are being met. Facilities that discharge wastewater have permit limits that are based on the historic low flow conditions. During droughts these wastewater discharges make up a larger percentage of the water flowing in streams than normal and might contribute to lowered dissolved oxygen concentrations and increased levels of other pollutants.

As stream flows decrease, less habitat is available for aquatic insects and fish, particularly around lake shorelines. Less water is also available for irrigation and for water supplies. The dry conditions and increased removal of water for these uses further increases strain on the resource. With less habitat, naturally lower dissolved oxygen levels and higher water temperatures, the potential for large kills of fish and aquatic insects is very high. These conditions may stress the fish to the point where they become more susceptible to disease and where stresses that normally would not harm them result in mortality.

These are also areas where longer retention times due to decreased flows allow algae to take full advantage of the nutrients present resulting in algal blooms. During the daylight hours, algae greatly increase the amount dissolved oxygen in the water, but at night algal respiration and die off can cause dissolved oxygen levels to drop low enough to cause fish kills. Besides increasing the frequency of fish kills, algae blooms can also cause problems for recreation and difficulty in water treatment resulting in taste and odor problems in finished drinking water.

Managing Streamflows from Impoundments

Under the authority of the Federal Power Act, the ***Federal Energy Regulatory Commission*** (FERC) licenses all non-federal dams located on the navigable waters in the United States that produce hydropower for the purposes of interstate commerce. The license may include requirements for flows from the project for designated in-stream or off-stream uses. Conditions may be placed on dam operations specifying mandatory minimum releases in order to maintain adequate quantity and quality of water downstream of the impoundment. One of the purposes of the Dam Safety Law is to ensure maintenance of minimum streamflows below dams. The ***Division of Water Resources*** (DWR), in conjunction with the ***Wildlife Resources Commission*** (WRC), recommends conditions related to release of flows to satisfy minimum instream flow requirements. The ***Division of Land Resources*** (DLR) issues the ***permits*** and is responsible for enforcement. Calculated mimimum streamflows for impoundments in the Yadkin-Pee Dee River Basin are listed Table 1.

Table 1. Minimal Streamflow Requirements for Impoundments

Name	Location	Waterbody	Drainage Area (sq. mi.)	Min. Release (cfs)
Dams associated with Power Production				
W. Kerr Scott	Near Wilkesboro	Yadkin River	367.0	125-4001.0
Idols	Near Clemmons	Yadkin River	1,945.0	5,542.0
Eury hydropower dam		Little River	232.0	36.3
Robinson Dam		Little River	200.0	31.0
Yadkin Division of APGI FERC Project No. 21978				
High Rock	Near Denton	Yadkin River	3,973.0	See Footnote[3]
Tuckertown	Near Richfield	Yadkin River	4,080.0	Run-of River[4]
Narrows (Badin)	Near Badin	Yadkin River	4,180.0	See Footnote[3]
Falls	Near Badin	Yadkin River	4,190.0	Run-of River
Progress Energy-CP&L FERC Project No. 22068				
Tillery	Near Albemarle	Yadkin River	4,638.0	405.0
Blewett Falls	Near Rockingham	Yadkin River	6,821.0	150.0
Cooleemee	Near Cooleemee	South Yadkin River	564.0	1,246.0
Ledbetter	Near Rockingham	Hitchcock Creek	73.1	6.5-9.57
Other Impoundments				
Lake Broyhill	Near Charlotte	Big Warrior Creek	3.9	0.8
John Andrews Dam	Near Charlotte	Unnamed Tributary to Little Warrior Creek	0.4	0.1
Allgood Mill Dam	East Bend	Unnamed Tributary to Yadkin River	5.1	0.8
Recreational Pond	Pilot Mountain	Unnamed Tributary to Grassy Creek	0.5	0.1 requested
Jack Holyfield Dam	Surry County	Unnamed Tributary to Snow Creek	1.3	0.4
Stewarts Creek	Near Mount Airy	Stewarts Creek		19.0
Fred Snow Pond Dam	Near King	Unnamed Tributary to King Creek	0.6	0.2

Name	Location	Waterbody	Drainage Area (sq. mi.)	Min. Release (cfs)
Reynolds Tobacco Dam Number One	Near Winston-Salem	Unnamed Tributary to Johnson Creek	1.0	0.2
C.L. White Dam	Surry County	Snow Creek	2.0	0.7
USDA NRCS flood control impoundment	Sugar Valley Airport	Sugar Creek	5.0	0.2
Lake Reese	Asheboro	Uwharrie	99.0	3.0
Lake Lucas	Asheboro	Back Creek	15.7	0.2
Highland Creek Golf Club's Highland Creek Dam	Albemarle	Unnamed Tributary to Clarke Creek	1.7	0.3
Rankin Dam	Ellerbe	Little Mountain Creek	15.7	0.8
Black Run Creek Reservoir	Mt. Pleasant	Black Run Creek	6.7	0.2
Edward Dawkins Dam	Rockingham	Unnamed Tributary to Hitchcock Creek	0.5	0.2
Lake Howell	Near Concord	Coddle Creek	47.6	6.0
1 Minimum flow ranges from 125 cfs when reservoir pool level is 1000.0-1003.99 feet to 400 cfs when pool level is at or above 1029 feet.				
2 The hydropower facility burned in 1998.				
3 Minimum discharge requirements for the Yadkin Project are measured at the Narrows Powerhouse and vary based on time of year. March 6-May 14: 1,500 CFS; May 15-July 1: 1,610 CFS; July 2-September 15: 1,400 CFS; September 16-March 5: no requirement, however, if streamflow into High Rock Reservoir is 3,600 CFS or less, discharge equivalent from Narrows. High Rock Reservoir is the primary storage reservoir for the Yadkin Project. Narrows Reservoir also offers storage. A drawdown schedule calls first on High Rock Reservoir then Narrows Reservoir is followed during abnormally dry and drought periods. The minimum discharges and drawdown schedule are subject to modification during extended periods of drought. APGI is currently operating the Yadkin Project in accordance with an annual license issued by the FERC on May 2, 2008 under the terms and conditions of its prior license, however, the minimum flows from the Yadkin Project reservoirs are likely to change prior to the next revision of the Basinwide Plan upon issuance of a new FERC license for the Yadkin Project. Under APGI's proposed minimum flows for the new FERC license, the Yadkin Project would, except when operating under the Low Inflow Protocol for the Yadkin-Pee Dee River Hydroelectric Projects (LIP) or Hydro Project Maintenance and Emergency Protocol, be required to provide a daily average minimum flow from the Falls Development according to the following schedule: June 1 – January 31 1,000 cfs; February 1 – May 15 2,000 cfs; May 16 – May 31 1,500 cfs. Flows under APGI's proposal would be modified during drought conditions under the agreed upon LIP.				
4 The development usually operates in a run-of-river mode (i.e., inflow equals outflow).				
5 Leakage from the dam has been measured by the USGS at 112 cfs.				
6 This flow is required in the bypass reach below the dam. Project should operate in a run-of-river mode such that inflow to the dam equals outflow from the powerhouse.				
7 Minimum flow requirements are 6.5 cfs when reservoir pool level is more than five feet below the crest and 9.5 cfs when reservoir pool level is less than five feet below the crest.				
8 FERC License Expired in April 2008; currently operating on annual license issued May 2008.				

PROPOSED PROJECTS WITH MINIMUM FLOWS

South Deep Creek

The Town of Yadkinville plans to expand withdrawals up to a capacity of 5.5 mgd and construct a pump-storage impoundment for low-flow periods. Yadkinville's intake is downstream of Highway 601. An instream flow study established a flow target of 15 cfs below the town's withdrawal. An agreement established a withdrawal limit of 1.7 cfs, 20 percent of the 7Q10 (8.4 cfs), when stream flow was equal to or below the 7Q10. The town can withdraw up to capacity when stream flow exceeds 8.4 cfs. The pump-storage impoundment, to be located on a north-draining, intermittent tributary of South Deep Creek just east of Highway 601, is still in development and should be completed in 2008.

The Yadkin County Soil and Water Conservation District and the Yadkin County Board of Commissioners are sponsoring the construction of a proposed impoundment upstream of Cranberry Creek. The dam will be subject to the N.C. Dam Safety Law and will be required to provide a minimum flow. The minimum flow from the dam will not be less than the 7Q10 of 4.0 cfs. The P.L. 566 work plan supplement is complete and all permits have been secured. Engineering contract has been let and design is underway. The project is waiting for federal funds in order to proceed.

Yadkin River

Caldwell County is proceeding with a water diversion weir on the Yadkin River at a drainage area of 85.2 sq. mi. in

conjunction with an impoundment on a nearby unnamed tributary, ("Donnahue Creek"), that will serve as a pump storage reservoir. The diversion weir will divert the following target flows from the Yadkin River: 15.4 cfs when flows equal or exceed 46.4 cfs; 9.2 cfs when river flow equals or exceeds 37 cfs; 4.6 cfs when river flow equals or exceeds 31 cfs; and no diversion when river flow is less than 24.8 cfs.

Unnamed Tributary of Yadkin River ("Donnahue Creek")

Caldwell County intends to impound the unnamed tributary, locally known as Donnahue Creek, to serve has a public water supply, pump storage impoundment for water withdrawn from the Yadkin River. (The tributary is the third, unnamed tributary indicated on the Grandin topographic map downstream of Hawkins Creek, draining Gill Knob on the north side of the Yadkin River.) The minimum flow from the Donnahue Creek impoundment will be an estimated 7Q10 flow of 0.5 cfs.

Yadkin River

The City of Winston Salem constructed a new water intake and low-head weir to meet future water demands. The city constructed riffle habitat downstream of the weir to mitigate the loss of aquatic habitat and a canoe-access primitive camp. They will also coordinate with the U.S. Army Corps of Engineers to maintain the 7Q10 stream flow target of 554 cfs below Idols dam with storage in W. Kerr Scott Reservoir.

Stewarts Creek

DWR requested a minimum flow requirement of 19.0 cfs (7Q10) below the Town of Mount Airy's Doggett Water Treatment Plant dam following the raising of the dam's height by five feet. The dam has a drainage area of 65 sq. mi. As a requirement for approval of raising the Doggett WTP dam height, the town agreed to release enough flow from the flood and water supply impoundment, Structure 1A, located upstream at a drainage area of 15 sq. mi. to maintain 19 cfs downstream of the intake during pumping when flow above the intake equals 19 cfs plus the volume pumped.

Coddle Creek

Lake Don T. Howell is owned by Cabarrus County – Water and Sewer Authority of Cabarrus County (WSACC). The water is used by the cities of Concord and Kannapolis. The Division of Water Resources requested a 6.0 cfs minimum flow from the reservoir. WSACC has sought to amend their 404 permit for the dam to lower flow requirements when available storage in the reservoir decreases. The top tier still requires a 6 cfs release. Flow would be reduced to 3 cfs when still in the top tier but reservoir inflow is below 75 percent of historical monthly flow for the month. The bottom tier would be 2 cfs when storage is less than or equal to 70 percent of storage. Lake Don T. Howell has a drainage area of 47.6 sq.mi.

Hitchcock Creek

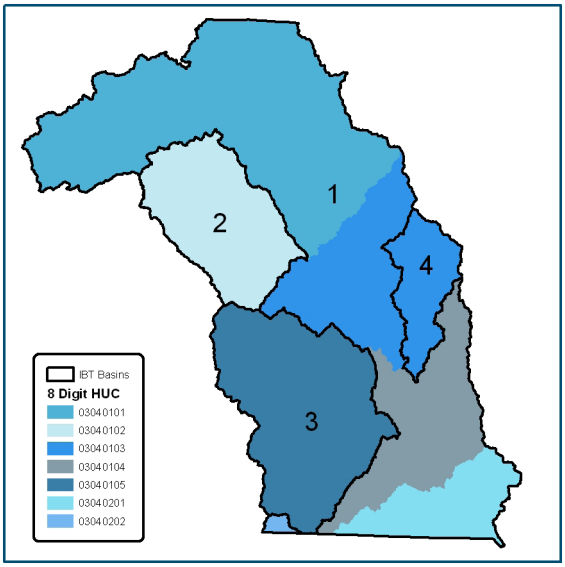
The Steeles Mill (FERC Project No. 8282) hydropower facility, located near Cordova, N.C., is no longer in operation. A final EA for the dam's removal has been submitted and the dam should be removed in 2008.

Interbasin Transfers (IBT)

Water users in North Carolina are also required to register surface water transfers with the Division of Water Resources if the amount is 100,000 gallons per day or more. Also, persons wishing to transfer more than the minimum transfer quantity allowed by the IBT law (usually 2 MGD) must first obtain a certificate from the Environmental Management Commission (G.S. 143-215.22I). The river basin boundaries that apply to these requirements are designated on a map entitled Major River Basins and Sub-Basins in North Carolina, on file in the Office of the Secretary of State, and included as part G.S. 143-215.22G of the law. These boundaries differ slightly from the 17 major river basins delineated by DWQ (Figure 11-2).

In 2007, the North Carolina General Assembly passed *House Bill 820* to enhance the IBT application process and review water regulations. This bill added additional requirements to

Figure 2. IBT Basins



demonstrate the need for and IBT and gain more public input. Here is a summary of the major points:

- Calls for a study by the Environmental Review Commission (EMC) of water allocation, interbasin transfer, consumptive water use
- Calls for development of a comprehensive plan to regulate surface water withdrawals
- Requires the *Division of Water Resources* to develop a new map defining the extent to which river basins extend from North Carolina into other states.
- An IBT applicant must file a notice of intent to file a petition and hold three public scooping meetings on the environmental documents to accompany the petition.
- The applicant must provide additional public notice along with the requirements of the previous statute, including newspaper notices in adjacent states that share the source river basin and mail notices to local governments in adjacent states that share the same basin. In addition, the applicant must send mail notices to public water system users and wastewater dischargers upstream and downstream of the proposed transfer.
- An environmental impact statement (EIS) is mandatory for any transfer from a major river basin to another basin.
- The EMC must hold a public hearing on the draft EIS.
- The EMC may appoint a mediation officer to initiate settlement negotiations between the applicant and interested parties.
- The EMC must issue a draft certificate, including findings of fact and conditions on the proposed transfer, and hold a public hearing on the draft.
- The EMC shall only approve the IBT certificate when it finds the applicant cannot satisfy its water needs from alternatives within the receiving basin, including unused capacity from other approved transfers and the purchase of water from other water systems, and that there is no reasonable alternative to the proposed transfer.
- The certificate must require the applicant to have water use efficiency and drought management plans that equal or exceed the most stringent plans in place in the source river basin.
- The EMC may amend the certificate to reduce the transfer if it appears that an additional water source is available to the certificate holder or if the holder's projected water needs are determined to be less than at the time the certificate was approved.
- The certificate holder cannot resell transferred water unless the buyer was a co-applicant.

Existing Interbasin Transfers

Table 2 lists interbasin transfers for the Yadkin-Pee Dee River basin. The DWR map of major river basins can be found on their website: ***http://www.ncwater.org/Permits_and_Registration/Interbasin_Transfer/BasinMap.gif***, which is used for determining interbasin transfers, considers the South Yadkin River, Rocky River and Uwharrie River as major river basins in and of themselves. Therefore, 13 of the transfers listed in the table are between these major tributaries and the Yadkin-Pee Dee River. For more information on interbasin transfers, visit the website: ***www.ncwater.org*** or call DWR at (919) 733-4064.

Table 2. Existing Interbasin Transfers in 1997

Supplying System	Receiving System	Source Subbasin	Receiving Subbasin	Estimated Transfers (MGD)
Anson County	Anson County	Yadkin	Rocky	0.6
Anson County	Marshville	Yadkin	Rocky	0.3
Anson County	Union County	Yadkin	Rocky	0.8
Asheboro	Asheboro	Uwharrie	Deep	4.6
Davidson Water	Davidson Water	Yadkin	Uwharrie	1.1
Davidson Water	Davidson Water	Yadkin	Deep	0.4
Davidson Water	Archdale	Yadkin	Deep	0.2
Winston-Salem	Winston-Salem	Yadkin	Roanoke	0.4
High Point	High Point	Deep	Yadkin	4.4
Montgomery County	Montgomery County	Yadkin	Deep, Lumber, Uwharrie	1.7 (total)
Montgomery County	Star	Yadkin	Deep	Unknown
Albemarle	Albemarle	Yadkin	Rocky	5.8
Albemarle	Stanly County	Yadkin	Rocky	0.8

Supplying System	Receiving System	Source Subbasin	Receiving Subbasin	Estimated Transfers (MGD)
Albemarle	Pfeiffer – North Stanly	Yadkin	Rocky	0.1
Norwood	Norwood	Yadkin	Rocky	0.4
Alexander County WC	Taylorsville	South Yadkin	Catawba	0.4
Statesville	West Iredell WC	South Yadkin	Catawba	Unknown
Asheboro	Asheboro	Uwharrie	Deep	4.6
Kannapolis	Kannapolis	Yadkin	Rocky	4.5
Union County	Union County	Catawba	Rocky	3.6
Union County	Monroe	Catawba	Rocky	2
Mooresville	Mooresville	Catawba	Rocky	Unknown
Mooresville	Mooresville	Catawba	South Yadkin	Unknown
Charlotte-Mecklenburg	Charlotte-Mecklenburg	Catawba	Rocky	16.1*
Mocksville	Mocksville	South Yadkin	Yadkin	0.6
Burlington Industries	Mooresville	Catawba	Rocky	0.4

Active Interbasin Transfer Certificates

Charlotte – Mecklenburg Utilities

A 33 mgd transfer from the Catawba River basin to the Rocky River basin.

Cities of Concord and Kannapolis

A transfer to the Rocky River basin of 10 mgd from the Catawba River basin and 10 mgd from the Yadkin River basin.

Local Water Supply Planning and Registered Water Withdrawals

In 1989 the North Carolina General Assembly established a water supply planning process to assure that communities have an adequate supply of potable water. Under the original legislation, all units of local government that provide water to the public are required to prepare a Local Water Supply Plan, submit the plan to the Division of Water Resources and update the plan at least every five years. In 2003 the General Assembly extended the requirement to any community water system that serves 1000 or more service connections or 3000 or more individuals. This change extended the requirement to the larger community water systems not operated by a unit of local government.

Local Water Supply Plans provide an assessment of a water system's present and future water needs and its ability to meet those needs. There are seventy-nine water systems within the Yadkin-Pee Dee River Basin that have submitted a Local Water Supply Plan to the Division of Water Resources. Some of these plans are for systems that are still in the planning and development phases and were not actually serving customers in 2002, the year when most local plans were last updated. Thirty-three systems have surface water intakes that provide water to an additional thirty-four water systems through various water sharing agreements. These systems, on average, withdrew about 147 million gallons per day of surface water to meet the demands of these sixty-seven water systems. In addition, twelve water systems withdrew just over three million gallons per day of ground water. These seventy-nine systems supplied over 935,000 persons in 2002.

Due to growth in the areas supplied by these water systems they expect to need 278 million gallons per day to supply service populations of over 1.6 million persons by 2030 and 400 million gallons per day to supply almost 2.2 million persons by 2050. These figures represent a 74% increase in service population from 2002 by 2030 and a 135% increase by 2050. Table 3 lists the water systems and their water use and service populations. Table 4 shows the systems that have surface water intakes in the basin.

In addition to the water systems submitting Local Water Supply Plans, eighty smaller community water systems provide water to residential customers. They have registered average water withdrawals totaling 1.2 million gallons per day of

ground water from this basin. Only one of these systems uses more than 100,000 gallons per day, most of them use less than 30,000 gallons per day.

Table 3. Local Water Supply Planning in the Yadkin-Pee Dee River Basin

County	Water System	Service Area Demand (MGD) 2002	Service Area Demand (MGD) 2030	Service Area Demand (MGD) 2050	Service Area Population 2002	Service Area Population 2030	Service Area Population 2050
Alexander							
	Energy United Water	1.009	2.345	3.530	9906	22680	32760
	Sugarloaf Water District	0.000	0.000	0.000	987	987	987
	Taylorsville	0.806	0.548	0.568	2000	2300	2500
Anson							
	Anson County	3.481	3.981	4.928	11067	13494	15000
	Ansonville	0.144	0.162	0.176	1850	2000	2100
	Lilesville	0.068	0.060	0.062	900	851	865
	McFarlan	0.014	0.014	0.014	90	90	90
	Morven	0.068	0.068	0.068	750	750	750
	Peachland	0.047	0.056	0.057	620	645	650
	Polkton	0.076	0.104	0.116	890	1185	1365
	Wadesboro	0.909	1.081	1.122	6450	7000	7200
Cabarrus							
	Cabarrus Woods/Cambridge Subdivision	0.377	0.377	0.377	4389	4389	4389
	Concord	9.494	28.512	40.217	63136	170000	235643
	Harrisburg	0.480	2.286	3.798	5600	24237	37616
	Mount Pleasant --WSACC	0.296	1.064	1.609	1296	5500	8441
	Pine Ridge MHP	0.003	0.003	0.003	50	50	50
	Pine Ridge MHP II	0.003	0.003	0.003	50	50	50
	Water and Sewer Authority of Cabarrus Co.1	0.000	0.000	0.000	0	0	0
Davidson							
	Davidson Water	10.321	17.390	24.876	126353	210353	270353
	Denton	0.614	0.710	0.781	1492	1725	1900
	Handy Sanitary District	0.652	2.016	5.626	9250	16500	21500
	Lexington	3.287	4.157	4.765	22230	25815	28461
	Thomasville	3.109	3.960	3.960	22700	26000	26000
Davie							
	Davie County	2.723	4.617	5.872	21075	40437	53237
	Mocksville	0.755	1.179	1.613	4670	7264	9909
Forsyth							
	Winston-Salem	43.411	69.168	86.897	248500	335300	397300
Iredell							
	Iredell Water Corporation 2	1.899	3.077	4.159	16777	35560	48060
	Love Valley	0.010	0.000	0.000	75	75	75
	Statesville	3.559	5.892	7.017	23974	35309	46536
	Troutman	0.297	0.964	1.298	2465	8012	10779

County	Water System	Service Area Demand (MGD) 2002	Service Area Demand (MGD) 2030	Service Area Demand (MGD) 2050	Service Area Population 2002	Service Area Population 2030	Service Area Population 2050
	West Iredell Water Corp.	0.405	0.844	1.308	4270	9000	14000
Montgomery							
	Badin Shores Resort	0.115	0.153	0.174	450	525	600
	Biscoe	0.396	0.550	0.706	1737	2336	2930
	Candor	0.105	0.133	0.137	834	900	950
	Montgomery County	1.500	1.522	1.573	8752	11252	14244
	Mount Gilead	0.136	0.193	0.230	1398	1950	2318
	Star	0.258	0.245	0.258	830	875	950
	Troy	0.734	0.000	0.000	3632	3632	3632
Randolph							
	Asheboro	4.796	8.287	10.879	23694	34128	41627
Richmond							
	Ellerbe	0.175	0.175	0.175	1500	1500	1500
	Hamlet	1.417	2.097	2.212	11027	12500	11000
	Richmond County	2.878	3.990	5.070	15850	22000	28000
	Rockingham	2.988	5.283	6.817	10652	12347	13101
Rowan							
	China Grove	0.506	1.072	1.573	3855	8644	12845
	Cleveland	0.097	0.084	0.088	808	869	912
	East Spencer	0.279	0.404	0.521	1738	2635	3397
	Faith	0.084	0.137	0.000	920	1495	1495
	Kannapolis	6.154	14.855	21.955	40032	103000	136587
	Landis	0.495	1.232	2.032	3008	5947	9805
	Salisbury	5.763	32.560	67.069	42827	146398	308112
Stanly							
	Albemarle	6.016	9.697	13.962	15758	25413	36594
	Norwood	0.335	1.430	1.764	3000	3560	3955
	Oakboro	0.201	0.240	0.289	1198	1595	1931
	Pfeiffer-North Stanly WA	0.460	0.535	0.602	3175	4148	4800
	Stanly County	0.968	1.322	1.654	6833	9400	11750
Stokes							
	King	1.658	2.340	2.992	19853	28029	35828
	Stokes County Water Sewer Authority	0.043	0.024	0.030	175	254	313
Surry							
	Dobson2	0.000	0.000	0.000			
	Elkin	1.200	1.274	1.295	4100	4500	4700
	Mount Airy	3.494	10.220	14.880	11034	27246	40487
	Pilot Mountain	0.384	0.807	1.422	1926	5397	10410
Union							
	Marshville	0.316	0.499	0.691	3658	6109	8798
	Monroe	6.787	10.027	12.212	27756	52960	64000

County	Water System	Service Area Demand (MGD) 2002	Service Area Demand (MGD) 2030	Service Area Demand (MGD) 2050	Service Area Population 2002	Service Area Population 2030	Service Area Population 2050
	Union County (from Anson County)3	0.951	-	-	-	-	-
Wilkes							
	Blue Ridge WA	0.696	1.952	4.598	6975	21160	38220
	Broadway Water Association, Inc.	0.234	0.249	0.258	2642	2800	2900
	Cricket-Millers Creek Water Assoc.	1.037	1.232	1.475	10872	13590	15937
	Moravian Falls Water Works	0.371	0.630	6.080	2845	5000	6000
	Mulberry Fairplains WA	0.501	0.911	1.055	8000	9500	10000
	North Wilkesboro	0.978	1.105	1.267	4135	6123	8098
	Ronda	0.033	0.219	0.365	406	3000	5000
	Wilkesboro	3.513	4.130	4.625	3110	4211	5095
Yadkin							
	Boonville	0.165	0.250	0.250	1138	1648	1648
	East Bend	0.064	0.101	0.108	1360	1600	1720
	Jonesville	0.331	0.673	0.839	2350	2550	2670
	Yadkinville	0.926	1.222	1.493	4920	6740	8326
	Total	149	279	401	934,625	1,627,024	2,201,751

Table 4. Current Surface Water Withdrawals by Local Water Supply Plan Systems

County	Water System	Surface Water Source	Average Daily Withdrawal (MGD)	Source Basin
Alexander				
	Energy United Water	South Yadkin River	1.600	South Yadkin River (18-2)
Anson				
	Anson County	Pee Dee River / Blewett Falls Lake	6.568	Yadkin River (18-1)
	Wadesboro	Jones Creek	0.616	Yadkin River (18-1)
Cabarrus				
	Concord	Cold Water Creek and Tributary	4.029	Rocky River (18-4)
	Mount Pleasant --WSACC	Dutch Buffalo Creek	0.266	Rocky River (18-4)
	Water and Sewer Authority of Cabarrus Co.	Coddle Creek	6.950	Rocky River (18-4)
Davidson				
	Davidson Water	Yadkin River	10.449	Yadkin River (18-1)
	Denton	Yadkin River / Tuckertown Reservoir	1.379	Yadkin River (18-1)
	Lexington	Abbotts Creek / Lake Tom-A-Lex	3.287	Yadkin River (18-1)

County	Water System	Surface Water Source	Average Daily Withdrawal (MGD)	Source Basin
	Thomasville	Abbotts Creek / Lake Tom-A-Lex	3.109	Yadkin River (18-1)
Davie				
	Davie County	Yadkin River	1.478	Yadkin River (18-1)
		South Yadkin River	1.245	South Yadkin River (18-2)
	Mocksville	Hunting Creek	0.755	South Yadkin River (18-2)
Forsyth				
	Winston-Salem	Yadkin River	39.490	Yadkin River (18-1)
		Salem Creek	4.630	Yadkin River (18-1)
Iredell				
	Statesville	South Yadkin River	3.924	South Yadkin River (18-2)
Montgomery				
	Montgomery County	Pee Dee River / Lake Tillery	3.106	Yadkin River (18-1)
Randolph				
	Asheboro	Back Creek	2.578	Uwharrie River (18-3)
		Uwharrie	2.520	Uwharrie River (18-3)
Richmond				
	Hamlet	Marks Creek / City Water Lake	1.400	Yadkin River (18-1)
	Richmond County	Pee Dee River / Blewett Falls Lake	3.204	Yadkin River (18-1)
	Rockingham	Hitchcock Creek / Roberdel Lake	1.310	Yadkin River (18-1)
		Falling Creek	0.674	Yadkin River (18-1)
Rowan				
	Kannapolis	Second Creek	2.260	South Yadkin River (18-2)
		Irish Buffalo Creek	1.500	Rocky River (18-4)
	Landis	Grants Creek	0.680	Yadkin River (18-1)
	Salisbury (Plan Revised 2006)	Yadkin River	6.246	Yadkin River (18-1)
Stanly				
	Albemarle	Yadkin River / Narrows Reservoir	4.040	Yadkin River (18-1)
		Yadkin River / Tuckertown Reservoir	3.524	Yadkin River (18-1)
	Norwood	Pee Dee River / Lake Tillery	0.371	Yadkin River (18-1)
Stokes				
	King	Yadkin River	1.658	Yadkin River (18-1)
Surry				
	Elkin	Elkin Creek	1.200	Yadkin River (18-1)
	Mount Airy	Stewarts Creek	2.935	Yadkin River (18-1)
		Lovills Creek	0.575	Yadkin River (18-1)

County	Water System	Surface Water Source	Average Daily Withdrawal (MGD)	Source Basin
	Pilot Mountain	Toms Creek	0.384	Yadkin River (18-1)
Union				
	Monroe	Stewarts Creek	6.860	Rocky River (18-4)
Wilkes				
	North Wilkesboro	Reddies River	2.678	Yadkin River (18-1)
	Wilkesboro	Yadkin River	4.640	Yadkin River (18-1)
Yadkin				
	Jonesville	Yadkin River	0.330	Yadkin River (18-1)
	Yadkinville	South Deep Creek	0.926	Yadkin River (18-1)
1) WASACC provides raw water to Concord and Kannapolis and wastewater treatment services in the county				
2) Dobson has not updated their Local Water Supply Plan				
3) Amount supplied to Union County water system in 2002, future amounts unknown				

North Carolina General Statute 143-215.22H requires that persons withdrawing 100,000 gallons or more per day for non-agricultural uses or 1,000,000 gallons or more per day for agricultural uses must register their withdrawals with the Division of Water Resources. And, like the local plans this data must be updated at five-year intervals. In the Yadkin-Pee Dee Basin there are seventeen mining operations, four industrial facilities and one thermoelectric power plant that registered withdrawals in 2004. Also there are five users that registered withdrawals for golf course irrigation. Table 5 lists these registered users and their average daily withdrawals. Details of this program can be found on the DWR's website at: ***www.ncwater.org***

Table 5. 2004 Non-residential Registered Water Withdraws in the Yadkin River Basin

County	Owner	Facility	Type of Use	Average Daily Withdrawal (MGD)
Anson				
	B.V. Hedrick Gravel And Sand Co.	Hedrick Mine	Mining	0.320
Cabarrus				
	Martin Marietta Materials. Inc.	Bonds Quarry	Mining	0.153
	Martin Marietta Materials. Inc.	Rocky River Quarry	Mining	0.048
	Vulcan Construction Materials. L. P.	Cabarrus Quarry	Mining	0.028
	Vulcan Construction Materials. L. P.	Gold Hill Quarry	Mining	0.034
Davidson				
	Martin Marietta Materials. Inc.	Thomasville Quarry	Mining	0.206
	Salem Glen Country Club LLC	Salem Glen Country Club	Irrigation, Golf	0.383
	Sapona Country Club	Sapona Country Club	Irrigation, Golf	0.024
Davie				
	Vulcan Construction Materials. L. P.	Smith Grove Quarry	Mining	0.001
Forsyth				
	Forsyth County	Tanglewood Park	Irrigation, Golf	0.095
	Martin Marietta Materials. Inc.	Salem Stone Quarry	Mining	0.166
	Vulcan Construction Materials. L. P.	East Forsyth Quarry	Mining	0.011
	Vulcan Construction Materials. L. P.	North Quarry	Mining	0.015
Iredell				
	Martin Marietta Materials. Inc.	Statesville Quarry	Mining	0.167
	Tyson Foods. Inc	River Valley Animal Foods	Industrial	0.030

County	Owner	Facility	Type of Use	Average Daily Withdrawal (MGD)
Mecklenburg				
	Martin Marietta Materials. Inc.	Mallard Creek Quarry	Mining	0.240
	North Stone Golf Club	North Stone Golf Club (2005)	Irrigation, Golf	0.188
	Skybrook Golf Club	Skybrook Golf Club (2006)	Irrigation, Golf	0.031
	Vulcan Construction Materials. L. P.	Clear Creek Quarry	Mining	0.003
Rowan				
	Duke Power a Duke Energy Company	Buck Steam Station	Thermoelectric	212.305
	Invista Sarl	Invista. Sarl	Industrial	1.021
	Martin Marietta Materials. Inc.	Kannapolis Quarry	Mining	0.200
	Martin Marietta Materials. Inc.	Woodleaf Quarry	Mining	0.381
Surry				
	Interface. Inc.	Interface Fabrics	Industrial	0.900
	Vulcan Construction Materials. L. P.	Elkin Quarry	Mining	0.007
Union				
	Martin Marietta Materials. Inc.	Bakers Quarry	Mining	0.125
Wilkes				
	Lousiana Pacific Corporation	Lousiana Pacific Corporation	Industrial	1.450