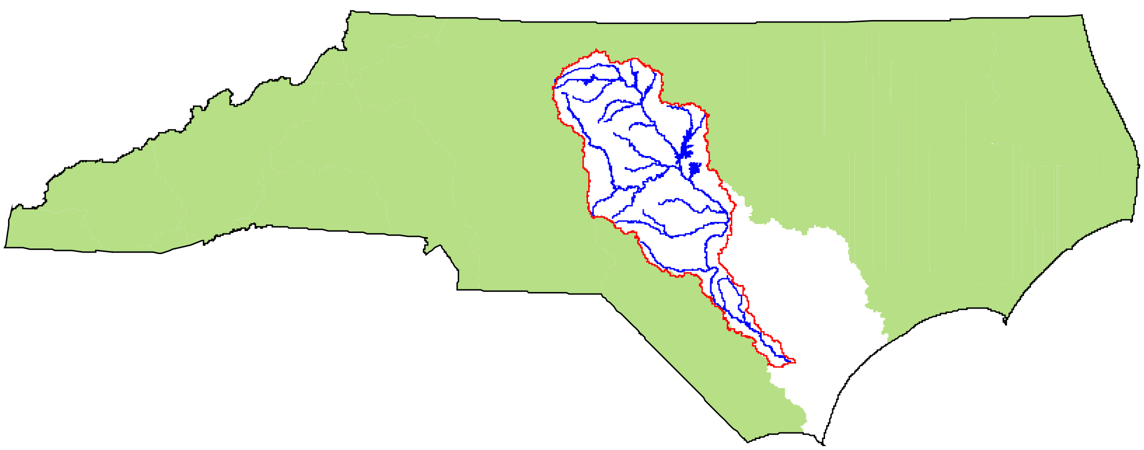
CAPE FEAR RIVER BASIN
WATER SUPPLY PLAN

SECOND DRAFT



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Water Allocation Section
NC Division of Water Resources

Division of Water Resources
Department of Environment and Natural Resource

NCDENR

Executive Summary

The Cape Fear River Basin Water Supply Plan evaluates the long term water needs of water supply systems through 2050, and the effects of surface water withdrawals on the flows of the Cape Fear River. The plan looks at municipal water systems that use water from the Haw River, the Deep River or the Cape Fear River above Lock & Dam #1, and municipal systems that discharge treated wastewater into the waters of these river basins. The plan includes information from 94 water systems in the following 19 counties: Rockingham, Guilford, Randolph, Alamance, Orange, Durham, Wake, Chatham, Montgomery, Moore, Lee, Harnett, Johnston, Cumberland, Hoke, Bladen, New Hanover, Brunswick and Columbus.

Our approach was to group water supply systems based on their existing interconnections, shared sources of supply, or interdependence, and then determine if there is enough water available within each mutually dependent group of systems to meet the projected needs of all systems within the group. Among the 94 water systems included in this analysis there are only four that are not connected to at least one other system for regular or emergency supply. For this analysis we evaluated each system independently, but within the context of the group of water systems that are mutually dependent on the same sources.

This analysis answers the question: is there enough water available in a particular area to meet the 2050 demands of the water supply systems in that area? The results of this analysis show that there appears to be enough water to meet the demands reflected in the 2050 estimates, if communities can develop the infrastructure to make use of it. However, the ability to develop efficient distribution systems and the ability to have additional water available by the time it is needed will depend on other factors such as funding and regional cooperation. Once again, the focus of the analysis was to determine if there is enough water available in the region to meet water supply needs over the next fifty years.

For our analysis of wastewater disposal, we again grouped water systems by their interconnections. The movement of wastewater does not necessarily follow the same pattern as the movement of drinking water, so the two means of grouping systems result in somewhat different groups.

While our analysis shows that there appears to be enough water available for communities in these basins to meet their projected demands, this may become a moot point if they cannot handle the wastewater they will generate. If the amounts of treated wastewater that a community or group can discharge to the waters of the state exceed NPDES limits and these limits cannot be increased, then they may have to develop alternative disposal systems. An effective demand management program could help control growth in water demand as populations increase, but as a community adds more people it will use more water and generate more wastewater. The actual amount of land will vary with soil and the amount of water to be applied. An inability to increase discharges could limit a community's ability to grow because of the difficulty of dealing with wastewater and/or the amount of land that would be required to deal with wastewater.

The Regulation of Surface Waters Transfer Act and its associated administrative rule list specific criteria and standards for managing interbasin transfers of water. Analyzing and projecting future interbasin transfers, as defined by the statute and rule, requires information about the quantities and locations of water withdrawals, water discharges and consumptive uses. We have not done such an analysis for this plan. Our analysis of interbasin water movement is limited to withdrawal and discharge quantities on an average day basis and water movement across major basin boundaries, only. This analysis differs from the Interbasin Transfer Law in that it does not consider the location of consumptive losses, is not on a maximum day basis, ignores the 2 mgd threshold, and does not consider subbasin boundaries. This analysis only describes the movement of water into and out of the major Cape Fear River Basin.

Based on these assumptions, in 1997 there was a net movement of 2.0 mgd from the Yadkin River Basin to the Cape Fear River Basin, 10.5 mgd from the Neuse River Basin to the Cape Fear River Basin, and 5.6 mgd from the Cape Fear River Basin to the Lumber River Basin; a total net water movement of 6.9 mgd into the Cape Fear River Basin on an average day basis. By 2030, the net movement of water from the Yadkin to the Cape Fear could be 2.3 mgd, 4.3 mgd from the Neuse to the Cape Fear, and 10.6 mgd from the Cape Fear to the Lumber; a total net water movement of 4.0 mgd out of the Cape Fear River Basin.

We developed two modeling scenarios with the Cape Fear River Basin Hydrologic Model to evaluate long-term water supply needs in the basin. Scenario 1 evaluates the long-term water supply needs in the basin projected for 2050. Scenario 2 evaluates the basin water supply needs and recommended Jordan Lake water supply storage allocations for 2030. Lacking definitive information, we assumed that wastewater discharge permits would be adjusted to accommodate the amount of wastewater generated by the projected water demands for all water supply systems. We did not incorporate any drought management measures for Jordan Lake withdrawals or releases in these scenarios. We assumed that self-supplied industrial withdrawals and agricultural withdrawals would remain constant.

We had to make additional assumptions regarding individual water supply systems to develop the modeling scenarios. Our method of grouping systems based on water supply or wastewater interconnections is appropriate for analyzing water supply needs, but for modeling we must assign specific water withdrawal and wastewater discharge locations for each water supply system. Each scenario is consistent with our analysis of water supply system groups. These modeling scenarios allow us to analyze the predicted impacts of an entire set of projected basinwide water withdrawals and discharges. Other modeling scenarios could be developed with differing assumptions about specific water withdrawals and wastewater discharges, and still be consistent with our system groups analysis.

The results of modeling Scenario 1 indicate that, with a couple of exceptions, there is enough water to meet the 2050 projected needs for the water systems included in the analysis, without significant effects on the reliability of the Jordan Lake low-flow augmentation pool, the ability to meet the flow target at the Lillington stream gage, or downstream flows of the Cape Fear River. The exceptions are the towns of Robbins, Carthage and Vass. The present water supply sources of these towns may not be adequate to reliably meet their projected demands.

Note that Jordan Lake water supply storage allocations do not impact the water supplies available to these communities in any way.

The results of modeling Scenario 1 and Scenario 2 indicate that the reliability of the low-flow augmentation pool will not change by 2030 and will decrease only slightly by 2050, compared with 1998. The 1998 model scenario results indicate that the flow augmentation pool has a 0.13 percent chance of being depleted on any given day, or is depleted during one year out of the 68 years modeled. Scenario 2 results indicate the same reliability for the year 2030. Scenario 1 results indicate that the flow augmentation pool has a 0.37 percent chance of being depleted on any given day, or is depleted 4 years out of the 68 years modeled for the year 2050.[1] This small decrease in reliability is a result of the large increases in projected demands for the water supply systems withdrawing water from the Deep River Basin and from the segment of the Cape Fear River between Jordan Dam and Lillington. The total projected increase in these withdrawals is 68 mgd by 2030 (an increase of 182 percent compared with 1998 withdrawals) and 113 mgd by 2050 (an increase of 302 percent compared with 1998 withdrawals). This means that multiplying the total withdrawals of all water supply systems affecting the flows at Lillington by four results in less than a one percent decrease in the daily reliability of the low-flow augmentation pool. Model scenario results also indicate that the slight decrease in reliability will not significantly affect the ability to meet the flow target at the Lillington stream gage. The flow profile at Lillington remains almost unchanged among the model scenarios.

The total projected increase in withdrawals upstream of Fayetteville is 114 mgd by 2030 (an increase of 93 percent compared with 1998 withdrawals) and 197 mgd by 2050 (an increase of 161 percent compared with 1998 withdrawals). Despite these large projected increases in upstream withdrawals, the flow profile at Fayetteville shows even less change among the model scenarios than the flow profile at Lillington. The Cape Fear River flows at Lock & Dam #1 are virtually unchanged among the model scenarios. Note that these modeled impacts on reliability do not incorporate any drought management for Jordan Lake or any water supply systems in the Basin. Drought management measures will improve the reliability of water supplies.

We expect this planning effort to continue as new information, such as the 2002 Local Water Supply Plans, becomes available. Information from this planning effort will be provided to the Division of Water Quality for use in the Cape Fear River Basinwide Water Quality Management Plan. Our next steps include:

1. developing additional modeling scenarios;
2. including additional model output analysis;
3. revising this draft document based on comments and corrections; and
4. incorporating drought management.

For additional information about the Cape Fear Hydrologic Model, model scenarios, or Jordan Lake allocations, please refer to our website at **www.ncwater.org**. Please direct any comments, corrections or concerns to Sydney Miller (919-715-3044 or sydney.miller@ncmail.net), or Don Rayno (919-715-3047 or don.rayno@ncmail.net).

[1] Note that during one of the four years that the low flow augmentation pool is depleted in Scenario 1, the pool is depleted for only one day.

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Introduction

The Cape Fear River Basin Water Supply Plan evaluates the long term water needs of water supply systems through 2050, and the cumulative effects of surface water withdrawals on the flows of the Cape Fear River. We expect this planning effort to continue as new information, such as the 2002 Local Water Supply Plans, becomes available. Information from this planning effort will be provided to the Division of Water Quality for use in the Cape Fear River Basinwide Water Quality Management Plan.

This document begins with an analysis of water supply systems by groups of systems and continues with a similar analysis focusing on wastewater. Following this general analysis we describe the more detailed analysis we used for hydrologic modeling and provide summaries of the model output analyses for the various modeling scenarios. Several appendices at the end include more detailed information than is provided in the general discussions.

Cape Fear River Basin

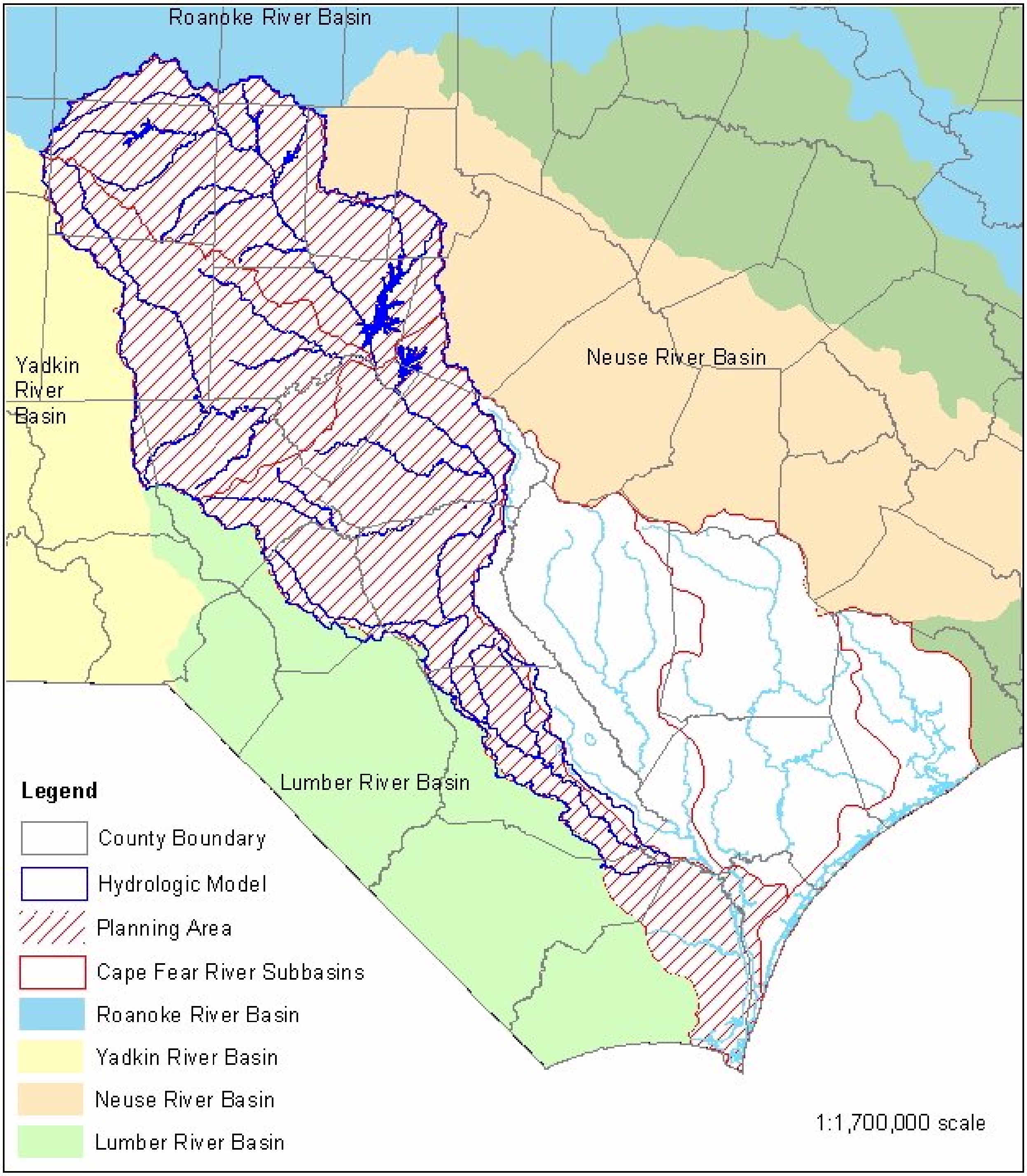
The Cape Fear River Basin is located entirely within North Carolina. It is the largest river basin in the state, draining 9,149 square miles from the headwaters in the northern Piedmont to the mouth at Cape Fear, south of Wilmington. The Cape Fear River major basin is composed of the Haw River, Deep River, Cape Fear River, South River, Northeast Cape Fear River and the New River Basins. The Haw River and Deep River merge near Moncure to form the Cape Fear River which flows southeasterly to the Atlantic Ocean. The South River, Northeast Cape Fear River and New River Basins drain most of Sampson, Duplin, Pender and Onslow counties in the Coastal Plain. Most of the water systems in the Coastal Plain areas of the basin use ground water, except for water systems supplied by the Lower Cape Fear Water and Sewer Authority and the City of Wilmington, both of which have surface water intakes on the Cape Fear River. The rest of the water systems in the Cape Fear River Basin largely rely upon surface water supplies.

The Haw River is impounded by the B. Everett Jordan Dam, just upstream of its confluence with the Deep River. Jordan Lake stores water to reduce downstream damage from flooding, to provide water supply and to supplement downstream flows. In addition, the lake provides recreational opportunities, including boating, swimming and fishing. Water supply storage in the lake is controlled by the State of North Carolina and is allocated by the Environmental Management Commission (EMC).

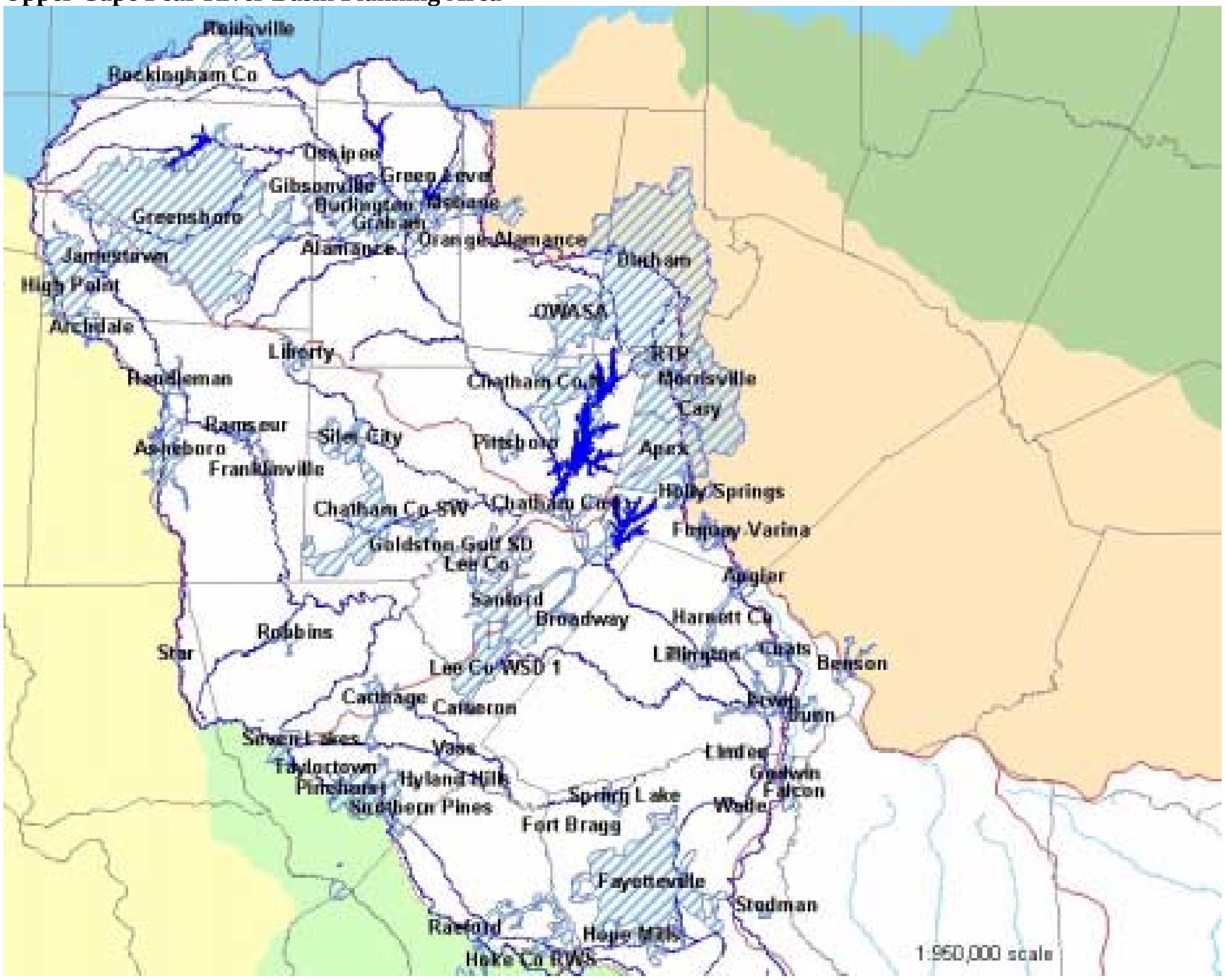
Water Systems Included

The plan looks at municipal water systems that use water from the Haw River, the Deep River or the Cape Fear River above Lock & Dam #1, and municipal systems that discharge treated wastewater into the waters of these river basins. The plan includes information from 94 water systems in the following 19 counties: Rockingham, Guilford, Randolph, Alamance, Orange, Durham, Wake, Chatham, Montgomery, Moore, Lee, Harnett, Johnston, Cumberland, Hoke, Bladen, New Hanover, Brunswick and Columbus. We selected these water systems based on information contained in the 1997 Local Water Supply Plans. We began with all water systems that are located in, or withdraw surface water or ground water from, the Haw, Deep and Cape Fear River Basins. Next, we included any water system that bought water from or sold water to our initial set of water systems. We also included any water system that discharges treated wastewater into any of the three basins under consideration. Figures on the following pages depict the Cape Fear River Basin and planning area.

Cape Fear River Basin Planning Area



Upper Cape Fear River Basin Planning Area



Information Sources

Local governments that provide water to the public are required to prepare a Local Water Supply Plan. These local plans provide vital information about water system characteristics and expected changes in demand and supply. We compiled most of the information for the Cape Fear River Basin Water Supply Plan from the Local Water Supply Plan database. We obtained information for some water systems from applications submitted during Round Three of Jordan Lake water supply storage allocations.

Local Water Supply Plans provided information on water system characteristics through the year 2020. DWR staff estimated population, water demand and wastewater discharges for those systems not applying for water from Jordan Lake, through the year 2050. Systems applying for an allocation of water from Jordan Lake provided estimates of water system characteristics through 2050 in their applications. Our analysis accepts the information provided in the Local Water Supply Plans and Round Three Jordan Lake Allocation Applications as given. DWR staff resolved any discrepancies in the information provided.

Lower Cape Fear River Basin Planning Area

Water System Service Populations

Many factors influence how and when a community grows: local land use patterns and controls, development of new roads, installation of water and sewer, and the availability of jobs, to name just a few. All affect the growth and distribution of population within communities. For the purposes of this analysis we assumed that local officials have a better perspective of how their communities will grow than we do. Therefore, for those water systems that did not submit applications for Round Three of Jordan Lake allocations, we based our estimations of population growth beyond 2020 on the pattern of population growth provided by local water systems in their Local Water Supply Plans.

Local Water Supply Plans are updated every five years with 1992 being the first year on which most plans were based. The 1992 LWSPs are based on actual water supply and demand conditions in calendar year 1992. The 1997 updated LWSPs were based on water supply and demand in 1997. Both the 1992 plans and the 1997 updates included estimates of service population for 2000, 2010 and 2020 in addition to the actual figures for the reporting years of 1992 and 1997. By combining information from the 1992 and 1997 local plans we were able to estimate future population based on actual population figures for 1992 and 1997, and population estimates for 2000, 2010 and 2020.

Our population projections for 2030, 2040 and 2050 are linear projections of the population data presented by each system in their Local Water Supply Plan for 1992 to 2020, or taken directly from Jordan Lake applications. This method assumes that over the period from 2020 to 2050, population growth will continue in the same pattern as reflected in the period 1992 to 2020. This method seems reasonable given the limits of existing information. Our population projection calculations are provided in Appendix B.

County Populations

We also examined the cumulative affect of these locally derived visions of growth by comparing our population projections with the county population estimates developed by the Department of Administration's Office of State Budget and Management (OSMB). The State Demographics unit analyzes census information and develops county population projections through the year 2020. We used the same method to extend the OSBM county population projections from 2020 to 2050 that we used to extend water system service population projections.

Water system population figures used in our analysis of water supply needs are presented in the following tables. The data are presented by county and include estimated water system service population, estimated county population, and the percentage of the estimated county population represented by each water system's estimated service population. Notes for all tables in this document are explained in Appendix A.

If we assume there will likely be some people in every county that do not receive water from one of the water systems included in our analysis, then the total percentages of water system service populations for each county should not exceed the total county population. However, there is a fair amount of uncertainty associated with all of the population estimates used in this analysis. In some cases when the estimates developed for individual systems are summed for each county they exceed our population estimates for the entire county. Service area population projections are therefore likely to represent a maximum growth scenario for 2050. Given the uncertainty in projecting populations through 2050, we only call the reader's attention to these discrepancies as a possible measure of that uncertainty. The following tables compare estimated water system service area populations and county population. Explanations of the notes listed in the tables can be found in Appendix A.

Rockingham County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	REIDSVILLE	Service Area Population	14,825	15,200	15,400	16,079	16,604	17,128
		% of County Population	16%	16%	15%	15%	15%	15%
1	ROCKINGHAM CO	Service Area Population	856	867	870	878	885	892
		% of County Population	1%	1%	1%	1%	1%	1%
		County Population	91,928	96,668	100,414	104,875	109,070	113,265

Guilford County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	GREENSBORO	Service Area Population	204,000	214,000	222,000	233,051	243,147	253,243
		% of County Population	48%	43%	39%	36%	34%	32%
	HIGH POINT	Service Area Population	76,527	80,063	83,840	89,494	94,503	99,512
		% of County Population	18%	16%	15%	14%	13%	13%
	JAMESTOWN	Service Area Population	5,000	6,000	7,000	8,559	9,892	11,225
		% of County Population	1%	1%	1%	1%	1%	1%
3	GIBSONVILLE	Service Area Population	4,473	5,815	7,560	9,100	10,687	12,273
		% of County Population	1%	1%	1%	1%	1%	2%
		County Population	421,048	495,634	568,580	642,522	716,136	789,750

Randolph County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	ARCHDALE	Service Area Population	10,000	15,000	20,000	24,541	29,282	34,023
		% of County Population	8%	10%	11%	12%	13%	14%
	RANDLEMAN	Service Area Population	3,984	4,398	4,807	5,462	6,026	6,591
		% of County Population	3%	3%	3%	3%	3%	3%
	ASHEBORO	Service Area Population	20,472	22,852	25,156	26,445	28,165	29,884
		% of County Population	16%	15%	14%	13%	12%	12%
2	RANDOLPH CO	Service Area Population	89,824	105,473	121,491	137,875	154,120	170,364
		% of County Population	69%	68%	68%	68%	68%	68%
	LIBERTY	Service Area Population	2,363	2,598	2,858	3,038	3,254	3,470
		% of County Population	2%	2%	2%	1%	1%	1%
	RAMSEUR	Service Area Population	2,680	2,970	3,240	3,602	3,929	4,257
		% of County Population	2%	2%	2%	2%	2%	2%
	FRANKLINVILLE	Service Area Population	1,131	1,200	1,300	1,770	2,089	2,407
		% of County Population	1%	1%	1%	1%	1%	1%
		County Population	130,454	155,040	178,852	202,991	227,095	251,199

Alamance County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	BURLINGTON	Service Area Population	48,757	51,967	55,094	61,444	66,623	71,801
		% of County Population	37%	34%	31%	31%	30%	30%
	ALAMANCE	Service Area Population	285	313	345	378	411	443
		% of County Population	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
	ELON COLLEGE	Service Area Population	5,363	5,710	6,060	6,603	7,072	7,541
		% of County Population	4%	4%	3%	3%	3%	3%
3	OSSIPEE SD	Service Area Population	400	425	450	516	569	621
		% of County Population	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	GRAHAM	Service Area Population	12,200	14,250	16,670	18,805	21,006	23,206
		% of County Population	9%	9%	9%	10%	10%	10%
	MEBANE	Service Area Population	8,118	11,359	14,100	17,872	21,362	24,852
		% of County Population	6%	7%	8%	9%	10%	10%
	HAW RIVER	Service Area Population	2,913	3,345	3,750	4,541	5,197	5,852
		% of County Population	2%	2%	2%	2%	2%	2%
3	GREEN LEVEL	Service Area Population	1,636	1,705	1,770	1,873	1,964	2,056
		% of County Population	1%	1%	1%	1%	1%	1%
		County Population	130,800	153,257	175,620	197,819	220,146	242,474

Orange County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
5	ORANGE-ALAMANCE/ORANGE CO	Service Area Population	13,800	17,300	20,800	24,300	27,800	31,300
		% of County Population	12%	12%	12%	13%	13%	13%
5	OWASA	Service Area Population	71,600	84,400	97,200	110,000	122,900	135,700
		% of County Population	61%	59%	58%	57%	57%	56%
		County Population	118,227	143,496	166,971	191,868	216,245	240,622

Durham County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
5	DURHAM	Service Area Population	203,341	240,530	276,403	298,974	314,127	329,280
		% of County Population	91%	90%	89%	84%	78%	74%
		County Population	223,314	268,284	312,144	356,753	401,135	445,517

Wake County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
5	CARY\APEX	Service Area Population	118,670	183,022	247,253	316,079	338,172	338,172
		% of County Population	19%	22%	23%	24%	22%	19%
5	MORRISVILLE	Service Area Population	6,500	17,750	27,000	27,000	27,000	27,000
		% of County Population	1%	2%	3%	2%	2%	2%
5	HOLLY SPRINGS	Service Area Population	9,192	37,275	71,403	103,890	122,221	125,002
		% of County Population	1%	4%	7%	8%	8%	7%
	FUQUAY-VARINA	Service Area Population	8,760	18,268	38,942	47,614	59,947	72,279
		% of County Population	1%	2%	4%	4%	4%	4%
		County Population	627,846	849,535	1,071,768	1,293,509	1,515,518	1,737,526

Chatham County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
5	CHATHAM CO COMBINED	Service Area Population	11,351	20,542	26,796	35,579	48,146	66,441
		% of County Population	23%	34%	39%	45%	54%	**67%**
7	GOLDSTON-GULF SD	Service Area Population	1,200	1,200	1,200	1,200	1,200	1,200
		% of County Population	2%	2%	2%	2%	1%	1%
7	PITTSBORO	Service Area Population	2,491	3,023	4,233	6,186	9,843	17,060
		% of County Population	5%	5%	6%	8%	11%	**17%**
7	SILER CITY	Service Area Population	8,645	10,754	13,381	16,204	19,658	23,893
		% of County Population	18%	18%	19%	20%	22%	**24%**
		County Population	49,329	59,559	69,137	79,250	89,134	99,019

Montgomery County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	STAR	Service Area Population	915	1,115	1,360	1,533	1,730	1,928
		% of County Population	3%	4%	4%	4%	4%	4%
		County Population	26,822	30,182	33,247	36,489	39,673	42,858

Moore County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	ROBBINS	Service Area Population	1,975	2,074	2,200	2,506	2,730	2,954
		% of County Population	3%	2%	2%	2%	2%	2%
	CAMERON	Service Area Population	468	524	573	654	725	797
		% of County Population	1%	1%	1%	1%	1%	1%
	CARTHAGE	Service Area Population	2,200	2,400	2,600	2,974	3,271	3,567
		% of County Population	3%	3%	3%	3%	2%	2%
	MOORE CO (HYLAND HILLS - NIAGRA)	Service Area Population	272	277	301	361	403	444
		% of County Population	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%
	MOORE CO (VASS)	Service Area Population	781	1,000	1,265	1,453	1,667	1,881
		% of County Population	1%	1%	1%	1%	1%	1%
	SOUTHERN PINES	Service Area Population	12,905	14,456	15,810	17,374	18,887	20,399
		% of County Population	17%	16%	15%	15%	14%	14%
	MOORE CO (PINEHURST)	Service Area Population	8,838	13,019	17,975	22,046	26,387	30,728
		% of County Population	12%	15%	17%	19%	20%	21%
	MOORE CO (SEVEN LAKES)	Service Area Population	3,069	4,163	5,270	6,392	7,508	8,624
		% of County Population	4%	5%	5%	5%	6%	6%
3	TAYLORTOWN	Service Area Population	612	785	980	1,139	1,309	1,479
		% of County Population	1%	1%	1%	1%	1%	1%
		County Population	74,769	89,477	102,828	117,098	131,046	144,995

Lee County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	SANFORD (Lee Co WSD I)	Service Area Population	27,000	40,900	56,600	76,000	92,100	111,600
		% of County Population	55%	72%	88%	**106%**	**116%**	**129%**
	BROADWAY	Service Area Population	1,080	1,246	1,308	1,440	1,553	1,667
		% of County Population	2%	2%	2%	2%	2%	2%
	LEE CO	Service Area Population	158	213	286	373	452	530
		% of County Population	0.3%	0.4%	0.4%	0.5%	0.6%	0.6%
		County Population	49,040	56,757	64,038	71,599	79,059	86,520

Harnett County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
5	HARNETT CO (Combined)	Service Area Population	66,097	85,356	110,226	142,342	183,616	237,374
		% of County Population	73%	74%	78%	86%	**96%**	**110%**
	DUNN	Service Area Population	11,464	12,561	13,609	15,501	17,099	18,698
		% of County Population	13%	11%	10%	9%	9%	9%
	ERWIN	Service Area Population	4,685	5,373	6,061	6,672	7,326	7,980
		% of County Population	5%	5%	4%	4%	4%	4%
		County Population	91,025	115,645	140,902	165,805	190,765	215,726

Johnston County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	BENSON	Service Area Population	4,245	5,175	6,310	7,504	8,642	9,780
		% of County Population	3%	3%	3%	3%	3%	3%
		County Population	121,965	165,971	210,178	254,148	298,143	342,138

Hoke County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
31	HOKE CO RWS	Service Area Population	18,799	27,827	41,191	60,973	90,255	133,599
		% of County Population	56%	61%	71%	87%	**110%**	**142%**
3	RAEFORD	Service Area Population	4,300	4,800	5,280	5,883	6,446	7,010
		% of County Population	13%	11%	9%	8%	8%	7%
		County Population	33,646	45,579	57,891	69,745	81,795	93,845

Cumberland County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
5, 8	FAYETTEVILLE	Service Area Population	178,200	243,160	315,840	402,480	445,140	487,800
		% of County Population	59%	73%	**86%**	**101%**	**104%**	**106%**
	FALCON	Service Area Population	747	797	845	906	963	1,020
		% of County Population	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
	GODWIN	Service Area Population	215	237	263	288	313	339
		% of County Population	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
	SPRING LAKE	Service Area Population	12,750	15,375	18,540	21,240	24,063	26,886
		% of County Population	4%	5%	5%	5%	6%	6%
	WADE	Service Area Population	472	532	590	644	699	755
		% of County Population	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
	STEDMAN	Service Area Population	787	887	983	1,067	1,162	1,256
		% of County Population	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
	FT BRAGG	Service Area Population	65,000	65,000	65,000	65,000	65,000	65,000
		% of County Population	21%	19%	18%	16%	15%	14%
		County Population	302,963	333,779	365,182	397,213	428,337	459,461

Bladen County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	ELIZABETHTOWN	Service Area Population	4,284	4,602	4,943	5,276	5,609	5,943
		% of County Population	13%	13%	13%	13%	13%	13%
9	WHITE LAKE	Service Area Population	1,042	1,085	1,132	1,177	1,223	1,270
		% of County Population	3%	3%	3%	3%	3%	3%
	BLADEN CO WD - 701 NORTH	Service Area Population	1,606	2,136	2,666	3,541	4,276	5,011
		% of County Population	5%	6%	7%	9%	10%	11%
	BLADEN CO WD - EAST ARCADIA	Service Area Population	970	1,368	1,765	2,464	3,049	3,634
		% of County Population	3%	4%	5%	6%	7%	8%
	BLADEN CO WD - W BLADEN	Service Area Population	5,098	6,158	7,218	9,013	10,512	12,010
		% of County Population	16%	17%	19%	22%	24%	25%
	BLADEN CO WD - WHITE OAK	Service Area Population	2,198	2,860	3,523	4,764	5,782	6,800
		% of County Population	7%	8%	9%	12%	13%	14%
	DUBLIN	Service Area Population	450	450	450	534	581	628
		% of County Population	1%	1%	1%	1%	1%	1%
	TAR HEEL	Service Area Population	210	225	240	256	271	287
		% of County Population	1%	1%	1%	1%	1%	1%
		County Population	32,278	35,617	38,274	41,388	44,348	47,309

New Hanover County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	WILMINGTON	Service Area Population	70,700	73,200	80,100	88,111	95,184	102,258
		% of County Population	44%	37%	34%	32%	31%	30%
	WRIGHTSVILLE BEACH	Service Area Population	3,241	3,580	3,600	3,937	4,180	4,424
		% of County Population	2%	2%	2%	1%	1%	1%
	APPLE VALLEY	Service Area Population	219	254	284	322	358	394
		% of County Population	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
	NEW HANOVER CO FLEMINGTON	Service Area Population	206	239	267	331	381	430
		% of County Population	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
11	FIGURE EIGHT ISLAND	Service Area Population	976	1,098	1,220	1,421	1,593	1,765
		% of County Population	1%	1%	1%	1%	1%	1%
	CAROLINA BEACH	Service Area Population	4,750	5,468	6,144	6,803	7,471	8,138
		% of County Population	3%	3%	3%	3%	2%	2%
	KURE BEACH	Service Area Population	1,308	1,518	1,762	2,159	2,485	2,810
		% of County Population	1%	1%	1%	1%	1%	1%
	MONTEREY HEIGHTS	Service Area Population	1,183	1,325	1,457	1,617	1,769	1,920
		% of County Population	1%	1%	1%	1%	1%	1%
	MURRAYVILLE	Service Area Population	8,438	10,548	12,130	14,198	16,134	18,069
		% of County Population	5%	5%	5%	5%	5%	5%
	WALNUT HILLS	Service Area Population	859	997	1,116	1,267	1,408	1,549
		% of County Population	1%	1%	0.5%	0.5%	0.5%	0.4%
	RUNNYMEADE	Service Area Population	801	929	1,040	1,180	1,312	1,443
		% of County Population	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%
	PRINCE GEORGE	Service Area Population	656	760	852	966	1,074	1,182
		% of County Population	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
	WESTBAY	Service Area Population	708	822	920	1,044	1,161	1,277
		% of County Population	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
	BRICKSTONE - MARSH OAKS	Service Area Population	589	683	765	868	965	1,062
		% of County Population	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%
		County Population	160,307	198,751	233,681	271,294	307,920	344,546

Brunswick County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	BRUNSWICK CO	Service Area Population	66,855	83,175	97,874	117,477	135,170	152,862
		% of County Population	**91%**	**88%**	**87%**	**88%**	**88%**	**88%**
3, 12	NORTH BRUNSWICK WSA (LELAND SD)	Service Area Population	4,200	5,000	5,500	6,453	7,274	8,094
		% of County Population	**6%**	**5%**	**5%**	**5%**	**5%**	**5%**
	NAVASSA	Service Area Population	525	590	685	763	844	925
		% of County Population	0.7%	0.6%	0.6%	0.6%	0.6%	0.5%
	CASWELL BEACH	Service Area Population	307	400	500	491	531	572
		% of County Population	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
	HOLDEN BEACH	Service Area Population	1,060	2,060	3,700	4,529	5,615	6,701
		% of County Population	1%	2%	3%	3%	4%	4%
	LONG BEACH WATER	Service Area Population	5,419	6,797	8,526	10,387	12,152	13,917
		% of County Population	**7%**	**7%**	**8%**	**8%**	**8%**	**8%**
	OCEAN ISLE BEACH	Service Area Population	880	1,057	1,270	1,560	1,818	2,076
		% of County Population	1%	1%	1%	1%	1%	1%
	SHALLOTTE	Service Area Population	1,315	1,380	1,450	1,601	1,718	1,836
		% of County Population	2%	1%	1%	1%	1%	1%
	SOUTHPORT	Service Area Population	5,572	6,756	7,834	9,430	10,820	12,209
		% of County Population	**8%**	**7%**	**7%**	**7%**	**7%**	**7%**
	SUNSET BEACH	Service Area Population	2,186	2,350	2,532	3,343	3,889	4,435
		% of County Population	3%	2%	2%	3%	3%	3%
	YAUPON BEACH	Service Area Population	949	1,048	1,158	1,297	1,424	1,550
		% of County Population	1.3%	1.1%	1.0%	1.0%	0.9%	0.9%
		County Population	73,143	94,189	112,885	133,419	153,284	173,149

Columbus County

Notes	WATER SYSTEM		2000	2010	2020	2030	2040	2050
	RIEGELWOOD SD	Service Area Population	350	400	425	472	513	554
		% of County Population	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%
		County Population	54,749	59,557	63,283	67,832	72,067	76,301

Water Demand Projections

This analysis is based on estimated average daily water demand. They are an annual average daily water use for a water system and reflect an averaging of the high and low demands that occur throughout the year. For most systems there will be a certain number of months where actual average daily demand is below the annual average and other months when daily demand is well above annual average. Each water system has to consider its particular use pattern and determine the amount of water it needs to have available to meet peak demands.

We estimated demands for water differently, depending on whether or not a system had applied for a Jordan Lake water supply storage allocation during Round Three. Systems that applied for an allocation provided demand estimates through 2050 in their applications. We developed water demand estimates through 2050 for non-applicants.

Applicants for Round Three of Jordan Lake allocations provided estimates of water demand through 2050. Where possible, applicants developed separate estimates for residential, commercial, institutional and industrial demands for their system. These estimates are combined with estimates of the additional water needed to meet production and distribution needs to arrive at an estimate of overall raw water demand for a system’s service population through 2050.

DWR developed estimates of average day water demands through 2050 for the other systems included in this analysis based on information in their 1997 Local Water Supply Plans.

For these systems we based demand estimates on 1997 per capita water use and DWR-generated population estimates for 2030, 2040, and 2050. The 1997 per capita water use rates are calculated by dividing total water use for a system in 1997 by 365, then by the system's 1997 service area population. We multiplied our service population estimates for 2000-2050 by the 1997 per capita water use rate for each system to develop estimates of average daily water demand. We did not estimate water demands separately for each use sector. Therefore, increases in water demands are solely related to increases in service population since per capita water use is held constant for each system at the 1997 rate. There were five systems in this analysis that did not submit a 1997 local plan. We used information from their 1992 plans to develop estimates of future water demands. Water use rates for each water system are provided in the tables on the following pages.

This approach to estimating water demands is useful for planning purposes, but has significant limitations. The assumption that per capita water use will stay the same for each system over the next fifty years is unlikely to be true. This method also assumes that per capita non-residential water use will remain constant for each system, based on the year 1997. While changes in commercial and institutional water use are usually closely related to changes in population, industrial water use is not necessarily directly related to population.

System Water Use Rates

PWSID	Notes	WATER SYSTEM	2000 SA Use Rate gpcd	2010 SA Use Rate gpcd	2020 SA Use Rate gpcd	2030 SA Use Rate gpcd	2040 SA Use Rate gpcd	2050 SA Use Rate gpcd
02-79-020		REIDSVILLE	239	239	239	239	239	239
02-79-050	1	ROCKINGHAM CO	204	204	204	204	204	204
02-41-010		GREENSBORO	197	197	197	197	197	197
02-41-020		HIGH POINT	183	183	183	183	183	183
02-41-030		JAMESTOWN	94	94	94	94	94	94
02-76-030		ARCHDALE	66	66	66	66	66	66
02-76-015		RANDLEMAN	348	348	348	348	348	348
02-76-010		ASHEBORO	230	230	230	230	230	230
none		RANDOLPH CO	0	98	98	98	98	98
02-76-025		LIBERTY	135	135	135	135	135	135
02-76-020		RAMSEUR	213	213	213	213	213	213
02-76-035		FRANKLINVILLE	57	57	57	57	57	57
02-01-010		BURLINGTON	262	262	262	262	262	262
02-01-035		ALAMANCE	128	128	128	128	128	128
02-01-025		ELON COLLEGE	92	92	92	92	92	92
02-41-010	3	GIBSONVILLE	154	154	154	154	154	154
02-01-123	3	OSSIPEE SD	80	80	80	80	80	80
02-01-015		GRAHAM	167	167	167	167	167	167
02-01-018		MEBANE	207	207	207	207	207	207
02-01-020	4	HAW RIVER	318	318	228	206	193	182
02-01-030	3	GREEN LEVEL	46	46	46	46	46	46
03-68-020	5	ORANGE-ALAMANCE/ORANGE CO	85	92	107	116	123	128
03-68-010	5	OWASA	130	133	134	135	136	136
03-32-010	5	DURHAM	152	155	155	155	155	155
03-92-020-045	5	CARY\APEX	107	102	105	100	101	101
03-92-075	5	MORRISVILLE	154	124	104	119	119	119
none	5	WAKE CO - RTP	na	na	na	na	na	na
03-19-XXX	5	CHATHAM CO (Combined)	115	302	302	306	309	312
03-19-025	7	GOLDSTON-GULF SD	117	117	117	117	117	117
03-19-015	7	PITTSBORO	482	595	543	485	396	328
03-19-010	7	SILER CITY	359	325	329	327	331	326
03-62-025	4	STAR	517	517	355	323	295	272
03-53-010		SANFORD (Lee Co WSD I)	233	230	240	251	287	328
03-53-015		BROADWAY	87	87	87	87	87	87
03-53-130	4	LEE CO	5241	5241	2672	2060	1712	1467
03-92-050	5	HOLLY SPRINGS	98	118	116	117	120	122
03-43-045	5	HARNETT CO (Combined)	97	90	90	90	89	90
03-92-055		FUQUAY-VARINA	115	115	115	115	115	115
03-43-010		DUNN	200	200	200	200	200	200
03-51-025		BENSON	343	343	343	343	343	343
03-26-035		FALCON	106	106	106	106	106	106
03-26-050		GODWIN	59	59	59	59	59	59
03-43-035		ERWIN	145	145	145	145	145	145

Notes are explained in Appendix A.

System Water Use Rates

PWSID	Notes	WATER SYSTEM	2000 SA Use Rate gpcd	2010 SA Use Rate gpcd	2020 SA Use Rate gpcd	2030 SA Use Rate gpcd	2040 SA Use Rate gpcd	2050 SA Use Rate gpcd
03-63-015	4	ROBBINS	421	421	377	337	313	293
03-63-040		CAMERON	125	125	125	125	125	125
03-63-025		CARTHAGE	138	138	138	138	138	138
03-63-103		MOORE CO (HYLAND HILLS - NIAGRA)	67	67	67	67	67	67
03-63-045		MOORE CO (VASS)	122	122	122	122	122	122
03-63-010		SOUTHERN PINES	159	159	159	159	159	159
03-63-108		MOORE CO (PINEHURST)	205	205	205	205	205	205
03-63-117		MOORE CO (SEVEN LAKES)	99	99	99	99	99	99
03-63-035	3	TAYLORTOWN	60	60	60	60	60	60
03-26-010	5, 8	FAYETTEVILLE	145	148	150	147	150	156
03-26-020		SPRING LAKE	82	82	82	82	82	82
03-47-025	15, 31	HOKE CO RWS	61	61	61	61	61	61
03-47-010	3, 4	RAEFORD	441	441	354	328	308	292
03-26-040		WADE	77	77	77	77	77	77
03-26-030		STEDMAN	102	102	102	102	102	102
03-26-344		FT BRAGG	116	116	116	116	116	116
03-09-010		ELIZABETHTOWN	209	209	209	209	209	209
03-09-030		WHITE LAKE	239	239	239	239	239	239
03-09-060		BLADEN CO WD - 701 NORTH	54	54	54	54	54	54
03-09-055		BLADEN CO WD - W BLADEN	101	101	101	101	101	101
03-09-065		BLADEN CO WD - EAST ARCADIA	82	82	82	82	82	82
03-09-035		BLADEN CO WD - WHITE OAK	45	45	45	45	45	45
03-09-025		DUBLIN	107	107	107	107	107	107
03-09-040		TAR HEEL	132	132	132	132	132	132
04-65-010		WILMINGTON	163	163	163	163	163	163
04-65-510	10, 15	NEW HANOVER CO AIRPORT	na	na	na	na	na	na
04-65-020		WRIGHTSVILLE BEACH	310	310	310	310	310	310
04-65-226		APPLE VALLEY	613	613	613	613	613	613
04-65-191	4	NEW HANOVER CO FLEMINGTON	1513	1513	1099	912	810	732
04-65-119		FIGURE EIGHT ISLAND	364	364	364	364	364	364
04-65-015		CAROLINA BEACH	136	136	136	136	136	136
04-65-025		KURE BEACH	273	273	273	273	273	273
04-65-999	10	LOWER CAPE FEAR WSA	na	na	na	na	na	na
04-10-045		BRUNSWICK CO	174	174	174	174	174	174
04-10-035	3, 12	NORTH BRUNSWICK WSA (LELAND SD)	118	118	118	118	118	118
04-10-065		NAVASSA	90	90	90	90	90	90
04-10-055		CASWELL BEACH	550	550	550	550	550	550
04-10-060		HOLDEN BEACH	388	388	388	388	388	388
04-10-015		LONG BEACH WATER	152	152	152	152	152	152
04-10-035		OCEAN ISLE BEACH	557	557	557	557	557	557
04-10-025		SHALLOTTE	165	165	165	165	165	165
04-10-010		SOUTHPORT	118	118	118	118	118	118
04-10-050		SUNSET BEACH	267	267	267	267	267	267
04-10-020		YAUPON BEACH	176	176	176	176	176	176
04-65-137		MONTEREY HEIGHTS	92	92	92	92	92	92
04-65-232		MURRAYVILLE	158	158	158	158	158	158
04-65-154		WALNUT HILLS	92	92	92	92	92	92
04-65-190	15	RUNNYMEADE	71	71	71	71	71	71
04-65-188		PRINCE GEORGE	87	87	87	87	87	87
04-65-229	15	WESTBAY	61	61	61	61	61	61
04-65-192	15	BRICKSTONE - MARSH OAKS	110	110	110	110	110	110
04-24-035	4	RIEGELWOOD SD	1836	1836	1439	1315	1224	1146

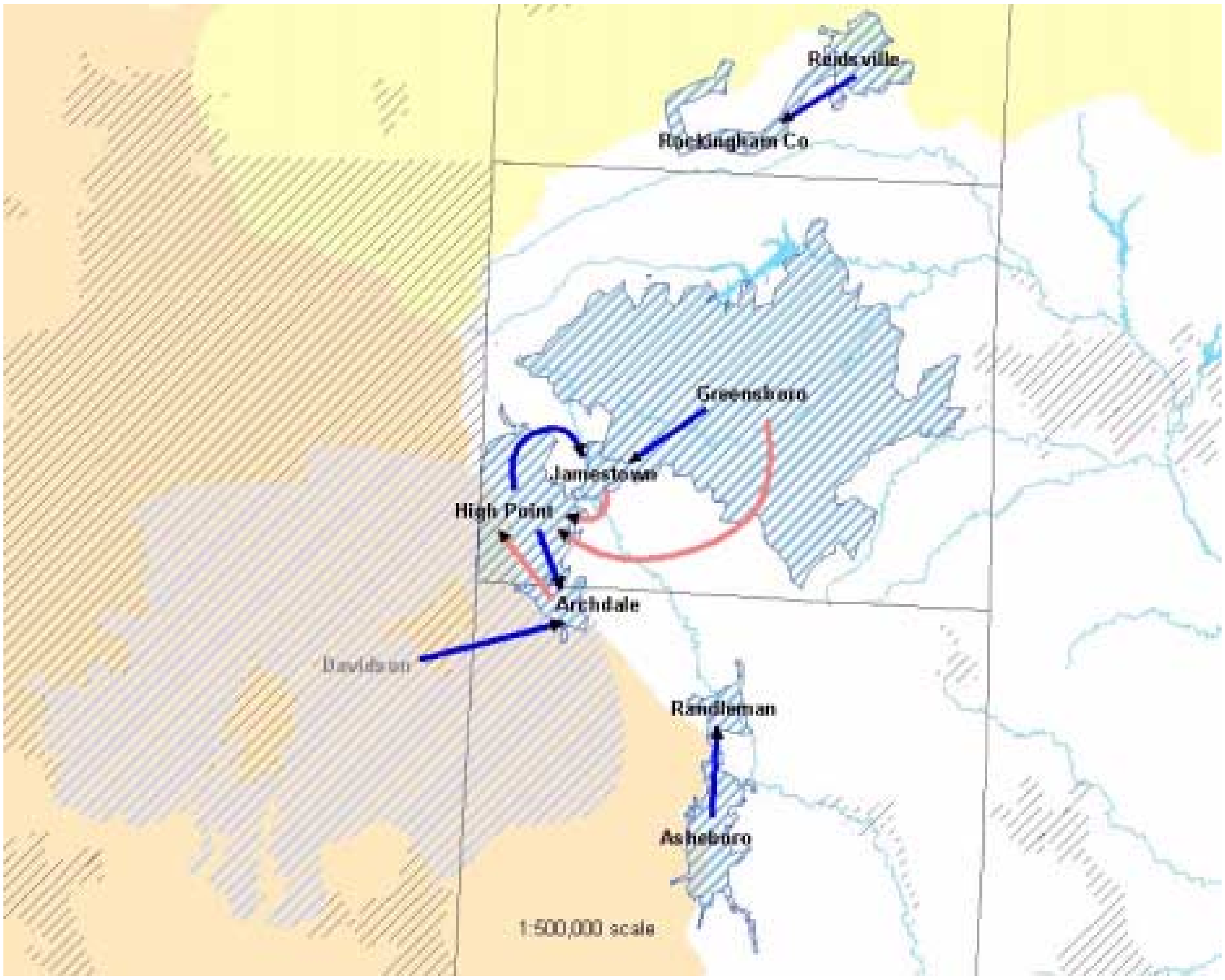
Notes are explained in Appendix A.

Water Supply System Groups

We assumed that as demand approaches water supply capacity, capacity would be expanded to a level adequate to meet projected demands at some point in the future, depending on what the community and water system customers decide is a worthwhile investment. The important question then becomes, is there enough water available to each community such that they can meet future demands with adequate investment? We had to determine where each water supply system was going to get the water needed to meet its customers' demands. With a fifty year planning period it is important to consider the amount of water available to a community from their existing and planned sources, not just the amount that is currently available based on the present level of infrastructure development, such as pump, pipe and treatment plant capacities. The Jordan Lake Allocation Applications and Local Water Supply Plans provided information on existing and planned future water supply sources. However, the Local Water Supply Plans only provide data through the year 2020.

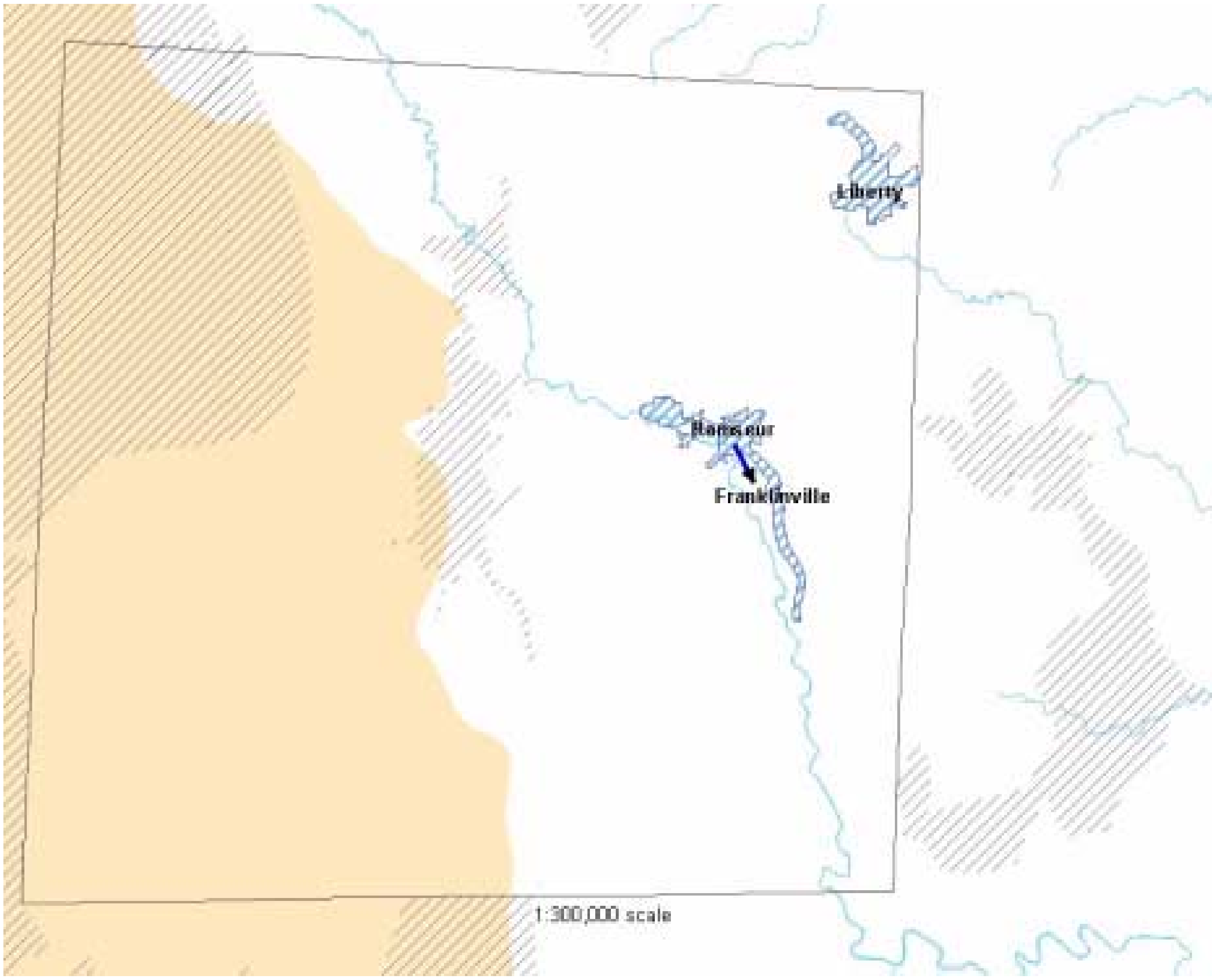
Our approach was to group water supply systems based on their existing interconnections, shared sources of supply, or interdependence, and then determine if there is enough water available within each mutually dependent group of systems to meet the projected needs of all systems within the group. Among the 94 water systems included in this analysis there are only four that are not connected to at least one other system for regular or emergency supply. There are groups of water systems that depend on the same supplies for water. This dependency may take the form of several systems withdrawing water from the same source or a single system distributing water to several other systems. For this analysis we evaluated each system independently, but within the context of the group of water systems that are mutually dependent on the same sources. The ability to utilize the resource and successfully meet customer demands will depend on the communities' abilities to collaborate in meeting their common goals of providing customers with water. The figures and tables on the following pages describe our water supply system groups. Blue arrows (black if not in color) indicate movement of supply water and red arrows (gray if not in color) indicate movement of wastewater. The notes listed in the tables are explained in Appendix A. Water movements are explained in the "Local Water Supply Systems" section.

Reidsville Group and Greensboro Group



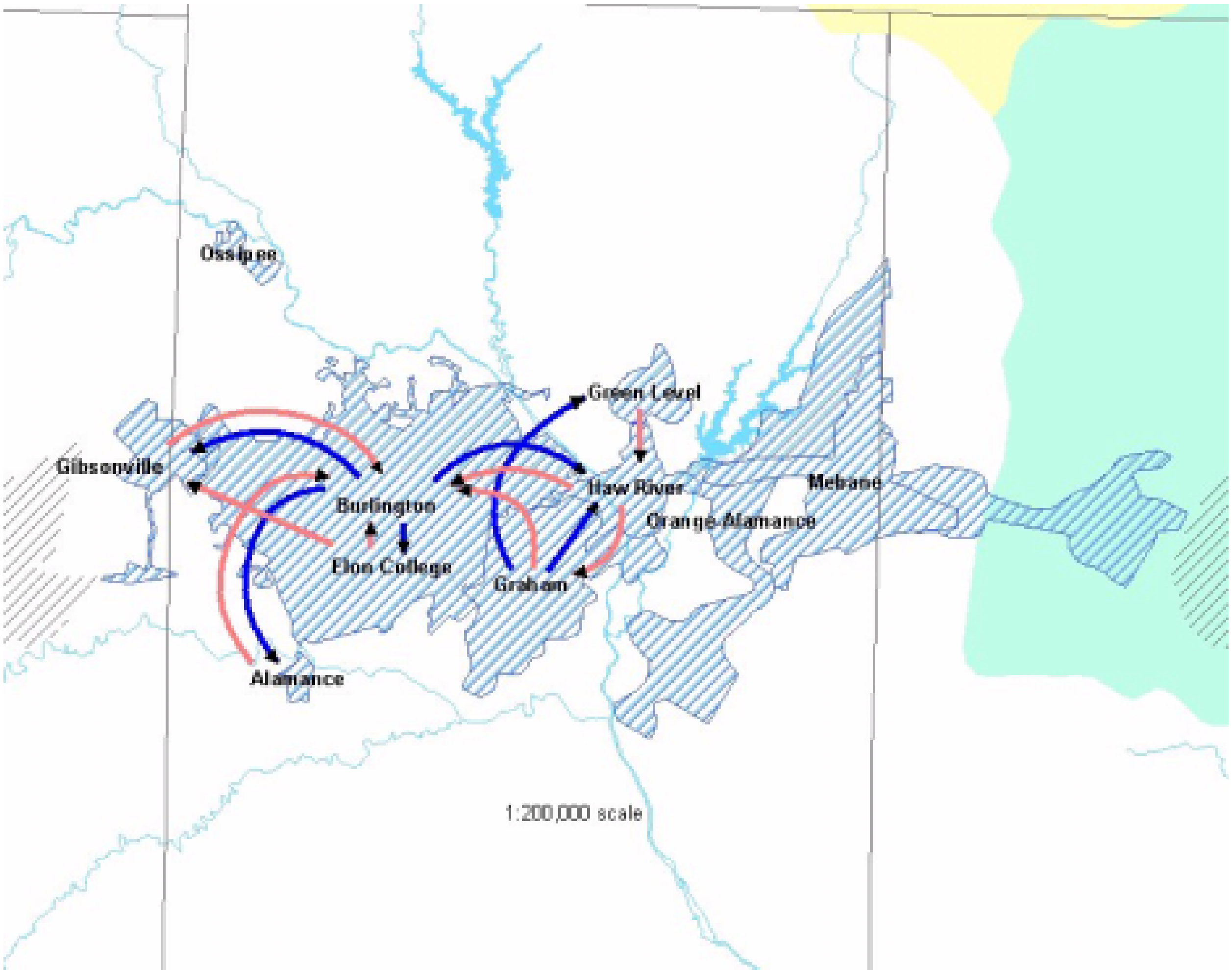
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
02-79-020		ROCKINGHAM	REIDSVILLE	02-1	source
02-79-050		ROCKINGHAM	ROCKINGHAM CO	02-1	source
02-41-010		GUILFORD	GREENSBORO	02-1	source
02-41-020		GUILFORD	HIGH POINT	02-2	source
02-41-030		GUILFORD	JAMESTOWN	02-2	source
02-76-030		RANDOLPH	ARCHDALE	02-2	source
02-76-015		RANDOLPH	RANDLEMAN	02-2	source
02-76-010		RANDOLPH	ASHEBORO	18-3	discharge
none		RANDOLPH	RANDOLPH CO	02-2	future source

Liberty and Ramseur Group



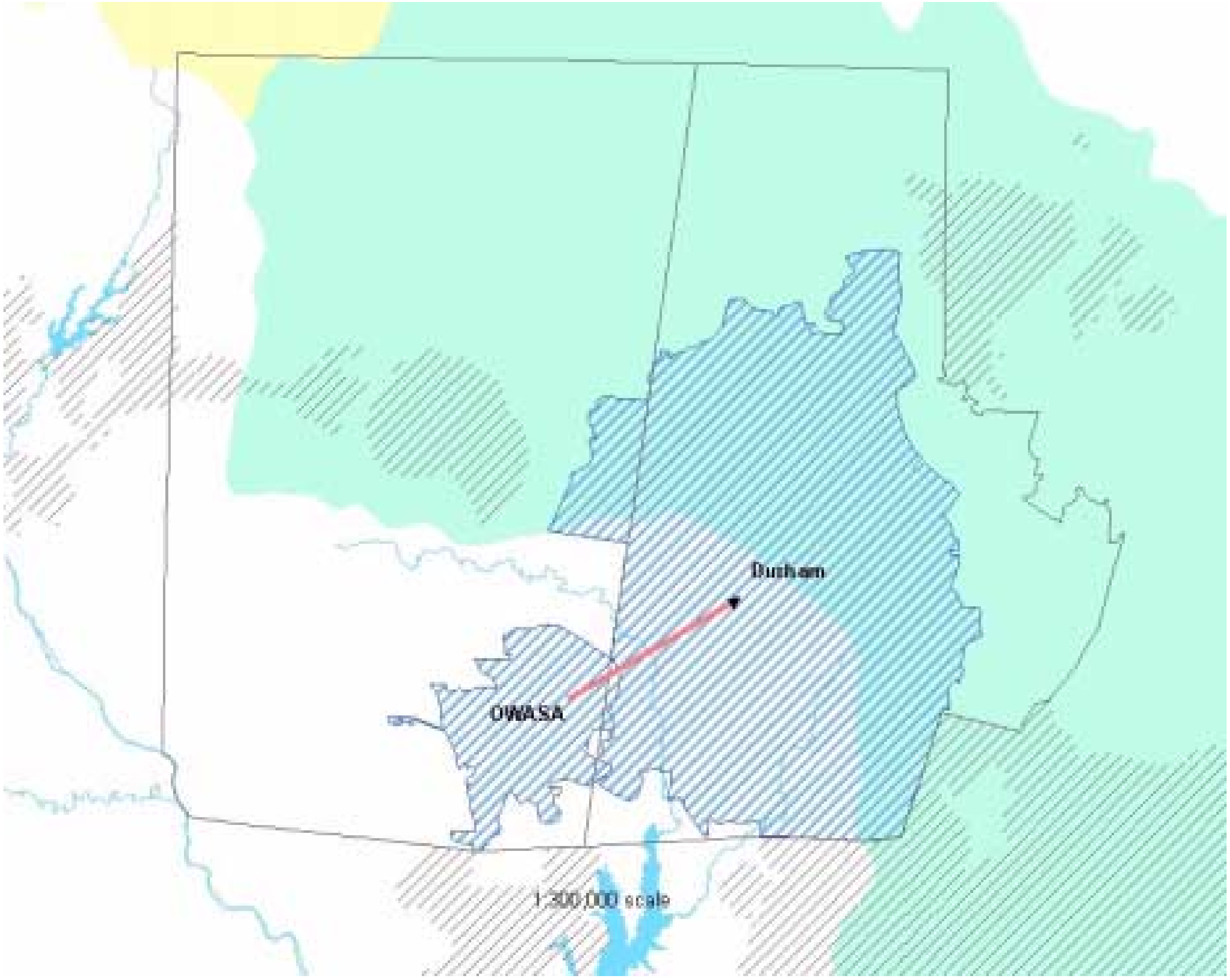
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
02-76-025		RANDOLPH	LIBERTY	02-2	source
02-76-020		RANDOLPH	RAMSEUR	02-2	source
02-76-035		RANDOLPH	FRANKLINVILLE	02-2	source

Burlington Group



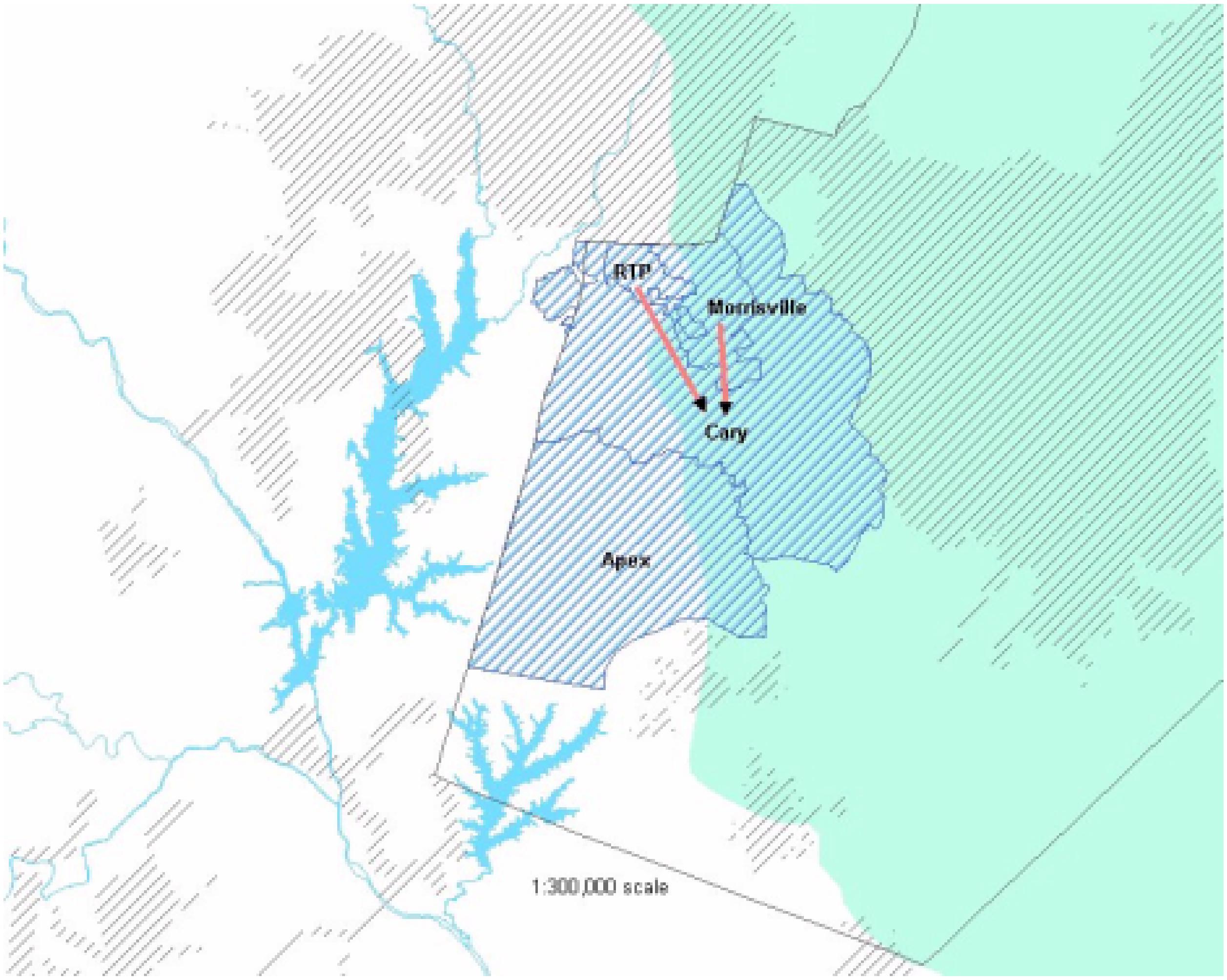
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
02-01-010		ALAMANCE	BURLINGTON	02-1	source
02-01-035		ALAMANCE	ALAMANCE	02-1	source
02-01-025		ALAMANCE	ELON COLLEGE	02-1	source
02-41-010	3	GUILFORD	GIBSONVILLE	02-1	source
02-01-123	3	ALAMANCE	OSSIPEE SD	02-1	source
02-01-015		ALAMANCE	GRAHAM	02-1	source
02-01-018		ALAMANCE	MEBANE	02-1	source
02-01-020		ALAMANCE	HAW RIVER	02-1	source
02-01-030	3	ALAMANCE	GREEN LEVEL	02-1	source
03-68-020	5	ORANGE	ORANGE-ALAMANCE/ORANGE CO	10-1	future source

OWASA and Durham



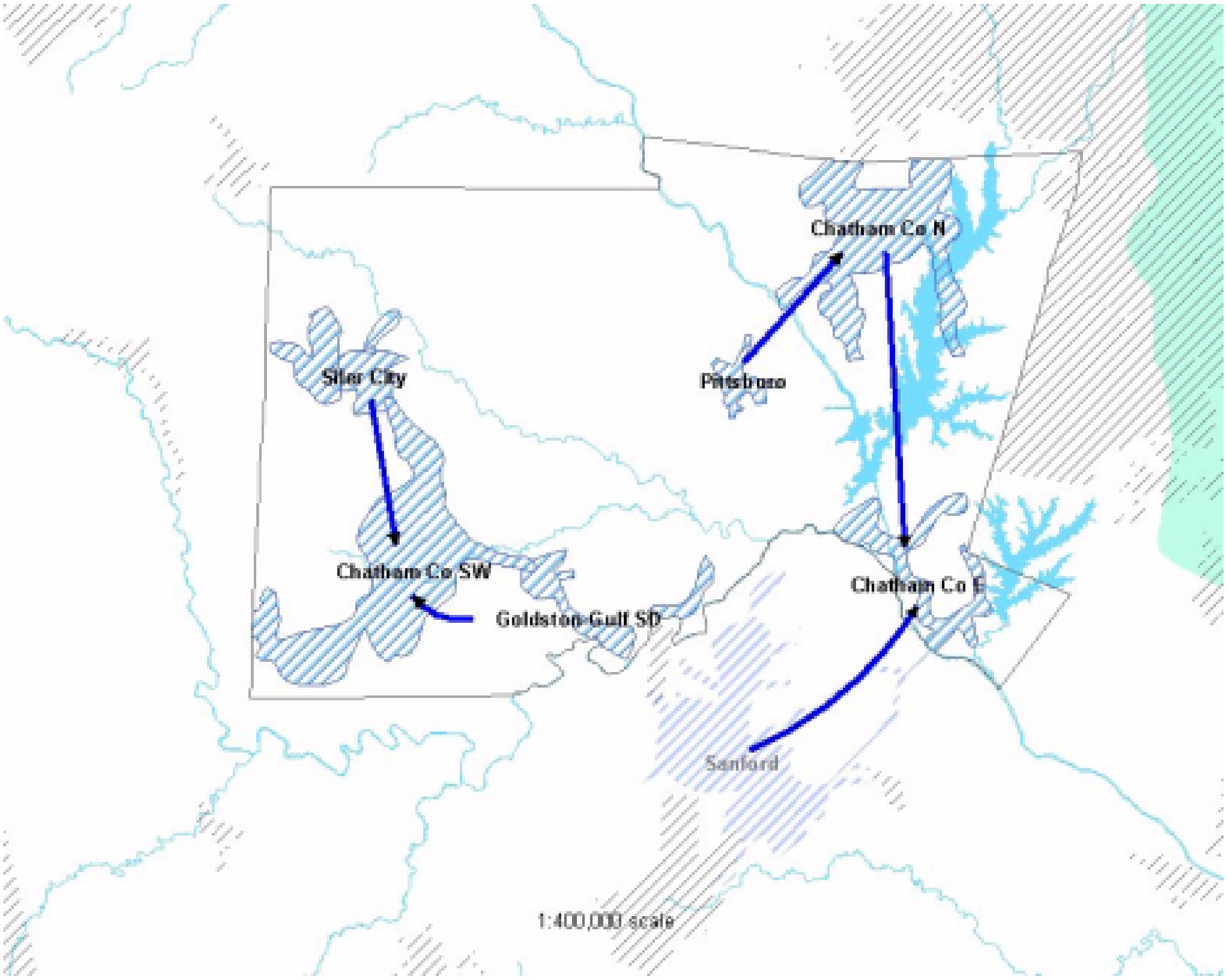
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-68-010	5	ORANGE	OWASA	02-1	source
03-32-010	5	DURHAM	DURHAM	10-1	future source

Cary Group



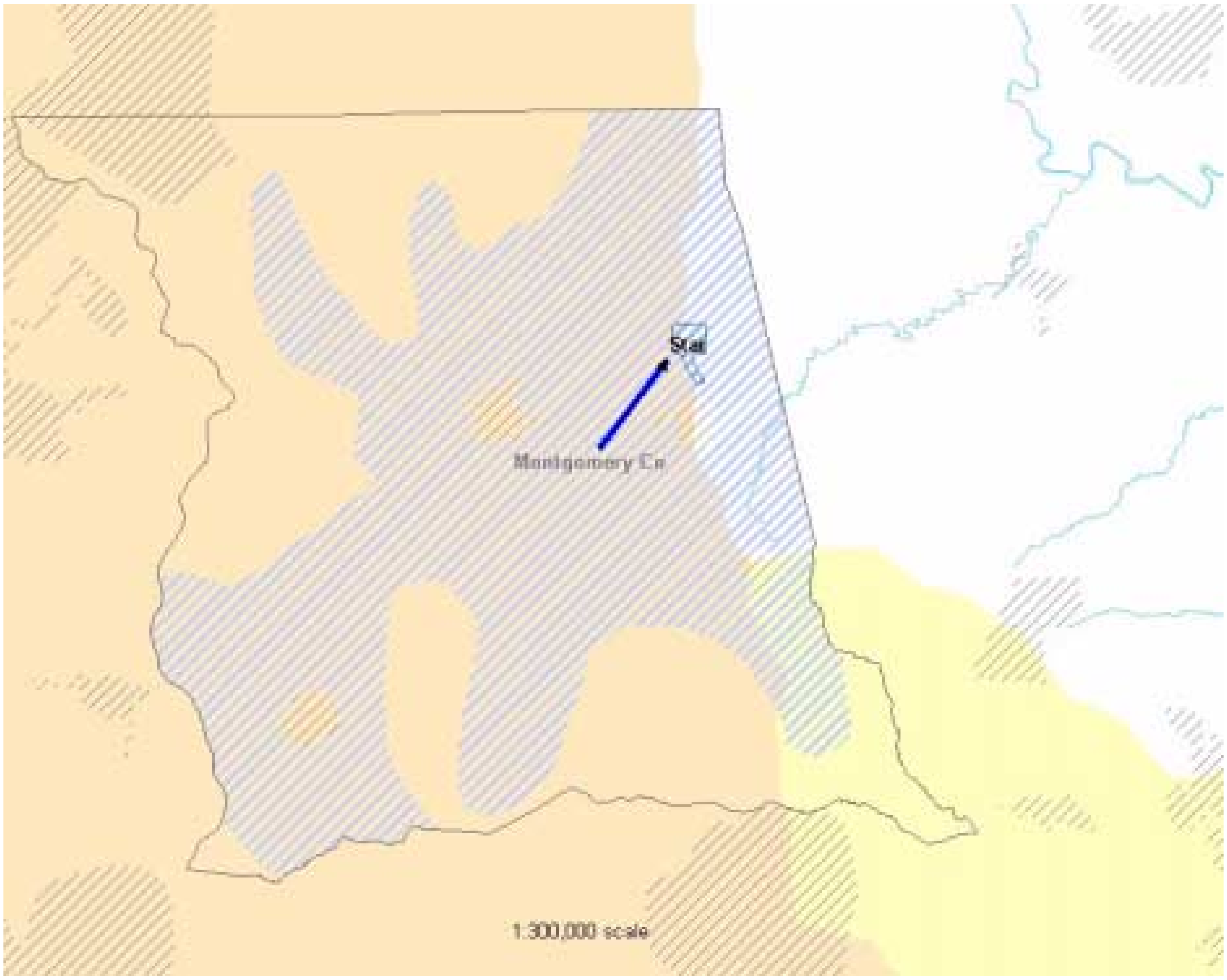
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-92-020-045	5	WAKE	CARY\APEX	02-1	source
03-92-075	5	WAKE	MORRISVILLE	02-1	source
none	5	WAKE	WAKE CO - RTP	02-1	source

Chatham Group



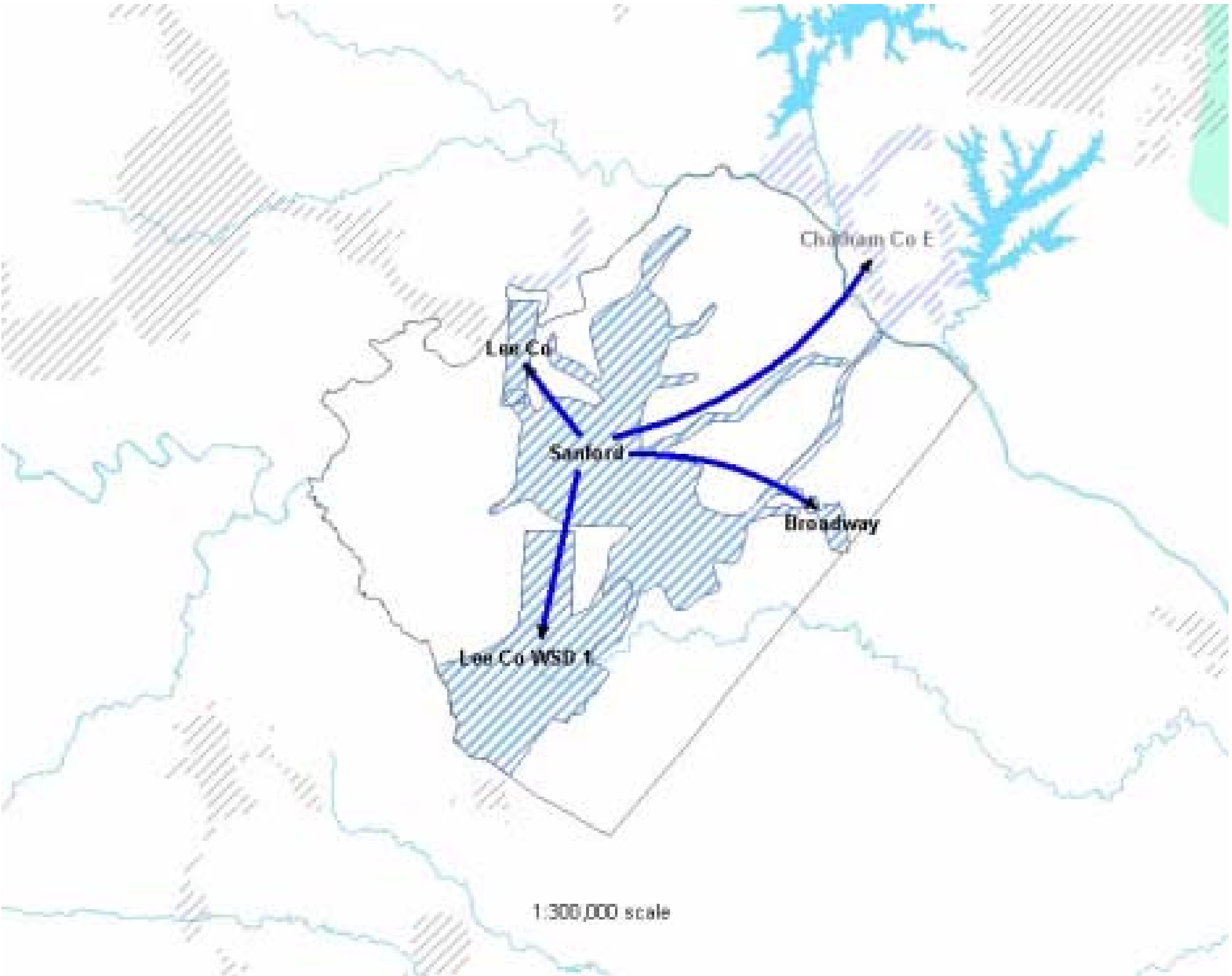
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-19-XXX	5	CHATHAM	CHATHAM CO COMBINED	02-1, 02-2	source
03-19-025		CHATHAM	GOLDSTON-GULF SD	02-2	source
03-19-015		CHATHAM	PITTSBORO	02-1	source
03-19-010		CHATHAM	SILER CITY	02-2	source

Star



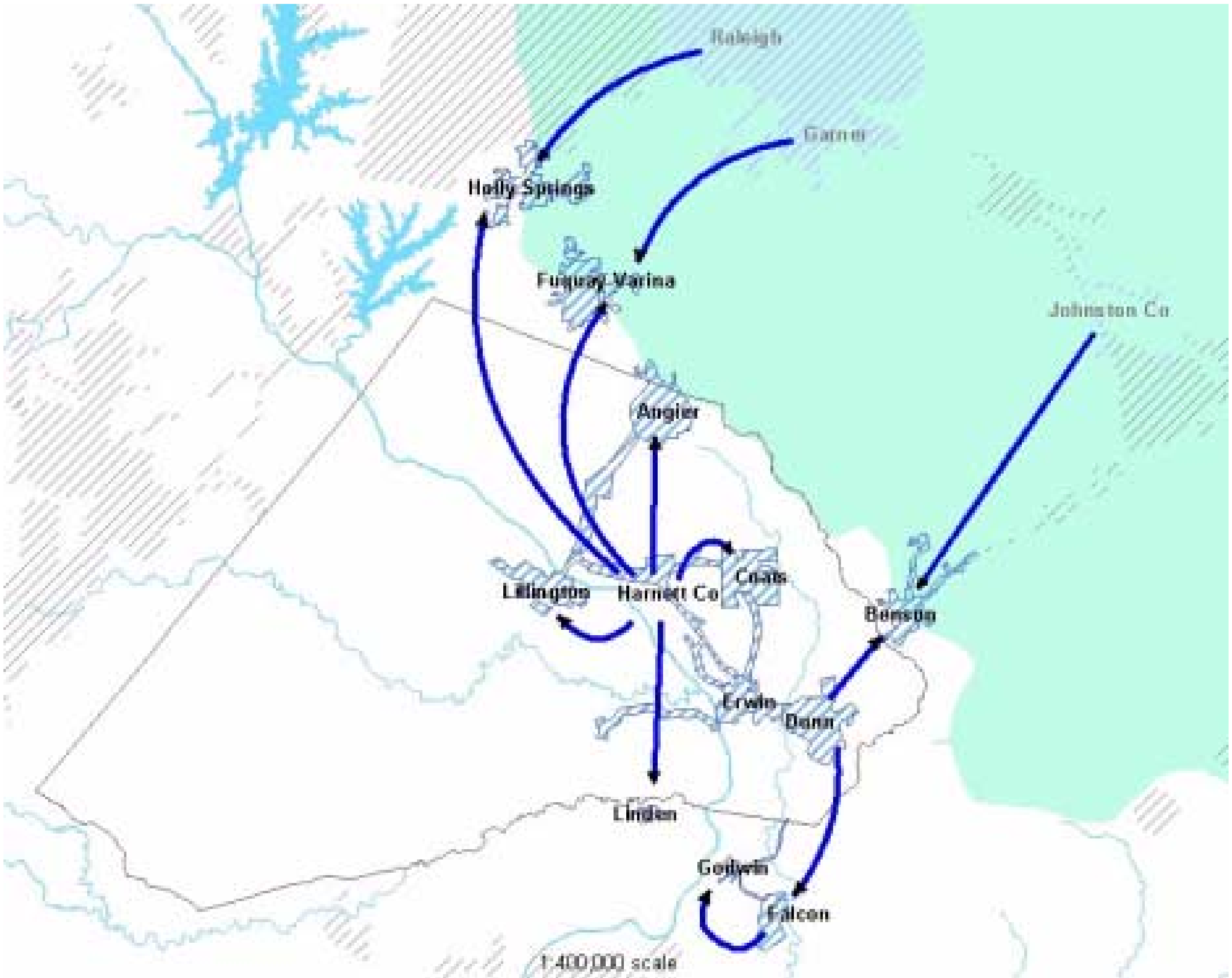
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-62-025		MONTGOMERY	STAR	18-1	discharge

Sanford Group



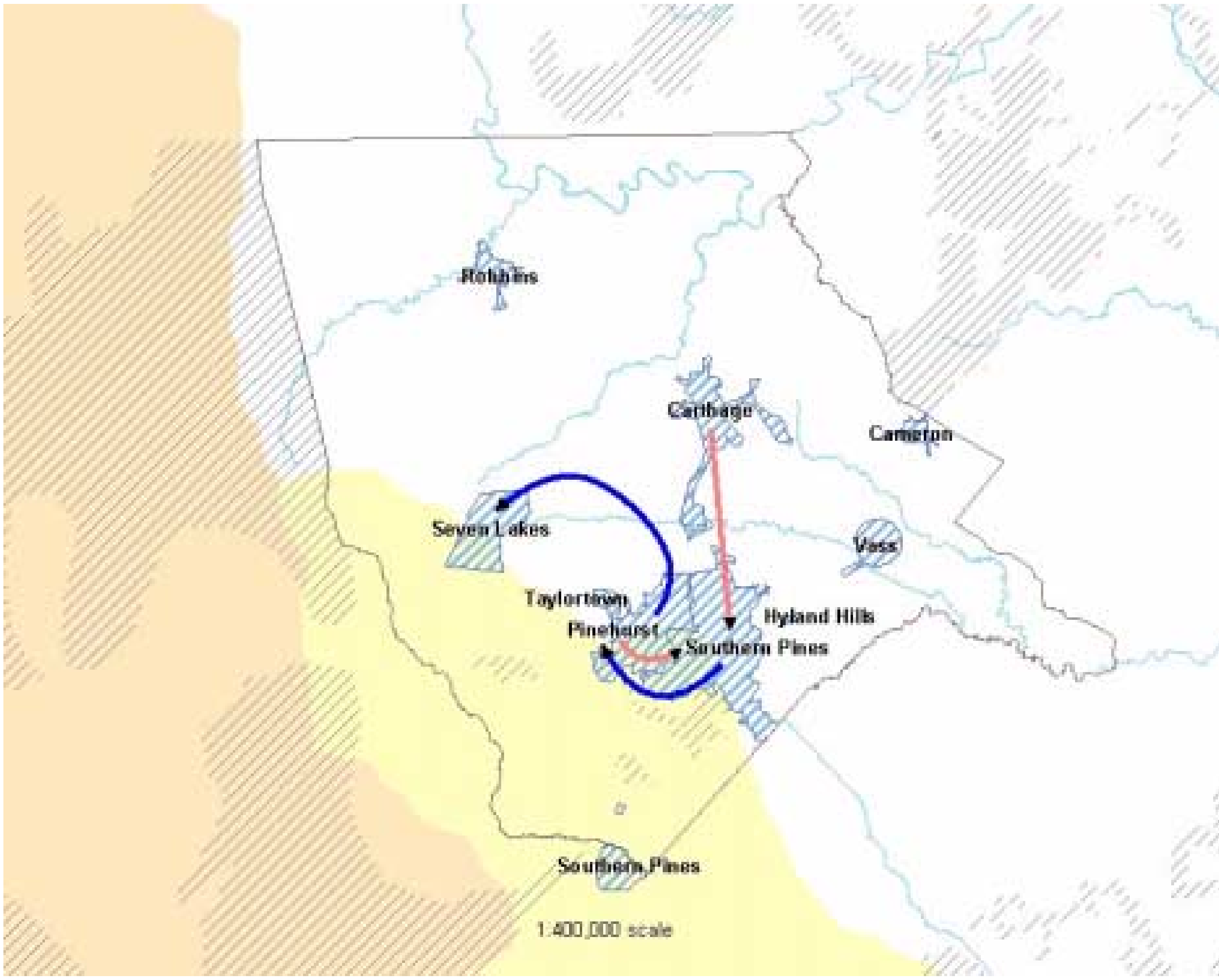
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-53-010	8	LEE	SANFORD (Lee Co WSD I)	02-3	source
03-53-015		LEE	BROADWAY	02-3	source
03-53-130		LEE	LEE CO	02-2	source

Harnett Group



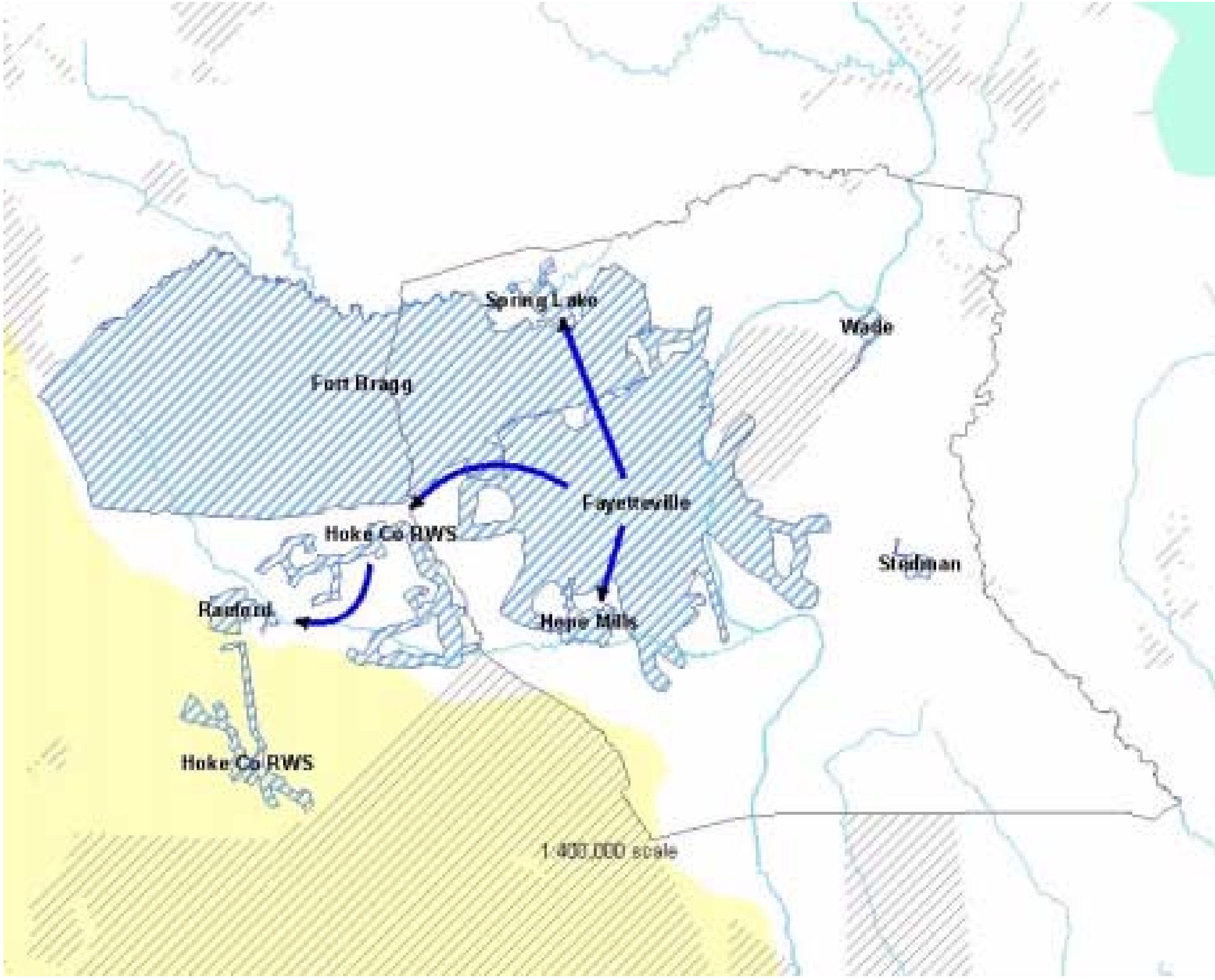
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-92-050	5	WAKE	HOLLY SPRINGS	02-1	future source
03-43-045	5	HARNETT	HARNETT CO (Combined)	02-3	source
03-92-055		WAKE	FUQUAY-VARINA	02-3	source
03-43-010		HARNETT	DUNN	02-3	source
03-51-025		JOHNSTON	BENSON	02-3	source
03-26-035		CUMBERLAND	FALCON	02-3	source
03-26-050		CUMBERLAND	GODWIN	02-3	source
03-43-035		HARNETT	ERWIN	02-3	source

Robbins, Cameron, Carthage, Hyland Hills, Vass, and Moore Group



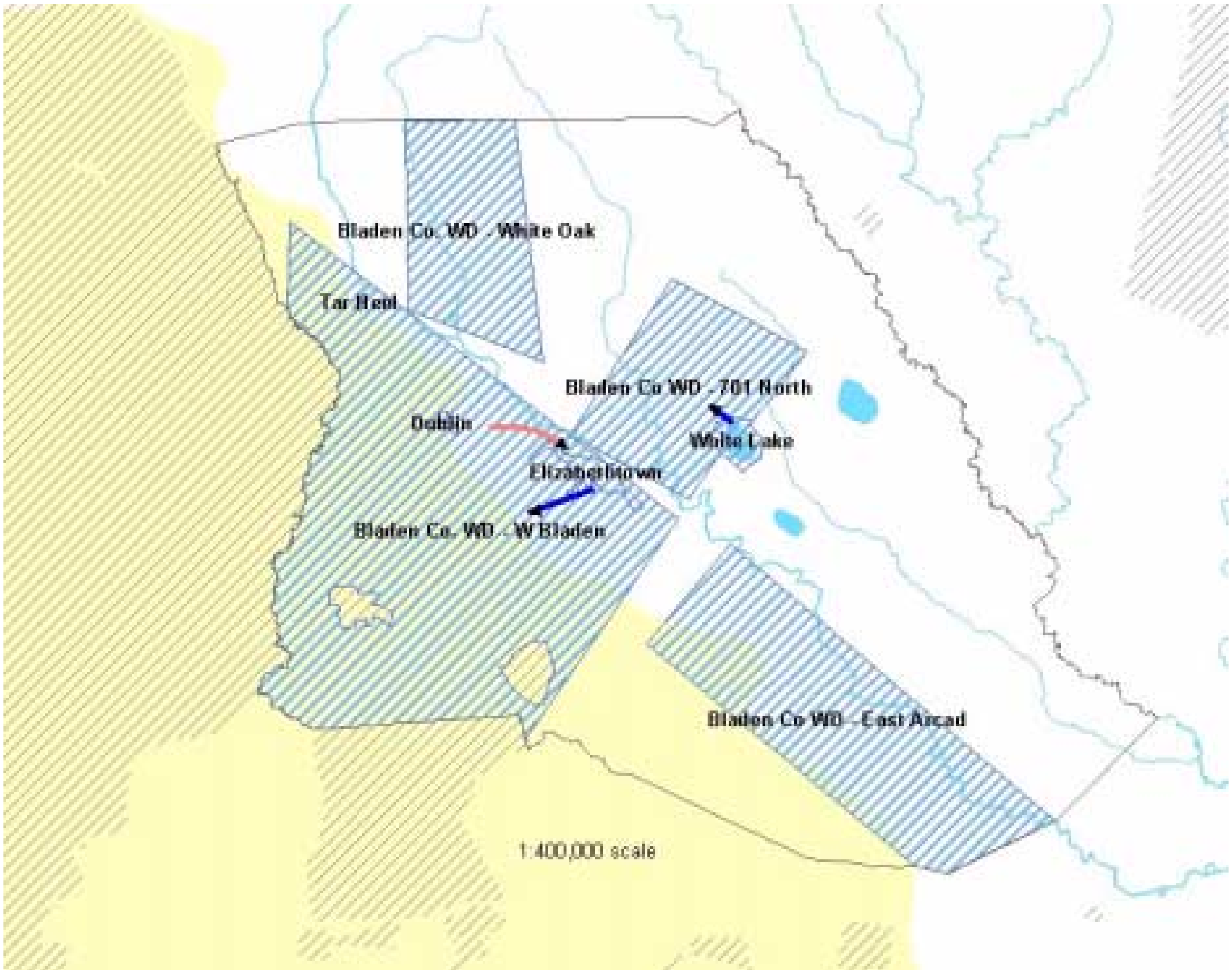
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-63-015		MOORE	ROBBINS	02-2	source
03-63-040		MOORE	CAMERON	02-3	source
03-63-025		MOORE	CARTHAGE	02-3	source
03-63-103		MOORE	MOORE CO (HYLAND HILLS - NIAGRA)	02-3	source
03-63-045		MOORE	MOORE CO (VASS)	02-3	source
03-63-010		MOORE	SOUTHERN PINES	09-1	servarea
03-63-108		MOORE	MOORE CO (PINEHURST)	02-3	source
03-63-117		MOORE	MOORE CO (SEVEN LAKES)	02-3	source
03-63-035	3	MOORE	TAYLORTOWN	02-3	source

Fayetteville Group



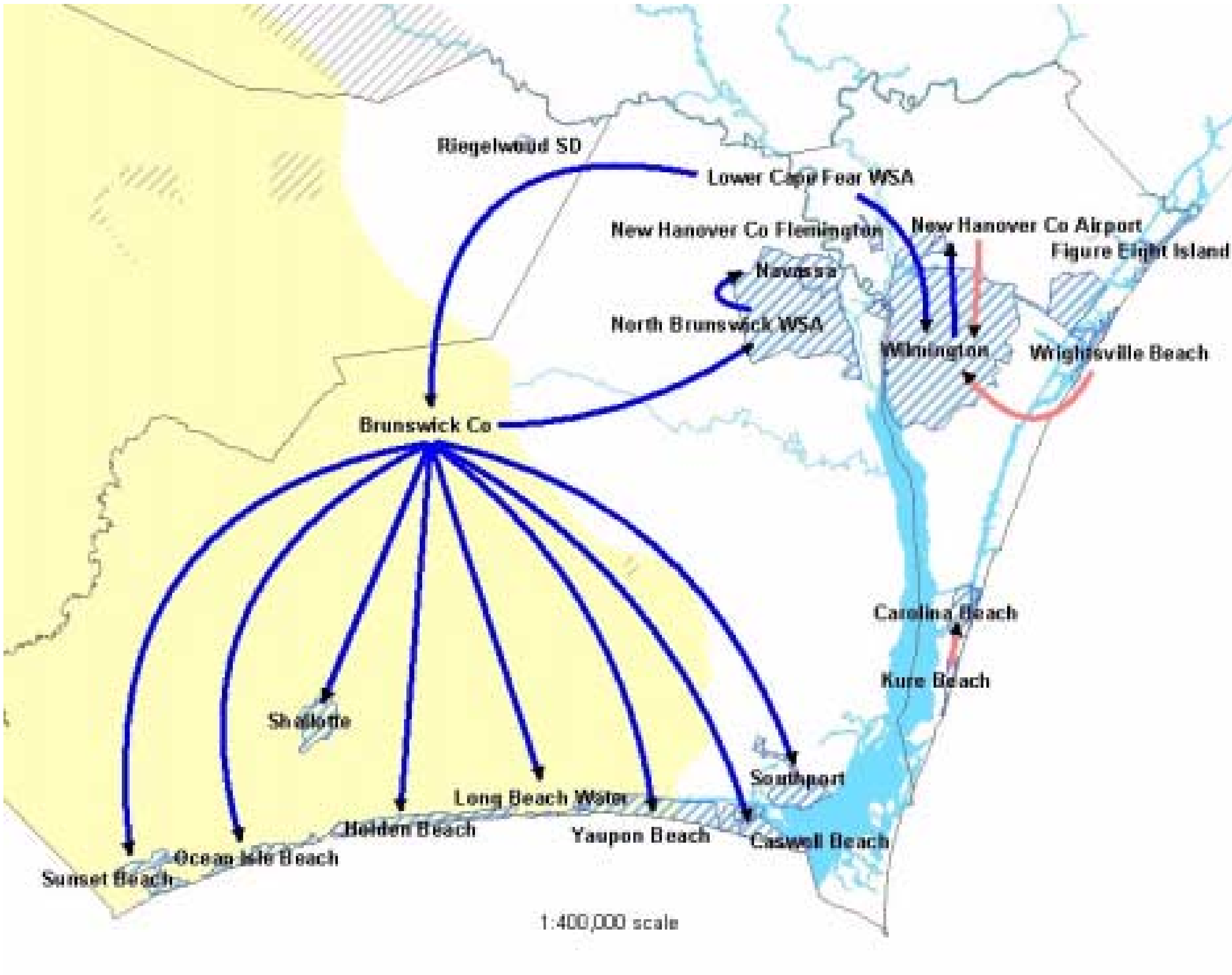
PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-26-010	5, 8	CUMBERLAND	FAYETTEVILLE	02-3	source
03-26-020		CUMBERLAND	SPRING LAKE	02-3	source
03-47-025		HOKE	HOKE CO RWS	09-1	servarea
03-47-010	3	HOKE	RAEFORD	09-1	discharge
03-26-040		CUMBERLAND	WADE	02-3	source
03-26-030		CUMBERLAND	STEDMAN	02-4	source
03-26-344		CUMBERLAND	FT BRAGG	02-3	source

Bladen Group



PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
03-09-010		BLADEN	ELIZABETHTOWN	02-3	source
03-09-030		BLADEN	WHITE LAKE	02-3	source
03-09-060		BLADEN	BLADEN CO WD - 701 NORTH	02-3	source
03-09-065		BLADEN	BLADEN CO WD - EAST ARCADIA	02-3	source
03-09-055		BLADEN	BLADEN CO WD - W BLADEN	09-1	servarea
03-09-035		BLADEN	BLADEN CO WD - WHITE OAK	02-3	source
03-09-025		BLADEN	DUBLIN	09-1	discharge
03-09-040		BLADEN	TAR HEEL	09-1	servarea

Lower Cape Fear WSA Group and Riegelwood



PWSID	Notes	COUNTY	WATER SYSTEM	SOURCE BASIN	WHY INCLUDED
04-65-010		NEW HANOVER	WILMINGTON	02-3	source
04-65-510		NEW HANOVER	NEW HANOVER CO AIRPORT	02-3	source
04-65-020		NEW HANOVER	WRIGHTSVILLE BEACH	02-6	source
04-65-226		NEW HANOVER	APPLE VALLEY	02-5	source
04-65-191		NEW HANOVER	NEW HANOVER CO FLEMINGTON	02-3	source
04-65-119		NEW HANOVER	FIGURE EIGHT ISLAND	02-6	source
04-65-015		NEW HANOVER	CAROLINA BEACH	02-3	source
04-65-025		NEW HANOVER	KURE BEACH	02-3	source
04-65-999		NEW HANOVER	LOWER CAPE FEAR WSA	02-3	source
04-10-045		BRUNSWICK	BRUNSWICK CO	02-3	source
04-10-035	3, 12	BRUNSWICK	NORTH BRUNSWICK WSA (LELAND SD)	02-3	source
04-10-065		BRUNSWICK	NAVASSA	02-3	source
04-10-055		BRUNSWICK	CASWELL BEACH	02-3	source
04-10-060		BRUNSWICK	HOLDEN BEACH	02-3	source
04-10-015		BRUNSWICK	LONG BEACH WATER	02-3	source
04-10-035		BRUNSWICK	OCEAN ISLE BEACH	02-3	source
04-10-025		BRUNSWICK	SHALLOTTE	02-3	source
04-10-010		BRUNSWICK	SOUTHPORT	02-3	source
04-10-050		BRUNSWICK	SUNSET BEACH	02-3	source
04-10-020		BRUNSWICK	YAUPON BEACH	02-3	source
04-65-137		NEW HANOVER	MONTEREY HEIGHTS	02-3	source
04-65-232		NEW HANOVER	MURRAYVILLE	02-5	source
04-65-154		NEW HANOVER	WALNUT HILLS	02-5	source
04-65-190		NEW HANOVER	RUNNYMEADE	02-5	source
04-65-188		NEW HANOVER	PRINCE GEORGE	02-5	source
04-65-229		NEW HANOVER	WESTBAY	02-6	source
04-65-192		NEW HANOVER	BRICKSTONE - MARSH OAKS	02-6	source
04-24-035		COLUMBUS	RIEGELWOOD SD	02-3	source

Available Water Supply

A crucial factor in determining whether a community has an adequate water supply is estimating the amount of water available to them. The methods used to estimate how much water is available differ depending on the source of water supply. It is important to remember that this analysis only looks at the quantity of water available. There may be water quality concerns at a particular intake location that limits the amount of water that can be withdrawn because of the affect on water quality.

Ground Water Supply

A practical definition of “yield” for a ground water well is the long-term rate at which water can be withdrawn without exceeding the natural recharge capability of the aquifer or, in coastal areas, without causing saltwater intrusion into the aquifer. Systems using ground water conduct a drawdown test, at least at initial well construction. The drawdown test determines how much water can be withdrawn from a well without exceeding the natural recharge capability of the associated aquifer. The results of the drawdown test are used to determine the maximum sustainable pumping rate, or yield, for the well. North Carolina requires at least a 24-hour drawdown test to determine well yield for public water supply wells (NCAC Title 15A, Subchapter 18C, Section .0402(f)(1)).

The Division of Environmental Health (DEH) requires that the combined yield of all wells of a water supply system be adequate to meet the average daily demand in 12 hours pumping time (Title 15A, Subchapter 18C, Section .0402(f)(3)). This requirement is intended to ensure that the system can provide adequate water to its customers during heavy use periods. The combined 12-hour supply for the wells supplying a water system is used in the water supply plan to determine the adequacy of the existing supplies. If the system needs to pump more than 12 hours a day to meet average system demands, the system administrators face the question of whether to encourage people to use less water or to develop additional sources of supply.

We used the data on existing 12-hour yield from the Local Water Supply Plans as the available supply from ground water sources for the systems included in this analysis.

Surface Water Supply

Reservoirs and run-of-river intakes are the two basic types of surface water supplies. Reservoirs impound surplus water during high flow periods for later use when stream flows would otherwise be insufficient to meet demand. Run-of-river intakes, on the other hand, simply withdraw a portion of the water in the stream or river as it flows by. The concept of safe yield or available supply is the same for both reservoir and run-of-river intake systems, but the methods for determining their safe yields are different. For a surface water source, the safe yield is the allowable draft rate at which water can be withdrawn during a low flow or drought event. The recurrence interval of a drought is an indication of the frequency at which a particular drought event is expected to occur on the average. A severe drought occurs less frequently than does a milder one and consequently has a greater recurrence interval.

Run-of-River Intake

Run-of-river intake systems differ from reservoirs in that they typically do not have the ability to augment water supply during extended dry weather periods; they simply withdraw a portion of the water in the stream or river as it flows by. During moderate to high flows this is not a problem. However, during low-flow periods this inability to augment flows through storage can be extremely critical. In some cases, even short-term low-flow events can result in water shortages if offstream storage is not available to augment water supply during these low flow periods.

A commonly used estimate of expected low flow levels is a measure of flow called the “7Q10”. The 7Q10 low flow is the lowest consecutive seven-day average flow expected to occur once on the average in 10 years. The 7Q10 is not the lowest flow of record, but rather the lowest 7-day average flow with a 10-year recurrence interval. It is also the minimum flow on which the Division of Water Quality bases its calculations of wasteload allocations for pollution discharge permits. A 10-year recurrence interval is frequent enough to warrant planning for such a flow. To protect aquatic ecosystems, run-of-river intakes are designed to withdraw only a portion of the 7Q10 low flow.

The impact of a water withdrawal on the local aquatic habitat can be evaluated on a site-by-site basis when determining the allowable withdrawal amount for a run-of-river intake. An instream-flow study is used to examine the affects of a withdrawal on the aquatic habitat at a particular location. The local habitat is assessed at various flow levels and a determination is made as to the quality of the habitat and the potential impacts of varying levels of withdrawals. These studies are time consuming and can be expensive. But, they provide a site-specific evaluation of the effects of potential withdrawals and help in designing intakes for specific conditions at a particular location. The alternative is to use a planning guideline that limits withdrawals to an amount that is unlikely to have serious effects on aquatic habitat during low flow conditions. In North Carolina this planning guideline is 20 percent of the 7Q10 flow.

If a proposed withdrawal will not take more than 20 percent of the 7Q10 flow there is a general presumption that it will have minimum effect on local habitat and additional studies are not automatically required. The 20 percent of the 7Q10 flow is not a limit on withdrawals, but rather a general planning guideline. If there are specific concerns at the proposed site, such as potential impacts on an endangered species, in-depth environmental studies can be required at any level of withdrawal. The 20 percent of the 7Q10 flow guideline is also the threshold that would trigger the need for an environmental assessment under the North Carolina Environmental Policy Act. A proposal to withdraw more than 20 percent of the 7Q10 flow of a watercourse will require the completion of an environmental assessment before a decision can be made on necessary permits.

If 20 percent of the 7Q10 does not provide enough water to meet the expected water demands of a particular system then an instream-flow study will help determine if more water can be withdrawn without seriously harming aquatic habitat. In addition, an environmental assessment will be required to identify any other environmental factors that may limit the withdrawal of water.

We used 20 percent of the 7Q10 flow to determine the available supply for run-of-river intakes unless we had more specific information. Remember that 20 percent of the 7Q10 only indicates the point at which a greater withdrawal would require additional study. The Cape Fear River Hydrologic Model provides a much more meaningful indication of available supply for run-of-river intakes. This is discussed later.

Reservoir Intakes

Water supply reservoirs impound water during high flow periods for later use when stream flows would be less than demand. Stream flows and reservoir storage capacity will determine how much water is available, or how many days of supply are available given a particular daily rate of use. Water can be stored by damming a stream channel or by developing an off-stream storage facility. In either case the recurrence interval of drought has to be considered. For any given impoundment the estimated safe yield is qualified by the drought recurrence interval the calculation is based on.

Typically, a drought event with a 20-year or 50-year recurrence interval is used for public water supply planning purposes. A 20-year safe yield (SY20) is the allowable draft rate that the supply can be expected to sustain 19 years out of 20. This implies that in any given year there would be a 5 percent risk that the SY20 cannot be sustained. For water systems serving less than 50,000 people a 20-year safe yield analysis is probably adequate. For systems serving more than 50,000 people a 50-year safe yield analysis is recommended. This provides an estimated withdrawal that can be sustained 49 years out of 50 with a resulting 2 percent risk that the withdrawal cannot be sustained in any year.

We used the safe yield figures provided in each water system's Local Water Supply Plan for systems reservoir intakes. Most surface water systems cannot use the entire amount of their available supply because of treatment limitations. We assumed that if water were available at the current intake, then systems would expand facilities to produce more water when demand approached treatment capacity.

Purchased Supply

Many water systems buy water from a neighboring system. The Division of Water Resources encourages systems that buy or sell water to develop contracts for the transactions. Contracts make clear to all parties the amount of water to be available and the length of time it will be available. Systems that buy water need to know how much water they can get and for how long. While sellers need to plan to have the committed amount of water available when needed. We used the contract limits for purchases not designated as "emergency" in the Local Water Supply Plan database as the existing available supply from bulk water sellers for systems purchasing water. For systems for which purchasing water is their only supply, we assumed the existing arrangements would remain in place over the fifty year planning horizon. We also assumed that sellers would provide the amount needed for purchasers to meet estimated demands, regardless of current contract limits.

Water Demand v. Supply

It is important to remember that this analysis does not answer the question: will this system have enough water to meet its projected demand in 2050? This analysis answers the question: is there enough water available in a particular area to meet the 2050 demands of the water supply systems in that area? The results of this analysis show that there appears to be enough water to meet the demands reflected in the 2050 estimates, if communities can develop the infrastructure to make use of it. However, the ability to develop efficient distribution systems and the ability to have additional water available by the time it is needed will depend on other factors such as funding and regional cooperation. The demand projections and available supply figures for each water system in our analysis are listed in the following tables, organized by the system groups previously discussed. Our analysis of individual water system supplies is in Appendix C. Once again, the focus of the analysis was to determine if there is enough water available in the region to meet water supply needs over the next fifty years.

Reidsville Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
REIDSVILLE		3.537	3.626	3.674	3.836	3.961	4.086	19.000
ROCKINGHAM CO	1	0.175	0.176	0.176	0.180	0.181	0.182	0.000
Group Total for Cape Fear RB		**3.712**	**3.802**	**3.850**	**4.015**	**4.142**	**4.268**	**19.000**

Greensboro Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
GREENSBORO		40.185	42.155	43.731	45.908	47.896	49.885	64.510
HIGH POINT		14.001	14.648	15.339	16.373	17.290	18.206	31.520
JAMESTOWN		0.471	0.565	0.660	0.807	0.932	1.058	1.200
ARCHDALE		0.664	0.995	1.327	1.628	1.943	2.257	1.200
RANDLEMAN		1.385	1.529	1.671	1.899	2.095	2.292	2.510
ASHEBORO	29	4.707	5.255	5.785	6.081	6.476	6.872	19.500
ASHEBORO (from Yadkin RB)	30	4.707	5.255	5.785	6.081	6.476	6.872	19.500
RANDOLPH CO		0.000	10.286	11.848	13.446	15.030	16.614	6.000
Group Total for Cape Fear RB		**56.706**	**70.179**	**74.576**	**80.061**	**85.187**	**90.313**	**106.940**

Liberty

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
LIBERTY		0.319	0.351	0.386	0.410	0.439	0.468	0.797
Group Total for Cape Fear RB		**0.319**	**0.351**	**0.386**	**0.410**	**0.439**	**0.468**	**0.797**

Ramseur Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
RAMSEUR		0.571	0.633	0.691	0.768	0.838	0.907	1.500
FRANKLINVILLE		0.065	0.069	0.074	0.101	0.119	0.137	0.000
Group Total for Cape Fear RB		**0.636**	**0.702**	**0.765**	**0.869**	**0.957**	**1.045**	**1.500**

Burlington Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
BURLINGTON		12.776	13.617	14.437	16.101	17.458	18.815	48.000
ALAMANCE		0.037	0.040	0.044	0.049	0.053	0.057	0.000
ELON COLLEGE		0.492	0.524	0.556	0.606	0.649	0.692	0.123
GIBSONVILLE	3	0.687	0.893	1.160	1.397	1.640	1.884	0.131
OSSIPEE SD	3	0.032	0.034	0.036	0.041	0.045	0.050	0.071
GRAHAM		2.034	2.376	2.780	3.135	3.502	3.869	8.000
MEBANE		1.682	2.354	2.922	3.704	4.427	5.151	4.000
HAW RIVER	4	0.927	1.065	0.854	0.935	1.001	1.068	0.000
GREEN LEVEL	3	0.075	0.078	0.081	0.085	0.090	0.094	0.000
ORANGE-ALAMANCE/ORANGE CO	5, 29	1.167	1.591	2.232	2.825	3.418	4.011	1.470
ORANGE-ALAMANCE (from Neuse RB)	30	0.370	0.370	0.370	0.370	0.370	0.370	0.370
Group Total for Cape Fear RB		**19.539**	**22.202**	**24.732**	**28.508**	**31.914**	**35.320**	**61.425**

OWASA

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
OWASA	5	9.300	11.200	13.000	14.900	16.700	18.400	19.300
Group Total for Cape Fear RB		**9.300**	**11.200**	**13.000**	**14.900**	**16.700**	**18.400**	**19.300**

Durham

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
DURHAM	5, 29	31.000	37.200	42.800	46.300	48.600	51.000	47.000
DURHAM (from Neuse RB)	30	31.000	37.000	37.000	37.000	37.000	37.000	37.000
Group Total for Cape Fear RB		**0.000**	**0.200**	**5.800**	**9.300**	**11.600**	**14.000**	**10.000**

Cary Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
CARY\APEX	5	12.700	18.700	25.900	31.500	34.000	34.000	32.000
MORRISVILLE	5	1.000	2.200	2.800	3.200	3.200	3.200	3.500
WAKE CO - RTP	5	0.300	1.700	2.600	3.400	3.900	4.400	3.500
Group Total for Cape Fear RB		**14.000**	**22.600**	**31.300**	**38.100**	**41.100**	**41.600**	**39.000**

Chatham Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
CHATHAM CO COMBINED	5	1.300	6.200	8.100	10.900	14.900	20.700	6.000
GOLDSTON-GULF SD	7	0.140	0.140	0.140	0.140	0.140	0.140	2.240
PITTSBORO	7	1.200	1.800	2.300	3.000	3.900	5.600	9.800
SILER CITY	7	3.100	3.500	4.400	5.300	6.500	7.800	5.800
Group Total for Cape Fear RB		**5.740**	**11.640**	**14.940**	**19.340**	**25.440**	**34.240**	**23.840**

Star

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
STAR	4, 29	0.473	0.577	0.483	0.496	0.510	0.525	0.904
STAR (from Yadkin RB)	30	0.473	0.577	0.483	0.496	0.510	0.525	0.904
Group Total for Cape Fear RB		**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Sanford Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
SANFORD (Lee Co WSD I)		6.300	9.400	13.600	19.100	26.400	36.600	61.600
BROADWAY		0.094	0.108	0.114	0.125	0.135	0.145	0.063
LEE CO	4	0.828	1.116	0.764	0.769	0.774	0.778	2.197
Group Total for Cape Fear RB		**7.222**	**10.625**	**14.478**	**19.994**	**27.309**	**37.523**	**63.860**

Harnett Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
HOLLY SPRINGS	5	0.900	4.400	8.300	12.200	14.700	15.300	34.250
HARNETT CO (Combined)	5	6.400	7.700	9.900	12.800	16.400	21.300	34.250
FUQUAY-VARINA		1.008	2.102	4.481	5.478	6.897	8.316	0.000
DUNN		2.289	2.508	2.717	3.095	3.414	3.733	69.800
BENSON		1.454	1.772	2.161	2.570	2.960	3.350	0.000
FALCON		0.080	0.085	0.090	0.096	0.103	0.109	0.000
GODWIN		0.013	0.014	0.016	0.017	0.019	0.020	0.000
ERWIN		0.680	0.780	0.880	0.968	1.063	1.158	5.000
Group Total for Cape Fear RB		**12.823**	**19.361**	**28.544**	**37.225**	**45.556**	**53.286**	**143.300**

Robbins

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
ROBBINS	4	0.831	0.872	0.830	0.844	0.855	0.865	1.500
Group Total for Cape Fear RB		**0.831**	**0.872**	**0.830**	**0.844**	**0.855**	**0.865**	**1.500**

Cameron

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
CAMERON		0.059	0.066	0.072	0.082	0.091	0.100	0.134
Group Total for Cape Fear RB		**0.059**	**0.066**	**0.072**	**0.082**	**0.091**	**0.100**	**0.134**

Carthage

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
CARTHAGE		0.303	0.331	0.359	0.410	0.451	0.492	1.000
Group Total for Cape Fear RB		**0.303**	**0.331**	**0.359**	**0.410**	**0.451**	**0.492**	**1.000**

Hyland Hills

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
MOORE CO (HYLAND HILLS - NIAGRA)		0.018	0.019	0.020	0.024	0.027	0.030	0.032
Group Total for Cape Fear RB		**0.018**	**0.019**	**0.020**	**0.024**	**0.027**	**0.030**	**0.032**

Vass

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
MOORE CO (VASS)		0.096	0.122	0.155	0.178	0.204	0.230	1.450
Group Total for Cape Fear RB		**0.096**	**0.122**	**0.155**	**0.178**	**0.204**	**0.230**	**1.450**

Moore Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
SOUTHERN PINES		2.056	2.303	2.519	2.768	3.009	3.251	8.000
SOUTHERN PINES (from Lumber RB)	30	2.056	2.303	2.519	2.768	3.009	3.251	8.000
MOORE CO (PINEHURST)		1.813	2.671	3.687	4.522	5.413	6.303	2.386
PINEHURST (from Lumber RB)	30	0.000	0.285	1.301	2.136	3.027	3.917	0.000
MOORE CO (SEVEN LAKES)		0.304	0.412	0.522	0.633	0.744	0.854	0.341
SEVEN LAKES (from Lumber RB)	30	0.000	0.071	0.181	0.292	0.403	0.513	0.000
TAYLORTOWN	3	0.037	0.047	0.059	0.069	0.079	0.089	0.081
TAYLORTOWN (from Lumber RB)	30	0.000	0.000	0.000	0.000	0.000	0.008	0.000
Group Total for Cape Fear RB		**2.154**	**2.774**	**2.786**	**2.796**	**2.806**	**2.808**	**2.808**

Fayetteville Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
FAYETTEVILLE	5, 8	25.900	36.100	47.300	59.300	66.900	76.000	85.800
SPRING LAKE		1.049	1.264	1.525	1.747	1.979	2.211	0.000
HOKE CO RWS	31	1.150	1.700	2.520	3.730	5.520	8.200	2.181
RAEFORD	3, 4	1.897	2.118	1.867	1.930	1.988	2.047	2.693
WADE		0.036	0.041	0.045	0.049	0.054	0.058	0.204
STEDMAN		0.080	0.090	0.100	0.109	0.118	0.128	0.157
FT BRAGG		7.560	7.560	7.560	7.560	7.560	7.560	20.000
Group Total for Cape Fear RB		**37.672**	**48.873**	**60.917**	**74.425**	**84.119**	**96.204**	**111.035**

Bladen Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
ELIZABETHTOWN		0.897	0.963	1.034	1.104	1.174	1.244	1.368
WHITE LAKE		0.249	0.259	0.270	0.281	0.292	0.303	0.950
BLADEN CO WD - 701 NORTH		0.087	0.115	0.144	0.191	0.231	0.271	0.144
BLADEN CO WD - EAST ARCADIA		0.098	0.138	0.178	0.248	0.307	0.366	0.198
BLADEN CO WD - W BLADEN		0.418	0.505	0.592	0.739	0.862	0.984	0.641
BLADEN CO WD - WHITE OAK		0.099	0.129	0.159	0.214	0.260	0.306	0.306
DUBLIN		0.048	0.048	0.048	0.057	0.062	0.067	0.050
TAR HEEL		0.028	0.030	0.032	0.034	0.036	0.038	0.318
Group Total for Cape Fear RB		**1.923**	**2.187**	**2.457**	**2.869**	**3.224**	**3.580**	**3.975**

Lower Cape Fear WSA Group

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
WILMINGTON		11.543	11.952	13.078	14.386	15.541	16.696	53.300
NEW HANOVER CO AIRPORT	10	0.021	0.024	0.029	0.032	0.036	0.040	0.000
WRIGHTSVILLE BEACH		1.005	1.111	1.117	1.221	1.297	1.372	1.222
APPLE VALLEY		0.134	0.156	0.174	0.198	0.220	0.241	0.166
NEW HANOVER CO FLEMINGTON	4	0.312	0.362	0.293	0.302	0.308	0.315	0.432
FIGURE EIGHT ISLAND		0.355	0.399	0.444	0.517	0.579	0.642	0.564
CAROLINA BEACH		0.645	0.742	0.834	0.923	1.014	1.104	0.890
KURE BEACH		0.357	0.414	0.480	0.589	0.677	0.766	0.824
LOWER CAPE FEAR WSA	10	6.650	11.650	11.650	11.650	11.650	11.650	53.300
BRUNSWICK CO		11.628	14.466	17.022	20.432	23.509	26.586	0.000
NORTH BRUNSWICK WSA (LELAND SD)	3, 12	0.494	0.588	0.647	0.759	0.856	0.953	0.000
NAVASSA		0.047	0.053	0.062	0.069	0.076	0.084	0.000
CASWELL BEACH		0.169	0.220	0.275	0.270	0.292	0.314	0.000
HOLDEN BEACH		0.411	0.799	1.435	1.757	2.178	2.599	0.000
LONG BEACH WATER		0.822	1.030	1.293	1.575	1.842	2.110	0.000
OCEAN ISLE BEACH		0.490	0.589	0.708	0.869	1.013	1.157	0.000
SHALLOTTE		0.217	0.228	0.239	0.264	0.284	0.303	0.000
SOUTHPORT		0.660	0.800	0.928	1.117	1.282	1.446	0.000
SUNSET BEACH		0.584	0.628	0.677	0.894	1.040	1.185	0.000
YAUPON BEACH		0.167	0.185	0.204	0.229	0.251	0.273	0.000
MONTEREY HEIGHTS		0.109	0.122	0.134	0.149	0.163	0.177	0.360
MURRAYVILLE		1.333	1.667	1.917	2.243	2.549	2.855	2.916
WALNUT HILLS		0.079	0.092	0.103	0.117	0.130	0.143	0.148
RUNNYMEADE		0.057	0.066	0.074	0.084	0.094	0.103	0.144
PRINCE GEORGE		0.057	0.066	0.074	0.084	0.094	0.103	0.180
WESTBAY		0.043	0.050	0.056	0.063	0.070	0.077	0.792
BRICKSTONE - MARSH OAKS		0.065	0.075	0.084	0.096	0.106	0.117	0.216
Group Total for Cape Fear RB		**38.455**	**48.534**	**54.032**	**60.889**	**67.151**	**73.412**	**115.454**

Riegelwood

WATER SYSTEM	Notes	2000 SA Demand MGD	2010 SA Demand MGD	2020 SA Demand MGD	2030 SA Demand MGD	2040 SA Demand MGD	2050 SA Demand MGD	Total Available Supply MGD
RIEGELWOOD SD	4	0.643	0.734	0.611	0.620	0.627	0.635	106.100
Group Total for Cape Fear RB		**0.643**	**0.734**	**0.611**	**0.620**	**0.627**	**0.635**	**106.100**

Wastewater Discharge Projections

Used water has to be dealt with in any water system. In some systems wastewater is collected and treated at a wastewater treatment plant or water reclamation facility. Other systems rely on individual customers to develop on-site disposal systems, such as a household septic system, to handle their own wastewater. There are very few communities where all residents receive drinking water from a community water system and return all wastewater to a municipal wastewater treatment plant. Communities with sewer systems typically have a percentage of residents who are not connected to the sewer and use on-site disposal systems. In addition, there are many uses to which drinking water is put that do not allow recovery, such as lawn watering, fire fighting, street cleaning and cooling. Therefore, not all water withdrawn from a source is returned to a water body where it is available to other users. Each time a quantity of water is removed from the local water resource pool some of it is not returned and the amount available to other users is reduced.

Our method of projecting wastewater discharges was similar to our method of projecting water demands. Applicants for an allocation from Jordan Lake supplied estimates of future wastewater discharges. Local Water Supply Plans provide information on location of and average amount of wastewater discharges as well as discharge permit limits. We calculated a ratio of water discharged to water withdrawn in 1997 and used this ratio to estimate the amounts of future discharges based on our demand projections. We also calculated the ratio of wastewater discharged outside of the Cape Fear River Basin to total projected wastewater discharged for each water system. The wastewater discharge ratios we used are provided in tables on this and the following page.

System Wastewater Ratios

PWSID	Notes	WATER SYSTEM	Discharge / Withdrawal ratio	Out of CFRB / Total Discharge ratio
02-79-020		REIDSVILLE	0.818	0
02-79-050	1	ROCKINGHAM CO	0	0
02-41-010		GREENSBORO	0.829	0
02-41-020		HIGH POINT	0.929	0.281
02-41-030		JAMESTOWN	2.652	0
02-76-030		ARCHDALE	1.618	0
02-76-015		RANDLEMAN	0.895	0
02-76-010		ASHEBORO	1.186	0
none		RANDOLPH CO	0	0
02-76-025		LIBERTY	0	0
02-76-020		RAMSEUR	0.538	0
02-76-035		FRANKLINVILLE	0.851	0
02-01-010		BURLINGTON	1.191	0
02-01-035		ALAMANCE	0.515	0
02-01-025		ELON COLLEGE	1.276	0
02-41-010	3	GIBSONVILLE	0.355	0
02-01-123	3	OSSIPEE SD	0	0
02-01-015		GRAHAM	1.039	0
02-01-018		MEBANE	0.950	0
02-01-020	4	HAW RIVER	1.389	0
02-01-030	3	GREEN LEVEL	0.793	0
03-68-020	5	ORANGE-ALAMANCE/ORANGE CO	0	0
03-68-010	5	OWASA	0.861	0
03-32-010	5	DURHAM	0.713	0.402
03-92-020-045	5	CARY\APEX	0.828	IBT certificate
03-92-075	5	MORRISVILLE	0.705	IBT certificate
none	5	WAKE CO - RTP	0.429	IBT certificate
03-19-XXX	5	CHATHAM CO (Combined)	0.012	0
03-19-025	7	GOLDSTON-GULF SD	0.025	0
03-19-015	7	PITTSBORO	0.441	0
03-19-010	7	SILER CITY	1.008	0
03-62-025	4	STAR	0.652	0
03-53-010		SANFORD (Lee Co WSD I)	0.700	0
03-53-015		BROADWAY	0.849	0
03-53-130	4	LEE CO	0	0
03-92-050	5	HOLLY SPRINGS	0.728	0
03-43-045	5	HARNETT CO (Combined)	0.203	0
03-92-055		FUQUAY-VARINA	1.056	0.156
03-43-010		DUNN	1.131	0
03-51-025		BENSON	1.120	1.000
03-26-035		FALCON	0	0
03-26-050		GODWIN	0	0
03-43-035		ERWIN	0.956	0

System Wastewater Ratios

PWSID	Notes	WATERSYS	Discharge / Withdrawal ratio	Out of CFRB / Total Discharge ratio
03-63-015	4	ROBBINS	0.902	0
03-63-040		CAMERON	0	0
03-63-025		CARTHAGE	0.370	1.000
03-63-103		MOORE CO (HYLAND HILLS - NIAGRA)	0	0
03-63-045		MOORE CO (VASS)	0.074	0
03-63-010		SOUTHERN PINES	2.775	1.000
03-63-108		MOORE CO (PINEHURST)	1.097	1.000
03-63-117		MOORE CO (SEVEN LAKES)	0	0
03-63-035	3	TAYLORTOWN	0	0
03-26-010	5, 8	FAYETTEVILLE	0.861	0
03-26-020		SPRING LAKE	0.807	0
03-47-025	15	HOKE CO RWS	0.8	1.000
03-47-010	3, 4	RAEFORD	0.870	0
03-26-040		WADE	0	0
03-26-030		STEDMAN	0	0
03-26-344		FT BRAGG	0.762	0.001
03-09-010		ELIZABETHTOWN	0.661	0
03-09-030		WHITE LAKE	1.121	0
03-09-060		BLADEN CO WD - 701 NORTH	0	0
03-09-055		BLADEN CO WD - W BLADEN	0	0
03-09-065		BLADEN CO WD - EAST ARCADIA	0	0
03-09-035		BLADEN CO WD - WHITE OAK	0	0
03-09-025		DUBLIN	1.300	0
03-09-040		TAR HEEL	0	0
04-65-010		WILMINGTON	1.115	0
04-65-510	10, 15	NEW HANOVER CO AIRPORT	0.8	0
04-65-020		WRIGHTSVILLE BEACH	0.563	0
04-65-226		APPLE VALLEY	0	0
04-65-191	4	NEW HANOVER CO FLEMINGTON	0	0
04-65-119		FIGURE EIGHT ISLAND	0	0
04-65-015		CAROLINA BEACH	2.114	0
04-65-025		KURE BEACH	1.068	0
04-65-999	10	LOWER CAPE FEAR WSA	0	0
04-10-045		BRUNSWICK CO	0.002	0
04-10-035	3, 12	NORTH BRUNSWICK WSA (LELAND SD)	0	0
04-10-065		NAVASSA	0	0
04-10-055		CASWELL BEACH	0	0
04-10-060		HOLDEN BEACH	0	0
04-10-015		LONG BEACH WATER	0	0
04-10-035		OCEAN ISLE BEACH	0	0
04-10-025		SHALLOTTE	0	0
04-10-010		SOUTHPORT	0.809	0
04-10-050		SUNSET BEACH	0	0
04-10-020		YAUPON BEACH	0	0
04-65-137		MONTEREY HEIGHTS	0.435	0
04-65-232		MURRAYVILLE	0.098	0
04-65-154		WALNUT HILLS	1.039	0
04-65-190	15	RUNNYMEADE	0.8	0
04-65-188		PRINCE GEORGE	0	0
04-65-229	15	WESTBAY	0.8	0
04-65-192	15	BRICKSTONE - MARSH OAKS	0.8	0
04-24-035	4	RIEGELWOOD SD	0	0

Wastewater Discharges v. Permit Limits

As with drinking water, many communities have connections with other systems for wastewater collection and treatment. Collection and treatment of wastewater provides another means of grouping mutually dependent systems. For our analysis of wastewater disposal, we again grouped water systems by their interconnections. The movement of wastewater does not necessarily follow the same pattern as the movement of drinking water, so the two means of grouping systems result in somewhat different groups. Wastewater discharge projections and current NPDES (National Pollution Discharge Elimination System) permit limits for each water system in our analysis are listed in the tables at the end of this section, organized by system groups. Our analysis of individual system wastewater discharges is in Appendix D.

The assumption about the ratio of "wastewater to raw water withdrawn" has a couple of implications that are important to keep in mind when considering this analysis. This assumption implies that a community's sewer system will expand in such a way as to generate the same ratio of wastewater from the service population of water customers as it did in 1997. One way to think about this is that for a system with only residential customers on the sewer system, if the sewer served 20% of water customers in 1997 this assumption implies it will be serving about 20% of estimated water customers in 2050. For water systems that expect to expand their sewer systems to serve a higher percentage of their population the method used in this analysis will underestimate how much wastewater they can expect to produce. This assumption also implies that the residents that are not served by the sewer system have acceptable alternative disposal options available to them. On-site disposal options are limited by soil and land use characteristics that can vary significantly throughout the basins and within a water system's service area. As populations grow and the number of water customers using on-site disposal systems increases communities may see a rise in the amount of land that needs to be dedicated to on-site disposal of wastewater.

If the amounts of treated wastewater that a community or group can discharge to the waters of the state exceed NPDES limits and these limits cannot be increased, then they may have to develop alternative disposal systems. An effective demand management program could help control growth in water demand as populations increase, but as a community adds more people it will use more water and generate more wastewater. Developing a non-discharge disposal system will require dedication of land for the disposal of wastewater. The actual amount of land will vary with soil and the amount of water to be applied. An inability to increase discharges could limit a community's ability to grow because of the difficulty of dealing with wastewater and/or the amount of land that would be required to deal with wastewater. So, while our analysis shows that there appears to be enough water available for communities in these basins to meet their projected demands this may become a moot point if they cannot handle the wastewater they will generate. The following tables show our estimates of wastewater discharges and their projected contribution to flows in the Cape Fear River Basin, as well as current discharge permit limits. The notes included in the tables are explained in Appendix A.

Reidsville

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
REIDSVILLE		2.894	2.968	3.007	3.139	3.242	3.344	7.500
Group Total for Cape Fear RB		**2.894**	**2.968**	**3.007**	**3.139**	**3.242**	**3.344**	**7.500**

Greensboro Group

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
GREENSBORO		33.326	34.960	36.267	38.072	39.722	41.371	38.072
HIGH POINT	13	13.002	13.603	14.244	15.205	16.056	16.907	22.200
HIGH POINT (to Yadkin RB)	14	3.656	3.825	4.006	4.276	4.515	4.755	6.200
JAMESTOWN		1.250	1.500	1.750	2.139	2.472	2.806	0.000
ARCHDALE		1.074	1.611	2.148	2.635	3.144	3.654	0.000
Group Total for Cape Fear RB		**44.995**	**47.848**	**50.403**	**53.776**	**56.879**	**59.983**	**54.072**

Randleman

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
RANDLEMAN		1.239	1.368	1.496	1.699	1.875	2.050	1.745
Group Total for Cape Fear RB		**1.239**	**1.368**	**1.496**	**1.699**	**1.875**	**2.050**	**1.745**

Asheboro

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
ASHEBORO		5.582	6.231	6.859	7.211	7.680	8.148	9.000
Group Total for Cape Fear RB		**5.582**	**6.231**	**6.859**	**7.211**	**7.680**	**8.148**	**9.000**

Ramseur

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
RAMSEUR		0.307	0.340	0.371	0.413	0.450	0.488	0.480
Group Total for Cape Fear RB		**0.307**	**0.340**	**0.371**	**0.413**	**0.450**	**0.488**	**0.480**

Franklinville

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
FRANKLINVILLE		0.055	0.058	0.063	0.086	0.102	0.117	0.030
Group Total for Cape Fear RB		**0.055**	**0.058**	**0.063**	**0.086**	**0.102**	**0.117**	**0.030**

Burlington Group

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
BURLINGTON		15.213	16.215	17.190	19.172	20.788	22.403	24.000
ALAMANCE		0.019	0.021	0.023	0.025	0.027	0.029	0.000
ELON COLLEGE		0.628	0.669	0.710	0.773	0.828	0.883	0.000
GIBSONVILLE	3	0.244	0.317	0.412	0.496	0.582	0.669	0.000
GRAHAM		2.113	2.468	2.888	3.257	3.639	4.020	3.500
HAW RIVER		1.288	1.479	1.187	1.298	1.391	1.483	0.000
GREEN LEVEL	3	0.059	0.062	0.064	0.068	0.071	0.074	0.000
Group Total for Cape Fear RB		**19.564**	**21.230**	**22.473**	**25.089**	**27.326**	**29.562**	**27.500**

Mebane

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
MEBANE		1.599	2.238	2.778	3.521	4.208	4.896	2.500
Group Total for Cape Fear RB		**1.599**	**2.238**	**2.778**	**3.521**	**4.208**	**4.896**	**2.500**

OWASA and Durham

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
OWASA	5	8.011	9.647	11.198	12.834	14.385	15.849	12.000
DURHAM	5, 13	22.111	26.533	30.527	33.024	34.664	36.376	46.000
DURHAM (to Neuse RB)	14	8.884	10.661	12.265	13.268	13.928	14.615	20.000
Group Total for Cape Fear RB		**21.238**	**25.520**	**29.460**	**32.589**	**35.121**	**37.610**	**38.000**

Cary Group

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
CARY\APEX	5	10.514	15.482	21.442	26.079	28.148	28.148	31.600
MORRISVILLE	5	0.705	1.552	1.975	2.257	2.257	2.257	0.000
WAKE CO - RTP	5	0.129	0.729	1.114	1.457	1.671	1.886	0.000
GROUP TOTAL (to Neuse RB)	28	11.348	16.000	16.000	16.000	16.000	16.000	31.600
Group Total for Cape Fear RB		**0.000**	**1.762**	**8.531**	**13.793**	**16.077**	**16.291**	**0.000**

Chatham

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
CHATHAM CO COMBINED	5	0.016	0.074	0.097	0.131	0.179	0.248	0.0750
Group Total for Cape Fear RB		**0.016**	**0.074**	**0.097**	**0.131**	**0.179**	**0.248**	**0.0750**

Goldston-Gulf

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
GOLDSTON-GULF SD	7	0.004	0.004	0.004	0.004	0.004	0.004	0.006
Group Total for Cape Fear RB		**0.004**	**0.004**	**0.004**	**0.004**	**0.004**	**0.004**	**0.006**

Pittsboro

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
PITTSBORO	7	0.530	0.794	1.015	1.324	1.721	2.471	0.750
Group Total for Cape Fear RB		**0.530**	**0.794**	**1.015**	**1.324**	**1.721**	**2.471**	**0.750**

Siler City

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
SILER CITY	7	3.124	3.527	4.434	5.341	6.550	7.860	4.000
Group Total for Cape Fear RB		**3.124**	**3.527**	**4.434**	**5.341**	**6.550**	**7.860**	**4.000**

Star

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
STAR		0.309	0.376	0.315	0.323	0.333	0.342	0.600
Group Total for Cape Fear RB		**0.309**	**0.376**	**0.315**	**0.323**	**0.333**	**0.342**	**0.600**

Sanford

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
SANFORD (Lee Co WSD I)		4.408	6.577	9.516	13.364	18.472	25.609	7.125
Group Total for Cape Fear RB		**4.408**	**6.577**	**9.516**	**13.364**	**18.472**	**25.609**	**7.125**

Broadway

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
BROADWAY		0.080	0.092	0.097	0.106	0.115	0.123	0.145
Group Total for Cape Fear RB		**0.080**	**0.092**	**0.097**	**0.106**	**0.115**	**0.123**	**0.145**

Holly Springs

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
HOLLY SPRINGS	5	0.655	3.204	6.044	8.883	10.704	11.141	1.500
Group Total for Cape Fear RB		**0.655**	**3.204**	**6.044**	**8.883**	**10.704**	**11.141**	**1.500**

Harnett

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
HARNETT CO (Combined)	5	1.301	1.565	2.012	2.601	3.333	4.329	2.000
Group Total for Cape Fear RB		**1.301**	**1.565**	**2.012**	**2.601**	**3.333**	**4.329**	**2.000**

Fuquay-Varina

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
FUQUAY-VARINA	13	1.065	2.220	4.733	5.787	7.286	8.785	1.7
FUQUAY-VARINA (to Neuse RB)	14	0.166	0.346	0.738	0.903	1.137	1.370	0.5
Group Total for Cape Fear RB		**0.899**	**1.874**	**3.995**	**4.884**	**6.149**	**7.414**	**1.7**

Dunn

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
DUNN		2.588	2.836	3.072	3.499	3.860	4.221	3.750
Group Total for Cape Fear RB		**2.588**	**2.836**	**3.072**	**3.499**	**3.860**	**4.221**	**3.750**

Benson

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
BENSON	13	1.628	1.985	2.420	2.878	3.314	3.751	1.5
BENSON (to Neuse RB)	14	1.628	1.985	2.420	2.878	3.314	3.751	1.5
Group Total for Cape Fear RB		**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Erwin

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
ERWIN		0.650	0.746	0.841	0.926	1.017	1.108	1.200
Group Total for Cape Fear RB		**0.650**	**0.746**	**0.841**	**0.926**	**1.017**	**1.108**	**1.200**

Robbins

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
ROBBINS		0.749	0.787	0.749	0.762	0.771	0.781	1.300
Group Total for Cape Fear RB		**0.749**	**0.787**	**0.749**	**0.762**	**0.771**	**0.781**	**1.300**

Vass

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
MOORE CO (VASS)		0.007	0.009	0.012	0.013	0.015	0.017	0.060
Group Total for Cape Fear RB		**0.007**	**0.009**	**0.012**	**0.013**	**0.015**	**0.017**	**0.060**

Moore Group

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
CARTHAGE	13	0.112	0.122	0.133	0.152	0.167	0.182	0.000
CARTHAGE (to Lumber RB)	14	0.112	0.122	0.133	0.152	0.167	0.182	0.000
SOUTHERN PINES	13	5.706	6.392	6.991	7.682	8.351	9.020	6.700
SOUTHERN PINES (to Lumber RB)	14	5.706	6.392	6.991	7.682	8.351	9.020	6.700
MOORE CO (PINEHURST)	13	1.989	2.930	4.046	4.962	5.939	6.916	0.000
PINEHURST (to Lumber RB)	14	1.989	2.930	4.046	4.962	5.939	6.916	0.000
Group Total for Cape Fear RB		**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Fayetteville

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
FAYETTEVILLE	5, 8	22.288	31.066	40.704	51.031	57.571	65.402	36.000
Group Total for Cape Fear RB		**22.288**	**31.066**	**40.704**	**51.031**	**57.571**	**65.402**	**36.000**

Spring Lake

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
SPRING LAKE		0.846	1.020	1.230	1.410	1.597	1.784	1.500
Group Total for Cape Fear RB		**0.846**	**1.020**	**1.230**	**1.410**	**1.597**	**1.784**	**1.500**

Hoke

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
HOKE CO RWS	13, 31	0.920	1.360	2.016	2.984	4.416	6.560	0.030
HOKE CO RWS (to Lumber RB)	14	0.920	1.360	2.016	2.984	4.416	6.560	0.030
Group Total for Cape Fear RB		**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Raeford

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
RAEFORD	3	1.650	1.841	1.624	1.678	1.729	1.780	3.000
Group Total for Cape Fear RB		**1.650**	**1.841**	**1.624**	**1.678**	**1.729**	**1.780**	**3.000**

Fort Bragg

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
FT BRAGG	13	5.764	5.764	5.764	5.764	5.764	5.764	8.020
FT BRAGG (to Lumber RB)	14	0.008	0.008	0.008	0.008	0.008	0.008	0.020
Group Total for Cape Fear RB		**5.756**	**5.756**	**5.756**	**5.756**	**5.756**	**5.756**	**8.000**

Elizabethtown and Dublin

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
ELIZABETHTOWN		0.593	0.637	0.684	0.730	0.776	0.823	1.275
DUBLIN		0.063	0.063	0.063	0.074	0.081	0.088	0.000
Group Total for Cape Fear RB		**0.656**	**0.700**	**0.747**	**0.805**	**0.857**	**0.910**	**1.275**

White Lake

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
WHITE LAKE		0.279	0.290	0.303	0.315	0.327	0.340	0.800
Group Total for Cape Fear RB		**0.279**	**0.290**	**0.303**	**0.315**	**0.327**	**0.340**	**0.800**

Wilmington Group

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
WILMINGTON		12.868	13.323	14.579	16.038	17.325	18.612	20.000
NEW HANOVER CO AIRPORT	10, 15	0.017	0.019	0.023	0.026	0.029	0.032	0.000
WRIGHTSVILLE BEACH		0.567	0.626	0.629	0.688	0.731	0.773	0.000
MURRAYVILLE		0.131	0.163	0.188	0.220	0.250	0.280	0.160
WESTBAY	15	0.034	0.040	0.045	0.051	0.056	0.062	0.000
BRICKSTONE - MARSH OAKS	15	0.052	0.060	0.067	0.077	0.085	0.094	0.000
Group Total for Cape Fear RB		**13.669**	**14.232**	**15.532**	**17.098**	**18.475**	**19.852**	**20.160**

Carolina and Kure

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
CAROLINA BEACH		1.363	1.569	1.763	1.952	2.143	2.335	3.000
KURE BEACH		0.381	0.442	0.513	0.628	0.723	0.818	0.285
Group Total for Cape Fear RB		**1.743**	**2.010**	**2.275**	**2.580**	**2.866**	**3.152**	**3.285**

Brunswick

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
BRUNSWICK CO		0.018	0.023	0.027	0.032	0.037	0.042	0.250
Group Total for Cape Fear RB		**0.018**	**0.023**	**0.027**	**0.032**	**0.037**	**0.042**	**0.250**

Southport

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
SOUTHPORT		0.534	0.647	0.751	0.904	1.037	1.170	0.800
Group Total for Cape Fear RB		**0.534**	**0.647**	**0.751**	**0.904**	**1.037**	**1.170**	**0.800**

Monterey Heights

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
MONTEREY HEIGHTS		0.048	0.053	0.059	0.065	0.071	0.077	0.050
Group Total for Cape Fear RB		**0.048**	**0.053**	**0.059**	**0.065**	**0.071**	**0.077**	**0.050**

Walnut Hills and Runnymeade

WATER SYSTEM	Notes	2000 SA Discharge MGD	2010 SA Discharge MGD	2020 SA Discharge MGD	2030 SA Discharge MGD	2040 SA Discharge MGD	2050 SA Discharge MGD	Total Permitted Discharge MGD
WALNUT HILLS		0.082	0.096	0.107	0.121	0.135	0.148	0.100
RUNNYMEADE	15	0.046	0.053	0.059	0.067	0.075	0.082	0.000
Group Total for Cape Fear RB		**0.128**	**0.149**	**0.166**	**0.189**	**0.210**	**0.231**	**0.100**

Inter Basin Water Movement

The Regulation of Surface Waters Transfer Act and its associated administrative rule list specific criteria and standards for managing interbasin transfers of water. Analyzing and projecting future interbasin transfers, as defined by the statute and rule, requires information about the quantities and locations of water withdrawals, water discharges and consumptive uses. We have not done such an analysis for this plan.

Our analysis of interbasin water movement is limited to withdrawal and discharge quantities on an average day basis and water movement across major basin boundaries, only. This analysis differs from the Interbasin Transfer Law in that it does not consider the location of consumptive losses, is not on a maximum day basis, ignores the 2 mgd threshold, and does not consider subbasin boundaries. This analysis only describes the movement of water into and out of the major Cape Fear River Basin.

For example, the Lower Cape Fear Water & Sewer Authority and its customer water supply systems move water from the Cape Fear River Basin to the Waccamaw, Shallotte and Cape Fear River Basins. However, the only water supply systems in that group that discharge wastewater do so in the Cape Fear, Northeast Cape Fear and New River Basins. Under the Interbasin Transfer Law, these systems would have consumptive losses in river basins other than the source river basin, as well as some discharges in river basins other than the source river basin. However, in our analysis all of these systems' water supply sources come from the Cape Fear River Basin and all of their discharges are in the Cape Fear and Northeast Cape Fear River Basin. Therefore, in our analysis there is no movement of water into or out of the major Cape Fear River Basin for these water systems.

The following tables describe the average day movement of water between the Cape Fear, Yadkin, Neuse and Lumber River Basin. The first column from the left describes movements of water that actually occurred in 1997. The other columns to the right describe projected movements of water, based on the group total projected withdrawals and discharges previously described. Therefore, the projected movements of water are not necessarily based on current trends. Furthermore, these tables do not include all of the water systems that might become subject to the Interbasin Transfer Law in the future given projected growth.

Group: Greensboro, High Point, Jamestown, Archdale, Randleman, Asheboro and Randolph

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Demand	59.092	61.413	75.433	80.360	86.142	91.663	97.184
Total Withdrawal From Cape Fear RB	54.190	56.706	70.179	74.576	80.061	85.187	90.313
Total Withdrawal From Yadkin RB	4.902	4.707	5.255	5.785	6.081	6.476	6.872
Total Discharge	53.250	55.473	59.272	62.763	66.962	70.949	74.936
Total Discharge To Cape Fear RB	49.850	51.817	55.447	58.758	62.686	66.434	70.181
Total Discharge To Yadkin RB	3.400	3.656	3.825	4.006	4.276	4.515	4.755
Net Movement From Yadkin RB To Cape Fear RB	**1.502**	**1.051**	**1.429**	**1.779**	**1.805**	**1.961**	**2.117**

Group: Burlington, Alamance, Elon College, Gibsonville, Ossipee SD, Graham, Mebane, Haw River, Green Level, Orange-Alamance/Orange Co

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Demand	17.236	19.909	22.572	25.102	28.878	32.284	35.690
Total Withdrawal From Cape Fear RB	16.247	19.539	22.202	24.732	28.508	31.914	35.320
Total Withdrawal From Neuse RB	0.989	0.370	0.370	0.370	0.370	0.370	0.370
Total Discharge	18.275	21.234	23.560	25.370	28.754	31.703	34.651
Total Discharge To Cape Fear RB	18.275	21.234	23.560	25.370	28.754	31.703	34.651
Total Discharge To Neuse RB	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Net Movement From Neuse RB To Cape Fear RB	**0.989**	**0.370**	**0.370**	**0.370**	**0.370**	**0.370**	**0.370**

Group: OWASA and Durham

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Demand	37.320	40.300	48.400	55.800	61.200	65.300	69.400
Total Withdrawal From Cape Fear RB	8.905	9.300	11.400	18.800	24.200	28.300	32.400
Total Withdrawal From Neuse RB	28.415	31.000	37.000	37.000	37.000	37.000	37.000
Total Discharge	31.053	30.122	36.180	41.725	45.858	49.049	52.225
Total Discharge To Cape Fear RB	21.923	21.238	25.520	29.460	32.589	35.121	37.610
Total Discharge To Neuse RB	9.130	8.884	10.661	12.265	13.268	13.928	14.615
Net Movement From Neuse RB To Cape Fear RB	**19.285**	**22.116**	**26.339**	**24.735**	**23.732**	**23.072**	**22.385**

Group: Cary\Apex, Morrisville and Wake Co-RTP

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Demand	13.638	14.000	22.600	31.300	38.100	41.100	41.600
Total Withdrawal From Cape Fear RB	11.685	14.000	22.600	31.300	38.100	41.100	41.600
Total Withdrawal From Neuse RB	1.953	0.000	0.000	0.000	0.000	0.000	0.000
Total Discharge	10.705	11.348	17.762	24.531	29.793	32.077	32.291
Total Discharge To Cape Fear RB	0.000	0.000	1.762	8.531	13.793	16.077	16.291
Total Discharge To Neuse RB	10.705	11.348	16.000	16.000	16.000	16.000	16.000
Net Movement From Cape Fear RB to Neuse RB	**8.752**	**11.348**	**16.000**	**16.000**	**16.000**	**16.000**	**16.000**

Group: Star

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Demand	0.446	0.473	0.577	0.483	0.496	0.510	0.525
Total Withdrawal From Cape Fear RB	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Withdrawal From Yadkin RB	0.446	0.473	0.577	0.483	0.496	0.510	0.525
Total Discharge	0.291	0.309	0.376	0.315	0.323	0.333	0.342
Total Discharge To Cape Fear RB	0.291	0.309	0.376	0.315	0.323	0.333	0.342
Total Discharge To Yadkin RB	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Net Movement From Yadkin RB to Cape Fear RB	**0.446**	**0.473**	**0.577**	**0.483**	**0.496**	**0.510**	**0.525**

Group: Holly Springs, Harnett Co (Combined), Fuquay-Varina, Dunn, Benson, Falcon, Godwin and Erwin

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Demand	9.792	12.823	19.361	28.544	37.225	45.556	53.286
Total Withdrawal From Cape Fear RB	9.340	12.823	19.361	28.544	37.225	45.556	53.286
Total Withdrawal From Neuse RB	0.451	0.000	0.000	0.000	0.000	0.000	0.000
Total Discharge	6.430	7.887	12.555	19.122	24.575	29.514	33.334
Total Discharge To Cape Fear RB	4.943	6.093	10.224	15.964	20.794	25.063	28.213
Total Discharge To Neuse RB	1.487	1.794	2.331	3.158	3.781	4.451	5.121
Net Movement From Cape Fear RB to Neuse RB	**1.036**	**1.794**	**2.331**	**3.158**	**3.781**	**4.451**	**5.121**

Group: Carthage, Southern Pines, Pinehurst, Seven Lake and Taylortown

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Demand	4.154	4.514	5.765	7.146	8.403	9.696	10.989
Total Withdrawal From Cape Fear RB	1.714	2.457	3.105	3.145	3.206	3.257	3.300
Total Withdrawal From Lumber RB	2.440	2.056	2.660	4.002	5.197	6.439	7.689
Total Discharge	7.273	7.808	9.445	11.169	12.796	14.457	16.118
Total Discharge To Cape Fear RB	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Discharge To Lumber RB	7.273	7.808	9.445	11.169	12.796	14.457	16.118
Net Movement From Cape Fear RB to Lumber RB	**4.833**	**5.751**	**6.785**	**7.167**	**7.599**	**8.018**	**8.428**

Group: Fayetteville, Spring Lake, Hoke Co RWS, Raeford, Wade, Stedman, Fort Bragg

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Demand	38.164	37.672	48.873	60.917	74.425	84.119	96.204
Total Withdrawal From Cape Fear RB	38.164	37.672	48.873	60.917	74.425	84.119	96.204
Total Withdrawal From Lumber RB	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Discharge	32.108	31.468	41.052	51.339	62.867	71.077	81.290
Total Discharge To Cape Fear RB	31.378	30.540	39.684	49.315	59.875	66.653	74.722
Total Discharge To Lumber RB	0.730	0.928	1.368	2.024	2.992	4.424	6.568
Net Movement From Cape Fear RB to Lumber RB	**0.730**	**0.928**	**1.368**	**2.024**	**2.992**	**4.424**	**6.568**

Totals for All Groups, Combined

Water Movement	Actual 1997 MGD	Hypothetical 2000 MGD	2010 MGD	2020 MGD	2030 MGD	2040 MGD	2050 MGD
Total Withdrawal From Yadkin RB	5.348	5.181	5.832	6.267	6.577	6.987	7.397
Total Withdrawal From Neuse RB	31.808	31.370	37.370	37.370	37.370	37.370	37.370
Total Withdrawal From Lumber RB	2.440	2.056	2.660	4.002	5.197	6.439	7.689
Total Discharge To Yadkin RB	3.400	3.656	3.825	4.006	4.276	4.515	4.755
Total Discharge To Neuse RB	21.322	22.026	28.992	31.424	33.049	34.379	35.737
Total Discharge To Lumber RB	8.003	8.736	10.813	13.193	15.788	18.881	22.686
Net Movement From Yadkin RB to Cape Fear RB	1.948	1.524	2.006	2.262	2.301	2.471	2.642
Net Movement From Neuse RB to Cape Fear RB	10.486	9.344	8.378	5.946	4.321	2.991	1.633
Net Movement From Cape Fear RB to Lumber RB	5.563	6.679	8.153	9.191	10.591	12.442	14.996
Total Net Movement Out of Cape Fear RB	-6.871	-4.189	-2.232	0.984	3.969	6.979	10.721

Hydrologic Model

The Cape Fear River Basin Hydrologic Model was developed to evaluate impacts of interbasin transfers related to the second round of Jordan Lake water supply storage allocations. We used the model to evaluate requests for allocations from the lake during the third round of allocations and to look at long-term water demands in the basin for the Cape Fear River Basin Water Supply Plan.

The model reflects historic conditions from 1930 to 1998, including extremes of precipitation and stream flow in the basin. Detailed water resource information was collected for the model's development in 1998. We use the conditions for 1998 as the base scenario against which we compare different future scenarios. The model includes estimates of irrigation and livestock demands, industrial withdrawals and discharges, runoff, and evapotranspiration for the counties in the basin as well as water supply withdrawals and discharges. It is important to note that the modeled withdrawals and discharges are average days on a monthly basis. For example, withdrawals and discharges for each day in January are estimated using the average daily withdrawal and discharge for January and the withdrawals and discharges for August are estimated using the average daily withdrawal and discharge for August, based on water use in 1998. For all days in a month the estimates for withdrawals and discharges are set at the average value for that month. Therefore, withdrawal and discharge values used in the model are different for each month and reflect the variation in water use for each month in a year. The demand satisfaction tables in Appendix G describe the range of withdrawal amounts used for model scenarios.

The model calculates flows **on a daily time step** at specific locations (nodes) in the river system based on the cumulative affects of withdrawals, discharges, watershed runoff and the calculated inflow from any upstream node. The model divides the three basins above Lock & Dam #1 into 73 catchments with 119 stream nodes where flows are computed. Contributions to flow from runoff are estimated for each of the catchments that contribute runoff to 13 selected stream gages within the modeled area.

Fourteen reservoirs are included in the model, including Randleman Lake, currently under construction. Each reservoir is characterized by its storage attributes, operation rules, the contribution from direct rainfall and losses from evaporation. The conservation pool of Jordan Lake is divided approximately ⅓ for water supply storage and ⅔ for low-flow augmentation below the dam. Jordan Lake is modeled as if it were two reservoirs to reflect the different operating rules for the water supply and low-flow augmentation pools.

Model Scenarios

We developed two modeling scenarios with the Cape Fear River Basin Hydrologic Model to evaluate long-term water supply needs in the basin. Scenario 1 evaluates the long-term water supply needs in the basin projected for 2050. Scenario 2 evaluates the basin water supply needs and recommended Jordan Lake water supply storage allocations for 2030. Lacking definitive information, we assumed that wastewater discharge permits would be adjusted to accommodate the amount of wastewater generated by the projected water demands for all water supply systems. We did not incorporate any drought management measures for Jordan Lake withdrawals or releases in these scenarios. We assumed that self-supplied industrial withdrawals and agricultural withdrawals would remain constant.

To evaluate the long-term water supply needs in the Cape Fear River Basin and the cumulative effects of these demands throughout the basin above Lock & Dam #1 for Scenario 1, we incorporated the average day demands for the Basin's water supply systems in 2050 as described in previous sections. In designing Scenario 1, we incorporated future Jordan Lake water supply storage allocations based on 2050 projected needs. These hypothetical 2050 allocations are necessary for modeling, but do not reflect any intention by DWR or the EMC. **No one should assume that the Division of Water Resources would recommend or that the EMC would make any such allocations**.

To evaluate the Basin water supply needs and recommended Jordan Lake water supply storage allocations for 2030, and the cumulative effects of these demands throughout the basin above Lock & Dam #1 for Scenario 2, we incorporated the same projections used for Scenario 1 adjusted for 2030 with the following exception. For Scenario 2, we adjusted the projected water demands for Chatham County, Siler City and Pittsboro based upon our evaluations of all Jordan Lake water supply storage applications. These adjustments are described in *Jordan Lake Water Supply Storage Allocation Recommendations: Round Three*.

The following sections describe the various model scenario assumptions and inputs in greater detail. We will develop additional model scenarios in the future.

Model Inputs

We had to make additional assumptions regarding individual water supply systems to develop the modeling scenarios. Our method of grouping systems based on water supply or wastewater interconnections is appropriate for analyzing water supply needs, but for modeling we must assign specific water withdrawal and wastewater discharge locations for each water supply system. Each scenario is consistent with our analysis of water supply system groups.

These modeling scenarios allow us to analyze the predicted cumulative impacts of an entire set of projected basinwide water withdrawals and discharges. Other modeling scenarios could be developed with differing assumptions about specific water withdrawals and wastewater discharges, and still be consistent with our system groups analysis. We developed our modeling scenarios as follows.

Water Withdrawals

We assigned water withdrawals to specific intakes based on the quantity of water available at that location, without regard to potential water quality induced limitations. Over the long term it may be possible to mitigate activities that contribute to water quality limitations on withdrawals and make more water available for public water supplies.

We assumed that each system would use water from their own supplies up to their maximum capacities (described in the Available Supply section). We assumed that the maximum capacity of a ground water source is a well's 12-hour supply. We assumed the maximum capacity of a reservoir is its estimated safe yield. We assumed the maximum capacity of a run-of-river intake is 20% of the 7Q10 flow at that location, unless there were other limits on withdrawals reported. If a system's projected demand exceeded it's own available supplies, we assumed the system would purchase water from another system to meet any additional water demand.

We assumed that any system purchasing water would purchase from another system within its group of systems. Again, we defined these groups based on current interconnections. If a system's only source of water is purchasing water from another system we assumed this arrangement would continue over the entire planning period. If a system purchases water from several sources we looked at which of the sellers would have water available to handle demands of the purchasing system above existing contract limits and assumed they would supply the needed water. We limited the cumulative bulk water sale demands on each supply to the supply's maximum capacity. We generally ignored contractual limits. Tables in Appendices E and F describe the water withdrawal assignments for the modeling scenarios.

Wastewater Discharges

We assumed that communities would be able to increase their wastewater discharges as needed to accommodate the wastewater generated by increased future water use. This assumption may have significant consequences for water systems if it proves incorrect. For our wastewater discharge analysis, water systems are grouped based on movement of wastewater. In some cases the wastewater groups are different from the water supply groups.

If a system is isolated and has only one wastewater location we assumed that discharge capacity would increase as necessary to accommodate the projected wastewater discharge amount, regardless of the current NPDES discharge permit limit. If a system has more than one wastewater discharge location we assigned future discharges in the same proportion that each facility was used in 1997. For systems with more than one wastewater treatment facility, if one facility reached its permit limit before the other then the remaining wastewater flows were shifted to the plant with available permit capacity. If the permitted capacity of all facilities would be exceeded we selected one facility to expand beyond its current permit limit.

If a system collects and sends wastewater to another system for treatment we assumed that relationship continues, regardless of current contract limits, for the fifty-year period of this analysis. If a system receives wastewater from other systems, we included the cumulative wastewater discharge amounts when assigning discharge locations. Tables in Appendices E and F describe the wastewater discharge assignments for the modeling scenarios.

A hypothetical example may be useful here to clarify this arrangement. In 1997, System A withdrew 2 mgd of water from their surface water source and collected 1 mgd of wastewater. The collected wastewater was sent to System B for treatment and disposal. System A's ratio of wastewater to withdrawn water was 0.5 (1mgd/2mgd) for 1997. This analysis assumes that ratio stays constant over the next fifty years and that System B continues to treat and dispose of System A's wastewater. In 1997, System B withdrew 12 mgd of water and produced 6 mgd of wastewater. System B has the same 0.5 ratio of wastewater to water withdrawn. In 2030, System A estimates it will withdraw 8 mgd and System B estimates it will need 38 mgd of water to meet their customers' demands. We would assume that the combined 46 mgd of water withdrawn by both systems will generate 23 mgd of wastewater, and that System B would treat and dispose of that wastewater. System B would need the treatment capacity and a NPDES permit adequate to handle 23 mgd of wastewater in 2030.

Local Water Supply Systems

This section briefly describes each water supply system included in the plan and our analysis and modeling assumptions. This section is organized by county, rather than by the water supply and wastewater system groups previously described. Systems within a county frequently have an additional level of interdependency with each other that overlays the interdependency associated with having common sources of water. Developing a municipal water system is the responsibility of local communities. Communities within the same county can take advantage of assistance available to them by their county government. This may take the form of providing a forum to encourage cooperation among communities or in some cases providing assistance with procuring funding, or formation of a county water system.

Rockingham County

The Town of Reidsville withdraws water from Troublesome Creek in the Haw River Basin. Their 1997 LWSP (Local Water Supply Plan) indicated they have an available supply of 19 mgd and the ability to treat up to 9 mgd for finished water. Reidsville has an agreement to supply up to 550,000 gallons per day of finished water to the Rockingham County Water System in the Roanoke River Basin. Reidsville operates a wastewater collection and treatment system that discharges to a tributary of Troublesome Creek. We estimated the average day demand for these two systems in 2050 to be 4.3 mgd, well within the capacity of their available supply. Reidsville currently also provides water to the City of Greensboro. However, indications are that when Randleman Lake is completed Greensboro will discontinue using water from Reidsville.

We assumed that in 2050 Reidsville's withdrawal would only be supplying Reidsville and the Rockingham County Water System.

Guilford and Randolph Counties

We evaluated the six communities that will draw water from Randleman Lake, Greensboro, Jamestown, High Point, Archdale, Randleman and Randolph County, along with Asheboro, as one group. Asheboro withdraws water from several intakes in the Uwharrie River Basin and discharges wastewater in the Deep River Basin. Asheboro currently provides water to Randleman; an arrangement we assumed will end when Randleman Lake comes online.

Greensboro obtains water from a series of reservoirs in the headwaters of the Haw River and has several discharge locations on tributaries of the Haw River. Greensboro provides finished water to Gibsonville and Jamestown. However, Gibsonville is more dependent on Burlington for water services and is evaluated with that cluster of communities in Alamance County. Jamestown is in the Deep River Basin and receives most of its water from High Point, which withdraws water from the Deep River. High Point also supplies water to the Archdale water system. High Point treats wastewater from Greensboro, Archdale and Jamestown, as well as its own, and discharges it to the Deep and Yadkin river basins. Archdale currently depends on High Point for water and wastewater services. The Town of Randleman withdraws water from Polecat Creek, in the Deep River Basin, receives some finished water from Asheboro and discharges treated wastewater to the Deep River. Randolph County is a partner in Randleman Lake, but currently does not have a water system. We estimated potential demand for a county-wide system by subtracting the projected populations of the existing systems in the county from projected county population and multiplying the resulting potential service population by 98 gallons per capita per day.

We assumed that communities with Randleman Lake allocations would use water from the lake when it was available instead of purchasing water from another system. We compared the total estimated demands for these systems to the total of their existing supplies and the amount that they would have available when the lake is finished. We estimated that in 2050 average daily demand from the Haw and Deep river basins for these systems could be 90 mgd and they would have a total available supply of 107 mgd. As a group these system appear to have an adequate supply of water, although some individual water systems have projected demands that will exceed their own available supplies.

The Town of Ramseur withdraws water from Sandy Creek in the Deep River Basin and discharges treated wastewater to the Deep River. Franklinville depends on Ramseur as its sole source of water. Franklinville's wastewater treatment plant discharges to Sandy Creek below Ramseur's intake. Ramseur's water treatment plant has a capacity of 1.5 mgd. We estimated the combined average day demand for these two systems in 2050 to be slightly over 1.0 mgd.

The Town of Liberty relies on ground water as its sole source of drinking water. They have a series of wells with an available supply of 0.8 mgd. They have a non-discharge system for disposal of treated wastewater. We estimated average day demand in 2050 for Liberty at 0.5 mgd, which appears to be within the capacity of their current supply.

Alamance County

Three surface water withdrawals from the Deep River Basin provide most of the water used by local government water systems in Alamance County. Burlington operates two water treatment plants with a combined capacity of 34 mgd. They withdraw water from Lake MacIntosh and Stoney Creek, both in the Deep River Basin. The estimated available supply from these sources is 48 mgd. The Towns of Graham and Mebane share Graham-Mebane Lake with an available supply of 12 mgd, and the associated water treatment plant that has a capacity of 6 mgd. Graham-Mebane Lake is on Back Creek in the Deep River Basin.

Burlington provides water to the Towns of Elon College, Alamance and Gibsonville. Gibsonville also obtains water from Greensboro. Graham provides water to the Towns of Green Level and Haw River. Mebane provides water to the Orange-Alamance Water System. The Orange-Alamance Water System also withdraws water from the Eno River, has a couple of wells and can obtain water from Hillsborough. Hillsborough's water also comes from the Eno River in the Neuse River Basin. Also, Graham and Burlington are connected for emergency purposes.

These communities are also mutually dependent for wastewater services. Graham treats wastewater from Haw River and Green Level and discharges the treated wastewater to the Haw River. Burlington treats wastewater from Gibsonville, Elon College, Alamance, Green Level, Haw River and Graham. Burlington discharges treated wastewater to Big Alamance Creek and the Haw River. Mebane has its own wastewater treatment facility that discharges to Moadam Creek. All of these discharges are in the Haw River Basin.

We grouped these communities together in our analysis, because of the interdependency of their water and wastewater systems. We developed average water demand estimates individually for the systems and assessed their ability to meet demand as a group. We assumed that, because of the existing level of cooperation among the systems, they will be able to coordinate development and delivery of water so all their customers' needs are met. We estimated average daily demand from the Haw River Basin for these systems in 2050 at 35 mgd. We calculated their total available supply in 2050 at about 61 mgd, an amount that should be able to satisfy their water needs.

The available supply we calculated for the Orange-Alamance Water System includes a 1 percent allocation of the Jordan Lake water supply pool held by Orange County, estimated to safely yield 1 mgd. Orange County submitted an application in Round Three of the Jordan Lake allocation process to keep their allocation, expecting to provide that water to county residents through the Orange-Alamance System. The Division of Water Resources recommendations for Round Three include maintaining Orange County's 1 percent allocation. Orange-Alamance's water supply is extremely limited and is frequently stressed by current levels of demand. The amount of water they can withdraw from the Eno River is limited by a voluntary capacity use agreement between the Orange-Alamance Water System, Piedmont Minerals and the Town of Hillsborough. They are in need of an additional source of water. For modeling purposes, we assumed this additional supply would come from Jordan Lake.

Orange County

With the Orange-Alamance Water System grouped with the systems in Alamance County, the Orange Water And Sewer Authority (OWASA) is the only other local government water system in the county for this analysis. OWASA has three surface water impoundments in the Haw River Basin with a total available supply of 14.3 mgd, providing water to a 15 mgd water treatment plant. In addition, OWASA has a 10 percent allocation of the Jordan Lake water supply pool, estimated to safely yield 10 mgd that they are not currently using. OWASA has submitted an application to retain a 5 percent allocation from Jordan Lake, thereby providing the system with a total available supply of 19.3 mgd. OWASA's Round Three allocation application projected the system's 2050 average day demand at 18.4 mgd. The Division of Water Resources' recommendations for Round Three allocations from Jordan Lake include a 5 percent allocation for OWASA.

OWASA operates a wastewater collection and treatment system that discharges to Morgan Creek, which flows into Jordan Lake.

Durham County

The City of Durham's water system is the only local government water system in Durham County. The system obtains water from Lake Michie on the Flat River and Little River Lake, both of which are in the Neuse River Basin above Falls Lake. These sources have a combined available supply of 37 mgd. Durham operates two water treatment plants with a combined capacity of 52 mgd. Durham has submitted an application for an allocation from Jordan Lake. The figures presented in the application show a service area demand in 2030 of 46.3 mgd and in 2050 of 51 mgd. Allocations from Jordan Lake are based on documented need within thirty years. The Division of Water Resources' recommendations for Round Three allocations from Jordan Lake include a 10 percent allocation for the City of Durham, estimated to safely yield 10 mgd. Combined with existing sources the allocation, if approved, would give them enough water to meet demand in 2030.

The City of Durham and Durham County have wastewater treatment plants. Two of the city's discharges and the county's discharge are in the Neuse River Basin. The city's South Durham water reclamation facility discharges to New Hope Creek, which flows into Jordan Lake in the Haw River Basin. The South Durham facility would allow Durham to return the amount of water used from a Jordan Lake allocation to the lake's watershed.

Chatham County

Chatham County has six local government water systems: Siler City; Pittsboro; Goldston-Gulf Sanitary District; and the North Chatham, East Chatham, and Southwest Chatham water systems, operated by the county. Siler City has two reservoirs on the Rocky River in the Deep River Basin with a combined available supply of 3.8 mgd. Siler City operates a wastewater collection and treatment system that discharges to Loves Creek, a tributary of the Rocky River. The Goldston-Gulf Sanitary District provides water to the communities of Goldston and Gulf. The system withdraws water from and returns treated wastewater to the Deep River. It has an available supply of 2.2 mgd. Chatham County's Southwest Chatham water system distributes the water it purchases from Siler City and the Goldston-Gulf Sanitary District, having no source of its own. Pittsboro withdraws water from and discharges treated wastewater to the Haw River. It has an estimated 9.8 mgd available supply from its run-of-river source. The East Chatham Water System distributes finished water purchased from the City of Sanford. Sanford treats water it pumps from the impoundment behind Buckhorn Dam on the Cape Fear River. The North Chatham Water System treats water from Jordan Lake. Chatham County has a 6 percent allocation of the Jordan Lake water supply storage, estimated to safely yield 6 mgd. Chatham County's 3 mgd water treatment plant pumps water through the intake constructed by the Towns of Cary and Apex. This is the only water supply intake on the lake at this time. The North Chatham water system can also receive water through connections with Pittsboro, OWASA and the Durham water system. The three county water systems are currently independent of each other. However, Chatham County's application for an increase in its allocation from Jordan Lake indicates that the county intends to develop a combined county system.

We analyzed all the water systems in Chatham County as a group. Chatham County's Round Three application included water demand estimates for Siler City and Pittsboro, as well as the planned county system. Chatham County owns a quarter of the Pittsboro water treatment plant, providing access to 0.5 mgd of water from the 2 mgd plant. At this time the North Chatham Water System is the only one of the three county systems that can make use of water from Pittsboro. However, with its existing treatment plant, it only uses water from Pittsboro to meet peak demands. Siler City is currently studying the feasibility of expanding their available supply by 2 mgd to at total of 5.8 mgd by 2010. If the expansion is not possible they may need to develop an alternative source of water. The county, in its allocation application, anticipates supplying water to Siler City sometime after 2030 if Siler City is successful in expanding the county system. Siler City did not submit an application for water from Jordan Lake. According to Chatham County's allocation application the service population and therefore water demand for the Goldston-Gulf Sanitary District is expected to stay about the same through 2050.

Looking at all the water systems together, they have about 23.8 mgd of water available to meet future demands. According to Chatham County's Jordan Lake allocation application, their 2030 projected demand is 19.3 mgd and 2050 projected demand is 34.2 mgd. However, their projections are based on a 200 gallons per capita per day residential use rate. This is a significant increase over Chatham County's 2000 residential water use rate of 59 gpcd. In our review of allocation applications we adjusted the projections for the Chatham County system to reflect a more realistic residential use rate of 85 gpcd. Note that this would be a 44 percent increase in their current residential use rate. Our adjustment reduced the 2030 demand estimate for the county system from 10.9 to 6.0 mgd. The Division of Water Resources' recommendations for Round Three include a 6 percent allocation for Chatham County, estimated to safely yield 6 mgd. We have taken Chatham County's water demand projections as given for the Cape Fear River Basin Water Supply Plan and the 2050 model scenario, but used our adjusted demand projection for the 2030 model scenario.

If service population growth for the water systems in the county proceeds as estimated and Siler City and Pittsboro are unable to expand their withdrawals the county may offer their best alternative to meet demands. In that case the county could request an increase in their allocation from Jordan Lake. It is important to remember that with Siler City's service area located in the Deep River Basin, sending water from Jordan Lake to Siler City would be a transfer of water between river basins.

Lee County

There are four local government water systems in Lee County: Lee County Water & Sewer District #1, Sanford, Broadway and the Lee County Water System. The Lee County Water & Sewer District #1 is supplied and administered by the City of Sanford. Future conditions for this system were included in Sanford's application for an allocation of water from Jordan Lake. In this analysis Lee County WSD#1 is considered part of Sanford's water system.

The Town of Broadway, located in the Cape Fear River Basin, obtains most of its water from a series of wells with the remainder supplied by Sanford. In this analysis we assumed that Broadway would continue to use their wells up to the existing available supply with additional demand supplied by water from Sanford. Broadway operates a wastewater treatment plant that discharges to Daniel's Creek in the Cape Fear River Basin.

The Lee County Water System provides water to some residential customers in the Cumnock area of the county and the county's largest water user, Golden Poultry. The system's 1.5 mgd treatment plant is supplied from a surface water intake on the Deep River. The available supply at their run-of-river intake is 2.2 mgd. In addition, they have a connection with Sanford for emergency supply. For this analysis we assumed that they would continue to use their existing intake up to the estimated available supply and that demands above the available supply would be met by the purchase of water from Sanford. If the projections used in this analysis prove accurate the Lee County system may need to get water from Sanford to meet regular demands some time after 2030. The county system does not operate a wastewater treatment system. However, Golden Poultry has its own wastewater treatment plant that discharges to the Deep River.

The City of Sanford treats water from the Cape Fear River at its12 mgd treatment plant. Sanford's water system withdraws water from the impoundment created by Buckhorn Dam about ten miles below B. Everett Jordan Dam. The estimated available supply used in this analysis at the location of Sanford's intake is 61.6 mgd. We estimated available supply as 20% of the 7Q10 flow at the intake site based on interpolating data from the 2001 USGS Low-flow report for the Cape Fear River. It does not include any increases in available supply that could be realized because the intake is located in an impoundment rather than being a run-of-river intake. In addition to Lee County Water & Sewer District #1, Sanford supplies water to Broadway and the Lee County and East Chatham County water systems. Sanford operates a wastewater collection and treatment system. Treated wastewater is discharged to the Deep River above its confluence with the Cape Fear River. With the discharge site upstream of their withdrawal site the water discharged does not constitute an interbasin transfer. However, because Sanford has service area in the Deep River Basin as well as the Cape Fear River Basin any consumptive use in the Deep River Basin constitutes an interbasin transfer.

The combined available supply for the water systems in Lee County is estimated at 63.9 mgd. We projected the average daily combined demand for these systems to be 20.0 mgd in 2030 and 37.5 mgd in 2050. The application submitted by Sanford for an allocation of water from Jordan Lake indicated they would expand their existing intake on the Cape Fear River to meet future demands. Using the supply and demand estimates noted above there is no need to allocate water supply storage in Jordan Lake to the City of Sanford. There is an adequate amount of water available to meet projected demands for this group of systems well into the future. The Division of Water Resources recommendations for Round Three does not include a Jordan Lake allocation for the City of Sanford.

Wake County

This analysis focuses on the Cape Fear River Basin, therefore it only includes water systems that have service area in or use water from the Deep River, the Haw River or the Cape Fear River Basins. The water systems in Wake County included are Cary, Apex, Morrisville, Research Triangle Park, Holly Springs and Fuquay-Varina. The City of Durham supplies water to the portions of Research Triangle Park located in Durham County and future water needs for this area are included in Durham's estimated future water demands. Based on information provided in the Jordan Lake water supply storage allocation applications, Holly Springs and Fuquay-Varina will be more intimately associated with the Harnett County Water System than the other systems in Wake County in the future, and will be discussed with the water systems in Harnett County.

Cary, Apex, Morrisville and the Wake County portion of Research Triangle Park currently hold allocations of water supply storage in Jordan Lake and depend on the lake to meet water demands. Cary has contracts for regular supplies of finished water from Durham and Raleigh. However, neither Raleigh nor Durham have enough water to provide a long term dependable supply to the four systems considered in this group. Cary and Apex combined have a 21 percent allocation, estimated to safely yield 21 mgd. Morrisville has a 2.5 percent allocation, estimated to safely yield 2.5 mgd. Wake County holds a 1.5 percent allocation for the facilities in Research Triangle Park supplied by the Cary-Apex water plant, estimated to safely yield 1.5 mgd. These systems all submitted applications to increase their allocations in the third round of allocations. Cary and Apex jointly own and operate the only surface water intake structure on Jordan Lake and an associated water treatment plant. Morrisville and Wake County-RTP obtain finished water through Cary from the Cary-Apex water treatment plant. The Cary-Apex water treatment plant has a capacity of 40 mgd.

Cary operates two water reclamation facilities, both of which discharge to the Neuse River Basin, one into Crabtree Creek and the other into Middle Creek. Apex's wastewater treatment facility also discharges into the Middle Creek watershed. Cary treats wastewater collected in the Wake County portion of Research Triangle Park and Morrisville. In issuing the revised Interbasin Transfer Certificate needed for these systems to increase their withdrawal from Jordan Lake, the Environmental Management Commission stipulated that they must develop the ability to return reclaimed water to the Haw or Cape Fear river basins. The new facilities are to be operational by January 1, 2011. Also, Cary and Apex will not be allowed to increase discharges from their existing reclamation facilities in the Neuse Basin above their current permitted capacities.

We used information supplied in the applications for Jordan Lake Allocation Round Three in the analysis of future water needs for this group of systems. The combined available supply for these systems, excluding the time limited contracts from Durham and Raleigh, is 25 mgd. Estimated average daily demand for these systems in 2030 is 38.1 mgd and in 2050 is 41.6 mgd.

The Division of Water Resources recommendations for Round Three of Jordan Lake allocations include increases in allocations of water supply storage for all of these systems. We recommended raising the allocation for Cary/Apex by 11 percent to a total of 32 percent, for Morrisville by 1 percent to a total of 3.5 percent and for Wake County by 1.5 percent to a total of 3.5 percent. If approved, these recommendations will bring the available supply for these systems to 39 mgd, an amount adequate to meet estimated demand in 2030.

If water demands grow as reflected in the application data, these communities would need to find additional sources of water to meet demands in 2050. We assumed this group would obtain additional water from Jordan Lake for modeling purposes. We also assumed the return of reclaimed water to the Cape Fear River Basin as mandated by their Inter Basin Transfer Certificate.

Moore County

There are six local government water systems in Moore County that use water from one of the three river basins that define the geographic limit of this analysis, Moore County-Vass, Moore County-Hyland Hills/Niagara, Robbins, Cameron, Carthage and Taylortown. Moore County-Vass treats surface water withdrawn from the Little River. The estimated available supply at the site of their intake is 1.45 mgd. The Vass system has its own wastewater treatment plant that discharges to the Little River. Moore County-Hyland Hills/Niagara has two wells that can provide 0.032 mgd of water and has no wastewater discharge. Robbins treats surface water withdrawn from Bear Creek in the Deep River Basin and operates a wastewater treatment facility that discharges to the Deep River. The estimated available supply at the site of Robbins' intake is 1.5 mgd. Cameron is located within the Cape Fear River Basin and depends on wells with an estimated available supply of 0.134 mgd. It has no wastewater discharge. Carthage withdraws water from Nick's Creek in the Cape Fear River Basin, where they can withdraw up to 1 mgd. Carthage's wastewater is treated by the Moore County facility that discharges into Aberdeen Creek in the Lumber River Basin. According to Taylortown's 1992 Local Water Supply Plan, the town had four wells with an available supply of 0.041 mgd of water. Taylortown's 1992 LWSP indicates an intention to develop additional wells giving the system a total available supply of 0.081 mgd. Taylortown does not have a wastewater discharge.

In addition to the six systems discussed above, there are three other local government water systems in Moore County with service areas in the Cape Fear or Deep river basins: Southern Pines, Moore County-Pinehurst and Moore County-Seven Lakes. Southern Pines withdraws water from Drowning Creek in the Lumber River Basin and provides water to Moore County-Pinehurst to supplement their wells, which can supply 2.4 mgd to the system. Pinehurst supplies water to Moore County-Seven Lakes to supplement their wells, which can provide 0.34 mgd to the Seven Lakes system. Without the additional water from Southern Pines the Pinehurst and Seven Lakes systems would have difficulty meeting average day demands in 2010 from their existing ground water sources.

Moore County operates a wastewater treatment facility that discharges to Aberdeen Creek in the Lumber River Basin. This county plant treats wastewater from Southern Pines, Pinehurst and Carthage as well as the Town of Aberdeen in the Lumber River Basin.

We grouped four of Moore County's water systems together that are included in this study and that use water supplied by Drowning Creek and ground water. This group is composed of Southern Pines, Pinehurst, Taylortown and Seven Lakes. This group of systems could share water sources to meet the projected, combined 2050 demand of 10.5 mgd. Based on existing and planned wells and the available supply at Southern Pines' intake the estimated available supply for these systems in 2050 is 10.8 mgd.

The Moore County water systems of Robbins, Carthage, Cameron, Moore County-Vass, and Moore County-Hyland Hills/Niagara are isolated and presently self-sufficient. According to the estimated yields presented in their LWSPs they appear to have enough water to meet their estimated average daily demands in 2050 from existing and planned future sources. The estimates of demand and available supply for these systems can be found in the Water Demand v. Supply section. However, the results of the hydrologic model indicate that the present water supply sources for the towns of Robbins, Carthage and Vass may not be adequate to reliably meet their projected demands. See the demand satisfaction tables in Appendix G.

The Town of Star in Montgomery County is included in the modeling for this analysis, because it discharges treated wastewater into the headwaters of Cabin Creek in the Deep River Basin upstream of the Town of Robbins. Star obtains water from the Montgomery County water system that treats water from the Yadkin River. As water use in Star grows the quantity of wastewater discharged will increase and contribute to an increase in flows in Cabin Creek. To improve the modeling of future flow conditions in the Deep River Basin we estimated future discharges from Star based on the ratio of the amount of wastewater discharged to the amount of water purchased in 1997 and projected water use.

Harnett County

Many communities use water withdrawn from the Cape Fear River as it flows through Harnett County. The Harnett County Department of Public Utilities operates a regional water system that supplies water to Lillington, Coats, Angier and Linden, as well as county residents outside of these municipalities. Water needs for these four communities are included in the demand estimates for the Harnett County water system. The estimates used for this analysis came from Harnett County's application for an allocation from Jordan Lake.

Harnett County Public Utilities discharges treated wastewater to the Cape Fear River at two locations. Angier discharges to the Cape Fear River and has a non-discharge treatment site in the South River Basin. Coats sends wastewater to the Harnett County facility in Buies Creek. Linden has no public sewer system and therefore no discharge.

Harnett County Public Utilities provides water to Holly Springs and Fuquay-Varina in Wake County. Holly Springs also has a contract to obtain water from Raleigh through 2017. Holly Springs has indicated that they expect to develop their own intake on the Cape Fear River, either in the vicinity of the current Harnett County intake in Lillington or near Sanford's intake above Buckhorn Dam. We assumed Holly Springs will continue to get water from the Cape Fear River in Lillington, given that they already receive water from there through the Harnett County system and have a pipeline already in use. If Holly Springs chooses to develop the upstream intake instead the difference on flows in the river and their ability to meet demand will not be significantly affected. Fuquay-Varina also obtains water from Garner, which is supplied by Raleigh.

Holly Springs discharges treated wastewater to Utley Creek in the Cape Fear River Basin. Fuquay-Varina has two discharge facilities: one into Terrible Creek in the Neuse River Basin and the other into Kenneth Creek in the Cape Fear River Basin.

Erwin and Dunn have intakes in the Cape Fear River below Lillington. Erwin's water treatment plant uses water from the former Swift Textiles' reservoir that is filled from the Cape Fear River. Dunn has its own intake on the Cape Fear River. Both Erwin and Dunn discharge treated wastewater to the Cape Fear River. Dunn supplies water to the towns of Benson and Falcon. Benson also receives water from the Neuse River through the Johnston County water system. Benson discharges treated wastewater to the Neuse River Basin. Falcon currently does not have a public sewer system.

Our analysis shows that there should be enough water available for the water systems currently depending on the Cape Fear River in Harnett County for all or part of their water supply to meet 2050 projected demands without significant impacts to the river's flow. This conclusion presumes that communities will be able to increase wastewater discharges as needed to accommodate increased water use. Erwin has an estimated available supply of 5 mgd from the reservoir and an estimated demand in 2050 of 1.2 mgd. Dunn has an estimated available supply from the river at the site of its intake of 69.8 mgd and an estimated demand in 2050 of 3.7 mgd. For Holly Springs and Harnett County we divided the estimated available supply at the intake site in Lillington evenly between them. We based the available supply estimate on 20% of the 7Q10 flow with each assumed to have 34.25 mgd available. Holly Springs' estimated demand in 2050 is 15.3 mgd and Harnett County's estimated average day demand is 21.3 mgd.

Harnett County and the Town of Holly Springs requested allocations from the water supply pool of Jordan Lake in applications submitted for Round Three. Because of the estimated available supply available to these systems at their current or planned intake locations the Division of Water Resources' recommendations for Round 3 Jordan Lake Allocations do not include allocations for either system.

Cumberland County

There are two community water systems withdrawing surface water in Cumberland County: Fort Bragg and the City of Fayetteville. Fort Bragg withdraws water from and discharges treated wastewater to the Little River. The amount of water available to Fort Bragg at the site of their intake is adequate to meet the projected demands for 2050. The Public Works Commission of the City of Fayetteville withdraws water from the Cape Fear River and Glenville Lake, a reservoir on Little Cross Creek also in the Cape Fear River Basin. Fayetteville discharges treated wastewater into the Cape Fear River and Rockfish Creek. The PWC of the City of Fayetteville provides water to Hope Mills and Spring Lake, and will supply water to the Hoke County Regional Water System in the near future. Hope Mills' water system is included with Fayetteville's projections. Cumberland County and the Public Works Commission of the City of Fayetteville are currently investigating the possibility of developing a countywide water system. In their application for an allocation from Jordan Lake the Public Works Commission of the City of Fayetteville indicated that they expected to serve 90% of the residents of the county by 2030. Given this stated intention, we assumed that systems in Cumberland County, unless they indicated another future source in their Local Water Supply Plan, would obtain any additional water needed from Fayetteville PWC.

In addition to the water supplied by Fayetteville PWC, the Spring Lake water system also uses ground water to supply customers. According to their 1997 Local Water Supply Plan the wells will be replaced by a contract with Harnett County Public Utilities in the near future. However, the contract amounts cited by Harnett County and Spring Lake are not the same, with Harnett County's figure being less than the capacity of Spring Lake's wells. Therefore, in this analysis we have assumed Spring Lake will get more water from Fayetteville PWC to meet future demands.

The Hoke County Regional Water System also uses wells and purchases water from NC Department of Corrections. We assumed their wells would be used to the limit of the available supply, the contract with the Department of Correction would be used to the contract limit, and any additional water needed would be supplied by Fayetteville PWC.

The towns of Stedman and Wade use well water for public supply. Stedman has a contract to provide water to Autryville through 2024. In its local plan Autryville indicated it was developing a connection with the Sampson County water system for additional water. In its 1997 Local Water Supply Plan, Wade indicated an intention to add a couple of wells and to develop an emergency connection with Fayetteville PWC. If the demand estimates we used for Stedman and Wade prove to be reasonable, they should be able to meet 2050 demands from existing and planned sources.

To improve the accuracy of modeled future flows in the Cape Fear River the discharge from the Town of Raeford is included in the hydrologic model. Raeford draws water from a series of wells and discharges treated wastewater to Rockfish Creek. Over the fifty-year horizon of this analysis discharges will increase as water use increases. Therefore, Raeford's discharge is included as an inflow into Rockfish Creek.

In its application for an allocation from Jordan Lake, Fayetteville PWC estimated its average day service area demand in 2050 at 76 mgd, a three-fold increase compared to the average amount used in 2000. This estimate included significant increases in industrial water use over the planning period and serving more people than we estimated would live in the county.

Based on a recent study published by the United States Geological Survey, the estimated 7Q10 flow in the Cape Fear River at Fayetteville is 625 cubic feet per second. We therefore estimated that 80.8 mgd of water (20 percent of the 7Q10) would be available to Fayetteville PWC. **An in-depth flow study would likely indicate that more water is available.** Combined with the additional 5 mgd available from Glenville Lake, Fayetteville PWC has an estimated available supply of 85.8 mgd.

This analysis considered the three aforementioned systems using the Cape Fear River for public water supply as a single group to determine future needs. Factoring in the additional demands and supplies expected from the Hoke County Regional Water System and Spring Lake, the available supply for the three systems rises to 88 mgd to supply a combined projected average daily demand of 86.4 mgd. The Division of Water Resources' recommendations for Round Three allocations from Jordan Lake do not include an allocation for the Public Works Commission of the City of Fayetteville.

Bladen County

Below Cumberland County, the Cape Fear River flows southeasterly through the heart of Bladen County on its way to the sea. Just before the river flows out of southern Bladen County the flow is controlled by Lock & Dam #1, operated by the U.S. Army Corps of Engineers. Lock & Dam #1 is the downstream limit of our hydrologic model. There are two surface water intakes just above the lock, one operated by the City of Wilmington and the other by the Lower Cape Fear Water and Sewer Authority. These two intakes provide water to communities downstream in Brunswick and New Hanover counties. Those systems will be discussed in a separate section after this discussion of the systems in Bladen County.

Eight public water systems in Bladen County are included in this analysis: Elizabethtown, White Lake, Dublin, Tarheel, and four Bladen County water districts (701 North, West Bladen, East Arcadia, and White Lake). All of these systems rely on wells for water supply and have service areas at least partly within the Cape Fear River Basin. There are two wastewater discharges to the basin in Bladen County. Elizabethtown treats wastewater from its own service area and that of the Town of Dublin, and discharges treated wastewater to the Cape Fear River. White Lake discharges treated wastewater to Colly Creek, which flows into the Cape Fear River. These discharges, supplied by ground water, supplement the flow in the river and enter the hydrologic model as inflows. We assumed that as water use grows in these systems discharges would also increase. We estimated average daily water use and the resulting average daily discharges for these systems in our analysis.

Based on well yield data in the 1997 Local Water Supply Plans most of these systems may have enough water to supply projected 2050 demands. Bladen County-West Bladen may need to develop additional wells to meet demand by 2050, even after its planned interconnection with Bladen County-East Arcadia. This analysis of future supply needs assumes that the available supplies provided in the Local Water Supply Plans remain constant. These water systems should regularly monitor well yields as the Division of Water Resources has evidence of declining water levels in this region. Declining water levels can lead to declining well yields with the result that systems may need to develop alternative sources of water to meet future demands.

Brunswick County and New Hanover County

As noted above, many communities in these two counties use water from the Cape Fear River. The City of Wilmington and the Lower Cape Fear Water and Sewer Authority (LCFWSA) each have intakes in the river above Lock & Dam #1. In 1997, Wilmington supplied finished water to its customers and the New Hanover County-Airport water system. Because of the amount of water Wilmington has available to its system from the Cape Fear River, we have assumed that in the future it will become a regional supplier of finished water to systems in New Hanover County that currently rely on ground water. The LCFWSA provides raw water to the Brunswick County water system and to several industrial customers. Brunswick County provides finished water to Carolina Shores, Caswell Beach, Holden Beach, Long Beach, North Brunswick Sanitary District, Ocean Isle Beach, Shallotte, Southport, Sunset Beach and Yaupon Beach. The North Brunswick Sanitary District also provides water to the Navassa water system. In addition to the water it receives from the LCFWSA the Brunswick County water system has wells that can provide 3.4 mgd of water. Southport and Yaupon Beach also have wells that supply water to their systems.

Because the intakes for Wilmington and the LCFWSA are located close to each other, we calculated the available supply for each intake as half the available supply at that location. Our analysis assumes that 53.3 mgd is available at each of these intakes, given the 825 cfs 7Q10 estimate provided by the latest USGS report. We considered all the systems that currently obtain water from Wilmington or LCFWSA and the other local government water systems in New Hanover and Brunswick counties as a regional group. The 27 systems included in this group have a combined, projected 2050 average daily demand of 73.4 mgd. They have 115.5 mgd of available supply when the supplies from existing wells are combined with the 106.6 mgd available at the intakes located on the Cape Fear River. Based on this analysis it appears these systems have enough water available to meet future demands.

Most of the water systems in these two counties experience seasonal fluctuations in service population and water demand. The data in the Local Water Supply Plans are not sufficient to project future demands during the months of increased seasonal water use. Seasonal water needs are considered to some extent, however, because of the way per capita water use was calculated for estimating future demands. Average daily water use for each water system is determined by dividing the total amount of water used in 1997 by 365. Therefore, the average daily demand reflects the increased amount of water used to meet summer demands.

Model Scenario Results

The results of modeling Scenario 1 indicate that, with a couple of exceptions, there is enough water to meet the 2050 projected needs for the water systems included in the analysis, without significant effects on the reliability of the Jordan Lake low-flow augmentation pool, the ability to meet the flow target at the Lillington stream gage, or downstream flows of the Cape Fear River. The exceptions are the towns of Robbins, Carthage and Vass. The present water supply sources of these towns may not be adequate to reliably meet their projected demands.

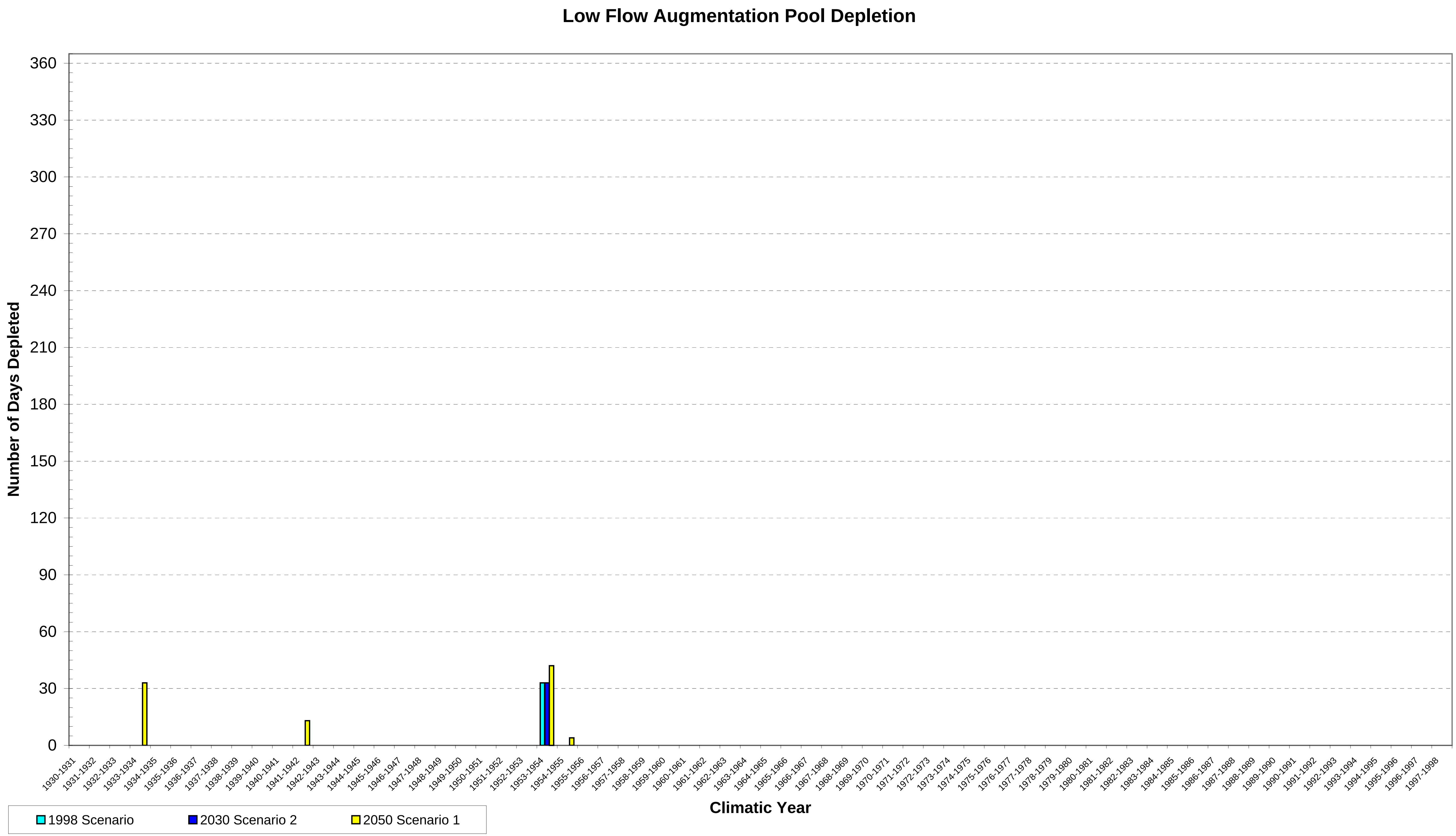
Note that Jordan Lake water supply storage allocations do not impact the water supplies available to these communities.

Jordan Lake

Water stored in Jordan Lake is a crucial component of the Cape Fear River Basin's hydrologic system. About two-thirds of the usable storage in Jordan Lake is dedicated to low-flow augmentation for the Cape Fear River. Water is released from the low-flow augmentation pool with the goal of maintaining a target flow of 600 cubic feet per second (cfs), plus or minus 50 cfs, at the stream gage at Lillington. The releases provide a minimum flow significantly higher than pre-dam flows. Prior to the initiation of water releases from Jordan Lake the 7Q10 flow (lowest seven-day average flow with an expected recurrence interval of ten years) at Lillington was 75 cfs. For the period since the filling of Jordan Lake the US Geologic Survey (USGS) currently calculates the 7Q10 flow at 530 cfs. The dam provides greater reliability for downstream water systems than the natural conditions of the river. Water stored in Jordan Lake enhances the available supply to communities above and below the dam. Using the planning guideline discussed above of estimating available supply as 20 percent of the 7Q10 flow, dam releases have raised the estimated available supply at Lillington from 9.7 mgd to 68.5 mgd. Likewise, other downstream locations enjoy increased amounts of water due to releases from Jordan Dam.

The results of modeling Scenario 1 and Scenario 2 indicate that the reliability of the low-flow augmentation pool will not change by 2030 and will decrease only slightly by 2050, compared with 1998. See the chart on the following page. The 1998 model scenario results indicate that the flow augmentation pool has a 0.13 percent chance of being depleted on any given day, or is depleted during one year out of the 68 years modeled. Scenario 2 results indicate the same reliability for the year 2030. Scenario 1 results indicate that the flow augmentation pool has a 0.37 percent chance of being depleted on any given day, or is depleted 4 years out of the 68 years modeled for the year 2050.[2] This small decrease in reliability is a result of the large increases in projected demands for the water supply systems withdrawing water from the Deep River Basin and from the segment of the Cape Fear River between Jordan Dam and Lillington. The total projected increase in these withdrawals is 68 mgd by 2030 (an increase of 182 percent compared with 1998 withdrawals) and 113 mgd by 2050 (an increase of 302 percent compared with 1998 withdrawals). This means that multiplying the total withdrawals of all water supply systems affecting the flows at Lillington by four results in less than a one percent decrease in the daily reliability of the low-flow augmentation pool. Note that these modeled impacts on reliability do not incorporate any drought management measures. Implementation of drought management measures will improve the reliability of the low-flow augmentation pool.

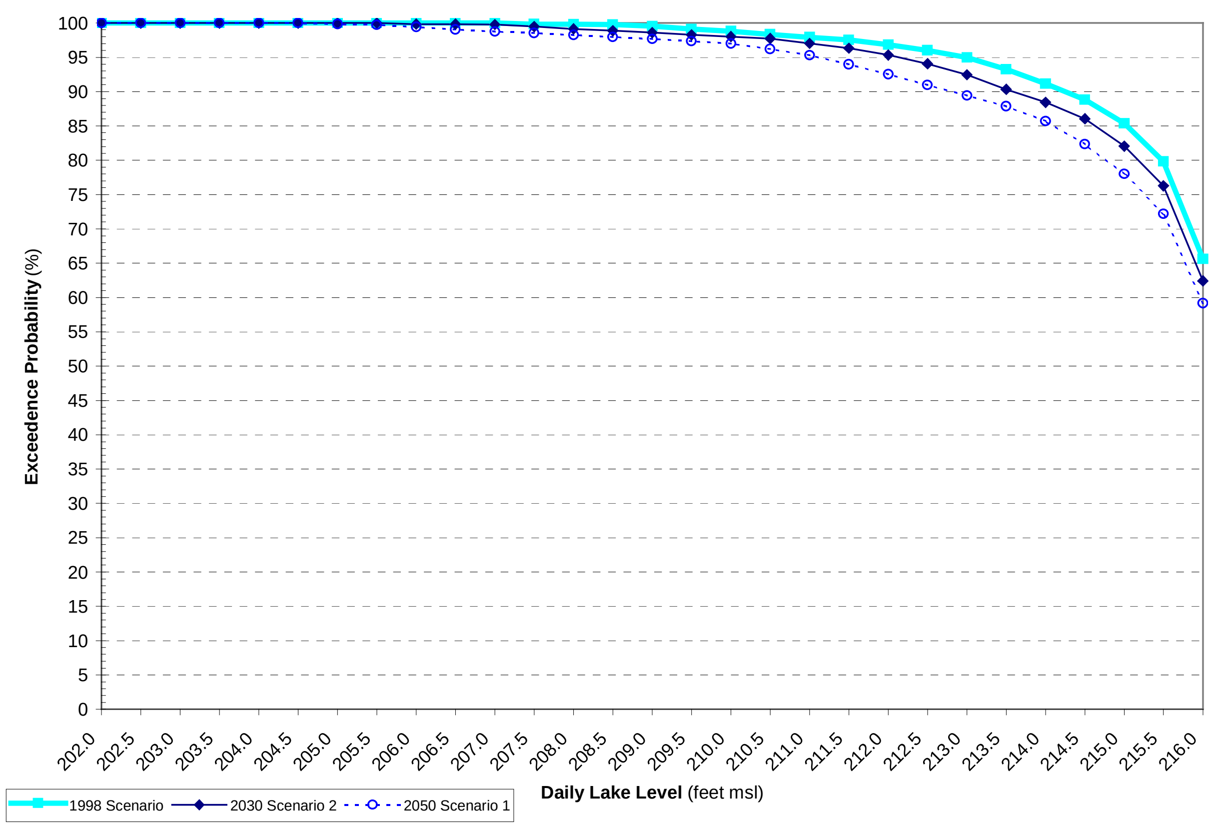
[2] Note that during one of the four years that the low flow augmentation pool is depleted in Scenario 1, the pool is depleted for only one day.


Low Flow Augmentation Pool Depletion
Number of Days Depleted
360
330
300
270
240
210
180
150
120
90
60
30
0
Climatic Year
1998 Scenario
2030 Scenario 2
2050 Scenario 1

Lake levels are also of interest. The following charts compare modeled lake levels among the scenarios. Each chart shows the probability a given lake level elevation is exceeded on a daily basis for each scenario. The charts differ by the period of analysis. The first chart shows lake levels for the entire year. This is useful for determining potential impacts on water intakes and year-round recreation, such as fishing. The associated table may be found in Appendix G.

Most of the time, the lake is at the normal pool level of 216 feet mean sea level (msl) for the various modeling scenarios. If, however, we look at the lake levels that have a 2 percent chance of occurring on any given day (i.e., a 98 percent probability of exceedence) during an entire year, we see that the lake is drawn down about 1 foot more by 2030 than it would have been in 1998 and this increases to about 2 feet more by 2050 than it would have been in 1998. The only water intake structure at Jordan Lake draws from elevations at 209 feet msl and 199 feet msl.[3] The lake is never drawn down below 205 feet msl under the various modeling scenarios, and the probability of the lake being drawn down below the top intake increases by 1 percent by 2030 when compared with 1998 and increases by 2 percent by 2050 when compared with 1998.

Modeled Jordan Lake Levels: Entire Year

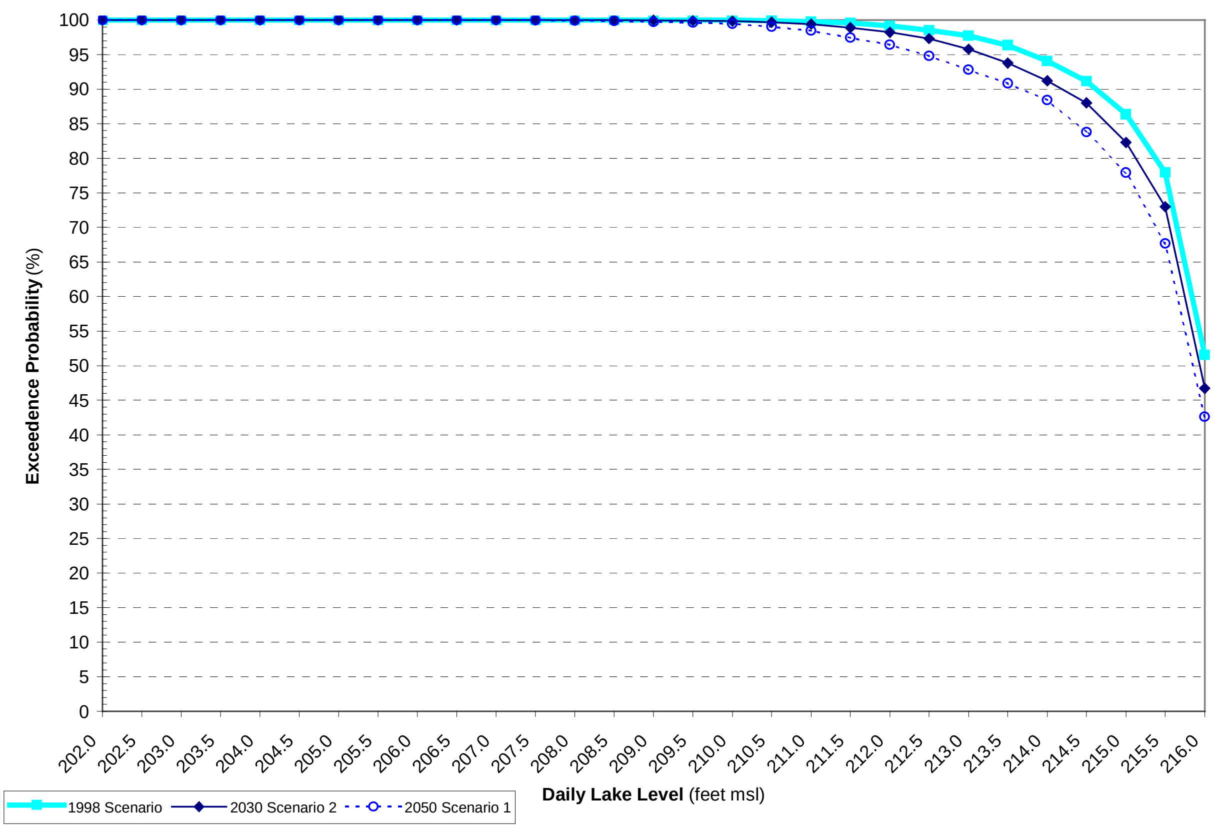


[3] The intake elevations are measured at the top of the intake screens.

The second chart depicts lake levels from May 1 to September 30. This is useful for determining potential impacts on beaches and boating during the main recreation season. Lake levels of 212 feet msl (mean sea level) and below have a negative impact on boating (due to ramp elevations) and beaches. The associated table may be found in Appendix G.

If the lake level drops to 212 feet msl, 15 boat ramp lanes out of 52 may not be usable and beaches are negatively impacted. The chance of this occurring during the peak recreation season increases by 1 percent by 2030 and by 3 percent by 2050 when compared with 1998. Compare the chart below with the table of Jordan Lake boat ramps on the following page.

Modeled Jordan Lake Levels: May 1 to September 30



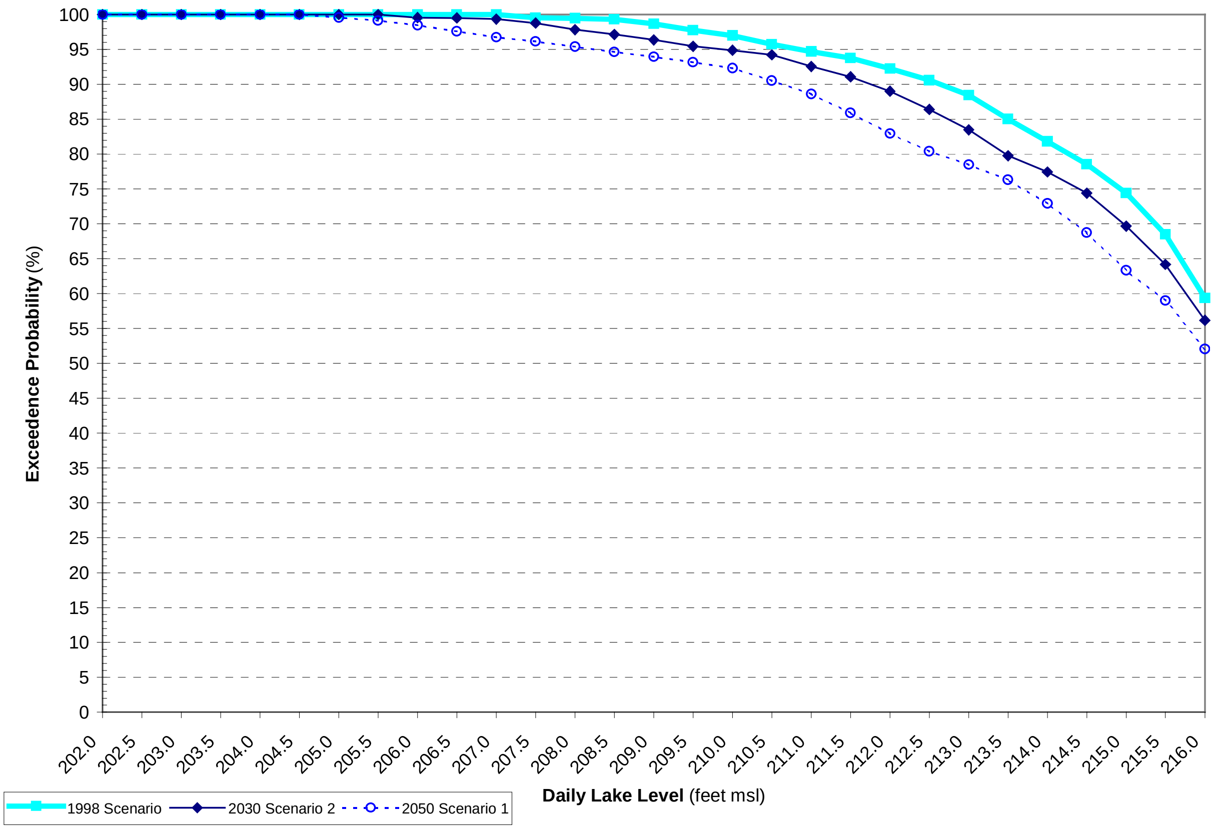
Jordan Lake Boat Ramps

Location	Ramp #	**Lanes** (#)	Bottom Elevation (feet msl)	**Useful Minimum Elevation** (feet msl)
Ebenezer	1	2	202	204.5
	2	4	206	208.5
Vista Point	1	2	202	204.5
	2	2	206	208.5
Parkers Creek	1	2	205	207.5
Farrington	1	2	202	204.5
	2	2	206	208.5
	3	2	208	210.5
Crosswinds Ramp	1	4	212	214.5
	2	2	202	204.5
Crosswinds Marina	1	2	202	204.5
	2	2	208	210.5
Crosswinds Campground	1	2	207	209.5
Poes Ridge	1	4	210	212.5
Poplar Point	1	4	210	212.5
Seaforth	1	3	205	207.5
	2	3	210	212.5
Robeson Creek	1	1	202	204.5
	2	1	208	210.5
New Hope Overlook	1	2	202	204.5
	2	4	208	210.5

The third chart (on the following page) depicts lake levels from October 1 to January 31. This is useful for determining potential impacts on duck hunting as it covers the various duck hunting seasons. Lake levels impact duck hunting by impacting boating, or, if very low, by increasing the distance between hunters on firm ground and ducks on the water. The associated table may be found in Appendix G.

Lake levels generally have a greater chance of being drawn down during this period, regardless of the modeling scenario. The differences between the modeling scenarios are also greater. The chance of lake levels dropping to 212 feet msl during this period increases by 3 percent by 2030 and by 9 percent by 2050 when compared with 1998.

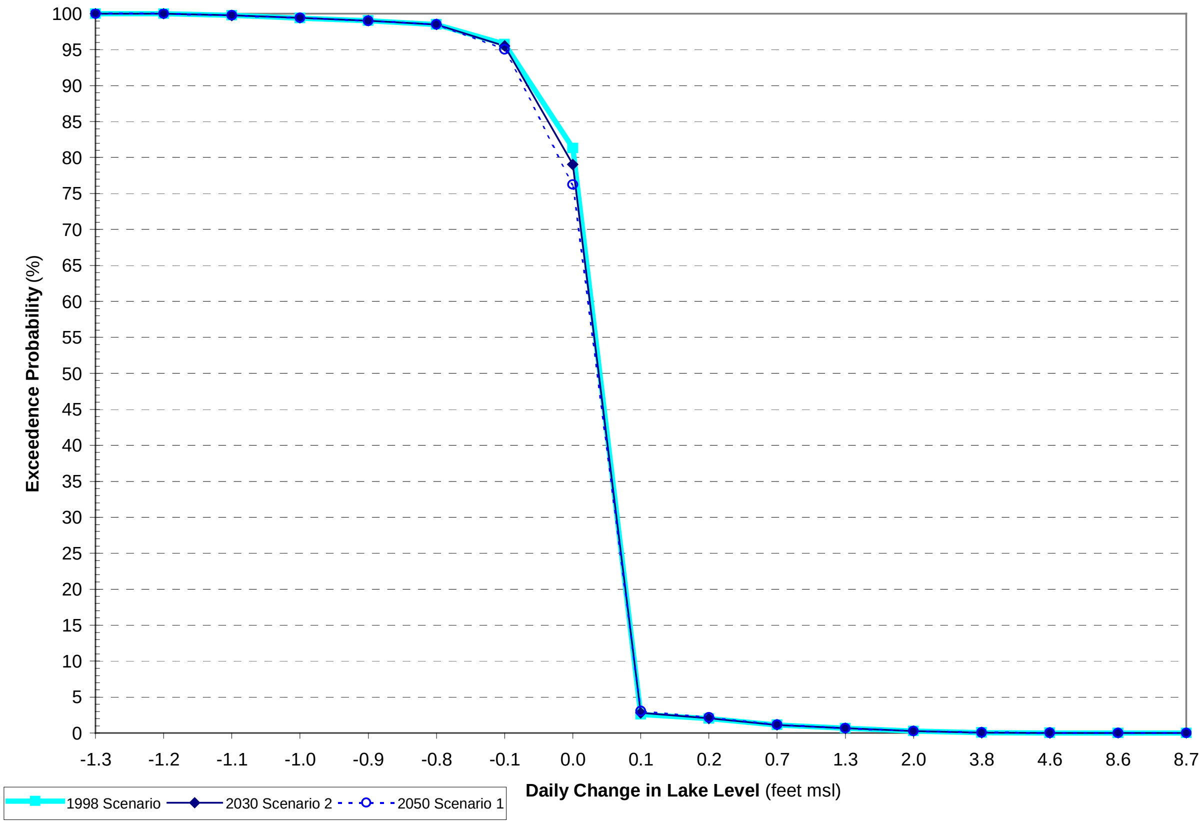
Modeled Jordan Lake Levels: October 1 to January 31



The forth chart (on the following page) depicts daily changes in lake levels from April 1 to June 30. This is useful for determining potential impacts on fish spawning. Any daily decrease in lake level has a negative impact on fish spawning. The associated table may be found in Appendix G.

There seems to be almost no difference between the various modeling scenarios when looking at the impact of falling lake levels on fish spawning. The chance of the lake level falling by less than 0.1 feet during this period remains the same by 2030 when compared with 1998, and increases by only 1 percent by 2050 when compared with 1998. The chance of the lake level falling by more than 0.1 feet during this period remains the same among the various modeling scenarios.

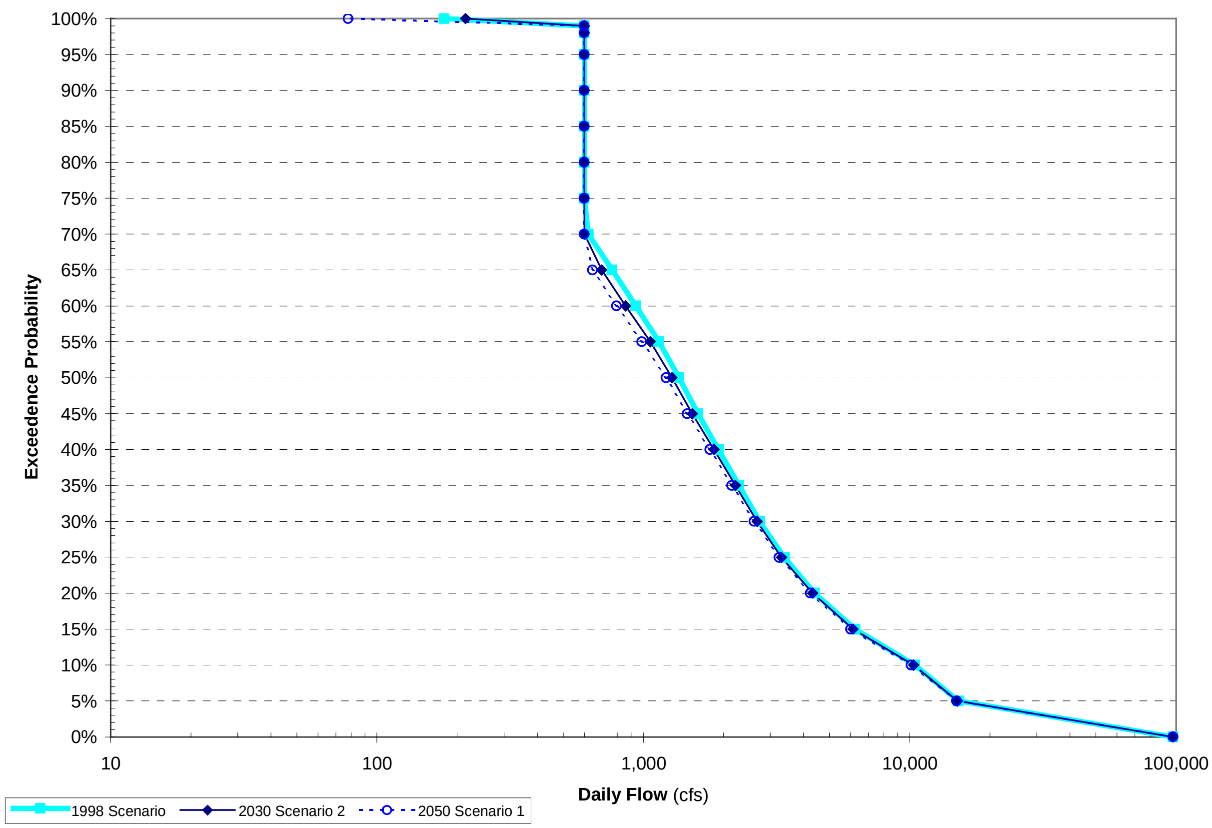
Modeled Changes in Jordan Lake Levels: April 1 to June 30



Cape Fear River Flows

Model scenario results indicate that the slight decrease in the reliability of the Jordan Lake low flow augmentation pool will not significantly affect the flows at the Lillington stream gage. The daily flow profile at Lillington remains almost unchanged among the model scenarios, as described in the following figure. The associated table is in Appendix G.

Modeled Cape Fear River Flows at Lillington



Four water systems located downstream of Jordan Dam, Sanford, Holly Springs, Harnett County and Fayetteville, requested allocations of Jordan Lake water supply storage during Round Three. Based on the information provided in their applications, we expect these systems to rely upon withdrawals from the Cape Fear River to meet their future water demands. The modeling results indicate that there will be adequate water available at their current or planned intake locations to meet their estimated 2050 average day demands. The table on the following page shows flow statistics at Lillington for the various model scenarios. Note that despite very large projected increases in water withdrawals between Jordan Dam and Lillington (over 300 percent by 2050), the 2050 scenario indicates only a 7 percent reduction in the 7Q50 when compared with 1998.[4]

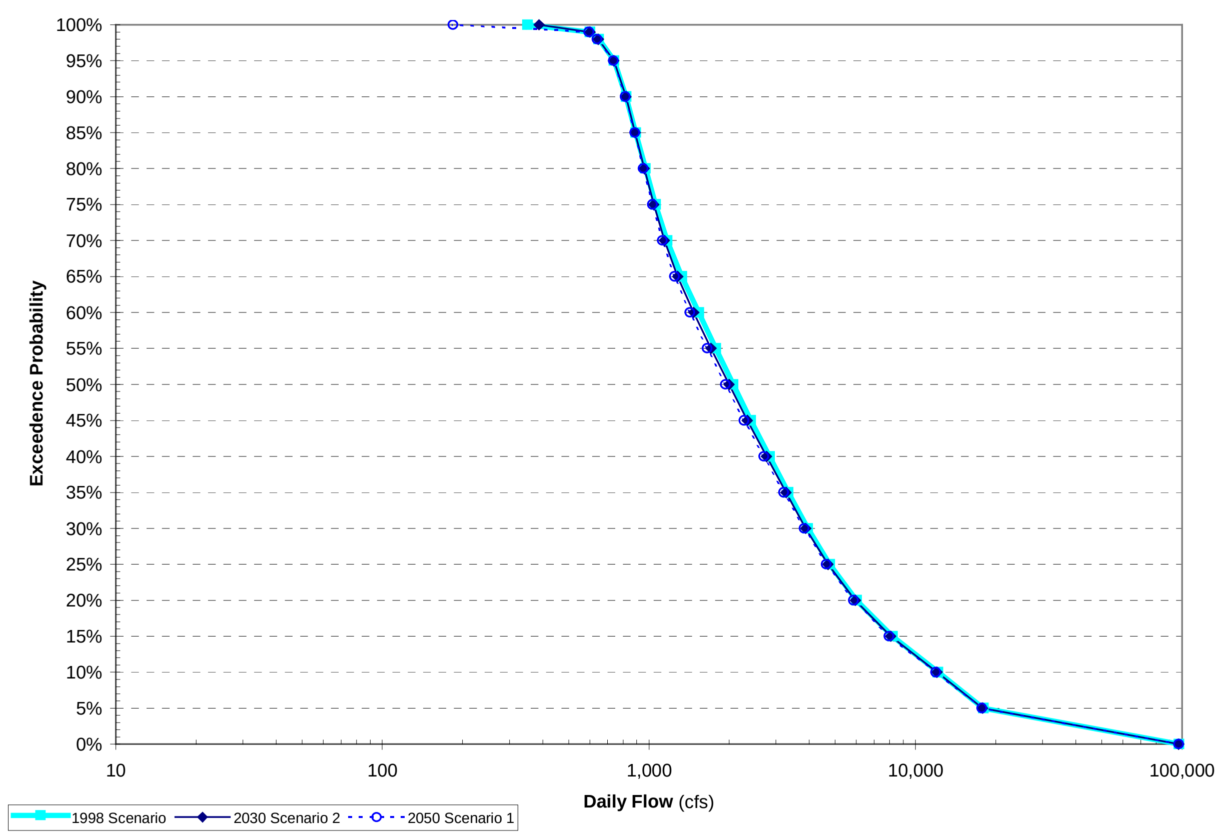
[4] The "7Q50" is the lowest, average 7-day flow expected to occur in a fifty-year period.

Modeled Cape Fear River Flow Statistics at Lillington

Flow Statistic	Flow (cfs)[1] 1998 Scenario	2030 Scenario 2	2050 Scenario 1
7Q10	581	583	515
7Q20	475	491	447
7Q50	450	468	420

The total projected increase in withdrawals upstream of Fayetteville is 114 mgd by 2030 (an increase of 93 percent compared with 1998 withdrawals) and 197 mgd by 2050 (an increase of 161 percent compared with 1998 withdrawals). Despite these large projected increases in upstream withdrawals, the flow profile at Fayetteville shows even less change among the model scenarios than the flow profile at Lillington, as described in the figure below. The associated table is in Appendix G. Note that these modeled impacts on reliability do not incorporate any drought management for Jordan Lake or any water supply systems in the Basin. Implementing drought management measures will improve the reliability of water supplies.

Modeled Cape Fear River Flows at Fayetteville



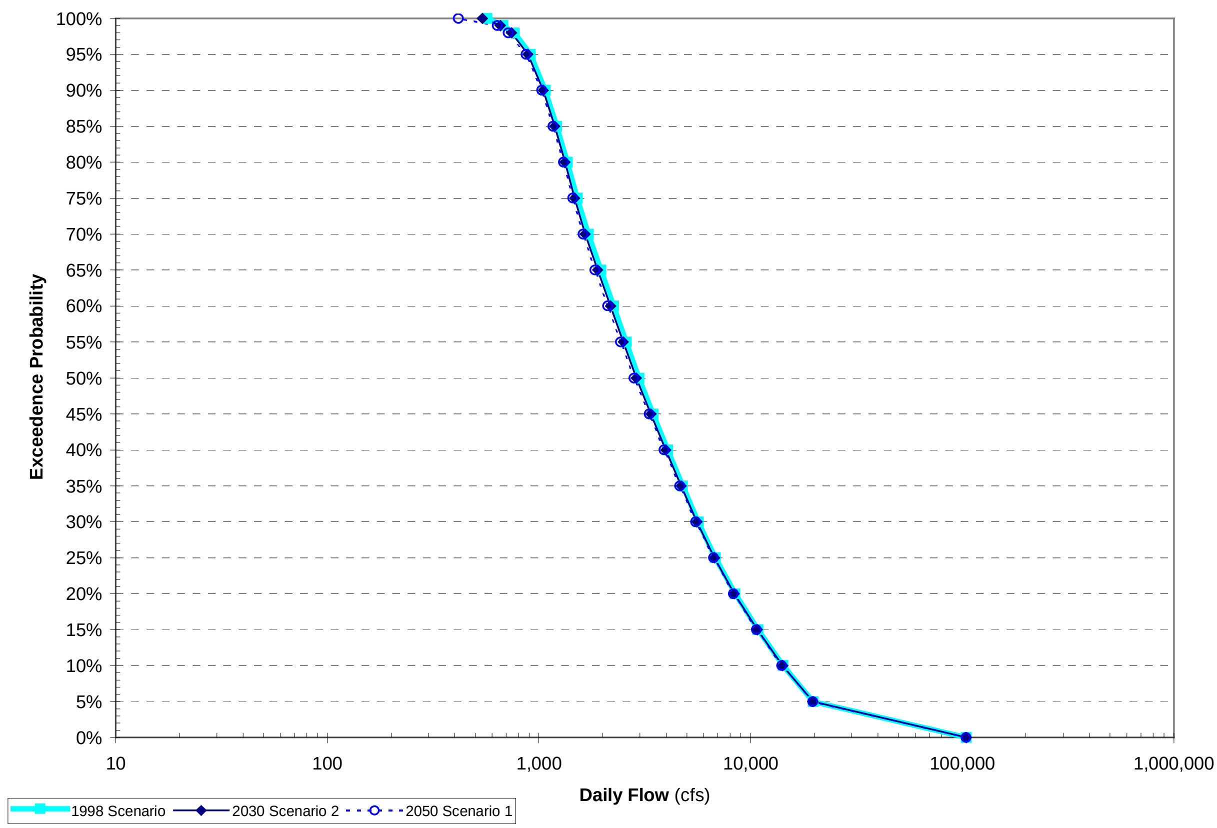
The table on the following page shows flow statistics at Fayetteville for the various model scenarios. Note that despite very large projected increases in water withdrawals above Fayetteville (over 191 percent by 2050), the 2050 scenario indicates only a 1 percent reduction in the 7Q50 when compared with 1998.

Modeled Cape Fear River Flow Statistics at Fayetteville

Flow Statistic	Flow (cfs)[1]		
	1998 Scenario	2030 Scenario 2	2050 Scenario 1
7Q10	618	623	598
7Q20	573	583	568
7Q50	523	538	531

The Cape Fear River daily flows at Lock & Dam #1 are virtually unchanged among the model scenarios, as described in the figure below. The associated table is in Appendix G.

Modeled Cape Fear River Flows at Lock & Dam #1



The table on the following page shows flow statistics at Lock & Dam #1 for the various model scenarios. Despite a projected increase of 411 mgd in water withdrawals above Lock & Dam #1 by 2050 (over 163 percent), the 2050 scenario indicates only a 10 percent reduction in the 7Q50 when compared with 1998.

Modeled Cape Fear River Flow Statistics at Lock & Dam #1

Flow Statistic	**Flow** (cfs)[1]		
	1998 Scenario	2030 Scenario 2	2050 Scenario 1
7Q10	699	679	652
7Q20	640	620	587
7Q50	577	557	519

Appendix A. Notes

1. Used 2000 water use, service area demand, and population. Population projections adjusted to represent residential use, not service to schools.
2. System population estimated by subtracting existing system populations from County population.
3. No 1997 LWSP submitted, therefore data based on 1992 LWSP.
4. Current industrial use is greater than 60% of total water use. Therefore, industrial use assumed to remain constant while other uses projected linearly.
5. Data from Jordan Lake application.
6. Projected demand adjusted by DWR.
7. Population & demand from Chatham Co Jordan Lake application.
8. Includes Hope Mills.
9. Summer population is 3x permanent population.
10. Projected demands for 1992-2020 used for projections of 2030-2050.
11. Seasonal population used for projections.
12. System also referred to as the N. Brunswick SD.
13. System's total service area wastewater discharge, including discharges out of Cape Fear River Basin.
14. System's service area wastewater discharged out of Cape Fear River Basin.
15. Quantity of wastewater discharged by system unknown, therefore assumed a ratio based on the average for all systems included in the plan.
16. 20-year safe yield estimate.
17. 25-year safe yield.
18. 50-year safe yield.
19. Current or expected contract limit.
20. 12-hour supply.
21. Total Jordan Lake water supply storage allocation recommended by the Division of Water Resources in October 2001.
22. Estimated 20% of 7Q10 flow.
23. One-half of estimated 20% of 7Q10 flow.
24. Facility permitted capacity.
25. Raw water intake capacity.
26. Permit does not limit discharge flow. Therefore, current average daily discharge is listed.
27. No contract limit specified. Therefore current average daily discharge is listed.
28. Cary, Apex, Morrisville & Wake IBT certificate limits transfer to 24 mgd on a maximum day basis, disregarding Condition 1. Disregarding consumptive loss, this equates to a transfer limit of 16 mgd on an average day basis, assuming a maximum/average ration of 1.5. This also assumes that their water supply source continues to be within the Haw River Basin.
29. System's total service area demand, including from sources out of Cape Fear River Basin.
30. System's service area demand for sources out of Cape Fear River Basin.
31. Population & demand from Fayetteville Jordan Lake application.

Appendix B. Population Projection Calculations

(Notes are explained in Appendix A)

PWSID	Notes	WATER SYSTEM	LWSP SERVICE AREA POPULATIONS					CALCULATED	
			1992	1997	2000	2010	2020	SLOPE	INTERCEPT
02-79-020		REIDSVILLE	14011	14085	14825	15200	15400	52	-90436
02-79-050	1	ROCKINGHAM CO			856	867	870	1	-543
02-41-010		GREENSBORO	194000	199000	204000	214000	222000	1010	-1816406
02-41-020		HIGH POINT	70258	71160	76527	80063	83840	501	-927385
02-41-030		JAMESTOWN	3000	4329	5000	6000	7000	133	-262065
02-76-030		ARCHDALE	7100	8500	10000	15000	20000	474	-937844
02-76-015		RANDLEMAN	3200	3526	3984	4398	4807	56	-109111
02-76-010		ASHEBORO	21000	20222	20472	22852	25156	172	-322588
02-76-025		LIBERTY	2344	2200	2363	2598	2858	22	-40775
02-76-020		RAMSEUR	2300	2524	2680	2970	3240	33	-62936
02-76-035		FRANKLINVILLE	225	823	1131	1200	1300	32	-62887
02-01-010		BURLINGTON	40369	43200	48757	51967	55094	518	-989743
02-01-035		ALAMANCE	259	257	285	313	345	3	-6281
02-01-025		ELON COLLEGE	4695	5045	5363	5710	6060	47	-88604
02-41-010	3	GIBSONVILLE	3799		4473	5815	7560	159	-312940
02-01-123	3	OSSIPEE SD	300		400	425	450	5	-10162
02-01-015		GRAHAM	10347	11725	12200	14250	16670	220	-427971
02-01-018		MEBANE	4960	5100	8118	11359	14100	349	-690640
02-01-020		HAW RIVER	1928	2183	2913	3345	3750	66	-128515
02-01-030	3	GREEN LEVEL	1536		1636	1705	1770	9	-16608
03-62-025		STAR	823	862	915	1115	1360	20	-38577
03-53-015		BROADWAY	1003	1070	1080	1246	1308	11	-21663
03-53-130		LEE CO	37	145	158	213	286	8	-15560
03-92-055		FUQUAY-VARINA	4300	6249	8760	18268	38942	1233	-2455839
03-43-010		DUNN	9200	9731	11464	12561	13609	160	-308983
03-51-025		BENSON	2880	4000	4245	5175	6310	114	-223514
03-26-035		FALCON	695	695	747	797	845	6	-10707
03-26-050		GODWIN		203	215	237	263	3	-4834
03-43-035		ERWIN	4400	4265	4685	5373	6061	65	-126186
03-63-015		ROBBINS	1400	1950	1975	2074	2200	22	-42949
03-63-040		CAMERON		391	468	524	573	7	-13784
03-63-025		CARTHAGE	1610	2175	2200	2400	2600	30	-57229
03-63-103		MOORE CO (HYLAND HILLS - NIAGRA)	140	267	272	277	301	4	-8121
03-63-045		MOORE CO (VASS)	678	736	781	1000	1265	21	-42001
03-63-010		SOUTHERN PINES	11709	12175	12905	14456	15810	151	-289696
03-63-108		MOORE CO (PINEHURST)	5785	7746	8838	13019	17975	434	-859158
03-63-117		MOORE CO (SEVEN LAKES)	2150	2685	3069	4163	5270	112	-220177
03-63-035	3	TAYLORTOWN	601		612	785	980	17	-33313

PWSID	Notes	WATER SYSTEM	LWSP SERVICE AREA POPULATIONS					CALCULATED	
			1992	1997	2000	2010	2020	SLOPE	INTERCEPT
03-26-020		SPRING LAKE	10500	12050	12750	15375	18540	282	-551858
03-47-025		HOKE CO RWS	0	12700	18799.1	27827.26	41191.15	1180	-2342451
03-47-010	3	RAEFORD	3910		4300	4800	5280	56	-108509
03-26-040		WADE	438	457	472	532	590	6	-10653
03-26-030		STEDMAN	777	668	787	887	983	9	-18075
03-26-344		FT BRAGG		65000	65000	65000	65000	0	65000
03-09-010		ELIZABETHTOWN	4000	4181	4284	4602	4943	33	-62414
03-09-030		WHITE LAKE	1010	1010	1042	1085	1132	5	-8226
03-09-060		BLADEN CO WD - 701 NORTH	432	1240	1606	2136	2666	73	-145628
03-09-055		BLADEN CO WD - W BLADEN	62	496	970	1368	1765	58	-116240
03-09-065		BLADEN CO WD - EAST ARCADIA	2675	4282	5098	6158	7218	150	-295229
03-09-035		BLADEN CO WD - WHITE OAK	505	1400	2198	2860	3523	102	-201857
03-09-025		DUBLIN	251	447	450	450	450	5	-9068
03-09-040		TAR HEEL		204	210	225	240	2	-2880
04-65-010		WILMINGTON	57213	66686	70700	73200	80100	707	-1347732
04-65-020		WRIGHTSVILLE BEACH	2935	3146	3241	3580	3600	24	-45412
04-65-226		APPLE VALLEY		199	219	254	284	4	-6947
04-65-191		NEW HANOVER CO FLEMINGTON	108	187	206	239	267	5	-9715
04-65-119		FIGURE EIGHT ISLAND	732	825	976	1098	1220	17	-33501
04-65-015		CAROLINA BEACH	4271	4643	4750	5468	6144	67	-128642
04-65-025		KURE BEACH	693	1251	1308	1518	1762	33	-63919
04-10-045		BRUNSWICK CO	45748	61959	66855	83175	97874	1769	-3474128
04-10-035	3, 12	NORTH BRUNSWICK WSA (LELAND SD)	3484		4200	5000	5500	82	-160084
04-10-065		NAVASSA	439	520	525	590	685	8	-15628
04-10-055		CASWELL BEACH	500	220	307	400	500	4	-7687
04-10-060		HOLDEN BEACH	687	910	1060	2060	3700	109	-215939
04-10-015		LONG BEACH WATER	3280	4789	5419	6797	8526	177	-347949
04-10-035		OCEAN ISLE BEACH	523	689	880	1057	1270	26	-50839
04-10-025		SHALLOTTE	1078	1242	1315	1380	1450	12	-22246
04-10-010		SOUTHPORT	3660	5124	5572	6756	7834	139	-272667
04-10-050		SUNSET BEACH	591	1908	2186	2350	2532	55	-107453
04-10-020		YAUPON BEACH	785	891	949	1048	1158	13	-24358
04-65-137		MONTEREY HEIGHTS		1095	1183	1325	1457	15	-29136
04-65-232		MURRAYVILLE		7671	8438	10548	12130	194	-378785
04-65-154		WALNUT HILLS		781	859	997	1116	14	-27400
04-65-190		RUNNYMEADE		728	801	929	1040	13	-25500
04-65-188		PRINCE GEORGE		596	656	760	852	11	-20902
04-65-229		WESTBAY		644	708	822	920	12	-22586
04-65-192		BRICKSTONE - MARSH OAKS		535	589	683	765	10	-18789
04-24-035		RIEGELWOOD SD	320	323	350	400	425	4	-7889

Appendix C. Water System Supplies

(Notes are explained in Appendix A)

REIDSVILLE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-79-020	16	Troublesome Creek/Lake Hunt	19.000	02-1
		Total	19.000	

ROCKINGHAM CO

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-79-050	19	from REIDSVILLE	0.550	02-1
		Total	0.000	

GREENSBORO

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-41-010	18	Lakes Brandt, Higgins, and Townsend	36.000	02-1
	18	Randleman Lake	28.510	02-2
		Total	64.510	

HIGH POINT

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-41-020	18	City Lake	8.600	02-2
	18	Oak Hollow Lake	12.840	02-2
	18	Randleman Lake	10.080	02-2
		Total	31.520	

JAMESTOWN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-41-030	19	from HIGH POINT	1.000	02-2
	19	from GREENSBORO	0.100	02-1
	18	Randleman Lake	1.200	02-2
		Total	1.200	

ARCHDALE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-76-030	19	from HIGH POINT	0.500	02-2
	19	from DAVIDSON	0.500	18-1
	18	Randleman Lake	1.200	02-2
		Total	1.200	

RANDLEMAN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-76-015	19	from ASHEBORO	1.000	18-3
	16	Polecat Creek	1.500	02-2
	18	Randleman Lake	1.010	02-2
		Total	2.510	

ASHEBORO

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-76-010	16	Lake Lucas	6.000	18-3
	17	Lake Reese	13.500	18-3
		Total	19.500	

RANDOLPH CO

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
none	18	Randleman Lake	6.000	02-2
		Total	6.000	

LIBERTY

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-76-025	20	well	0.797	na
		Total	0.797	

RAMSEUR

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-76-020	16	Sandy Creek	1.500	02-2
		Total	1.500	

FRANKLINVILLE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-76-035	19	from RAMSEUR	0.090	02-2
		Total	0.000	

BURLINGTON

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-01-010	16	Lake Mackintosh	36.000	02-1
	16	Stoney Creek	12.000	02-1
		Total	48.000	

ALAMANCE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-01-035	19	from BURLINGTON	0.500	02-1
		Total	0.000	

ELON COLLEGE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-01-025	19	from BURLINGTON	1.000	02-1
	20	well	0.123	na
		Total	0.123	

GIBSONVILLE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-41-010	19	from BURLINGTON	0.900	02-1
	19	from Greensboro	1.000	02-1
	3, 20	well	0.131	na
		Total	0.131	

OSSIPEE SD

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-01-123	3, 20	well	0.071	na
		Total	0.071	

GRAHAM

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-01-015	16	Graham-Mebane Lake	8.000	02-1
		Total	8.000	

MEBANE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-01-018	16	Graham-Mebane Lake	4.000	02-1
		Total	4.000	

HAW RIVER

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-01-020	19	from GRAHAM	1.000	02-1
	19	from BURLINGTON	0.800	02-1
		Total	0.000	

GREEN LEVEL

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
02-01-030	3, 19	from GRAHAM	0.133	02-1
		Total	0.000	

ORANGE-ALAMANCE/ORANGE CO

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-68-020	5, 16	Corporation Lake	0.370	10-1
	18, 21	Jordan Lake	1.000	02-1
	20	well	0.100	na
		Total	1.470	

OWASA

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-68-010	5, 18	University Lake and Cane Creek	14.300	02-1
	18	Jordan Lake	10.000	02-1
	18, 21	Jordan Lake (recommended)	5.000	02-1
		Total	19.300	

DURHAM

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-32-010	5, 18	Lake Michie	19.000	10-1
	18	Little River Lake	18.000	10-1
	18, 21	Jordan Lake (recommended)	10.000	02-1
		Total	47.000	

CARY\APEX

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-92-020-045	5, 18	Jordan Lake	21.000	02-1
	18, 21	Jordan Lake (recommended)	32.000	02-1
		Total	32.000	

MORRISVILLE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-92-075	5, 18	Jordan Lake	2.500	02-1
	18, 21	Jordan Lake (recommended)	3.500	02-1
		Total	3.500	

WAKE CO - RTP

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
none	5, 18	Jordan Lake	1.500	02-1
	18, 21	Jordan Lake (recommended)	3.500	02-1
		Total	3.500	

CHATHAM CO COMBINED

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-19-XXX	5, 18, 21	Jordan Lake	6.000	02-1
	19	from PITTSBORO	0.500	02-1
	19	from GOLDSTON-GULF	0.160	02-2
	19	from SILER CITY	0.300	02-2
	19	from SANFORD	0.300	02-3
		Total	6.000	

GOLDSTON-GULF SD

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-19-025	22	Deep River	2.24	02-2
		Total	2.240	

PITTSBORO

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-19-015	22	Haw River	9.800	02-1
		Total	9.800	

SILER CITY

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-19-010	16	Rocky River Reservoirs	5.800	02-2
		Total	5.800	

STAR

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-62-025	19	from MONTGOMERY CO	0.904	18-1
		Total	0.904	

SANFORD (Lee Co WSD I)

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-53-010	5, 22	Cape Fear River	61.600	02-3
		Total	61.600	

BROADWAY

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-53-015	19	from SANFORD	0.033	02-3
	20	well	0.063	na
		Total	0.063	

LEE CO

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-53-130	22	Deep River	2.197	02-2
	19	from SANFORD	unk	02-3
		Total	2.197	

HOLLY SPRINGS

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-92-050	5, 18	Jordan Lake	2.000	02-1
	18, 21	Jordan Lake (recommended)	0.000	02-1
	19	from RALEIGH	1.200	10-1
	19	from HARNETT CO	1.000	02-3
	23	Cape Fear River	34.250	02-3
		Total	34.250	

HARNETT CO (Combined)

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-43-045	5, 23	Cape Fear River	34.250	02-3
		Total	34.250	

FUQUAY-VARINA

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-92-055	19	from HARNETT CO	1.300	02-3
	19	from GARNER	0.750	10-1
		Total	0.000	

DUNN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-43-010	22	Cape Fear River	69.800	02-3
		Total	69.800	

BENSON

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-51-025	19	from DUNN	1.500	02-3
	19	from JOHNSTON CO	0.200	10-1
		Total	0.000	

FALCON

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-26-035	19	from DUNN	0.200	02-3
		Total	0.000	

GODWIN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-26-050	19	from FALCON	0.040	02-3
		Total	0.000	

ERWIN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-43-035	25	Swift Textiles Reservoir	5.000	02-3
		Total	5.000	

ROBBINS

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-015	24	Bear Creek	1.500	02-2
		Total	1.500	

CAMERON

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-040	20	well	0.134	na
		Total	0.134	

CARTHAGE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-025	24	Nick's Creek	1.000	02-3
		Total	1.000	

MOORE CO (HYLAND HILLS - NIAGRA)

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-103	20	well	0.032	na
		Total	0.032	

MOORE CO (VASS)

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-045	22	Little River	1.450	02-3
		Total	1.450	

SOUTHERN PINES

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-010	22	Drowning Creek	8.000	09-1
		Total	8.000	

MOORE CO (PINEHURST)

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-108	20	well	2.386	na
	19	from SOUTHERN PINES	0.750	09-1
		Total	2.386	

MOORE CO (SEVEN LAKES)

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-117	20	well	0.341	na
	19	from PINEHURST	0.750	09-1
		Total	0.341	

TAYLORTOWN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-63-035	3, 20	well	0.081	na
		Total	0.081	

FAYETTEVILLE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-26-010	5, 8, 16	Glenville Lake	5.000	02-3
	22	Cape Fear River	80.800	02-3
		Total	85.800	

SPRING LAKE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-26-020	19	from FAYETTEVILLE	0.400	02-3
		Total	0.000	

HOKE CO RWS

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-47-025	20	well	1.956	na
	19	from NC DEPT OF CORRECTIONS	0.225	na
		from FAYETTEVILLE	0.200	02-3
		Total	2.181	

RAEFORD

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-47-010	3, 20	well	2.693	na
	19	from HOKE CO RWS	unk	02-3
		Total	2.693	

WADE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-26-040	20	well	0.204	na
		Total	0.204	

STEDMAN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-26-030	20	well	0.157	na
		Total	0.157	

FT BRAGG

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-26-344	16	Little River	20.000	02-3
		Total	20.000	

ELIZABETHTOWN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-09-010	20	well	1.368	na
		Total	1.368	

WHITE LAKE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-09-030	20	well	0.950	na
		Total	0.950	

BLADEN CO WD - 701 NORTH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-09-060	20	well	0.144	na
	19	from WHITE LAKE	0.581	na
		Total	0.144	

BLADEN CO WD - EAST ARCADIA

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-09-065	20	well	0.198	na
		Total	0.198	

BLADEN CO WD - W BLADEN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-09-055	20	well	0.641	na
	19	from ELIZABETHTOWN	0.026	na
		Total	0.641	

BLADEN CO WD - WHITE OAK

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-09-035	20	well	0.306	na
		Total	0.306	

DUBLIN

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-09-025	20	well	0.050	na
		Total	0.050	

TAR HEEL

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
03-09-040	20	well	0.318	na
		Total	0.318	

WILMINGTON

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-010	23	Cape Fear River	53.300	02-3
	19	from LOWER CAPE FEAR WSA	15.000	02-3
		Total	53.300	

NEW HANOVER CO AIRPORT

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-510	19	from WILMINGTON	0.025	02-3
		Total	0.000	

WRIGHTSVILLE BEACH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-020	20	well	1.222	na
		Total	1.222	

APPLE VALLEY

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-226	20	well	0.166	na
		Total	0.166	

NEW HANOVER CO FLEMINGTON

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-191	20	well	0.432	na
		Total	0.432	

FIGURE EIGHT ISLAND

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-119	20	well	0.564	na
		Total	0.564	

CAROLINA BEACH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-015	20	well	0.890	na
		Total	0.890	

KURE BEACH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-025	20	well	0.824	na
		Total	0.824	

LOWER CAPE FEAR WSA

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-999	23	Cape Fear River	53.300	02-3
		Total	53.300	

BRUNSWICK CO

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-045	19	from LOWER CAPE FEAR WSA	24.000	02-3
		Total	0.000	

NORTH BRUNSWICK WSA (LELAND SD)

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-035	3, 12, 19	from BRUNSWICK CO	0.455	02-3
		Total	0.000	

NAVASSA

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-065	19	from NORTH BRUNSWICK WSA	0.133	02-3
		Total	0.000	

CASWELL BEACH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-055	19	from BRUNSWICK CO	0.260	02-3
		Total	0.000	

HOLDEN BEACH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-060	19	from BRUNSWICK CO	0.822	02-3
		Total	0.000	

LONG BEACH WATER

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-015	19	from BRUNSWICK CO	1.321	02-3
		Total	0.000	

OCEAN ISLE BEACH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-035	19	from BRUNSWICK CO	0.386	02-3
		Total	0.000	

SHALLOTTE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-025	19	from BRUNSWICK CO	0.180	02-3
		Total	0.000	

SOUTHPORT

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-010	19	from BRUNSWICK CO	0.418	02-3
		Total	0.000	

SUNSET BEACH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-050	19	from BRUNSWICK CO	1.085	02-3
		Total	0.000	

YAUPON BEACH

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-10-020	19	from BRUNSWICK CO	0.052	02-3
		Total	0.000	

MONTEREY HEIGHTS

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-137	20	well	0.360	na
		Total	0.360	

MURRAYVILLE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-232	20	well	2.916	na
		Total	2.916	

WALNUT HILLS

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-154	20	well	0.148	na
		Total	0.148	

RUNNYMEADE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-190	20	well	0.144	na
		Total	0.144	

PRINCE GEORGE

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-188	20	well	0.180	na
		Total	0.180	

WESTBAY

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-229	20	well	0.792	na
		Total	0.792	

BRICKSTONE - MARSH OAKS

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-65-192	20	well	0.216	na
		Total	0.216	

RIEGELWOOD SD

PWSID	Notes	WATER SUPPLY SOURCE	AVAILABLE SUPPLY MGD	SOURCE BASIN
04-24-035	22	Cape Fear River	106.100	02-3
		Total	106.100	

Appendix D. System Wastewater Discharges

(Notes are explained in Appendix A)

REIDSVILLE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-79-020		NC0024881	Little Troublesome Creek	7.500	02-1
			Total	7.500	

GREENSBORO

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-41-010		NC0047384	S. Buffalo Creek	22.000	02-1
		NC0024325	N. Buffalo Creek	16.000	02-1
	26	NC0082082 (UNC Greensboro)	N. Buffalo Creek	0.072	02-1
	19		to HIGH POINT	0.600	02-2
			Total	38.072	

HIGH POINT

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-41-020		NC0024210	Richland Creek	16.000	02-2
		NC0024228	Rich Fork	6.200	18-1
			Total	22.200	

JAMESTOWN

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-41-030	19		to HIGH POINT	1.75	02-2
			Total	0.000	

ARCHDALE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-76-030	19		to HIGH POINT	1.75	02-2
			Total	0.000	

RANDLEMAN

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-76-015		NC0025445	Deep River	1.745	02-2
			Total	1.745	

ASHEBORO

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-76-010		NC0026123	Haskett's Creek	9.000	02-2
			Total	9.000	

RAMSEUR

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-76-020		NC0026565	Deep River	0.480	02-2
			Total	0.480	

FRANKLINVILLE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-76-035		NC0007820	Deep River	0.030	02-2
			Total	0.030	

BURLINGTON

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-01-010		NC0023868	Haw River	12.000	02-1
		NC0023876	Big Alamance Creek	12.000	02-1
			Total	24.000	

ALAMANCE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-01-035	19		to BURLINGTON	0.500	02-1
			Total	0.000	

ELON COLLEGE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-01-025	27		to BURLINGTON	0.348	02-1
	27		to GIBSONVILLE	0.023	02-1
			Total	0.000	

GIBSONVILLE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-41-010	19		to BURLINGTON	0.850	02-1
			Total	0.000	

GRAHAM

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-01-015		NC0021211	Haw River	3.500	02-1
	27		to BURLINGTON	0.075	02-1
			Total	3.500	

MEBANE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-01-018		NC0021474	Moadams Creek	2.500	02-1
			Total	2.500	

HAW RIVER

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-01-020	19		to BURLINGTON	2.000	02-1
	19		to GRAHAM	0.125	02-1
			Total	0.000	

GREEN LEVEL

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
02-01-030	3, 27		to HAW RIVER	0.115	02-1
			Total	0.000	

OWASA

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-68-010	5	NC0025241	Morgan Creek	12.000	02-1
	27		to DURHAM	0.010	02-1
			Total	12.000	

DURHAM

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-32-010	5	NC0047597	New Hope Creek	20.000	02-1
		NC0026051 (Durham County)	Northeast Creek	6.000	02-1
		NC0023841	Ellerbee Creek	20.000	10-1
			Total	46.000	

CARY\APEX

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-92-020-045	5	NC0048879	Crabtree Creek	12.000	10-1
		NC0065102	Middle Creek	16.000	10-1
		NC0064050	UT of Middle Creek	3.600	10-1
			Total	31.600	

MORRISVILLE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-92-075	5, 19		to CARY	2.000	10-1
			Total	0.000	

WAKE CO - RTP

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
none	5, 27		to CARY	0.090	10-1
			Total	0.000	

CHATHAM CO COMBINED

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-19-XXX	5	NC0051314	UT of Cub Creek	0.050	02-1
		NC0035866 (Bynum)	Haw River	0.025	02-1
			Total	0.075	

GOLDSTON-GULF SD

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-19-025		NC0081795	Deep River	0.006	02-2
			Total	0.006	

PITTSBORO

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-19-015		NC0020354	Roberson Creek	0.750	02-1
			Total	0.750	

SILER CITY

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-19-010		NC0026441	Loves Creek	4.000	02-2
			Total	4.000	

STAR

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-62-025		NC0058548	Cotton Creek	0.600	02-2
			Total	0.600	

SANFORD (Lee Co WSD I)

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-53-010	5	NC0024147	Deep River	6.800	02-2
		NC0038831 (Carolina Trace)	Upper Little River	0.325	02-3
			Total	7.125	

BROADWAY

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-53-015		NC0059242	Daniel's Creek	0.145	02-3
			Total	0.145	

HOLLY SPRINGS

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-92-050	5	NC0063096	Utley Creek	1.500	02-3
			Total	1.500	

HARNETT CO (Combined)

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-43-045	5	NC0031470	Jumping Run Creek	0.400	02-3
		NC0030091	Cape Fear River	0.500	02-3
		NC0021636 (Lillington)	Cape Fear River	0.600	02-3
		NC0082597 (Angier)	Cape Fear River	0.500	02-3
			Total	2.000	

FUQUAY-VARINA

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-92-055		NC0028118	Kenneth Creek	1.200	02-3
		NC0066516	Terrible Creek	0.500	10-1
			Total	1.700	

DUNN

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-43-010		NC0043176	Cape Fear River	3.750	02-3
			Total	3.750	

BENSON

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-51-025		NC0020389	Hannah Creek	1.500	10-1
			Total	1.500	

ERWIN

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-43-035		NC0064521	Cape Fear River	1.200	02-3
			Total	1.200	

ROBBINS

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-63-015		NC0062855	Deep River	1.300	02-2
			Total	1.300	

CARTHAGE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-63-025	27		to MOORE CO	0.111	09-1
			Total	0.000	

MOORE CO (VASS)

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-63-045		NC0074373	Little River	0.060	02-3
			Total	0.060	

SOUTHERN PINES

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-63-010		NC0037508 (MOORE CO)	Aberdeen Creek	6.700	09-1
			Total	6.700	

MOORE CO (PINEHURST)

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-63-108	27		to MOORE CO	1.762	09-1
			Total	0.000	

FAYETTEVILLE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-26-010	5, 8	NC0023957	Cape Fear River	22.000	02-3
		NC0050105	Cape Fear River	14.000	02-3
			Total	36.000	

SPRING LAKE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-26-020		NC0030970	Lower Little River	1.500	02-3
			Total	1.500	

HOKE CO RWS

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-47-025		NC0086045	Raft Swamp	0.020	09-1
		NC0086037	Little Marsh Swamp	0.010	09-1
			Total	0.030	

RAEFORD

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-47-010	3	NC0026514	Rockfish Creek	3.000	02-3
			Total	3.000	

FT BRAGG

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-26-344		NC0003964	Little River	8.000	02-3
		NC0052477	Drowning Creek	0.020	09-1
			Total	8.020	

ELIZABETHTOWN

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-09-010		NC0026671	Cape Fear River	1.275	02-3
			Total	1.275	

WHITE LAKE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-09-030		NC0023353	UT of Colly Creek	0.800	02-4
			Total	0.800	

DUBLIN

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
03-09-025	19		to ELIZABETHTOWN	0.060	02-3
			Total	0.000	

WILMINGTON

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-010		NC0023973	Cape Fear River	12.000	02-3
		NC0023965	Northeast Cape Fear River	8.000	02-5
			Total	20.000	

NEW HANOVER CO AIRPORT

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-510	27		to WILMINGTON	0.015	02-3
			Total	0.000	

WRIGHTSVILLE BEACH

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-020	19		to WILMINGTON	1.500	02-3
			Total	0.000	

CAROLINA BEACH

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-015		NC0023256	Cape Fear River	3.000	02-3
			Total	3.000	

KURE BEACH

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-025		NC0025763	Cape Fear River	0.285	02-3
	19		to CAROLINA BEACH	0.750	02-3
			Total	0.285	

BRUNSWICK CO

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-10-045		NC0065676	Cape Fear River	0.250	02-3
			Total	0.250	

SOUTHPORT

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-10-010		NC0021334	Coastal Creek	0.800	02-3
			Total	0.800	

MONTEREY HEIGHTS

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-137		NC0029173	Cape Fear River	0.050	02-3
			Total	0.050	

MURRAYVILLE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-232		NC0062804	Northeast Cape Fear River	0.160	02-5
	27		to WILMINGTON	0.116	02-3
			Total	0.160	

WALNUT HILLS

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-154		NC0039527	UT of Northeast Cape Fear River	0.100	02-5
			Total	0.100	

RUNNYMEADE

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-190	27		to WALNUT HILLS	0.040	02-5
			Total	0.000	

WESTBAY

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-229	27		to WILMINGTON	0.031	02-3
			Total	0.000	

BRICKSTONE - MARSH OAKS

PWSID	Notes	PERMIT	RECEIVING STREAM	PERMITTED DISCHARGE MGD	RECEIVING BASIN
04-65-192	27		to WILMINGTON	0.047	02-3
			Total	0.000	

Appendix E. Model Scenario 1 Inputs

These tables summarize the input data we used for Model Scenario 1. The purpose of Scenario 1 is to evaluate the long-term water supply needs in the Cape Fear River Basin and the cumulative effects of these demands throughout the basin above Lock & Dam #1. Model Scenario 1 incorporates the maximum projected demands for the Basin's water supply systems in 2050. The following tables provide the 2050 withdrawal amounts and the sources of those water demands for each water withdrawal location we modeled, as well as the 2050 discharge amounts and the sources of those wastewater discharges for each wastewater discharge location we modeled. The demand satisfaction table in Appendix G shows the average daily demand and seasonal extremes incorporated in the model input for each withdrawal node.

Withdrawal Node Inputs

System	Withdrawal Node (file name)	Demand Source	2050 Withdrawal (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)
REIDSVILLE	**02-79-020Reidsville**	REIDSVILLE	4.086	
		ROCKINGHAM CO	0.182	
		Total =	**4.268**	19
GREENSBORO	**02-41-010Greensboro-TownsendLk**	GREENSBORO	15.000	
		Total =	**15.000**	36
	02-41-010GreensboroNLMitchell	GREENSBORO	15.000	
		Total =	**15.000**	see above
	GreensboroRL	GREENSBORO	19.885	
		JAMESTOWN	0.000	
		GIBSONVILLE	0.515	
		Total =	**20.400**	28.51
HIGH POINT	**02-41-020HighPointFWard**	HIGH POINT	8.206	
		JAMESTOWN	0.000	
		ARCHDALE	1.057	
		Total =	**9.264**	21.44
	HighPointRL	HIGH POINT	10.000	
		Total =	**10.000**	10.08
JAMESTOWN	**JamestownRL**	JAMESTOWN	1.058	
		Total =	**1.058**	1.2
ARCHDALE	**ArchdaleRL**	ARCHDALE	1.200	
		Total =	**1.200**	1.2
RANDLEMAN	**02-76-015Randleman**	RANDLEMAN	1.500	
		Total =	**1.500**	1.5
	RandlemanRL	RANDLEMAN	0.792	
		Total =	**0.792**	1.01
RANDOLPH CO	**RandolphRL**	RANDOLPH CO	6.000	
		Total =	**6.000**	6
RAMSEUR	**02-76-020Ramseur**	RAMSEUR	0.907	
		FRANKLINVILLE	0.137	
		Total =	**1.044**	6.6
BURLINGTON	**02-01-010Burlington-Mackintosh**	BURLINGTON	18.330	
		ALAMANCE	0.057	
		GIBSONVILLE	1.238	
		Total =	**19.624**	36
	02-01-010Burlington-EdThomas	BURLINGTON	0.485	
		ELON COLLEGE	0.569	
		HAW RIVER	0.228	
		Total =	**1.282**	12
GRAHAM/ MEBANE	**02-01-015-018GrahamMebane**	GRAHAM	3.869	
		MEBANE	5.151	
		HAW RIVER	0.840	
		GREEN LEVEL	0.094	
		ORANGE-ALAMANCE\ORANGE CO	0.000	
		Total =	**9.954**	12

Withdrawal Node Inputs

System	Withdrawal Node (file name)	Demand Source		2050 Withdrawal (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)
ORANGE-ALAMANCE \ ORANGE CO	**OrangeJL**	ORANGE-ALAMANCE\ORANGE CO		3.541	
			Total =	**3.541**	4.0
OWASA	**03-68-010OWASA**	OWASA		5.000	
			Total =	**5.000**	14.3
	03-68-010OWASACaneCrk	OWASA		8.400	
			Total =	**8.400**	see above
	OWASAJL	OWASA		5.000	
			Total =	**5.000**	5.0
DURHAM	**DuhamJL**	DURHAM		14.000	
			Total =	**14.000**	14.0
CARY\APEX	**03-92-020-045CaryApex**	CARY\APEX		34.000	
			Total =	**34.000**	34.0
MORRISVILLE	**MorrisvilleJL**	MORRISVILLE		3.200	
			Total =	**3.200**	3.5
WAKE CO - RTP	**RTPJL**	WAKE CO - RTP		4.400	
			Total =	**4.400**	4.5
CHATHAM CO (Combined)	**ChathamCo**	CHATHAM CO (Combined)		14.389	
		SILER CITY		2.000	
			Total =	**16.389**	17.0
GOLDSTON-GULF SD	**03-19-025GoldstonGulf**	GOLDSTON-GULF SD		0.140	
		CHATHAM CO (Combined)		2.100	
			Total =	**2.240**	2.24
PITTSBORO	**03-19-015Pittsboro**	PITTSBORO		5.600	
		CHATHAM CO (Combined)		4.211	
			Total =	**9.811**	9.811
SILER CITY	**03-19-010SilerCity**	SILER CITY		5.800	
			Total =	**5.800**	5.8
SANFORD	**03-53-010Sanford**	SANFORD		36.600	
		BROADWAY		0.082	
		LEE CO		0.000	
			Total =	**36.682**	61.6
LEE CO	**03-53-130Lee-Cumnock**	LEE CO		0.778	
			Total =	**0.778**	2.2
HOLLY SPRINGS	**HollySprings** [1]	HOLLY SPRINGS		15.300	
			Total =	**15.300**	34.25
	HollySpringsRelease	HOLLY SPRINGS		0.000	
			Total =	**0.000**	0
HARNETT CO (Combined)	**03-43-045HarnettCo** [1]	HARNETT CO (Combined)		21.300	
		FUQUAY-VARINA		7.566	
		HOLLY SPRINGS		0.000	
			Total =	**28.866**	34.25
	HarnettRelease	HARNETT CO (Combined)		0.000	
			Total =	**0.000**	0
DUNN	**03-43-010Dunn**	DUNN		3.733	
		BENSON		3.150	
		FALCON		0.109	
		GODWIN from FALCON		0.020	
			Total =	**7.012**	69.8
ERWIN	**03-43-035BurligtonIndustries(SwiftTextiles-Er**	ERWIN		1.158	
			Total =	**1.158**	5

Withdrawal Node Inputs

System	Withdrawal Node (file name)	Demand Source		2050 Withdrawal (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)
ROBBINS	**03-63-015Robbins-CBBrooks**	ROBBINS		0.865	
			Total =	**0.865**	1.5
CARTHAGE	**03-63-025Carthage**	CARTHAGE		0.492	
			Total =	**0.492**	1
MOORE CO (VASS)	**03-63-045MowasaVass**	MOORE CO (VASS)		0.230	
			Total =	**0.230**	1.45
FAYETTEVILLE	**3-26-010FayettevillePOHoffer**	FAYETTEVILLE		71.000	
		SPRING LAKE		2.211	
		HOKE CO RWS		6.019	
		RAEFORD from HOKE CO RWS		0.000	
			Total =	**79.230**	80.8
	03-26-010FayettevilleGlenville	FAYETTEVILLE		5.000	
			Total =	**5.000**	5
	FayettevilleRelease	FAYETTEVILLE		0.000	
			Total =	**0.000**	0
FT BRAGG	**03-26-344FortBragg**	FT BRAGG		7.560	
			Total =	**7.560**	20
WILMINGTON	**04-65-010Wilmington** [2]	WILMINGTON		16.696	
		NEW HANOVER CO AIRPORT		0.040	
		WRIGHTSVILLE BEACH		0.150	
		APPLE VALLEY		0.075	
		NEW HANOVER CO FLEMINGTON		0.000	
		FIGURE EIGHT ISLAND		0.078	
		CAROLINA BEACH		0.214	
			Total =	**17.253**	53.3
LCFWASA	**04-65-999LowerCapeFearWSA** [2]	LCFWASA		11.650	
		BRUNSWICK CO		23.168	
		NORTH BRUNSWICK WSA from BRUNSWICK CO		0.953	
		NAVASSA from N. BRUNSWICK SD		0.084	
		CASWELL BEACH from BRUNSWICK CO		0.314	
		HOLDEN BEACH from BRUNSWICK CO		2.599	
		LONG BEACH WATER from BRUNSWICK CO		2.110	
		OCEAN ISLE BEACH from BRUNSWICK CO		1.157	
		SHALLOTTE from BRUNSWICK CO		0.303	
		SOUTHPORT from BRUNSWICK CO		1.093	
		SUNSET BEACH from BRUNSWICK CO		1.185	
		YAUPON BEACH from BRUNSWICK CO		0.090	
		WILMINGTON		0.000	
			Total =	**44.707**	53.3

[1] These intakes will likely be located close together. Therefore, the SEPA trigger of 68.5 will apply to the sum of both withdrawals.
[2] These intakes are located close together. Therefore, the SEPA trigger of 106.6 will apply to the sum of both withdrawals.

Discharge Node Inputs

System	Discharge Node (file name)	Discharge Source	2050 Discharge (mgd)	Permit Limit (mgd)
REIDSVILLE	**nc0024881Reidsville**	REIDSVILLE	3.344	
		Total =	**3.344**	7.5
GREENSBORO	**nc0047384GreensboroTZOsborne**	GREENSBORO	25.229	
		Total =	**25.229**	22
	nc0024325GreensboroNBuffalo	GREENSBORO	16.000	
		Total =	**16.000**	16
	nc0082082UNCGreensboro	GREENSBORO	0.091	
		Total =	**0.091**	not limited
HIGH POINT	**nc0024210HighPoint**	HIGH POINT	12.152	
		GREENSBORO	0.051	
		JAMESTOWN	2.806	
		ARCHDALE	3.654	
		Total =	**18.662**	16
RANDLEMAN	**nc0025445Randleman**	RANDLEMAN	2.050	
		Total =	**2.050**	1.745
ASHEBORO	**nc0026123Asheboro**	ASHEBORO	8.148	
		Total =	**8.148**	9
RAMSEUR	**nc0026565Ramseur**	RAMSEUR	0.488	
		Total =	**0.488**	0.48
FRANKLINVILLE	**nc0007820Franklinville**	FRANKLINVILLE	0.117	
		Total =	**0.117**	0.03
BURLINGTON	**nc0023876BurlingtonWWTP**	BURLINGTON	12.480	
		ALAMANCE	0.029	
		ELON COLLEGE	0.532	
		ELON COLLEGE to GIBSONVILLE	0.351	
		GIBSONVILLE	0.669	
		Total =	**14.062**	12
	nc0023868Burlington	BURLINGTON	9.923	
		GRAHAM	0.520	
		HAW RIVER	1.358	
		HAW RIVER to GRAHAM	0.125	
		GREEN LEVEL to HAW RIVER	0.074	
		Total =	**12.000**	12
GRAHAM/ MEBANE	**nc0021211Graham**	GRAHAM	3.500	
		Total =	**3.500**	3.5
	nc0021474MebaneWWTP	MEBANE	4.896	
		Total =	**4.896**	2.5
OWASA	**nc0025241OWASA-Mason**	OWASA	12.000	
		Total =	**12.000**	12
DURHAM	**nc0047597DurhamSouth**	DURHAM	16.142	
		OWASA	3.849	
		Total =	**19.991**	20
	nc0026051DurhamTriangle	DURHAM	5.619	
		Total =	**5.619**	6
CARY\APEX	**CaryRegionalWWTP**	CARY\APEX	23.399	
		Total =	**23.399**	unk
CHATHAM CO (Combined)	**nc0051314NorthChatham**	CHATHAM CO (Combined)	0.205	
		Total =	**0.205**	0.05
PITTSBORO	**nc0020354Pittsboro**	PITTSBORO	2.471	
		Total =	**2.471**	0.75

Discharge Node Inputs

System	Discharge Node (file name)	Discharge Source	2050 Discharge (mgd)	Permit Limit (mgd)
SILER CITY	**nc0026441SilerCity**	SILER CITY	7.860	
		Total =	**7.860**	4
STAR	**nc0058548Star**	STAR	0.342	
		Total =	**0.342**	0.6
SANFORD	**nc0024147Sanford**	SANFORD	25.284	
		Total =	**25.284**	6.8
	nc0038831CarTrace	SANFORD	0.325	
		Total =	**0.325**	0.325
BROADWAY	**nc0059242Broadway**	BROADWAY	0.123	
		Total =	**0.123**	0.145
HOLLY SPRINGS	**nc0063096HollySprings**	HOLLY SPRINGS	11.141	
		Total =	**11.141**	1.5
HARNETT CO (Combined)	**nc0031470HarnettCoUtilities**	HARNETT CO (Combined)	0.400	
		Total =	**0.400**	0.4
	nc0030091BuiesCrk	HARNETT CO (Combined)	0.500	
		Total =	**0.500**	0.5
	nc0021636LillingtonWWTP	HARNETT CO (Combined)	2.929	
		Total =	**2.929**	0.6
	nc0082597Angier	HARNETT CO (Combined)	0.500	
		Total =	**0.500**	0.5
FUQUAY-VARINA	**nc0028118FuquayVarina**	FUQUAY-VARINA	7.414	
		Total =	**7.414**	1.2
DUNN	**nc0043176Dunn**	DUNN	4.221	
		Total =	**4.221**	3
ERWIN	**nc0064521ErwinSouthWWTP**	ERWIN	1.108	
		Total =	**1.108**	1.2
	nc0001406SwiftTextiles	ERWIN	0.000	
		Total =	**0.000**	2.5
ROBBINS	**nc0062855Robbins**	ROBBINS	0.781	
		Total =	**0.781**	1.3
FAYETTEVILLE	**nc0023957FayettevillCrossCrk**	FAYETTEVILLE	51.402	
		Total =	**51.402**	22
	nc0050105FayettevilleRockfishCrk	FAYETTEVILLE	14.000	
		Total =	**14.000**	14
SPRING LAKE	**nc0030970SpringLake**	SPRING LAKE	1.784	
		Total =	**1.784**	1.5
RAEFORD	**nc0026514Raeford**	RAEFORD	1.780	
		Total =	**1.780**	3
ELIZABETHTOWN	**nc0026671Elizabethtown**	ELIZABETHTOWN	0.823	
		DUBLIN	0.088	
		Total =	**0.910**	1.275

Appendix F. Model Scenario 2 Inputs

These tables summarize the input data we used to develop Model Scenario 2. The purpose of Model Scenario 2 is to evaluate the Basin water supply needs and recommended Jordan Lake water supply storage allocations for 2030, and the cumulative effects of these demands throughout the basin above Lock & Dam #1. For Scenario 2, we incorporated the same projections used for Scenario 1 adjusted for 2030 with the following exception. For Scenario 2, we adjusted the projected water demands for Chatham County, Siler City and Pittsboro based upon our evaluations of all Jordan Lake water supply storage applications. The tables on the following pages provide the 2030 withdrawal amounts and the sources of those water demands for each water withdrawal location we modeled, as well as the 2030 discharge amounts and the sources of those wastewater discharges for each wastewater discharge location we modeled. The demand satisfaction table in Appendix G shows the average daily demand and seasonal extremes incorporated in the model input for each withdrawal node.

Withdrawal Node Inputs

System	Withdrawal Node (file name)	Demand Source	2030 Withdrawal (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)
REIDSVILLE	**02-79-020Reidsville**	REIDSVILLE	3.836	
		ROCKINGHAM CO	0.180	
		Total =	**4.016**	19
GREENSBORO	**02-41-010Greensboro-TownsendLk**	GREENSBORO	15.000	
		Total =	**15.000**	36
	02-41-010GreensboroNLMitchell	GREENSBORO	15.000	
		Total =	**15.000**	see above
	GreensboroRL	GREENSBORO	15.908	
		JAMESTOWN	0.000	
		GIBSONVILLE	0.348	
		Total =	**16.256**	28.51
HIGH POINT	**02-41-020HighPointFWard**	HIGH POINT	7.873	
		JAMESTOWN	0.000	
		ARCHDALE	0.428	
		Total =	**8.302**	21.44
	HighPointRL	HIGH POINT	8.500	
		Total =	**8.500**	10.08
JAMESTOWN	**JamestownRL**	JAMESTOWN	0.807	
		Total =	**0.807**	1.2
ARCHDALE	**ArchdaleRL**	ARCHDALE	1.200	
		Total =	**1.200**	1.2
RANDLEMAN	**02-76-015Randleman**	RANDLEMAN	1.500	
		Total =	**1.500**	1.5
	RandlemanRL	RANDLEMAN	0.399	
		Total =	**0.399**	1.01
RANDOLPH CO	**RandolphRL**	RANDOLPH CO	6.000	
		Total =	**6.000**	6
RAMSEUR	**02-76-020Ramseur**	RAMSEUR	0.768	
		FRANKLINVILLE	0.101	
		Total =	**0.869**	6.6
BURLINGTON	**02-01-010Burlington-Mackintosh**	BURLINGTON	15.686	
		ALAMANCE	0.049	
		GIBSONVILLE	0.918	
		Total =	**16.653**	36
	02-01-010Burlington-EdThomas	BURLINGTON	0.415	
		ELON COLLEGE	0.496	
		HAW RIVER	0.200	
		Total =	**1.111**	12

Withdrawal Node Inputs

System	Withdrawal Node (file name)	Demand Source	2030 Withdrawal (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)
GRAHAM/ MEBANE	**02-01-015-018GrahamMebane**	GRAHAM	3.135	
		MEBANE	3.704	
		HAW RIVER	0.735	
		GREEN LEVEL	0.085	
		ORANGE-ALAMANCE\ORANGE CO	1.355	
		Total =	**9.014**	12
ORANGE-ALAMANCE \ ORANGE CO	**OrangeJL**	ORANGE-ALAMANCE\ORANGE CO	1.000	
		Total =	**1.000**	1.0
OWASA	**03-68-010OWASA**	OWASA	3.000	
		Total =	**3.000**	14.3
	03-68-010OWASACaneCrk	OWASA	7.400	
		Total =	**7.400**	see above
	OWASAJL	OWASA	4.500	
		Total =	**4.500**	5.0
DURHAM	**DuhamJL**	DURHAM	9.300	
		Total =	**9.300**	10.0
CARY\APEX	**03-92-020-045CaryApex**	CARY\APEX	31.500	
		Total =	**31.500**	32.0
MORRISVILLE	**MorrisvilleJL**	MORRISVILLE	3.200	
		Total =	**3.200**	3.5
WAKE CO - RTP	**RTPJL**	WAKE CO - RTP	3.400	
		Total =	**3.400**	3.5
CHATHAM CO (Combined)	**ChathamCo**	CHATHAM CO (Combined)	5.500	
		SILER CITY	0.000	
		Total =	**5.500**	6.0
GOLDSTON-GULF SD	**03-19-025GoldstonGulf**	GOLDSTON-GULF SD	0.140	
		CHATHAM CO (Combined)	0.000	
		Total =	**0.140**	2.24
PITTSBORO	**03-19-015Pittsboro**	PITTSBORO	1.200	
		CHATHAM CO (Combined)	0.500	
		Total =	**1.700**	9.8
SILER CITY	**03-19-010SilerCity**	SILER CITY	4.100	
		Total =	**4.100**	5.8
SANFORD	**03-53-010Sanford**	SANFORD	19.100	
		BROADWAY	0.062	
		LEE CO	0.000	
		Total =	**19.162**	61.6
LEE CO	**03-53-130Lee-Cumnock**	LEE CO	0.769	
		Total =	**0.769**	2.2
HOLLY SPRINGS	**HollySprings** [1]	HOLLY SPRINGS	12.200	
		Total =	**12.200**	34.25
	HollySpringsRelease	HOLLY SPRINGS	0.000	
		Total =	**0.000**	0

Withdrawal Node Inputs

System	Withdrawal Node (file name)	Demand Source		2030 Withdrawal (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)
HARNETT CO (Combined)	**03-43-045HarnettCo** [1]	HARNETT CO (Combined)		12.800	
		FUQUAY-VARINA		4.728	
		HOLLY SPRINGS		0.000	
			Total =	**17.528**	34.25
	HarnettRelease	HARNETT CO (Combined)		0.000	
			Total =	**0.000**	0
DUNN	**03-43-010Dunn**	DUNN		3.095	
		BENSON		2.393	
		FALCON		0.096	
		GODWIN from FALCON		0.017	
			Total =	**5.601**	69.8
ERWIN	**03-43-035BurligtonIndustries(SwiftTextiles-Er**	ERWIN		0.968	
			Total =	**0.968**	5
ROBBINS	**03-63-015Robbins-CBBrooks**	ROBBINS		0.844	
			Total =	**0.844**	1.5
CARTHAGE	**03-63-025Carthage**	CARTHAGE		0.410	
			Total =	**0.410**	1
MOORE CO (VASS)	**03-63-045MowasaVass**	MOORE CO (VASS)		0.178	
			Total =	**0.178**	1.45
FAYETTEVILLE	**3-26-010FayettevillePOHoffer**	FAYETTEVILLE		54.300	
		SPRING LAKE		1.747	
		HOKE CO RWS		1.549	
		RAEFORD from HOKE CO RWS		0.000	
			Total =	**57.596**	80.8
	03-26-010FayettevilleGlenville	FAYETTEVILLE		5.000	
			Total =	**5.000**	5
	FayettevilleRelease	FAYETTEVILLE		0.000	
			Total =	**0.000**	0
FT BRAGG	**03-26-344FortBragg**	FT BRAGG		7.560	
			Total =	**7.560**	20
WILMINGTON	**04-65-010Wilmington** [2]	WILMINGTON		14.386	
		NEW HANOVER CO AIRPORT		0.032	
		WRIGHTSVILLE BEACH		0.000	
		APPLE VALLEY		0.032	
		NEW HANOVER CO FLEMINGTON		0.000	
		FIGURE EIGHT ISLAND		0.000	
		CAROLINA BEACH		0.033	
			Total =	**14.483**	53.3
LCFWASA	**04-65-999LowerCapeFearWSA** [2]	LCFWASA		11.650	
		BRUNSWICK CO		17.014	
		NORTH BRUNSWICK WSA from BRUNSWICK CO		0.759	
		NAVASSA from N. BRUNSWICK SD		0.069	
		CASWELL BEACH from BRUNSWICK CO		0.270	
		HOLDEN BEACH from BRUNSWICK CO		1.757	
		LONG BEACH WATER from BRUNSWICK CO		1.575	
		OCEAN ISLE BEACH from BRUNSWICK CO		0.869	
		SHALLOTTE from BRUNSWICK CO		0.264	
		SOUTHPORT from BRUNSWICK CO		0.764	
		SUNSET BEACH from BRUNSWICK CO		0.894	
		YAUPON BEACH from BRUNSWICK CO		0.075	
		WILMINGTON		0.000	
			Total =	**35.960**	53.3

[1] These intakes will likely be located close together. Therefore, the SEPA trigger of 68.5 will apply to the sum of both withdrawals.
[2] These intakes are located close together. Therefore, the SEPA trigger of 106.6 will apply to the sum of both withdrawals.

Discharge Node Inputs

System	Discharge Node (file name)	Discharge Source	2030 Discharge (mgd)	Permit Limit (mgd)
REIDSVILLE	**nc0024881Reidsville**	REIDSVILLE	3.139	
		Total =	**3.139**	7.5
GREENSBORO	**nc0047384GreensboroTZOsborne**	GREENSBORO	21.942	
		Total =	**21.942**	22
	nc0024325GreensboroNBuffalo	GREENSBORO	16.000	
		Total =	**16.000**	16
	nc0082082UNCGreensboro	GREENSBORO	0.084	
		Total =	**0.084**	not limited
HIGH POINT	**nc0024210HighPoint**	HIGH POINT	10.929	
		GREENSBORO	0.047	
		JAMESTOWN	2.139	
		ARCHDALE	2.635	
		Total =	**15.750**	16
RANDLEMAN	**nc0025445Randleman**	RANDLEMAN	1.699	
		Total =	**1.699**	1.745
ASHEBORO	**nc0026123Asheboro**	ASHEBORO	7.211	
		Total =	**7.211**	9
RAMSEUR	**nc0026565Ramseur**	RAMSEUR	0.413	
		Total =	**0.413**	0.48
FRANKLINVILLE	**nc0007820Franklinville**	FRANKLINVILLE	0.086	
		Total =	**0.086**	0.03
BURLINGTON	**nc0023876BurlingtonWWTP**	BURLINGTON	9.957	
		ALAMANCE	0.025	
		ELON COLLEGE	0.466	
		ELON COLLEGE to GIBSONVILLE	0.308	
		GIBSONVILLE	0.496	
		Total =	**11.251**	12
	nc0023868Burlington	BURLINGTON	9.215	
		GRAHAM	0.120	
		HAW RIVER	1.275	
		HAW RIVER to GRAHAM	0.023	
		GREEN LEVEL to HAW RIVER	0.068	
		Total =	**10.701**	12
GRAHAM/ MEBANE	**nc0021211Graham**	GRAHAM	3.137	
		Total =	**3.137**	3.5
	nc0021474MebaneWWTP	MEBANE	3.521	
		Total =	**3.521**	2.5
OWASA	**nc0025241OWASA-Mason**	OWASA	12.000	
		Total =	**12.000**	12
DURHAM	**nc0047597DurhamSouth**	DURHAM	14.654	
		OWASA	0.834	
		Total =	**15.488**	20
	nc0026051DurhamTriangle	DURHAM	5.101	
		Total =	**5.101**	6
CARY\APEX	**CaryRegionalWWTP**	CARY\APEX	20.901	
		Total =	**20.901**	unk
CHATHAM CO (Combined)	**nc0051314NorthChatham**	CHATHAM CO (Combined)	0.059	
		Total =	**0.059**	0.05
PITTSBORO	**nc0020354Pittsboro**	PITTSBORO	0.530	
		Total =	**0.530**	0.75

Discharge Node Inputs

System	Discharge Node (file name)	Discharge Source	2030 Discharge (mgd)	Permit Limit (mgd)
SILER CITY	**nc0026441SilerCity**	SILER CITY	4.132	
		Total =	**4.132**	4
STAR	**nc0058548Star**	STAR	0.323	
		Total =	**0.323**	0.6
SANFORD	**nc0024147Sanford**	SANFORD	13.039	
		Total =	**13.039**	6.8
	nc0038831CarTrace	SANFORD	0.325	
		Total =	**0.325**	0.325
BROADWAY	**nc0059242Broadway**	BROADWAY	0.106	
		Total =	**0.106**	0.145
HOLLY SPRINGS	**nc0063096HollySprings**	HOLLY SPRINGS	8.883	
		Total =	**8.883**	1.5
HARNETT CO (Combined)	**nc0031470HarnettCoUtilities**	HARNETT CO (Combined)	0.400	
		Total =	**0.400**	0.4
	nc0030091BuiesCrk	HARNETT CO (Combined)	0.500	
		Total =	**0.500**	0.5
	nc0021636LillingtonWWTP	HARNETT CO (Combined)	1.201	
		Total =	**1.201**	0.6
	nc0082597Angier	HARNETT CO (Combined)	0.500	
		Total =	**0.500**	0.5
FUQUAY-VARINA	**nc0028118FuquayVarina**	FUQUAY-VARINA	4.884	
		Total =	**4.884**	1.2
DUNN	**nc0043176Dunn**	DUNN	3.499	
		Total =	**3.499**	3
ERWIN	**nc0064521ErwinSouthWWTP**	ERWIN	0.926	
		Total =	**0.926**	1.2
	nc0001406SwiftTextiles	ERWIN	0.000	
		Total =	**0.000**	2.5
ROBBINS	**nc0062855Robbins**	ROBBINS	0.762	
		Total =	**0.762**	1.3
FAYETTEVILLE	**nc0023957FayettevillCrossCrk**	FAYETTEVILLE	37.031	
		Total =	**37.031**	22
	nc0050105FayettevilleRockfishCrk	FAYETTEVILLE	14.000	
		Total =	**14.000**	14
SPRING LAKE	**nc0030970SpringLake**	SPRING LAKE	1.410	
		Total =	**1.410**	1.5
RAEFORD	**nc0026514Raeford**	RAEFORD	1.678	
		Total =	**1.678**	3
ELIZABETHTOWN	**nc0026671Elizabethtown**	ELIZABETHTOWN	0.730	
		DUBLIN	0.074	
		Total =	**0.805**	1.275

Appendix G. Selected Model Scenario Analysis Tables

The tables in this appendix summarize model output analyses for the various scenarios. The following demand satisfaction tables show the annual average daily demand for each withdrawal node, as well as the monthly extremes in daily demand. The tables also show the minimum and average percentage of the demand that is satisfied for each withdrawal node.

Demand Satisfaction: 2050 Scenario 1

		2050 Withdrawal			Nominal Safe Yield	Demand Satisfaction	
System	Withdrawal Node (file name)	Annual ADD (mgd)	Minimum Monthly ADD (mgd)	Maximum Monthly ADD (mgd)	or SEPA Trigger (mgd)	Minimum (% of Demand)	Mean (% of Demand)
REIDSVILLE	02-79-020Reidsville	4.268	3.690	4.894	19	100.0%	100.0%
GREENSBORO	02-41-010Greensboro-TownsendLk	15.000	11.130	16.944	36	100%	100%
	02-41-010GreensboroNLMitchell	15.000	10.076	22.989	see above	100%	100%
	GreensboroRL	20.400	17.770	24.095	28.51	100%	100%
HIGH POINT	02-41-020HighPointFWard	9.264	8.082	10.858	21.44	100%	100%
	HighPointRL	10.000	8.962	11.257	10.08	100%	100%
JAMESTOWN	JamestownRL	1.058	0.603	1.514	1.2	100%	100%
ARCHDALE	ArchdaleRL	1.200	1.070	1.327	1.2	100%	100%
RANDLEMAN	02-76-015Randleman	1.500	1.182	1.703	1.5	100%	100%
	RandlemanRL	0.792	0.721	0.852	1.01	100%	100%
RANDOLPH CO	RandolphRL	6.000	5.439	6.462	6	100%	100%
RAMSEUR	02-76-020Ramseur	1.044	0.867	1.191	6.6	100%	100%
BURLINGTON	02-01-010Burlington-Mackintosh	19.624	10.116	23.839	36	100%	100%
	02-01-010Burlington-EdThomas	1.282	1.159	1.408	12	100%	100%
GRAHAM\MEBANE	02-01-015-018GrahamMebane	9.954	8.428	12.079	12	100%	100%
ORANGE-ALAMANCE \ ORANGE CO	OrangeJL	3.541	2.829	4.261	4.0	100%	100%
OWASA	03-68-010OWASA	5.000	0.265	7.147	14.3	0%	96%
	03-68-010OWASACaneCrk	8.400	0.000	26.077	see above	66%	100%
	OWASAJL	5.000	3.995	6.016	5.0	100%	100%
DURHAM	DuhamJL	14.000	11.909	16.896	14.0	100%	100%
CARY\APEX	03-92-020-045CaryApex	34.000	26.248	38.464	34.0	100%	100%
MORRISVILLE	MorrisvilleJL	3.200	2.348	4.198	3.5	100%	100%
WAKE CO - RTP	RTPJL	4.400	2.375	6.180	4.5	100%	100%
CHATHAM CO (Combined)	ChathamCo	16.389	11.705	22.111	17.0	100%	100%
GOLDSTON-GULF SD	03-19-025GoldstonGulf	2.240	1.616	2.994	2.24	100%	100%
PITTSBORO	03-19-015Pittsboro	9.811	7.828	11.651	9.8	100%	100%
SILER CITY	03-19-010SilerCity	5.800	5.288	6.369	5.8	100%	100%
SANFORD	03-53-010Sanford	36.682	31.137	42.827	61.6	19%	100%
LEE CO	03-53-130Lee-Cumnock	0.778	0.691	0.875	2.2	100%	100%
HOLLY SPRINGS	HollySprings [1]	15.300	8.773	21.278	34.25	100%	100%
HARNETT CO (Combined)	03-43-045HarnettCo [1]	28.866	22.218	39.256	34.25	100%	100%
DUNN	03-43-010Dunn	7.012	6.209	7.993	69.8	100%	100%
ERWIN	03-43-035BurligtonIndustries(SwiftT	1.158	0.472	1.573	5	100%	100%
ROBBINS	03-63-015Robbins-CBBrooks	0.865	0.830	0.931	1.5	0%	87%
CARTHAGE	03-63-025Carthage	0.492	0.389	0.573	1	31%	96%
MOORE CO (VASS)	03-63-045MowasaVass	0.230	0.208	0.257	1.45	0%	93%

Demand Satisfaction: 2050 Scenario 1

System	Withdrawal Node (file name)	2050 Withdrawal Annual ADD (mgd)	Minimum Monthly ADD (mgd)	Maximum Monthly ADD (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)	Demand Satisfaction Minimum (% of Demand)	Mean (% of Demand)
FAYETTEVILLE	03-26-010FayettevillePOHoffer	79.230	60.709	96.240	80.8	100%	100%
	03-26-010FayettevilleGlenville	5.000	4.074	7.042	5	100%	100%
FT BRAGG	03-26-344FortBragg	7.560	5.783	10.673	20	41%	97%
WILMINGTON	04-65-010Wilmington [2]	17.253	6.858	19.910	53.3	100%	100%
LCFWASA	04-65-999LowerCapeFearWSA [2]	44.707	32.433	57.883	53.3	100%	100%

[1] These intakes will likely be located close together. Therefore, the SEPA trigger of 68.5 will apply to the sum of both withdrawals.
[2] These intakes are located close together. Therefore, the SEPA trigger of 106.6 will apply to the sum of both withdrawals.

Demand Satisfaction: 2030 Scenario 2

System	Withdrawal Node (file name)	2030 Withdrawal Annual ADD (mgd)	Minimum Monthly ADD (mgd)	Maximum Monthly ADD (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)	Demand Satisfaction Minimum (% of Demand)	Mean (% of Demand)
REIDSVILLE	02-79-020Reidsville	4.016	3.472	4.604	19	100%	100%
GREENSBORO	02-41-010Greensboro-TownsendLk	15.000	11.130	16.944	36	100%	100%
	02-41-010GreensboroNLMitchell	15.000	10.076	22.989	see above	100%	100%
	GreensboroRL	16.256	14.160	19.200	28.51	100%	100%
HIGH POINT	02-41-020HighPointFWard	8.302	7.243	9.730	21.44	53%	100%
	HighPointRL	8.500	7.617	9.568	10.08	100%	100%
JAMESTOWN	JamestownRL	0.807	0.460	1.155	1.2	100%	100%
ARCHDALE	ArchdaleRL	1.200	1.070	1.327	1.2	100%	100%
RANDLEMAN	02-76-015Randleman	1.500	1.182	1.703	1.5	100%	100%
	RandlemanRL	0.399	0.363	0.429	1.01	100%	100%
RANDOLPH CO	RandolphRL	6.000	5.439	6.462	6	100%	100%
RAMSEUR	02-76-020Ramseur	0.869	0.721	0.991	6.6	100%	100%
BURLINGTON	02-01-010Burlington-Mackintosh	16.653	8.584	20.229	36	100%	100%
	02-01-010Burlington-EdThomas	1.111	1.004	1.220	12	100%	100%
GRAHAM\MEBANE	02-01-015-018GrahamMebane	9.014	7.632	10.938	12	100%	100%
ORANGE-ALAMANCE \ ORANGE CO	OrangeJL	1.000	0.799	1.203	1.0	100%	100%
OWASA	03-68-010OWASA	3.000	0.159	4.288	14.3	0%	100%
	03-68-010OWASACaneCrk	7.400	0.000	22.973	see above	100%	100%
	OWASAJL	4.500	3.595	5.415	5.0	100%	100%
DURHAM	DuhamJL	9.300	7.911	11.223	10.0	100%	100%
CARY\APEX	03-92-020-045CaryApex	31.500	24.318	35.636	32.0	100%	100%
MORRISVILLE	MorrisvilleJL	3.200	2.348	4.198	3.5	100%	100%
WAKE CO - RTP	RTPJL	3.400	1.835	4.775	3.5	100%	100%
CHATHAM CO (Combined)	ChathamCo	5.500	3.928	7.420	6.0	100%	100%
GOLDSTON-GULF SD	03-19-025GoldstonGulf	0.140	0.101	0.187	2.24	100%	100%
PITTSBORO	03-19-015Pittsboro	1.700	1.356	2.019	9.8	100%	100%
SILER CITY	03-19-010SilerCity	4.100	3.738	4.502	5.8	85%	99%
SANFORD	03-53-010Sanford	19.162	16.266	22.372	61.6	50%	100%

Demand Satisfaction: 2030 Scenario 2

System	Withdrawal Node (file name)	2030 Withdrawal Annual ADD (mgd)	Minimum Monthly ADD (mgd)	Maximum Monthly ADD (mgd)	Nominal Safe Yield or SEPA Trigger (mgd)	Demand Satisfaction Minimum (% of Demand)	Mean (% of Demand)
LEE CO	03-53-130Lee-Cumnock	0.769	0.683	0.865	2.2	100%	100%
HOLLY SPRINGS	HollySprings [1]	12.200	6.996	16.967	34.25	100%	100%
HARNETT CO (Combined)	03-43-045HarnettCo [1]	17.528	14.303	17.071	34.25	100%	100%
DUNN	03-43-010Dunn	5.601	4.960	6.386	69.8	100%	100%
ERWIN	03-43-035BurligtonIndustries(SwiftT	0.968	0.395	1.315	5	100%	100%
ROBBINS	03-63-015Robbins-CBBrooks	0.844	0.810	0.909	1.5	0%	87%
CARTHAGE	03-63-025Carthage	0.410	0.324	0.477	1	32%	96%
MOORE CO (VASS)	03-63-045MowasaVass	0.178	0.161	0.198	1.45	0%	93%
FAYETTEVILLE	03-26-010FayettevillePOHoffer	57.596	44.132	69.961	80.8	100%	100%
	03-26-010FayettevilleGlenville	5.000	4.074	7.042	5	100%	100%
FT BRAGG	03-26-344FortBragg	7.560	5.783	10.673	20	38%	97%
WILMINGTON	04-65-010Wilmington [2]	14.483	5.757	16.713	53.3	100%	100%
LCFWASA	04-65-999LowerCapeFearWSA [2]	35.960	26.088	46.559	53.3	100%	100%

[1] These intakes will likely be located close together. Therefore, the SEPA trigger of 68.5 will apply to the sum of both withdrawals.
[2] These intakes are located close together. Therefore, the SEPA trigger of 106.6 will apply to the sum of both withdrawals.

The following daily flow tables support the daily flow charts provided in the Model Scenario Results section of the document.

Modeled Cape Fear River Flows at Lillington

Exceedence Probability	Daily Flow (cfs)[1] 1998 Scenario	2030 Scenario 2	2050 Scenario 1
0%	97551	97368	97385
5%	15240	15127	15005
10%	10446	10355	10124
15%	6240	6128	5999
20%	4396	4320	4234
25%	3383	3304	3235
30%	2736	2676	2608
35%	2283	2217	2149
40%	1913	1842	1778
45%	1600	1526	1461
50%	1360	1280	1218
55%	1142	1061	988
60%	937	858	792
65%	763	698	645
70%	621	600	600
75%	600	600	600
80%	600	600	600
85%	600	600	600
90%	600	600	600
95%	600	600	600
98%	600	600	600
99%	600	600	600
100%	179	215	78

Modeled Cape Fear River Flows at Fayetteville

Exceedence Probability	Daily Flow (cfs)[1] 1998 Scenario	2030 Scenario 2	2050 Scenario 1
0%	97536	97281	97254
5%	17984	17854	17767
10%	12164	12044	11914
15%	8193	8071	7948
20%	6021	5948	5856
25%	4768	4695	4625
30%	3943	3878	3820
35%	3334	3274	3206
40%	2836	2763	2698
45%	2410	2338	2274
50%	2073	1997	1938
55%	1781	1711	1653
60%	1538	1474	1423
65%	1330	1283	1248
70%	1172	1143	1123
75%	1059	1044	1033
80%	971	961	953
85%	893	888	885
90%	822	820	816
95%	741	739	735
98%	648	647	639
99%	602	601	596
100%	351	388	184

Modeled Cape Fear River Flows at Lock & Dam #1

Exceedence Probability	**Daily Flow** (cfs)[1] 1998 Scenario	2030 Scenario 2	2050 Scenario 1
0%	104692	104592	104524
5%	19768	19730	19666
10%	14260	14165	14035
15%	10821	10751	10654
20%	8458	8374	8281
25%	6817	6759	6683
30%	5657	5575	5500
35%	4777	4697	4628
40%	4064	3978	3898
45%	3461	3378	3313
50%	2970	2884	2812
55%	2581	2502	2432
60%	2254	2181	2114
65%	1960	1892	1838
70%	1715	1654	1614
75%	1515	1473	1445
80%	1362	1328	1305
85%	1215	1187	1165
90%	1072	1047	1030
95%	911	886	868
98%	765	742	716
99%	675	656	635
100%	567	540	416

The following daily Jordan Lake level tables support the daily lake level charts provided in the Model Scenario Results section of the document.

Daily Jordan Lake Levels: Entire Year

	Exceedence Probability [1]		
Daily Lake Level (feet msl)	1998 Scenario (%)	2030 Scenario 2 (%)	2050 Scenario 1 (%)
216.0	65.6	62.4	59.2
215.5	79.8	76.3	72.2
215.0	85.4	82.1	78.0
214.5	88.8	86.0	82.3
214.0	91.2	88.4	85.7
213.5	93.2	90.3	87.9
213.0	95.0	92.5	89.4
212.5	96.0	94.1	91.0
212.0	96.9	95.4	92.5
211.5	97.5	96.3	94.0
211.0	97.9	97.0	95.3
210.5	98.3	97.7	96.2
210.0	98.8	98.0	97.0
209.5	99.1	98.3	97.4
209.0	99.5	98.6	97.7
208.5	99.8	98.9	98.0
208.0	99.8	99.1	98.2
207.5	99.8	99.5	98.5
207.0	100.0	99.8	98.8
206.5	100.0	99.8	99.1
206.0	100.0	99.9	99.4
205.5	100.0	100.0	99.7
205.0	100.0	100.0	99.9
204.5	100.0	100.0	100.0
204.0	100.0	100.0	100.0
203.5	100.0	100.0	100.0
203.0	100.0	100.0	100.0
202.5	100.0	100.0	100.0
202.0	100.0	100.0	100.0

[1] Statistics based on Climatic Year.

Daily Jordan Lake Levels: May 1 to September 30

	Exceedence Probability [1]		
Daily Lake Level (feet msl)	1998 Scenario (%)	2030 Scenario 2 (%)	2050 Scenario 1 (%)
216.0	51.5	46.7	42.6
215.5	77.9	73.0	67.7
215.0	86.4	82.3	77.9
214.5	91.1	88.0	83.8
214.0	94.1	91.2	88.4
213.5	96.4	93.8	90.8
213.0	97.7	95.8	92.8
212.5	98.5	97.3	94.8
212.0	99.2	98.2	96.4
211.5	99.6	98.9	97.4
211.0	99.8	99.4	98.5
210.5	99.9	99.7	99.0
210.0	100.0	99.9	99.5
209.5	100.0	99.9	99.6
209.0	100.0	100.0	99.7
208.5	100.0	100.0	99.9
208.0	100.0	100.0	99.9
207.5	100.0	100.0	100.0
207.0	100.0	100.0	100.0
206.5	100.0	100.0	100.0
206.0	100.0	100.0	100.0
205.5	100.0	100.0	100.0
205.0	100.0	100.0	100.0
204.5	100.0	100.0	100.0
204.0	100.0	100.0	100.0
203.5	100.0	100.0	100.0
203.0	100.0	100.0	100.0
202.5	100.0	100.0	100.0
202.0	100.0	100.0	100.0

[1] Statistics based on May 1 to September 30.

Daily Jordan Lake Levels: October 1 to January 31

Daily Lake Level (feet msl)	Exceedence Probability [1] 1998 Scenario (%)	2030 Scenario 2 (%)	2050 Scenario 1 (%)
216.0	59.4	56.2	52.0
215.5	68.5	64.2	59.0
215.0	74.4	69.7	63.3
214.5	78.6	74.4	68.7
214.0	81.8	77.4	72.9
213.5	85.0	79.8	76.3
213.0	88.5	83.5	78.5
212.5	90.6	86.4	80.4
212.0	92.3	89.0	82.9
211.5	93.8	91.1	85.9
211.0	94.7	92.6	88.6
210.5	95.7	94.2	90.5
210.0	97.0	94.9	92.3
209.5	97.7	95.4	93.2
209.0	98.6	96.3	93.9
208.5	99.3	97.1	94.6
208.0	99.5	97.8	95.4
207.5	99.5	98.8	96.1
207.0	100.0	99.4	96.7
206.5	100.0	99.5	97.6
206.0	100.0	99.6	98.5
205.5	100.0	100.0	99.1
205.0	100.0	100.0	99.6
204.5	100.0	100.0	100.0
204.0	100.0	100.0	100.0
203.5	100.0	100.0	100.0
203.0	100.0	100.0	100.0
202.5	100.0	100.0	100.0
202.0	100.0	100.0	100.0

[1] Statistics based on October 1 to January 31.

Daily Change in Jordan Lake Levels: April 1 to June 3

Daily Change in Lake Level (feet msl)	Exceedence Probability [1] 1998 Scenario (%)	2030 Scenario 2 (%)	2050 Scenario 1 (%)
8.7	0.0	0.0	0.0
8.6	0.0	0.0	0.0
4.6	0.0	0.0	0.0
3.8	0.1	0.1	0.1
2.0	0.3	0.3	0.3
1.3	0.7	0.7	0.7
0.7	1.1	1.1	1.2
0.2	2.0	2.1	2.2
0.1	2.6	2.8	3.1
0.0	81.3	79.0	76.2
-0.1	95.8	95.5	95.0
-0.8	98.5	98.5	98.5
-0.9	99.0	99.0	99.0
-1.0	99.4	99.4	99.4
-1.1	99.8	99.8	99.8
-1.2	100.0	100.0	100.0
-1.3	100.0	100.0	100.0

[1] Statistics based on April 1 to June 30.

Appendix H. Assumptions

The following list describes our assumptions in developing the Cape Fear River Basin Water Supply Plan and various hydrologic model scenarios.

- This study includes municipal water systems, self-supplied industries and agriculture using water from the Haw River Basin, the Deep River Basin or the Cape Fear River Basin above Lock & Dam #1, and systems that discharge treated wastewater into the waters of these river basins.
- The analyses are based on estimated average daily water demands on either an annual or monthly basis.
- No drought management measures are included in the analyses.
- Self-supplied industrial withdrawals and discharges will remain constant over the analysis period. Large industrial expansions are included in the various local water supply system demand projections.
- Agricultural withdrawals will remain constant over the analysis period.
- Potential water quality induced limitations on withdrawals are not considered.
- Local water supply system demand projections are reasonable.
- The 1992 Local Water Supply Plans are the next best source of information for the five water systems in this analysis that did not submit a 1997 LWSP.
- Population growth beyond 2020 will follow a pattern similar to the population growth reported in the Local Water Supply Plans or Round Three Jordan Lake Allocation Applications.
- Population projections for 2030, 2040 and 2050 are linear projections of the population data presented by each system in their Local Water Supply Plan for 1992 to 2020, or taken directly from Jordan Lake applications.
- County population projections for outlying years are linear projections of the county population estimates from the Office of State Budget and Management for the years 2000 to 2020.
- Water supply systems that have existing interconnections, shared sources of supply, or some other interdependence are more likely to exhibit some interdependence in the future than water supply systems that are currently unrelated.
- The per capita rate at which water is used is held constant at 1997 levels for water systems not submitting an allocation for water from Jordan Lake.
- Future water demands may be estimated by multiplying 1997 per capita use rates by projected populations.
- Water demand projections provided in Round Three Jordan Lake Allocation Applications supercede 1997 Local Water Supply Plans and the DWR extensions of those plans. The only exception is Chatham County's residential demand projection (see discussion in text).
- The available supply from a ground water source is the 12-hour yield reported in the Local Water Supply Plans.
- The available supply from a run-of-river intake is 20 percent of the 7Q10 flow, unless more specific information is available.
- The available supply from a reservoir is the safe yield estimate reported in the Local Water Supply Plans.
- Each system will use water from their own supplies up to their available supply limits.

- If sufficient water is available at a current intake, then systems will expand treatment facilities to produce more water when demand approaches treatment capacity.
- If a system's projected demand exceeds its available supply the system will purchase water from another system to meet any additional water demand.
- A system will only purchase water from another system to meet demands exceeding their own system's available supplies.
- Any system purchasing water will do so from another system within its group of systems.
- The available supply from a purchased water source is at least equal to the contract limits for regular supply connections as reported in the Local Water Supply Plans.
- Bulk water sellers will provide the amount needed for dependent purchasers for the years included in this analysis regardless of current contract limits.
- For systems purchasing water from several sources, demands above existing contract limits will be met by sellers that are most likely to be able to provide water.
- Cumulative bulk water sales for each system are limited to the system's maximum supply capacity.
- Jordan Lake water supply storage allocations are assumed for Scenario 1, based on 2050 projected needs.
- Existing wastewater relationships will continue throughout the analysis period.
- Wastewater treatment systems are grouped based on existing interconnections.
- Withdrawal and discharge locations will remain the same throughout the period of analysis.
- The ratio of wastewater to water used will remain constant over the period of analysis.
- For systems with only one wastewater discharge location, discharge capacity will increase as necessary to accommodate the projected wastewater discharge amount, regardless of the current NPDES discharge permit limit.
- For systems with more than one wastewater discharge location, future discharges are assigned in the same proportion that each facility was used in 1997.
- For systems with more than one wastewater treatment facility, if one facility will reach its permit limit before the other, then the remaining wastewater flows are shifted to the plant with available permit capacity.
- If the permitted wastewater discharge limits of all facilities will be exceeded, one facility is selected to expand beyond its current permit limit.
- If a system collects and sends wastewater to another system for treatment that relationship continues, regardless of current contract limits, for the fifty-year period of this analysis.
- If a system receives wastewater from other systems, the cumulative wastewater discharge amounts are included in the discharges assigned to specific locations in the model.