DRAFT

Jordan Lake Water Supply Allocation Recommendations

Prepared by:

North Carolina

Division of Water Resources

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Executive Summary

The B. Everett Jordan Dam creates Jordan Lake a multipurpose reservoir that provides water supply storage and flow augmentation storage in addition to its primary purpose of providing flood storage to manage flooding impacts downstream in the Cape Fear River Basin.

Water supply storage was included in the project at the request of the State of North Carolina. The water supply storage pool was designed to reliably provide 100 million gallons per day of water supply. The Environmental Management Commission was delegated the authority to allocate water supply to units of local government upon request and proof of need. Allocations are made as a percentage of the water supply pool. Allocation can be made for documented needs for 30 years in the future. The rules governing the allocation process are included in this document as Appendix A.

The Commission is mandated by rule to limit allocations that would result in a diversion of water off the Jordan Lake watershed to 50 percent of the water supply pool. This provision was included, prior to initial allocation, to protect the yield of the reservoir. The yield analysis of the water supply pool discussed in the Cape Fear River Water Supply Evaluation indicates this limitation my not be needed given the current management of water resources affecting the inflow to Jordan Lake. The allocations recommended by the Division of Water Resources staff in this document are estimated to result in 40 percent of the water supply pool being diverted off the Jordan Lake watershed.

The applications and support documentation submitted for Round 4 of Jordan Lake Water Supply Allocations are available on the Division's website at http://www.ncwater.org/jordan-lake-allocation-round-4 . A review of the population and water demand projections included in the allocation applications is presented as well as similar projections developed by DWR staff. Each application includes projections of water supply needs through 2060. The criteria used for developing allocation recommendations is the documented need in 2045. The alternatives provided in each application are summarized and discussed for each applicant.

Division staff used the Cape Fear – Neuse River Basins Hydrologic Model to evaluate the potential changes to water availability and hydrologic conditions looking at several levels of future water demands compared to surface water conditions from 1931 to 2011. Conditions produced by withdrawing water to meet demands in 2010 are used as the starting points to present the potential changes generated by withdrawing water to meet future demands. Key results of the four hydrologic model scenarios used to derive allocation recommendations are presented in tabular, graph and text modes.

Based on the analyses conducted for the Cape Fear River Water Supply Evaluation and the review of water needs in 2045 of the applicants for water supply allocations Division staff recommends to the Environmental Management Commission the following allocations presented in Table ES-1.

Table ES-1 Jordan Lake Water Supply Pool Allocations

Allocation of Jordan Lake Water Supply Pool			
Applicant	Current Allocation	Requested Allocation	Draft Recommendation
	Allocation Percent	Allocation Percent	Allocation Percent
Cary Apex Morrisville RTP	39	46.2	46.2
Chatham County-North*	6	13	13
Durham*	10	16.5	16.5
Fayettteville PWC	0	10	0
Hillsborough	0	1	1
Holly Springs	2	2	2
Orange County	1	1.5	1.5
Orange Water&Sewer Authorit	5	5	5
Pittsboro*	0	6	6
Raleigh	0	4.7	4.7
Total Percent	63	105.9	95.9
* Western Intake Partners			

Introduction

The Jordan Lake water supply allocation recommendations presented here were developed based on information contained in the Cape Fear River Water Supply Evaluation. Portions of the water supply evaluation are presented in this document to provide context for information associated with the development of allocation recommendations. Readers who wish more detailed discussions of the details of the basinwide water demand and water availability analysis can find additional inform in the Cape Fear River Water Supply Evaluation available at http://www.ncwater.org/jordan-lake-allocation-round-4.

B. Everett Jordan Dam and reservoir is a multi-purpose project built and managed by the U.S. Army Corps of Engineers located on the Haw River in Chatham County, North Carolina. Downstream of the dam the Haw River merges with the Deep River to form the Cape Fear River. The Cape Fear River experienced several significant flooding events prior to the devastating flood of September 1945 which produced $4.7 million dollars of damage[1] in Fayetteville. The Deep River Basin and Haw River Basin received about six inches of precipitation during the first week of September that year producing river flows at Lillington, upstream of Fayetteville, of 140,000 cubic feet per second. The citizens of Fayetteville saw the Cape Fear River rise to 68.9 feet above mean sea level, more than 33 feet above flood stage. Shortly after this event the U.S. Congress commissioned the U.S. Army Corps of Engineers to study water resource needs in the basin.

In 1963, based on the results of this study, the U.S. Congress authorized the construction of "New Hope Reservoir" on the Haw River to address issues identified by the study with the primary focus on reducing flood damages. The State of North Carolina requested the inclusion of water supply storage in the project and agreed to assume financial responsibility for expanding the storage capacity to provide 100 million gallons per day of water for future water supply needs. After consultation with the U.S. Public Health Service the USACOE included storage capacity to provide water to augment downstream river flows to meet water quality targets. The project was later renamed in honor of U.S. Senator B. Everett Jordan. "The purposes of B. Everett Jordan Dam and Lake are to provide flood damage reduction, water supply, water quality control, fish and wildlife conservation and outdoor recreation."[2] Construction began in 1967 and the reservoir was filled to normal water level in 1982.

[1] 2007; Carolina Public Health; "The Lake That Almost Wasn't"; Spivey, Angela; Fall 2007
[2] http://www.saw.usace.army.mil/Locations/DistrictLakesandDams/BEverettJordan.aspx

Figure 1 Jordan Lake Storage Diagram

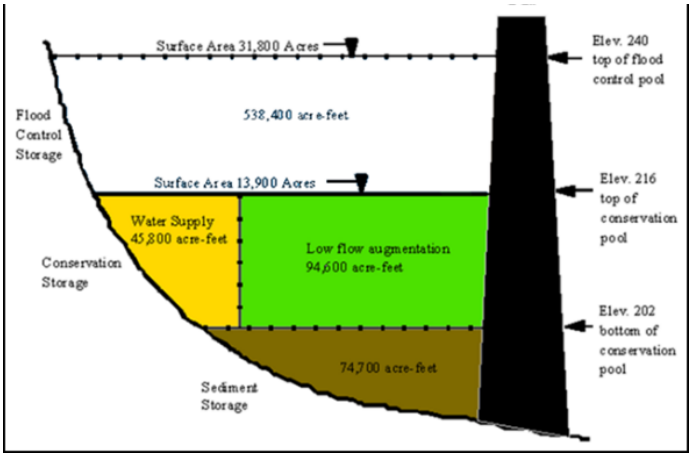


Figure 1 shows a generalized representation of the various water storage pools in Jordan Lake. The water supply pool and the low flow augmentation pools are managed as if they were physically separate. The U.S. Army Corps of Engineers monitors water withdrawals and releases from the flow augmentation pool and deducts withdrawals from the appropriate storage accounts.

The completed project provides 538,400 acre-feet of controlled flood storage, 94,600 acre-feet of flow augmentation storage, 45,800 acre-feet of water supply storage and 74,700 acre-feet of storage to compensate for reductions in storage due to sediment accumulation.

Except during times of low precipitation the reservoir is managed to maintain the water level at 216 feet above mean sea level. At this level the flow augmentation, water supply storage and sediment storage pools are full. The storage between 202 feet mean sea level and 216 feet mean sea level, the conservation pool, is dedicate to flow augmentation and water supply. Storage below 202 feet mean sea level is reserved to compensate for sediment accumulation in the reservoir. The space between 216 feet mean sea level and 240 feet mean sea level is normally empty in order to retain water during high precipitation events and manage flooding impacts downstream.

Allocating Water Supply Storage

The State of North Carolina oversees the allocation of 32.62 percent of the conservation pool dedicated to water supply. Under General Statute § 143-354 (a) (11) the General Assembly authorized the Environmental Management Commission to allocate water supply storage in Jordan Lake to local governments upon proof of need and the commitment to pay the capital, interest, administrative and operating costs based on the volume allocated.

The rules regulating allocations allow the Environmental Management Commission to make allocations sufficient to meet applicants' water supply needs over a 30 -year planning horizon. For allocation requests where the withdrawal or return flows would be a transfer of surface water requiring an interbasin transfer certificate the review of the application for an interbasin transfer certificate must be coordinated with the review of the allocation request. [3] In 1982 the first round

[3] http://www.ncwater.org/?page=297 15A NCAC 02G .0504 (h)

of reviewing water allocation requests was begun. The Environmental Management Commission approved the first set of allocation in 1988, allocating 42 percent of the water supply pool.

In 1996 a second round of allocation requests were submitted for review. In 1997 requests that did not require certification of an interbasin transfer were approved resulting in a total of 35 percent of the water supply pool being allocated. In 2000 the second round applications requiring interbasin transfer certificates were approved raising the total allocation to 44 percent of the water supply pool. A third round of allocation requests were submitted in 2000 resulting in allocation approvals in 2002 for 63 percent of the water supply pool.

Round 4 Jordan Lake Water Supply Allocation Process

In late 2008 the communities of Apex, Cary, Durham, Hillsborough, Holly Springs, Morrisville, Pittsboro, and Raleigh along with Chatham County, Orange County and Wake County joined with the Orange Water and Sewer Authority to form the Jordan Lake Regional Water Supply Partnership. The purpose of the organization was to provide a forum where members could explore working together to jointly plan for future water supply needs. Their cooperative efforts over several years produced a regional water needs assessment released in February 2012 and the Triangle Regional Water Supply Plan Volume II: Regional Water Supply Alternatives Analysis, released in April 2014. These documents are available at http://www.jordanlakepartnership.org/ .

In 2009 the Jordan Lake Partnership submitted a request to the Division of Water Resources to initiate another round of allocations from the Jordan Lake water supply pool. This analysis focuses on the planning, preparation and evaluation of the resulting allocation requests and recommendations from the Division of Water Resources to the Environmental Management Commission.

In January 2010 the Environmental Management Commission granted permission for the Division of Water Resources to initiate a fourth round of water allocations from Jordan Lake. DWR notified potentially interested parties in 32 counties surrounding and downstream of Jordan Lake of the opportunity to apply for water allocations. An informational meeting was held on February 24, 2010 to explain the process and answer questions. DWR proposed to evaluate water supply needs for surface water users in the basin over a 50-year planning horizon, to investigate if changes are warranted to the current requirement to limit allocations off the reservoir's watershed to 50 percent of the total water supply yield and to evaluate the yield of the water supply pool. These evaluations are presented in the Cape Fear River Water Supply Evaluation.

The evaluations presented in the Cape Fear River Water Supply Evaluations and the recommendations presented in this document are based on computer modeling done by Division staff using the Cape Fear – Neuse River Basins Hydrologic Model. The model is discussed in detail in the water supply evaluation document and additional information is available on the Division's website at http://www.ncwater.org/data_and_modeling/Cape_Fear-Neuse/ . Basically, the model is used to compare various surface water withdrawal levels with surface water availability over the range of hydrologic conditions in these basins between 1931 and 2011.

Jordan Lake Water Supply Storage Applications

The State of North Carolina assumed financial responsibility for including water supply storage in B. Everett Jordan Lake. Under G.S. 143-354(a) (11) the State, acting through the Environmental Management Commission, assigns storage to local governments documenting a need for water. Administrative rule T15A: 02G.0500 describes the specific information that must be included in a request for a water supply allocation and the procedures to be used when allocating the Jordan Lake water supply storage. A copy of the rules and other relevant regulatory requirements are included with this document as Appendix A, the "Jordan Lake Water Supply Storage Allocation Application Guidelines". The two main criteria for Jordan Lake water supply allocations are future water needs and availability of alternative water sources.

During 2010 the Division of Water Resources staff held a series of meetings with potential applicants and other interested parties to discuss updating river basin hydrologic models and data required to prepare and evaluate allocation applications. Since 2010 the Cape Fear River Basin Hydrologic Model and the Neuse River Basin Hydrologic Model were updated and combined to produce the Cape Fear – Neuse River Basins Hydrologic Model. The combined model provides a tool to analyze the effects of surface water withdrawal options in both basins in each model scenario run. Current allocation holders and applicants for new allocations use surface waters in the Cape Fear River Basin and Neuse River Basin.

Round 4 Jordan Lake Water Allocation Timeline

- November 2009-DWR receives request to start Round 4 allocation process
- January 2010 Environmental Management Commission authorized DWR to proceed with Round 4 allocation process (JLA-4)
- March 2010 –letters expressing an interest in applying for a water supply allocation from Jordan Lake were submitted to DWR by thirteen local governments
- 2010-2014- upgrade hydrologic models of Cape Fear and Neuse River Basins and merge the separate basin models together into the Cape Fear – Neuse River Basins Hydrologic Model. Develop alternative demand scenarios based on estimated water needs of all surface water users in the basins.
- November 2014 Final Jordan Lake Water Supply Allocation Applications submitted DWR
- November 2014 – April 2015 Review applications and revise the CFNRBHM to analyze proposals in the applications
- April 2015 >> Analyze modeling results and develop a Draft Cape Fear River Water Supply Evaluation and Draft Jordan Lake Water Supply Allocation Recommendations

Division staff prepared the *Jordan Lake Water Supply Storage Allocation Application Guidelines* that described in detail the information to be included in an application for an allocation. To accompany this document DWR prepared a spreadsheet template to be used by applicants to supplement local water supply plan information and provide additional detailed needed for the allocation review process. The guidelines can be found in Appendix A or on the Division's website at http://www.ncwater.org/?page=317 which also contains a link to the "Local Water Supply Plan supplemental information for Jordan Lake Allocation Application" spreadsheet file.

The Division of Water Resources uses hydrologic modeling to evaluate surface water availability under various water withdrawal and management scenarios. A hydrologic model creates a hypothetical representation of surface water conditions based on historic data and inferences derived from known data to characterize the relationships between water withdrawals, return flows and management protocols. Each model produces a mathematical characterization of surface water volumes and streamflows based on conditions defined for a point in time when water withdrawals, wastewater discharges, and water management protocols are fixed and data describing the resultant surface water conditions are available. For the Cape Fear – Neuse River Basins Hydrologic Model that point is the year 2010. The model coding is adjusted to closely approximate the known conditions in 2010. This model scenario captures current conditions at the time of model development, based on conditions up to that time and provides the "basecase" for the model. The basecase scenario provides the benchmark against which the impacts from changes in management regimes and water withdrawals can be compared.

While future demand scenarios are developed using withdrawals thought to be needed to meet demands some year in the future, the model does not project future surface water flows. It evaluates various water demand quantities against the range of streamflows that have occurred in the historic record. For this model the historic record includes flow conditions from 1931 to 2011. Comparing model scenarios provides information to describe how surface water conditions may differ from those of the basecase scenario, under the alternative scenarios, over the range of flow conditions that historically occurred in the basins.

The 2010 basecase scenario is a point in time with which many people living and working in the basin had direct experience. Looking at the outputs from the basecase of the model provides information on the magnitude and duration of water shortages that might have occurred with the 2010 levels of water demands during historic flow conditions or that may occur if similar flow conditions occur in the future. For instance, what might water resource conditions be like if water withdrawers were trying to meet 2010 water demands during the water availability conditions that existed during the 1953-54 drought?

The Cape Fear – Neuse River Basins Hydrologic Model was used to evaluate requests for allocations from Jordan Lake and to evaluate long-term water supply needs in both basins. The basecase version of the model provides the starting points for analyzing the effects of various water demand and supply options presented in the allocation applications. Twelve modeling scenarios were developed portraying alternative Jordan Lake allocation options to analyze the effects of water demands estimated to be needed to meet demands in 2035, 2045 and 2060 for all surface water withdrawers in both basins.

Details of the model and the water withdrawal, wastewater returns and the Jordan Lake Drought Contingency Plan are discussed in detail in the Cape Fear River Water Supply Evaluation. The document also discusses the effects of allocation options on Jordan Lake water levels, the water supply pool and the flow augmentation pool focusing on meeting projected 2060 water demands. The rules governing Jordan Lake water supply allocations limits the Environmental Management Commission to making allocations sufficient to meet expected needs over a 30 year planning horizon. With an initial presumption that allocation decision would likely be finalized in late 2015 the analysis used to develop allocation recommendations focuses on estimated needs in 2045. Table 1 summarizes the current allocations and the allocations requested in the applications submitted in November 2014.

Table 1 Allocation Summary

Jordan Lake Water Supply Pool		
Applicant	Current	JLA-4 Requested
	Allocation Percent	Allocation Percent
Cary Apex Morrisville RTP	39	46.2
Chatham Co North*	6	13
Durham*	10	16.5
Holly Springs	2	2
Hillsborough	0	1
OWASA*	5	5
Orange Co	1	1.5
Pittsboro*	0	6
Raleigh	0	4.7
Fayetteville	0	10
Total Percent	63.0	105.9
* Western Intake Partners		

Cape Fear-Neuse River Basin Hydrologic Model

Each Cape Fear-Neuse River Basins Hydrologic Model scenario balances surface water coming into the streams in the basins with water going out of the streams at each node, subject to goals, constraints and management protocols defined for the scenario. Water withdrawals are given a priority at each node during model development so that water is apportioned between competing uses to emulate real world conditions. At the reservoir nodes water is stored and released subject to operating rules established in consultation with reservoir managers and users. Each model scenario run calculates water availability at each node for each of the 29,858 days in the historic flow dataset using daily average values for the characteristics considered.

For future demand scenarios water systems that depend on neighboring water systems for their current water supplies are assumed to continue having their demands met by the same suppliers in the future, unless information is available describing planned changes.

Public water systems that submit a local water supply plan provide estimates of future water demands. The plans do not include estimates of future wastewater return flows. Therefore, for model scenarios other than the basecase scenario wastewater return flows are estimated at the same percentage of water withdrawal or water use as that used in the 2010 basecase scenario, unless additional information is available. The actual amount of treated wastewater returned to the surface waters in these basins will be determined by the utilities' desire and ability to construct the necessary collection systems and treatment facilities as well as the ability to secure the necessary permits.

The results of the various modeling scenarios used for this analysis are inextricably linked to the assumptions about how much treated wastewater is returned to the surface waters of the basins. Changes in modeling assumptions will change the model outputs.

Jordan Lake Water Supply Allocation

In 2009 a group of thirteen entities that deliver public water services to communities in the Research Triangle Region of North Carolina formalized their efforts to work together toward the goal of having a sustainable and secure regional water supply. Representatives of the municipalities of Apex, Cary, Durham, Hillsborough, Holly Springs, Morrisville, Pittsboro, Raleigh and Sanford working with representatives of Chatham County, Orange County, Wake County and the Orange Water and Sewer Authority organized the Jordan Lake Partnership. The group came together with the goal of evaluating the regional water supply resources and quantifying the region's water needs through 2060. The resulting Triangle Regional Water Supply Plan describes their work and presents the resulting proposals for cooperative use of water supply resources to meet future public water supply needs. The Triangle Regional Water Supply Plan provides detailed discussions of the evaluations that ultimately formed the basis of Jordan Lake allocation requests by the partners. The Triangle Regional Water Supply Plan is available on the Partnership's web site at http://www.jordanlakepartnership.org/ .

The Jordan Lake Partners worked together to develop mutually acceptable projections of future population and water demand growth to estimate future regional water needs. This effort included evaluating existing water system interconnections and commissioning studies of options to improve water sharing among regional water utilities. The work of the Jordan Lake Partners placed a high priority on developing a consensus on regional water supply alternatives and coordinated regional use of the water supply storage in Jordan Lake assumed to be 100 million gallons per day. The Triangle Regional Water Supply Plan shows that existing water supply sources and current Jordan Lake allocations will need to be supplemented by 91 million gallons a

day to meet the projected needs of the region's water utilities in 2060. Currently there is 63 percent of the water supply pool in Jordan Lake allocated to local governments. Allocating the remaining 37 percent could cover a significant portion of the identified supply deficit.

There is only one water supply intake on Jordan Lake. The Cary-Apex raw water pump station provides access to the water for all current allocation holders. The Cary-Apex water treatment plant and the Chatham County water treatment plant treat the water withdrawn from the Jordan Lake reservoir. The Chatham County WTP treats and supplies water to its service area customers. As well as providing potable water to their service area customers the Cary-Apex water treatment plant can also provide potable water to other allocation holders through distribution system interconnections. The capacities of the existing water system interconnections limit the amount of water that can be passed from the Cary-Apex system to other allocation holders. The Cary-Apex raw water intake has a capacity limit of about 80 million gallons per day.

Water supply storage exists in Jordan Lake because the State of North Carolina partnered with the U.S. Army Corps of Engineers to include water supply storage for allocation by the State in what was then called the New Hope Dam. The portion of storage set aside for water supply was intended to reliably provide 100 million gallons per day and subsequent studies have supported that calculation. The potential yield of the water supply pool was evaluated using the Cape Fear-Neuse River Basins Hydrologic Model. The evaluation indicates that even if all the water from the water supply pool is used out of the Cape Fear River basin the estimated potential yield is 104 million gallons per day. Under current and anticipated future water use and return scenarios water is returned to the Jordan Lake watershed further raising the potential water supply pool yield. Continuing to assume a yield of 100 million gallons per day for the allocation analysis improves the reliability of being able to supply 100 million gallons per day even if the flows in the future are outside of the range of the historical record. A detailed discussion of the potential yield of the water supply pool is presented in the Cape Fear River Water Supply Evaluation. Developing the infrastructure necessary to use water from the water supply storage pool is the responsibility of the allocation holders. The current raw water intake does not have the capacity to withdraw 100 million gallons per day, therefore another raw water intake will be required to make optimal use of the water set aside for local governments from Jordan Lake.

The applications for water supply storage submitted by members of the Jordan Lake Partnership support the joint development of an additional regional water supply intake and treatment facility to provide for the optimal use of the water supply storage in Jordan Lake. The proposed supply facility would improve regional water supply reliability and redundancy to meet community water needs. Chatham County, the City of Durham, Orange Water and Sewer Authority and the Town of Pittsboro are jointly evaluating options for a regional water supply intake along the western shore of Jordan Lake with a water treatment plant constructed on property adjacent to the project's boundary currently owned by Orange Water and Sewer Authority. The new facilities, in combination with the existing facilities, would allow allocation holders to make optimal use of their current allocations and the allocation requests to meet 2045 needs being considered in this fourth round of Jordan Lake water supply allocations.

Regional Growth in Population and Water Demand:

All the applicants expect significant population growth through 2045, the permitting horizon for this round of allocation decisions, and continued growth through 2060. Table 2 shows the applicants' service population projections and county population estimates developed by Division of Water Resources staff based on data from the Office of State Budget and Management for 1990 to 2034 with trend extensions to 2060.

Table 2 Population Estimates

Applicants Estimated Service Population					
JLA-4 Applicants	**County Served**	**2010**	**2035**	**2045**	**2060**
Cary-Apex-Morrisville-WakeCoRTP	Wake / Chatham	182,600	309,600	344,150	360,600
Chatham Co-North	Chatham	10,200	49,450	65,350	94,000
Pittsboro	Chatham	3,700	69,250	83,500	96,800
Durham	Durham	246,180	350,922	393,924	458,426
Hillsborough	Orange	12,216	22,150	26,600	33,800
Holly Springs	Wake	24,700	68,371	81,931	103,261
Orange County	Orange	132	11,897	17,185	25,115
OWASA	Orange	79,400	115,700	129,950	149,700
Raleigh	Wake	485,219	879,441	1,048,700	1,316,200
Fayetteville PWC	Cumberland	199,102	350,574	398,380	440,390
	Total Service Population	1,243,449	2,227,355	2,589,670	3,078,292

Table 2 Population Estimates (continued)

Estimated County Population				
County	**2010**	**2035**	**2045**	**2060**
CHATHAM	63,751	93,544	105,802	124,189
CUMBERLAND	327,445	375,428	396,220	427,407
DURHAM	271,297	397,205	446,627	520,761
ORANGE	134,303	178,148	196,202	223,284
WAKE	906,909	1,433,761	1,657,599	1,993,356
Total Estimated Population	1,703,705	2,478,086	2,802,450	3,288,996
http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic-data.shtm				
Estimated 1990-2034 & extensions				

Comparing the population totals for each time period for all the applicants and the counties served, the numbers show fairly comparable growth expectations. However there are some significant variations that need to be highlighted, most notably the variation in the Office of State Budget and Management population estimates with trend extensions for Chatham County and the estimated service populations for the Chatham County – North and Pittsboro water systems from their allocation applications. The recent proposal to develop the Chatham Park project, east of Pittsboro, forced both of these water utilities to revise service population estimates based on projections of development within the boundary of the project and expectations of growth in the

surrounding county lands. The change to historical population growth from this project is unlikely to be accurately captured by the simple trend extension used by staff. There is uncertainty associated with all these population estimates. The applicants' estimates show the number of customers the water utilities anticipate needing to supply with potable water in the future. The growth expectations define the scope of the distribution system that has to be developed and the water supply that has to be available to meet anticipated customer demands.

Variations similar to the population estimates can be seen in Table 3 showing average daily water demands for the allocation applicants and average daily water demands estimated by Division staff using the county population estimates and the 2010 average daily per capita water use of the applicant systems in each county. Consistent with the population discussion above, the demand estimates for Pittsboro and the Chatham County – North water systems exceed the demand based on the county population estimates. The demand estimates based on county population do not account for growth associated with the Chatham Park project. Also estimates based on all county residents include county residents served by other community water systems and household wells along with customers of the applicant water systems.

Table 3 Water Demand Estimates in Million Gallons per Day

Applicants Estimated Average Day Demand (MGD)					
JLA-4 Applicants	**County Served**	**2010**	**2035**	**2045**	**2060**
Cary-Apex-Morrisville-WakeCoRTP	Wake / Chatham	20.72	40.82	45.82	48.33
Chatham Co-North	Chatham	2.16	10.13	13.03	18.12
Pittsboro	Chatham	0.56	8.41	9.92	11.24
Durham	Durham	25.27	36.12	39.98	44.37
Hillsborough	Orange	1.17	2.87	3.22	3.70
Holly Springs	Wake	1.98	6.23	7.24	8.78
Orange County	Orange	0.02	2.01	2.81	3.92
OWASA	Orange	7.86	10.24	11.32	12.91
Raleigh	Wake	52.75	84.76	97.02	115.01
Fayetteville PWC	Cumberland	28.01	55.03	65.41	78.92
Total Estimated Average Day Demand		140.50	256.62	295.77	345.30

Estimated System Demand based on Estimated County Population (MGD)				
Based on projected county population figures and average				
2010 system wide per capita use of applicants in each county				
County	**2010**	**2035**	**2045**	**2060**
CHATHAM	11.60	17.02	19.25	22.60
CUMBERLAND	46.07	52.82	55.75	60.14
DURHAM	27.85	40.77	45.85	53.46
ORANGE	16.90	22.42	24.69	28.10
WAKE	91.40	144.49	167.05	200.89
Total Estimated Demand	193.82	277.53	312.59	365.18

Summary of Allocation Requests

Ten applications, representing twelve members of the Jordan Lake Partnership and the Fayetteville Public Works Commission, were received by the Division of Water Resources. This section presents condensed summaries of the allocation requests. The complete applications for Jordan Lake water supply allocations are available on the division's website at http://www.ncwater.org/jordan-lake-allocation-round-4.

The following tables summarize information from the applications for water supply allocations submitted in November 2014. The applications and associated workbooks contain information in five-year increments from 2010 to 2060. The following discussion will focus on data for those periods that are important for determining the needs for water supply allocations from Jordan Lake.

The starting point for this analysis is the conditions that existed in 2010. This year is the starting point for determining water demand and service population growth for 50 years into the future, which defines the end of the analysis period at 2060. The water system's and water resources conditions in 2010 are also used as representative of current conditions and provide reference conditions against which modeled future conditions are compared. During previous allocation processes members of the Environmental Management Commission requested reviews of conditions 50 years in the future to identify water utilities that may need water in the future.

The rules governing the allocation process limit allocations to the amounts needed to meet estimated water needs 30 years in the future. Round 4 allocation decisions are expected to be finalized in 2015. Therefore, allocation recommendations are based on the amount of water needed to meet the expected demands in 2045, 30 years from the expected approval of Round 4 allocations. Evaluations of conditions associated with expected demands in 2035 were reviewed because the allocation rules provide for two levels of allocations based on 20-year and 30-year needs. This distinction has become a questionable point after 2012.

The rules established Level 1 and Level 2 allocations with two different payback protocols. Holders of Level 1 allocations must pay proportional costs for capital investments, interest, operations and maintenance based on the size of the allocation. Holders of Level 2 allocations, which were not expected to be used within the first five years after approval, were only required to pay interest costs, operation costs and maintenance costs until they began to use their allocation. This distinction is no longer relevant because the rules also require complete repayment of capital costs associated with an allocation by 2012. Therefore, local governments that receive new allocations in this round will be required to pay the total amount of the capital cost, operations and maintenance, and interest associated with the percentage of the water supply pool allocated to them.

Each application includes estimates of the population the water utility expects to serve in the future. This figure represents the number of people the system anticipates being dependent on the water distribution system at each point in time. The size and geographic coverage of the

distribution system is a function of where local decision makers expect growth to occur and local policies about expansion of utility service boundaries. The number of people served by a particular water utility may not correspond to municipal or county census figures. Also, some water utilities in North Carolina have service areas encompassing areas in multiple counties. The estimated service populations in the applications are best judgements based on available information at the time the applications were developed. They may include locally known information that may or may not have been available when other sources of population projections were being developed.

An important consideration of alternative water sources that must be considered is whether the alternative can be brought online by the time additional water is needed to meet customer demands. Some of the alternative sources presented in the applications face considerable hurdles that could limit their timely development. The uncertainty associated with getting legal access and regulatory approval may seriously limit the ability to bring a source online in a timely manner. Statutory and administrative rule requirements outline specific requirements that must be met for many of the decisions that must be made. Also, approval processes can be significantly influenced by local and regional politics. Regulatory uncertainty may make an allocation of water from Jordan Lake an important increase in available supply as development of alternative sources progress through the approval process.

Granting an allocation of water supply storage from Jordan Lake, an existing reservoir may also avoid or at least postpone development of new or expanded water supply sources and the associated environmental impacts.

The information included in each applicant's final application will be discussed in the context of the information needed to support allocation recommendations. Tables summarizing each applicants water needs and their proposed alternatives to meet those needs are included in each discussion. It is useful to keep in mind that while most of the demand data contained in the applications are based on annual average water demands actual water use varies considerably throughout the year. To help show that demand variation, DWR staff reviewers have included estimates of the average day demand in the month when water use is the highest for each applicant's water system. The multipliers used to produce maximum month daily demands were derived from the water demand monthly distribution factors in the Cape Fear – Neuse River Basin Hydrologic Model. As noted above, the tables include data for 2060 but the evaluation of need for an allocation are limited by rule to needs documented for 30 years after the allocations are made. In this case estimated demands for 2045 are used as the basis for allocation recommendations.

The map below shows the current and future service area boundaries of the members of the Jordan Lake Partnership. It is followed by a map showing water system connections among the partner communities in 2012. This group includes all allocation applicants except for the Fayetteville Public Works Commission.

Figure 2 Triangle Regional Water Service Areas (from the TRWSP)

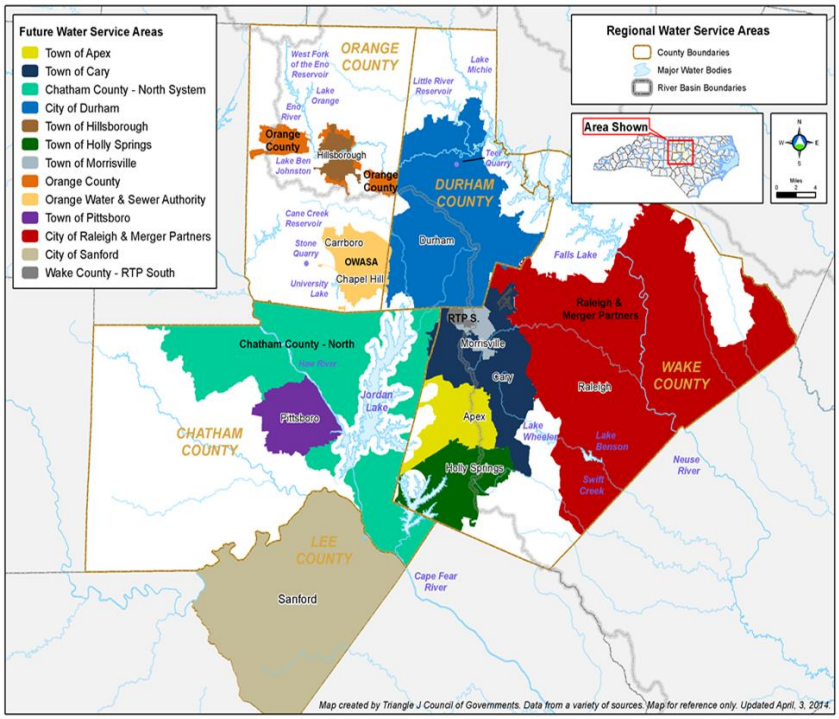
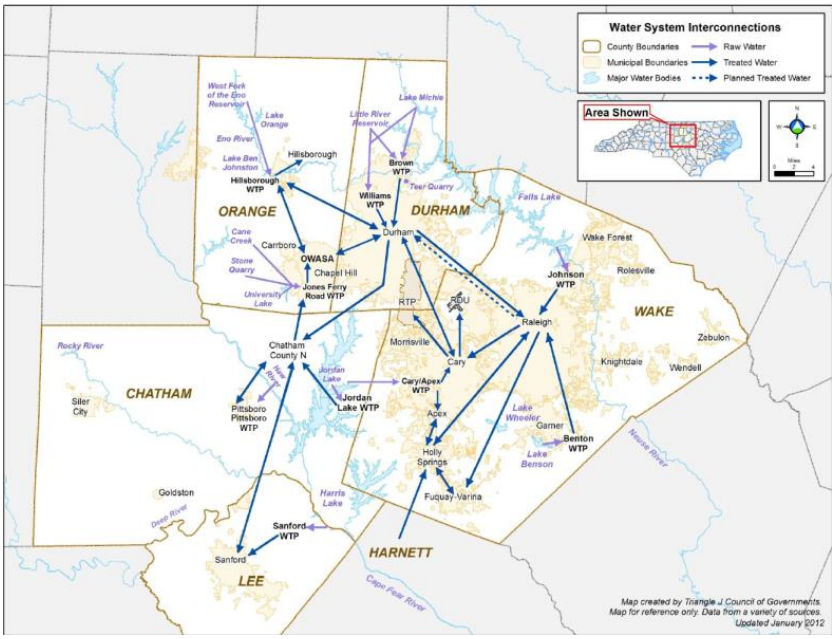


Figure 3 Triangle Regional Water System Interconnections as of 2012 (from the TRWSP)



Cary, Apex, Morrisville and Wake County – Research Triangle Park

Table 4 labeled "Cary, Apex, Morrisville, Wake Co-RTP" summarizes the information submitted in the joint application for water to supply the residents and businesses served by the Cary and Apex public water systems. Cary and Apex jointly hold a 32 percent allocation from Jordan Lake. Morrisville and Wake County each hold 3.5 percent allocations. The four utilities together have allocations totaling 39 percent of the water supply pool. In the joint application they are seeking an increase of 7.2 percent to give them a total of 46.2 percent to cover expected water demands through 2045. Morrisville's application requests that they retain their 3.5 percent allocation. The remaining 42.7 percent allocation would be held by Cary and Apex jointly.

By 2045 these water systems are planning to need water to meet the demands of over 344,000 people and supporting institutions. Currently Jordan Lake is the sole source of water for these communities to meet daily customer demands. Under Alternative 1 the Towns of Cary and Apex would continue to withdraw and treat water from the current raw water intake to meet the needs of Apex and the combined needs of Cary, Morrisville and RTP-South. Plans are underway to expand water treatment capacity to 56 million gallons per day with completion expected in 2016. Some of the wastewater collected and treated by these utilities will be discharged to the Neuse River Basin under an Interbasin Transfer Certificate approved by the Environmental Management Commission. The remainder of the collected and treated wastewater will be discharged to the Cape Fear River below Jordan Dam contributing to the flow at the USGS streamflow gage at Lillington.

Alternative 2, 4 and 5 all involve significant regulatory approval processes. Alternative 3 may offer a second best option to an increased allocation from Jordan Lake but would generate environmental impacts that would not be produced by merely increasing withdrawals at the current location. This option would withdraw water downstream of Jordan Dam and pump water to the existing water treatment plant or a newly constructed water treatment plant and pump finished water to the distribution system. Alternative 1 requires no new construction to access water supply beyond what is already planned. Expansions to the distribution system to accommodate growth would be similar for all alternatives. Alternative 3 may require additional releases from the flow augmentation pool to meet downstream flow targets.

Table 4 Cary, Apex, Morrisville, Wake Co.-RTP Alternatives Summary

Cary,Apex,Morrisville,WakeCo-RTP		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	182,600	201,200	309,600	344,150	360,600
1.4	Maximum Month Daily Demand	29.01	33.36	57.15	64.15	67.66
	Annual Average System Demand (MGD)	20.72	23.83	40.82	45.82	48.33
Cary & Apex	Demand	18.40	20.90	34.80	39.15	41.40
Morrisville	Demand	1.72	2.03	3.32	3.47	3.63
RTP-South	Demand	0.60	0.90	2.70	3.20	3.30
Alternative 1	Water Sources	39.00	46.20	46.20	46.20	48.50
	Current Jordan Lake Allocation	39	39	39	39	39
	JLA4 Allocation		7.2	7.2	7.2	7.2
	JLA5 allocation					2.30
Alternative 2	Water Sources	39.00	39.00	48.50	48.50	48.50
	Current Jordan Lake Allocation	39	39	39	39	39
	Allocation from Increased JL Water Supply Pool			9.5	9.5	9.5
Alternative 3	Water Sources	39.00	39.00	48.50	48.50	48.50
	Current Jordan Lake Allocation	39	39	39	39	39
	Cape Fear River @ Harnett County			9.5	9.5	9.5
Alternative 4	Water Sources	39.00	39.00	48.50	48.50	48.50
	Current Jordan Lake Allocation	39	39	39	39	39
	Crabtree Creek and Triangle Quarry			9.5	9.5	9.5
Alternative 5	Water Sources	39.00	39.00	39.00	48.50	48.50
	Current Jordan Lake Allocation	39	39	39	39	39
	Kerr Lake				9.5	9.5
JLA4 Request	Average Annual System Demand (MGD)	20.72	23.83	40.82	45.82	48.33
	Water Sources	39.00	46.20	46.20	46.20	46.20
	Current Jordan Lake Allocation	39	39	39	39	39
	JLA4 Allocation		7.2	7.2	7.2	7.2
Cary-Apex-Morrisvill	**Total JLA4 Allocation Request**	**39**	**46.2**	**46.2**	**46.2**	**46.2**

Western Water Intake Partners

Pittsboro, Chatham County, Durham and the Orange Water and Sewer Authority have been working together on a proposal to construct a new intake and water treatment plant on the western shore of Jordan Lake. The new facilities would allow these systems to access their requested allocations and provide the ability to fully utilize the water supply storage in Jordan Lake reservoir. Development of a new intake, treatment plant and transmission pipelines faces an extensive review and approval process. The new facility, is not expected to be operational until around 2035. With the 80 million gallon per day limit on the existing raw water intake an additional intake will be required if the region is to reap the benefits of the water supply storage in Jordan Lake reservoir. As currently envisioned the project would include a new raw water intake and pump station in or adjacent to the reservoir, a treatment plant constructed on land owned by the Orange Water and Sewer Authority adjacent to the Corps of Engineers' property and finished water pumping and transmission facilities to deliver water to the project partners.

This proposal, supported by the Jordan Lake Partnership, is explained in more detail in the TRWSP and the allocation applications submitted by JLP members.

Pittsboro

The Town of Pittsboro is facing a very significant increase in the number of residents and businesses dependent on the municipal pubic water system. Development of the proposed 7000 acres in the Chatham Park development east of the town will include about 22,000 residential units with about 64,000 new residents over the 30 years anticipated to reach build out. In addition the project will include about 2.4 million square feet of commercial space, 16.6 million square feet of office space and 2.5 million square feet of civic, school and hospital space.

With approval of the Planned Development District for Chatham Park and Pittsboro's commitment to provide water service the town proposes to expand its current two million gallon per day water treatment capacity from the Haw River. This would be accomplished in two expansions of two million gallons per day each to reach of total of six million gallons per day from their existing withdrawal location on the Haw River near Bynum, North Carolina. Pittsboro has also submitted an allocation request for a six percent allocation of the water supply pool in Jordan Lake.

Pittsboro plans to access their allocation through the proposed western Jordan Lake intake and water treatment plant. Pittsboro intends to meet its growing demand from its existing location on the Haw River as needed while the new treatment and transmission facilities are being developed. Without water from Jordan Lake it is unclear if Pittsboro, or any other entity, could reliably supply the level of water demands necessary to support development of the Chatham Park project and the secondary development likely to be generated. The only alternative to the water supply scheme discussed above submitted by Pittsboro relies on a larger allocation from Jordan Lake which would be utilized earlier in the planning horizon. While Pittsboro could possibly access water from the Cape Fear River below Jordan Dam such an arrangement would likely require larger flow augmentation releases from Jordan Lake to meet management rules. There are many unanswered question about how water demand will grow in Chatham County because of the Chatham Park project. Additional water supplies will be needed to meet the increased water needs to be generated by this development project.

Table 5 Pittsboro Alternative Summary

Pittsboro		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	3,700	13,850	69,250	83,500	96,800
1.15	Maximum Month Daily Demand	0.65	2.07	9.67	11.41	12.93
	Annual Average System Demand (MGD)	0.56	1.80	8.41	9.92	11.24
Alternative 1	**Water Sources total**	2.00	2.00	9.00	12.00	12.00
	Existing Haw River	2	2	2	2	2
	Haw River Expansion			2	2	2
	Haw River Expansion			2	2	2
	Requested Total JL Allocation			3	6	6
Alternative 2	**Water Sources total**	2	2	12	12	12
	Existing Haw River	2	2	2	2	2
	Jordan Lake Allocation			10	10	10
JLA4 Request	Annual Average System Demand (MGD)	0.56	1.80	8.41	9.92	11.24
	Water Sources total	2.00	8.00	12.00	12.00	12.00
	Existing Haw River	2	2	2	2	2
	Haw River Expansion			2	2	2
	Haw River Expansion			2	2	2
Pittsboro	**JLA4 Request**	**0**	**6**	**6**	**6**	**6**

Chatham County-North Water System

Chatham County initiated the first inquiries for a fourth round of allocations of water supply storage in Jordan Lake. The Chatham County-North water system continues to face rapid growth in water demand with limited capacity in the existing water treatment plant. Discussions generated by Chatham County's inquiries evolved into formation of the Jordan Lake Partners and ultimately in the development of the Triangle Regional Water Supply Plan. The Chatham County-North service area includes the land surrounding Jordan Lake in Chatham County except Pittsboro and its extra-territorial jurisdiction. While the water system's service area borders portions of the Chatham Park project it does not include the project. Chatham County is experiencing growth as development, particularly residential development, expands southward from Orange and Durham counties. In addition, the success of the Chatham Park project is expected to foster development in the county areas around the project.

The County's application estimates the service population to increase to about 65,300 and associated non-residential growth resulting in an estimated annual average water demand of 13.3 million gallons per day by 2045. These estimates are based on current development patterns and the area of developable parcels within the service area with some increase to reflect anticipated changes due to surrounding development.

Chatham County holds a current allocation from Jordan Lake of six percent of the water supply pool, which supplies a water treatment plant with three million gallons per day capacity. Raw water to supply the treatment plant currently comes from the pipeline supplying the Cary-Apex water treatment plant. Part of the systems' current demand is met through a time-limited

arrangement to purchase finished water from Durham. This arrangement is intended to help Chatham County meet water demands over the time period needed to secure additional water supply and develop the infrastructure to use it. Chatham County is requesting an additional seven percent allocation from the water supply pool, giving the Chatham County-North water system a 13 percent allocation to meet estimated 2045 customer demands. The Chatham County-North water system intends to access its Jordan Lake allocation through the proposed western intake and treatment facilities.

Table 6 Chatham County-North Alternative Summary

Chatham County-North		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	10,200	18,050	49,450	65,350	94,000
1.36	Maximum Month Daily Demand	2.94	5.07	13.77	17.72	24.64
	Annual Average System Demand (MGD)	2.16	3.73	10.13	13.03	18.12
Alternative 1	Water Sources	6.00	13.00	13.00	13.00	18.10
	Current Jordan Lake Allocation	6	6	6	6	6
	JLA4		7	7	7	7
	JLA5					5.1
Alternative 2	Water Sources	6.00	6.00	18.20	18.20	18.20
	Current Jordan Lake Allocation	6	6	6	6	6
	Cape Fear River -Harnett County			12.2	12.2	12.2
JLA4 Request	Average Annual System Demand (MGD)	2.16	3.73	10.13	13.03	18.12
	Water Sources	6	13	13	13	13
	Jordan Lake Allocation	6				
Chatham County-No	**JLA4 Request**		**13**	**13**	**13**	**13**

Durham

Durham's primary sources of water are Lake Michie, on the Flat River, and the Little River Reservoir both of which are located on the Falls Lake watershed in the Neuse River Basin. The estimated yield of these two reservoirs is 27.9 million gallons per day. Durham has been pursuing the development of the Teer Quarry as an off-stream supplemental raw water source. For optimum use to Durham the quarry would be filled by pumping water from the Eno River during high flow conditions. The Eno River flows into Falls Lake. The portions of the flow in the Flat River, Little River and Eno River not used by Durham flows into Falls Lake contributing to the water supply and flow augmentation pools of that reservoir. Falls Lake is the major source of water for the Raleigh public water system.

Durham's sources are supplemented by a current allocation of 10 percent of the water supply pool in Jordan Lake. Durham has access to the allocation by arrangement with Cary to provide finished water through interconnections of their distribution systems.

As one corner of the Research Triangle, Durham has grown significantly since the formation of Research Triangle Park and continues to do so. Over the fifty-year planning horizon of this analysis the Durham water system projects an 86 percent increase in its service population from about 246,000 to over 458,000. Increasing water withdrawals from Durham's sources, other than

Jordan Lake, will decrease flows into Falls Lake as Raleigh's water demands continue to increase.

Durham submitted an allocation request for an additional 6.5 percent of the water supply pool of Jordan Lake giving the system a total allocation of 16.5 percent. Durham is one of the four Jordan Lake Partners jointly working to develop a raw water intake and water treatment plant on the western side of Jordan Lake. This project will expand the availability of public water supplies to the region. The current understanding, and the way Durham's demands are modeled for this analysis, assumes that upon completion of the western water treatment plant and transmission facilities Durham will maximize use of its Jordan Lake allocation thereby moderating use of its sources on the Falls Lake watershed.

All of Durham's supply alternatives assume that they will maintain the current 10 percent allocation which to date has been used when supply from their reservoirs is limited. With this allocation Durham's estimated reliable supply is 37.9 million gallons per day. To meet future demands through 2045 current sources could be increased by expanding Lake Michie Reservoir using two possible scenarios, increasing pumping from the Eno River to Teer Quarry and/or increasing distribution of reclaimed water. Except for the reclaimed water option the other options would all result in increased withdrawals above Falls Lake.

The Durham Water Management Department has three locations where collected wastewater is treated and discharged. The South Durham Water Reclamation Facility and the Triangle Regional Wastewater Treatment Plan treat about 60 percent of the systems collected wastewater discharging it to the Jordan Lake watershed. The remainder of collected wastewater is treated at the North Durham Water Reclamation Facility which discharges to the Falls Lake watershed. Durham has the capacity to return water withdrawn from Jordan Lake to the reservoir's watershed. Currently almost all of the water discharged by Durham to the Jordan Lake watershed in the Haw River Basin was withdrawn from the Neuse River Basin, above Falls Lake.

By using more water from Jordan Lake, and discharging the associated wastewater back to the reservoir's watershed, Durham's use of the requested allocation has the potential to reduce withdrawals from the Falls Lake watershed leaving more water to support Raleigh's water supply. This beneficial outcome depends on the successful completion of the western Jordan Lake intake, treatment plant and transmission facilities. This, in turn, depends on the project partners securing the requested water supply allocations guaranteeing water availability.

Table 7 Durham Alternatives Summary

Durham		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	246,180	266,300	350,922	393,924	458,426
1.182	Maximum Month Daily Demand	29.87	33.05	42.69	47.25	52.45
	Annual Average System Demand (MGD)	25.27	27.97	36.12	39.98	44.37
Alternative 1	Water Sources total	37.90	44.40	44.40	44.40	44.40
	Lake Michie/Little River Reservoir	27.9	27.9	27.9	27.9	27.9
	Current Jordan Lake Allocation	10	10	10	10	10
	Requested Total JL Allocation		16.5	16.5	16.5	16.5
Alternative 2	Water Sources total	37.90	37.90	45.30	45.30	45.30
	Lake Michie/Little River Reservoir	27.9	27.9	27.9	27.9	27.9
	Current Jordan Lake Allocation	10	10	10	10	10
	Teer Quarry			5.2	5.2	5.2
	Reclaimed Water System			2.2	2.2	2.2
Alternative 3	Water Sources total	37.90	37.90	49.90	49.90	49.90
	Lake Michie/Little River Reservoir	27.9	27.9	27.9	27.9	27.9
	Current Jordan Lake Allocation	10	10	10	10	10
	Raise Lake Michie to 365' MSL			12	12	12
Alternative 4	Water Sources total	37.90	37.90	63.90	63.90	63.90
	Lake Michie/Little River Reservoir	27.9	27.9	27.9	27.9	27.9
	Current Jordan Lake Allocation	10	10	10	10	10
	Raise Lake Michie to 380' MSL			26	26	26
Alternative 5	Water Sources total	37.90	37.90	49.20	49.20	49.20
	Lake Michie/Little River Reservoir	27.9	27.9	27.9	27.9	27.9
	Current Jordan Lake Allocation	10	10	10	10	10
	Aggressive Reclaimed Water System			11.3	11.3	11.3
JLA4 Request	Annual Average System Demand (MGD)	25.27	27.97	36.12	39.98	44.37
	Water Sources total	37.90	44.40	44.40	44.40	44.40
	Lake Michie/Little River Reservoir	27.9	27.9	27.9	27.9	27.9
Durham	**JLA4 Request**	**10**	**16.5**	**16.5**	**16.5**	**16.5**

Orange Water and Sewer Authority (OWASA)

The Orange Water and Sewer Authority provides water and sewer services to the Towns of Chapel Hill and Carrboro, the University of North Carolina at Chapel Hill and portions of southern Orange County. OWASA manages the Cane Creek and University Lake reservoirs which have an estimated combined yield of 10.5 million gallons per day. OWASA currently holds a 5 percent allocation of the water supply pool in Jordan Lake. The Cary-Apex water treatment plant can treat water from OWASA's allocation and send finished water to them through Cary-Durham and Durham-OWASA interconnections. OWASA has plans to expand the available supply by 2.1 million gallons per day in 2035 when the utility takes control of a local quarry for water supply storage. Currently about ten percent of daily system demand is met by providing reclaimed water to UNC-CH for cooling water. OWASA's demand projections are based on presumptions that UNC-CH will continue to be able to use reclaimed water and that utility customers will meet aggressive water use efficiency goals. OWASA has expressed concern that changes in wastewater treatment processes, required to meet total nitrogen limits on the discharge, may change the reclaimed water's chemistry to the point it may no longer be economically feasibility for UNC-CH to use it in cooling towers. Increasing infill development is

producing higher density in some recent developments. The effects on water demands of these changes in land use are unknown at this time. Also, the reliability of current demand projections depends on utility customers' acceptance and adoption of water conservation practices. OWASA's 5 percent allocation from Jordan Lake increases the reliability of the utilities total water supply especially in the period before the quarry project comes online around 2035. The allocation also provides OWASA with an alternative supply from another water source increasing system reliability.

OWASA's allocation application presents five alternative supply scenarios that could meet estimated public water demands through 2060. Alternative 1 reflects existing planned supply expansions and maintaining the utilities current 5 percent allocation of the water supply pool in Jordan Lake. Alternative 2 proposes developing a larger storage capacity in the quarry project with the possibility of relinquishing their Jordan Lake allocation. The third alternative includes developing a new run-of-river raw water intake on the Haw River upstream of Jordan Lake in combination with the currently planned quarry project. Water from the Haw River would be pumped to the Cane Creek Reservoir supplementing natural inflow. The fourth alternative proposes increased use of reclaimed water to supplement the future supply from existing sources and the quarry project.

Table 7 Orange Water and Sewer Authority Alternatives Summary

Orange Water and Sewer Authority		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	79,400	86,850	115,700	129,950	149,700
1.142	Maximum Month Daily Demand	8.98	9.24	11.69	12.93	14.74
	Annual Average System Demand (MGD)	7.86	8.09	10.24	11.32	12.91
Alternative 1	Water Sources total	15.50	15.50	17.60	17.60	17.60
	UnivLake/CaneCrk Sys	10.5	10.5	10.5	10.5	10.5
	Future Stone Quarry Expansion	0	0	2.1	2.1	2.1
	Current Jordan Lake Allocation	5	5	5	5	5
Alternative 2	Water Sources total	15.5	15.5	13.9	13.9	13.9
	UnivLake/CaneCrk Sys	10.5	10.5	10.5	10.5	10.5
	Future Stone Quarry Expansion	0	0	3.4	3.4	3.4
	Current Jordan Lake Allocation	5	5			
Alternative 3	Water Sources total	15.5	15.5	20.3	20.3	20.3
	UnivLake/CaneCrk Sys	10.5	10.5	10.5	10.5	10.5
	Future Stone Quarry Expansion	0	0	2.1	2.1	2.1
	Current Jordan Lake Allocation	5	5			
	Haw River Intake			7.7	7.7	7.7
Alternative 4	Water Sources total	15.5	15.5	12.94	12.94	12.94
	UnivLake/CaneCrk Sys	10.5	10.5	10.5	10.5	10.5
	Future Stone Quarry Expansion	0	0	2.1	2.1	2.1
	Current Jordan Lake Allocation	5	5			
	Reclaimed Water			0.34	0.34	0.34
JLA4 Request	Annual Average System Demand (MGD)	7.86	8.09	10.24	11.32	12.91
	Water Sources total	15.50	15.50	17.60	17.60	17.60
	UnivLake/CaneCrk Sys	10.5	10.5	10.5	10.5	10.5
	Future Stone Quarry Expansion	0	0	2.1	2.1	2.1
OWASA	**JLA4 Request**	**5**	**5**	**5**	**5**	**5**

City of Raleigh Public Utilities Department

The City of Raleigh Public Utilities Department (CORPUD) provides water and sewer services to residential and non-residential customers in Raleigh, Garner, Wake Forest, Rolesville, Knightdale, Wendell, and Zebulon. The primary water supply source is Falls Lake with an estimated yield of 66.1 million gallons per day. An additional 11.2 million gallons per day is available from the combined system of Lake Benson and Lake Wheeler on Swift Creek giving the system a total estimated available supply of 77.3 million gallons per day. Except for emergency sources, all of CORPUD's water supply comes from sources in the Neuse River Basin. According to information included in CORPUD's allocation request annual average demand is expected to increase to over 84 million gallons per day by 2035 and 97 million gallons per day by 2045. During the month of the year when water use is typically the highest the system could see water demands in excess of 84 million gallons per day by 2025 given the estimated increases in population and water demand.

The City of Raleigh's allocation application presents several supply alternatives that could secure their customers adequate supplies of water through 2060. However, there is a high level of uncertainty associated with all of the larger projects.

Similar to Jordan Lake, the water conservation pool of Falls Lake is managed as two separate accounts. During the design of Falls Lake the City of Raleigh contracted with the Corps of Engineers for water supply storage of 42.3 percent of the conservation pool. The remaining 57.7 percent is managed for flow augmentation in the Neuse River below the dam. Raleigh is investigating the possibility of changing the demarcation of these two storage accounts to provide an additional 14 million gallons per day from the flow augmentation pool to water supply. Raleigh withdraws water from the water supply pool to supply its customers. The wastewater generated by its customers is collected, treated and discharged to the Neuse River supplementing flows and reducing the amount of water that must be released from the flow augmentation pool to maintain flow targets at the Clayton streamflow gage. The reallocation of storage in the two storage accounts requires an extensive study by the Corps of Engineers and is not expected to be approved before 2020. Even with an additional 14 million gallons per day available from Falls Lake Raleigh may need an additional supply to meet anticipated 2045 water demands.

Another option for increasing the available water supply for Raleigh's customers is to develop an new surface water intake in the Neuse River below Falls Lake and upstream of the city's Neuse River water reclamation facility discharge. This option is thought to be able to supply an additional 23.7 million gallons per day. Besides the normal environmental reviews and regulatory permitting requirements this proposal faces there is the additional complication that withdrawing water at the proposed location could affect management of the flow augmentation pool in Falls Lake by reducing flows above the Clayton streamflow gage. A Neuse River intake is not expected to be operational prior to 2035.

The City of Raleigh has been considering two other options for potential water supply sources both of which are not expected to be available prior to 2045 due to the complexity of the projects

and regulatory requirements. Raleigh has proposed building a reservoir on the Little River in Wake County which at one time was thought to be able to provide up to 14 million gallons per day. Regulatory compliance issues and the existence of other options with less environmental impacts means this is best considered as a long-range project that is unlikely to be developed for several decades. Similarly a proposal to pump water from the Neuse River to a nearby quarry for off-stream storage is a long-range project. This project, thought to be able to supply about 10.6 million gallons per day, also faces extensive regulatory requirements which are further complicated by the fact that the quarry is expected to continue being productive for its current owners beyond the time Raleigh needs the additional supply.

Raleigh submitted an application for a 4.7 percent allocation of the Jordan Lake water supply pool. Raleigh's application includes an approach designed to compensate for the burden imposed by the current surface water transfer regulations. To avoid the necessity of getting an interbasin transfer certificate Raleigh proposed having any allocation they received released from the reservoir so it could be withdrawn from the river down steam in the vicinity of Lillington and piped to the D.E. Benson WTP. Treated wastewater would be returned to the Cape Fear River near where the water was withdrawn, avoiding a surface water transfer.

River flows below Jordan Lake are augmented by releases from the reservoir maintaining reliable flows well above the low flows experienced before completion of the reservoir. Based on the location suggested in Raleigh's application the desired volume of water would likely be available at the specified location without a supplemental release from a water supply allocation from Jordan Lake.

Raleigh's allocation application indicates their willingness to investigate the possibility of accessing an allocation through one of the Jordan Lake Partners to which they are already connected. Raleigh's interconnections with Cary and Durham may have the capacity to move this volume of water. However, the IBT Certificate recently issued to Cary and Apex specifically prohibits them from selling water they withdraw from Jordan Lake to any water system that is not included on the certificate. However, options may exist to partner with Durham in the future to access water from Jordan Lake.

Modeling scenarios used for this evaluation include a 4.7 million gallons per day withdrawal from Jordan Lake and a scenario with the same volume being withdrawn from the Cape Fear River at Lillington without an allocation and with a corresponding wastewater return flow to the river. As noted above Raleigh's estimated average day demand in 2045 is 97 million gallons per day. With the additional supply from the Cape Fear River and the aggressive drought response plan included in the model there is no indication of flow related shortages associated with meeting the 97 million gallons per day annual average day demand. During drought conditions implementation of the drought response plan would reduce normal demands as supply declined and the expected reduced demands would be met.

Evaluating the proposal strictly from a water quantity perspective, the approach of withdrawing water and returning used water in the same river reach could likely provide Raleigh the desired amount of water without an allocation of water supply storage from Jordan Lake.

Table 8 Raleigh Public Utilities Alternatives Summary

Raleigh Public Utilities Department		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	485,219	561,882	879,441	1,048,700	1,316,200
1.181	Maximum Month Daily Demand	62.30	69.61	100.10	114.58	135.82
	Annual Average System Demand (MGD)	52.75	58.95	84.76	97.02	115.01
Alternative 1	Water Sources total	77.30	77.30	115.00	115.00	115.00
	Falls lake	66.1	66.1	66.1	66.1	66.1
	L.Benson/L.Wheeler	11.2	11.2	11.2	11.2	11.2
	Current Jordan Lake Allocation	0	0	0	0	0
	Future Source_Falls Lake Reallocation			14	14	14
	Future Source_Neuse River Intake			23.7	23.7	23.7
Alternative 2	Water Sources total	77.30	77.30	105.70	119.40	119.40
	Falls lake	66.1	66.1	66.1	66.1	66.1
	L.Benson/L.Wheeler	11.2	11.2	11.2	11.2	11.2
	Current Jordan Lake Allocation	0	0	0	0	0
	Future Source_Neuse River Intake			23.7	23.7	23.7
	Requested Total JL Allocation			4.7	4.7	4.7
	Little River Reservoir				13.7	13.7
Alternative 3	Water Sources total	77.30	77.30	105.70	119.60	119.60
	Falls lake	66.1	66.1	66.1	66.1	66.1
	L.Benson/L.Wheeler	11.2	11.2	11.2	11.2	11.2
	Current Jordan Lake Allocation	0	0	0	0	0
	Future Source_Neuse River Intake			23.7	23.7	23.7
	Requested Total JL Allocation			4.7	4.7	4.7
	Water Purchase (Cary?)				3.3	3.3
	Neuse River Intake - Raleigh Quarry				10.6	10.6
JLA4 Request	Average Annual System Demand (MGD)	52.75	58.95	84.76	97.02	115.01
	Water Sources total	77.30	77.30	82.00	82.00	82.00
	Falls lake	66.1	66.1	66.1	66.1	66.1
	L.Benson/L.Wheeler	11.2	11.2	11.2	11.2	11.2
Raleigh	**JLA4 Request**	**0**	**0**	**4.7**	**4.7**	**4.7**

Orange County

Orange County does not operate a public water system. However, the county assists with securing water to supply areas of the county bordering the service areas of Hillsborough and the Orange-Alamance Water System. Orange County is a member of the Jordan Lake Partnership and contributed to the development of the Triangle Regional Water Supply Plan. The county benefited from the assistance provided by other JLP members in developing water demand projections for their economic development areas. Orange County has a one percent allocation of the water supply pool in Jordan Lake. The county has three economic development areas that it is committed to support by assisting with provision of public water services. The total estimated demand for these areas is divided between two public water systems. Orange County has a contract with the City of Mebane that is expected to be able to supply water to the area west of Hillsborough through 2045, estimated to be half of the total demand of 3 million gallons per day. The current purchase from Mebane will have to increase to meet expected future demands in the

economic development area it supplies. Orange County plans to meet the demands of the areas in the eastern side of the county using its Jordan Lake allocation delivered through Durham's distribution system.

To support the expected development in these areas, Orange County is requesting an increase to its current Jordan Lake allocation to 1.5 percent of the water supply pool. As an alternative to the preferred allocation Orange County proposes to maintain its purchase from Mebane at its current level of 0.25 million gallons per day and increase its allocation request to 3 percent of the water supply pool. For communities that rely on others to provide potable water to their service areas maintaining their own source of water, such as a Jordan Lake allocation, facilitates treatment and delivery of potable water because the supplying utility does not have to commit a portion of their own supply to cover the purchaser's demands. This is a common arrangement among the current allocation holders.

Table 9 Orange County Alternatives Summary

Orange County		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	132	2,049	11,897	17,185	25,115
1.077	Maximum Month Daily Demand	0.03	0.39	2.16	3.03	4.22
	Annual Average System Demand (MGD)	0.02	0.36	2.01	2.81	3.92
Alternative 1	Water Sources total	1.25	1.75	2.25	2.25	2.25
	From Mebane	0.25	0.25	0.25	0.25	0.25
	Mebane Increase			0.5	0.5	0.5
	Current Jordan Lake Allocation	1	1	1	1	1
	Requested Total JL Allocation		1.5	1.5	1.5	1.5
Alternative 2	Water Sources total	0.25	3.25	3.25	3.25	3.25
	From Mebane	0.25	0.25	0.25	0.25	0.25
	Requested Total JL Allocation		3	3	3	3
JLA4 Request	Annual Average System Demand (MGD)	0.02	0.36	2.01	2.81	3.92
	Water Sources total	1.25	1.75	2.25	2.25	2.25
	From Mebane	0.25	0.25	0.25	0.25	0.25
	Mebane Increase			0.5	0.5	0.5
	Current Jordan Lake Allocation	1	1	1	1	1
Orange County	**JLA4 Request**	**1**	**1.5**	**1.5**	**1.5**	**1.5**

Hillsborough

The Town of Hillsborough currently gets its water supply from Lake Ben Johnson on the Eno River in the Neuse River Basin. Lake Ben Johnson receives water from Lake Orange and the town-owned West Fork of the Eno Reservoir. Water is supplied to augment flow in the Eno River to maintain adequate water at the water supply intake and to maintain a one cubic foot per second release to the Eno River. Plans are underway to expand the West Fork reservoir increasing its estimated yield from 2.56 to 3.76 million gallons per day. With relatively small drainage areas the Town's water supply reservoirs are susceptible to shortages during drought conditions in the upper Neuse River Basin. Hillsborough has interconnections with Durham and

Orange Water and Sewer Authority. Hillsborough is dependent on water from the upper Neuse River Basin to meet all its everyday drinking water needs.

To improve water supply resilience and meet essential water needs during drought conditions Hillsborough is requesting a one percent allocation from the Jordan Lake water supply pool. The allocation would be accessed through interconnections with Durham and OWASA. These utilities have access to Jordan Lake water through agreements to receive finished water from the Cary-Apex water treatment plant that is debited against their own allocations. Development of the western Jordan Lake intake and water treatment facility is expected to supply the access needed for Hillsborough to receive water from an allocation.

Table 20 Hillsborough Alternatives Summary

Hillsborough		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	12,216	14,508	22,150	26,600	33,800
1.068	Maximum Month Daily Demand	1.25	1.86	3.07	3.43	3.95
	Annual Average System Demand (MGD)	1.17	1.74	2.87	3.22	3.70
Alternative 1	Water Sources total	2.60	3.60	4.80	4.80	4.80
	Upper Eno Res Sys	2.6	2.6	2.6	2.6	2.6
	WF Eno Res Expansion (In Process)			1.2	1.2	1.2
	Current Jordan Lake Allocation	0	0	0	0	0
	Requested Total JL Allocation		1	1	1	1
Alternative 2	Water Sources total	2.60	2.60	3.80	3.80	3.80
	Upper Eno Res Sys	2.6	2.6	2.6	2.6	2.6
	WF Eno Res Expansion (In Process)			1.2	1.2	1.2
	Requested Total JL Allocation	0	0	0	0	0
JLA4 Request	Annual Average System Demand (MGD)	1.17	1.74	2.87	3.22	3.70
	Water Sources total	2.60	3.60	4.80	4.80	4.80
	Upper Eno Res Sys	2.6	2.6	2.6	2.6	2.6
	WF Eno Res Expansion (In Process)			1.2	1.2	1.2
Hillsborough	**JLA4 Request**	**0**	**1**	**1**	**1**	**1**

Holly Springs

The Town of Holly Springs provides water to about 35,000 residents of southwestern Wake County. The Harnett County Regional Water System withdraws and treats water from the Cape Fear River and provides Holly Springs with finished water. The current contract allows Holly Springs to receive up to ten million gallons per day from the Harnett County water system. In addition Holly Springs has a two percent allocation of the Jordan Lake water supply pool that it can access through an interconnection with the Apex water distribution system. Having this alternative source of water available through another water treatment plant provides Holly Springs with redundancy to meet customer needs and protect health during emergencies and other disruption of deliveries from their primary water supplier. Holly Springs currently has a

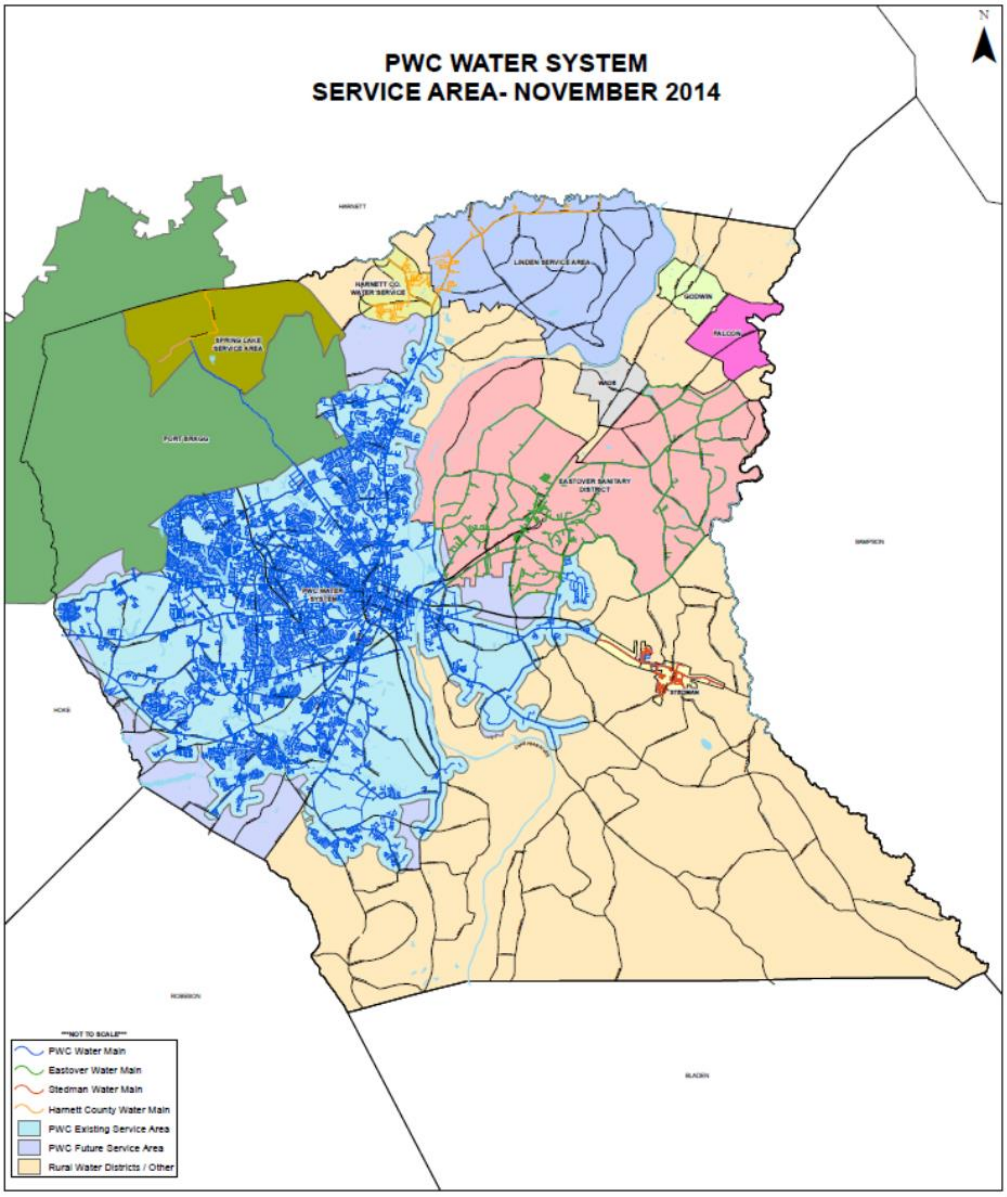
time-limited contract with the City of Raleigh to provide up to 1.2 million gallons per day in emergencies that will expire in 2017.

The Town of Holly Springs is requesting to maintain its current two percent allocation of the water supply pool in Jordan Lake. The Town intends to use this allocation as needed to meet essential water needs of their customers and to protect the general public health. The role of public health protection is emphasized in their allocation application. Holly Springs is currently the location of major international vaccine production facilities.

Table 11 Holly Springs Alternatives Summary

Holly Springs		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	24,700	35,705	68,371	81,931	103,261
1.221	Maximum Month Daily Demand	2.42	4.07	7.61	8.84	10.72
	Annual Average System Demand (MGD)	1.98	3.34	6.23	7.24	8.78
Alternative 1	Water Sources total	12.00	12.00	12.00	12.00	12.00
	Cape Fear River (Harnett Co RWS)	10	10	10	10	10
	Current Jordan Lake Allocation	2	2	2	2	2
	Requested Total JL Allocation	2	2	2	2	2
Alternative 2	Water Sources total	10	12	12	12	12.2
	Cape Fear River (Harnett Co RWS)	10	10	10	10	10
	IncreaseCape Fear River (HCRWS)		2	2	2	2.2
Alternative 3	Water Sources total	10	12.2	12.2	12.2	12.2
	Cape Fear River (Harnett Co RWS)	10	10	10	10	10
	City of Raleigh		2.2	2.2	2.2	2.2
Alternative 4	Water Sources total	10	18.8	18.8	18.8	18.8
	Cape Fear River (Harnett Co RWS)	10	10	10	10	10
	Cape Fear River new intake & wtp		8.8	8.8	8.8	8.8
JLA4 Request	Annual Average System Demand (MGD)	1.98	3.34	6.23	7.24	8.78
	Water Sources total	12.00	12.00	12.00	12.00	12.00
	Cape Fear River (Harnett Co RWS)	10	10	10	10	10
Holly Springs	**JLA4 Request**	**2**	**2**	**2**	**2**	**2**

Figure 4 Fayetteville Public Works Commission Service Areas (including neighboring communities that depend on water from Fayetteville PWC)



Fayetteville Public Works Commission

The Fayetteville Public Works Commission provides water and sewer services to about 60 percent of the residents of Cumberland County. Fayetteville PWC's Jordan Lake allocation application indicates it expects to be serving 90 percent of the county population by 2040 or an estimated 384,000 persons. Several neighboring water systems are dependent on Fayetteville PWC for public water service. PWC uses water from the Cape Fear River, Big Cross Creek and Little Cross Creek to meet customer demands. PWC has two water treatment facilities the Glenville Lake WTF with a permitted capacity of 18 million gallons per day and the P.O. Hoffer

WTF with a permitted capacity of 39.5 million gallons per day giving the utility a combined treatment capacity of 57.5 million gallons per day. An estimated 4.5 million gallons per day is available to the Glenville Lake WTF from the Little Cross Creek watershed which is supplemented by pumping water from the Cape Fear River. The Cape Fear River is the sole raw water source for the P.O. Hoffer WTF. The two pump stations on the Cape Fear River have combined design capacities of 92 million gallons per day and combined firm capacities of 58 million gallons per day.

The pump stations are located in a section of the river that is impounded by the William O. Huske Lock and Dam, often referred to as Lock & Dam #3. This structure, located 95 miles upstream from the mouth of the Cape Fear River, creates an impoundment in the river that backs up water for approximately 29 miles upstream, to river mile 124. In this section of the river the water elevation is maintained close to the elevation of the top of the dam.

For determining the amount of water available to a water utility the Jordan Lake Water Supply Storage Allocation Application Guidelines stated that; *"For run-of-river sources, applicants will use the results of an instream flow study, when such is available, to determine the available supply. If the results of an instream flow study are not available for a given source, the applicant's available supply is assumed to be 20% of the 7Q10 flow as determined using the basecase scenario of the appropriate river basin hydrologic model if there are no other intakes in close proximity."*

Following this guideline the available supply reported by Fayetteville PWC in the allocation application is 20 percent of 239 million gallons per day or 47.8 million gallons per day. Information in PWC's application indicates existing treatment capacity of 57.5 million gallons per day and the installed pumping capacity to supply that volume of water from the current intake locations. The installed capacity for withdrawal and treatment already exceed the available supply estimate cited in their application.

Fayetteville PWC collects and treats a high percentage of the water it delivers to its customers as well as receiving and treating wastewater from several neighboring communities. The treated wastewater is discharged downstream of PWC's water supply intake in the backwater of Lock & Dam #3.

In the 2010 model scenario PWC returned on average about 95 percent of the water it withdrew for water supply back to the Cape Fear River in the backwater of Lock & Dam #3. With this arrangement of withdrawal, wastewater discharge and flow measurement locations the logical metric to use to evaluate PWC's impact on flows in the Cape Fear River would be the net withdrawal of water from the impoundment upstream of Lock & Dam #3. For the 2010 example above, an annual average water supply withdrawal of 27.35 million gallons per day resulted in a net water withdrawal of 1.5 million gallons per day or about 0.5 percent of the model-estimated 7Q10 flow at Lock & Dam #3.

Fayetteville PWC submitted a request for a 10 percent allocation from the Jordan Lake water supply pool. If the allocation is granted, PWC will ask that the water be released from Jordan Lake into the Cape Fear River to be withdrawn at the current intake location in Fayetteville.

Table 12 summarizes the water supply alternatives included in PWC's allocation application. Alternatives 2, 3 and 4, which do not include a Jordan Lake allocation, will require extensive environmental review.

PWC's withdrawal location benefits from the water quality releases from Jordan Lake. Modeling indicates the utility's future supply needs can reliably be met without an allocation from Jordan Lake. Based on the modeling done for the Draft Cape Fear Water Supply Evaluation, there is no indication of flow related shortages associated with Fayetteville PWC's ability to meet its expected 2060 water demands from its current water supply sources.

Table 12 Fayetteville Public Works Commission Alternatives Summary

Fayetteville Public Works Commission		2010	2015	2035	2045	2060
MaxMonMultiplier	Service Population	199,102	226,655	350,574	398,380	440,390
1.208	Maximum Month Daily Demand	33.84	37.43	66.47	79.02	95.34
	Annual Average System Demand (MGD)	28.014	30.982	55.03	65.41	78.92
Alternative 1	Water Sources total	57.50	67.50	67.50	67.50	67.50
	PO Hoffer WTF	39.5	39.5	39.5	39.5	39.5
	Glenville Lake WTF	18.0	18.0	18.0	18.0	18.0
	Current Jordan Lake Allocation	0	0	0	0	0
	Requested Total JL Allocation		10	10	10	10
Alternative 2	Water Sources total	57.50	57.50	95.50	95.50	95.50
	PO Hoffer WTF	39.5	39.5	39.5	39.5	39.5
	Glenville Lake WTF	18	18	18	18	18
	New Reservoir in Cumberland Co	0	0	38	38	38
Alternative 3	Water Sources total	57.50	57.50	87.50	87.50	87.50
	PO Hoffer WTF	39.5	39.5	39.5	39.5	39.5
	Glenville Lake WTF	18	18	18	18	18
	Blewett Falls Intake(100% IBT)	0	0	30	30	30
Alternative 4	Water Sources total	57.50	57.50	87.50	87.50	87.50
	PO Hoffer WTF	39.5	39.5	39.5	39.5	39.5
	Glenville Lake WTF	18	18	18	18	18
	Blewett Falls Intake(reduced IBT)	0	0	30	30	30
JLA4 Request	Annual Average System Demand (MGD)	28.01	30.98	55.03	65.41	78.92
	Water Sources total	57.50	67.50	67.50	67.50	67.50
	PO Hoffer WTF	39.5	39.5	39.5	39.5	39.5
	Glenville Lake WTF	18	18	18	18	18
Fayetteville PWC	**JLA4 Request**	**0**	**10**	**10**	**10**	**10**

DWR Allocation Recommendations

Based on the information presented in the allocation applications and the hydrologic modeling comparing projected future demands to the 2010 basecase scenario of the Cape Fear – Neuse River Basins Hydrologic Model, ~~the Division of Water Resources recommends allocating the~~ the allocations of the water supply pool in Jordan Lake as described in the Table 13 are recommended.

Table 13 Division of Water Resources' Draft Allocation Recommendations

Jordan Lake Water Supply Pool			
Applicant	Current Allocation Percent	JLA-4 Requested Allocation Percent	Draft Recommended Allocation Percent
Cary Apex Morrisville RTP	39	46.2	46.2
Chatham Co North*	6	13	13
Durham*	10	16.5	16.5
Holly Springs	2	2	2
Hillsborough	0	1	1
OWASA*	5	5	5
Orange Co	1	1.5	1.5
Pittsboro*	0	6	6
Raleigh	0	4.7	0
Fayetteville	0	10	0
Total Percent	63.0	105.9	91.2
* Western Intake Partners			

The evaluation of the options for water supply allocations focuses on the amount of water estimated to be needed to meet regional public water supply needs in 2045. The four model scenarios described in Table 14 were used to evaluate the impacts of allocation alternatives.

The scenario labeled "04_JLA_Raleigh_from_Lillington_Dem2045" shows the results of the Division's allocation recommendations. DWR supports the allocation requests for all applicants except the Raleigh Public Utilities Department and the Fayetteville Public Works Commission.

It is the judgement of DWR staff that Raleigh's proposal to withdraw their requested allocation of 4.7 percent of the water supply pool, assumed to be 4.7 million gallons per day, from the Cape Fear River in the vicinity of Lillington could be accomplished without releasing water from the water supply pool in Jordan Lake. Raleigh's proposal included the expectation of returning treated wastewater close to where water is withdrawn to avoid the need to receive permission from the Environmental Management Commission for interbasin transfer. With this proposed

arrangement Raleigh's withdrawal and wastewater return is expected to have minimal detrimental effects on streamflows downstream of their wastewater discharge.

Analysis of the ability of Fayetteville PWC to withdraw water sufficient to meet expected future demands in 2045 and 2060 indicates that the quantity of water available at their Cape Fear River intakes will be sufficient without releasing water from the water supply pool in Jordan Lake. Being downstream of the streamflow gage in Lillington, used to determine the need for water quality releases from Jordan Lake, Fayetteville PWC's available supply is augmented by water quality releases during low-flow conditions. Modeling for the Cape Fear River Water Supply Evaluation indicates the Fayetteville PWC is not expected to face flow related water shortages under any of the model scenarios run. Appendix C of the Cape Fear River Water Supply Evaluation presents a table summarizing the water system supply shortages shown by hydrologic modeling.

Modeling results

By rule allocations of the Jordan Lake water supply pool is limited to the amount of water needed to meet demands for thirty years in the future. With final decisions about allocations initially expected to be made in late 2015 the planning horizon for evaluation of allocations extends to 2045. Four model scenarios were run to determine variations in water resource conditions produced by allocation options. The "Simbase_Current" scenario presents the current conditions in 2010, providing a point of comparison to evaluate changes under alternative water supply options. The "01_LWSP_Dem_2045" scenario models the ability of all surface water users in the model to meet expected 2045 water demands from existing and future sources reported in the local water supply plans. The "03_JLA_F_Req2045_Dem2045" scenario models the effects if all the round four requested allocations are approved. And, the "04_JLA_Raleigh_from_Lillington_Dem2045" models the effects if the round four allocations are made consistent with the Division's recommendations presented in Table 13. Each of these model scenarios is described in more detail in Table 14.

A series of graphs showing the modeling results for each of these scenarios for critical water resource features. The duration and storage percentage plots show the percent of simulation periods in the historic record when the measurement presented is less than the normal operating levels, in the case of Jordan Lake water elevations, or less than full storage, in the case of the water supply and water quality storage pools.

For the model scenarios used in this analysis the water level in the Jordan Lake Reservoir is at or above the normal operating elevation of 216 feet above mean sea level for at least 60 percent of the daily simulations in the historic record. Figure 5 shows the 40 percent of the time when water levels are predicted to drop below 216 feet mean sea level. The graph indicates that as water withdrawals increase in the future water levels in Jordan Lake will likely be below 216 feet mean sea level for longer and drop to lower levels than in the 2010 basecase scenario. For the basecase scenario the model indicates water levels may be at or below 214 feet mean sea level about 10 percent of the time. In the future demand scenarios the estimated likelihood of water levels being

at or below 214 feet mean sea level is about 16 to 17 percent of the time. The minimum level for the future demand scenarios drops to 207.4 feet mean sea level from the Simbase_Current minimum of 209.7 feet mean sea level.

Table 14 Hydrologic Model Scenario Descriptions

Model Scenario Descriptions	
Simbase_Current	This scenario models the baseline current conditons in 2010 based on available water supplies, infrastructure and customer demands at that time
01_LWSP_Dem_2045	**LWSP** indicates this scenario uses data extracted from the local water supply plans of all water systems dependent on surface water sources in the model. **Dem_2045** indicates this scenario models the ability to meet the estimated water withdrawals needed to meet 2045 demands based on information in the local water supply plans.
03_JLA_F_Req2045_Dem2045	**JLA** indicates this scenario uses data from Jordan Lake Water Supply Allocation applications submitted to DWR. **Req2045** indicates this scenario adds the requested Jordan Lake allocations to existing water supplies. The **"F"** indicates this scenario includes the allocation request for Fayetteville PWC. **Dem2045** indicates this scenario evaluates the ability to meet the water withdrawals needed to meet 2045 water demands and the resulting changes to water availability.
04_JLA_Raleigh_from_Lillington_Dem2045	**JLA** indicates this scenario uses data from the Jordan Lake Water Supply Allocation applications submitted to DWR including the requested allocations from Jordan Lake, new infrastructure, and changes in the priority of how multiple water sources are used. **Raleigh_from_Lillington** indicates this scenario models Raleigh's requested allocation amount as being withdrawn from the Cape Fear River near Lillington without an allocation from Jordan Lake. The **lack of an "F"** indicates this scenario does not include the allocation request for Fayetteville PWC. **Dem2045** indicates this scenario evaluates the ability to meet the water withdrawals needed to meet 2045 water demands and the resulting changes to water availability.

Jordan Lake Water Levels

Figure 5 Jordan Lake Reservoir Elevation Duration

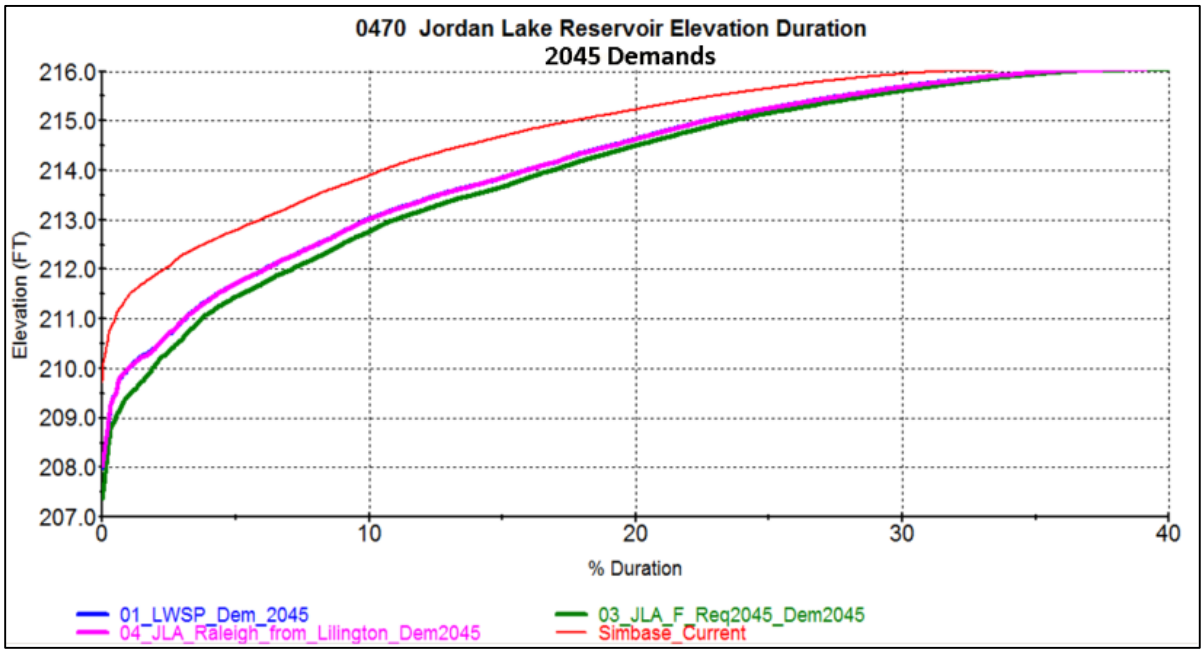
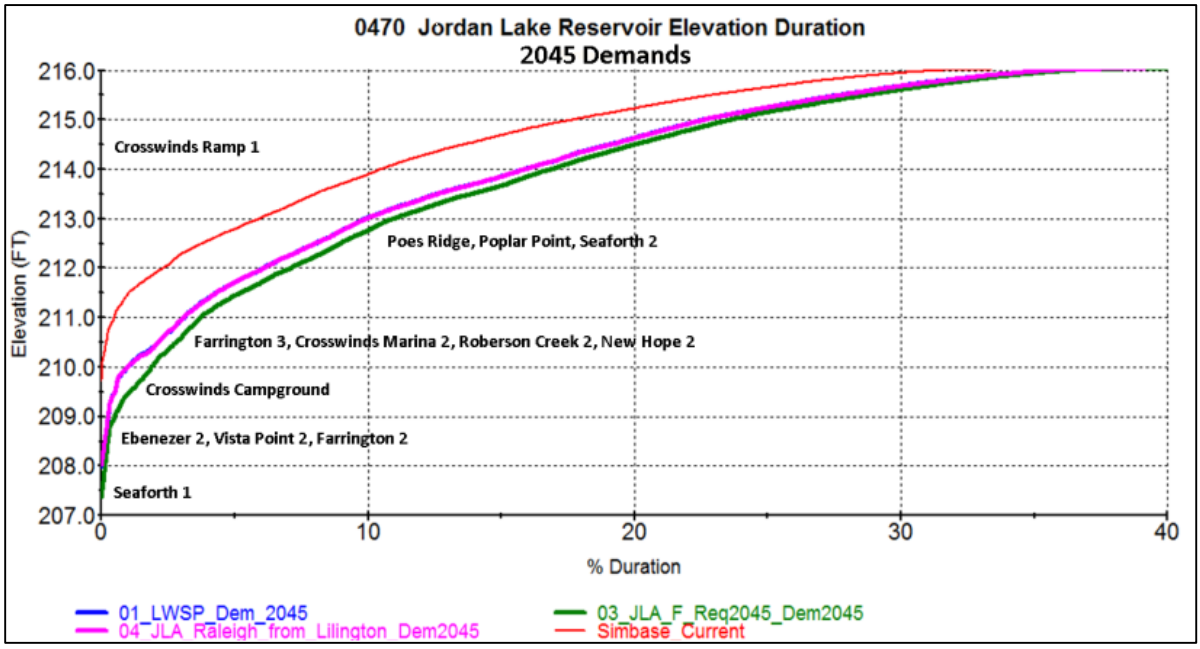


Figure 6 includes the elevations of the boat ramps on Jordan Lake that may be affected by the longer periods of lower water levels predicted for the time when water withdrawals reach the levels currently thought to be needed to meet 2045 customer demands. As withdrawals increase and water levels are lower for longer periods of time boat launching facilities may experience more periods of restricted use.

Figure 6 Jordan Lake Reservoir Elevation Duration including Boat Ramp Elevations



Water Supply Pool Evaluation

Water supply storage was included in the B. Everett Jordan Project, at the request of North Carolina, to provide water to meet the needs of local governments. As more stored water is used from a water supply reservoir the remaining storage naturally declines. In some cases inflow to the reservoir is sufficient to replace the amount of water withdrawn and released so the normal operating water level is maintained. Figure 7 shows the percent of the 29,858 days in the flow record used in the Cape Fear – Neuse River Basins Hydrologic Model when storage in the water supply pool is less than 100 percent. For the 2010 level of withdrawals, shown in the Simbase-Current scenario plot, the water supply pool is predicted to be less than full about 7 percent of historic record reaching a minimum of 90.9 percent of capacity. The local water supply plans for water systems throughout the modeled area predict increasing water demands in the future. By 2045 water supply withdrawals from Jordan Lake Reservoir are predicted to result in more time below full and lower minimum storage volumes. Figure 7 shows the percent of time over the entire flow record from 1931 to 2011 when storage in the water supply pool will be at or below percentages shown in the vertical scale.

Figure 7 Duration of Jordan Lake Water Supply Pool Storage

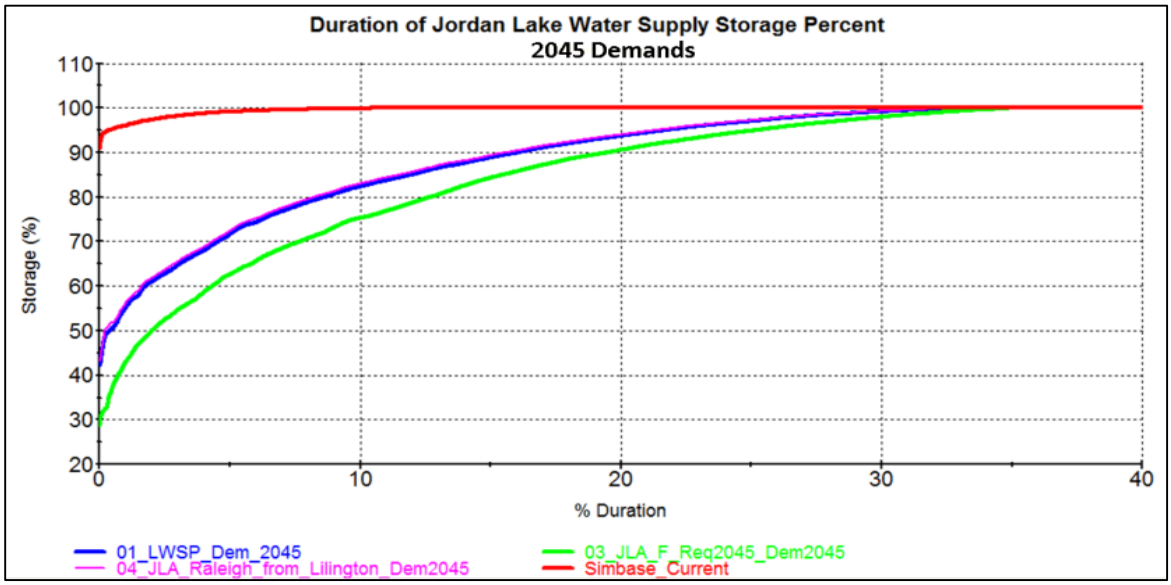


Figure 8 provides more detail of the status of water supply storage over the period from 2000 to 2011 which covers recent significant droughts. In Figures 7 and 8 there is little discernable difference between the plots for the 01_LWSP_Dem_2045 scenario and the 04_JLA_Raleigh_from_Lillington_Dem2045 scenario. The scenario that includes a 10 percent allocation for the Fayetteville Public Works Commission shows a deeper reduction in storage in both figures. The minimum values and dates of the flow conditions under which they occur are shown in Table 15.

Figure 8 Jordan Lake Water Supply Storage (flows from 2000 to 2011)

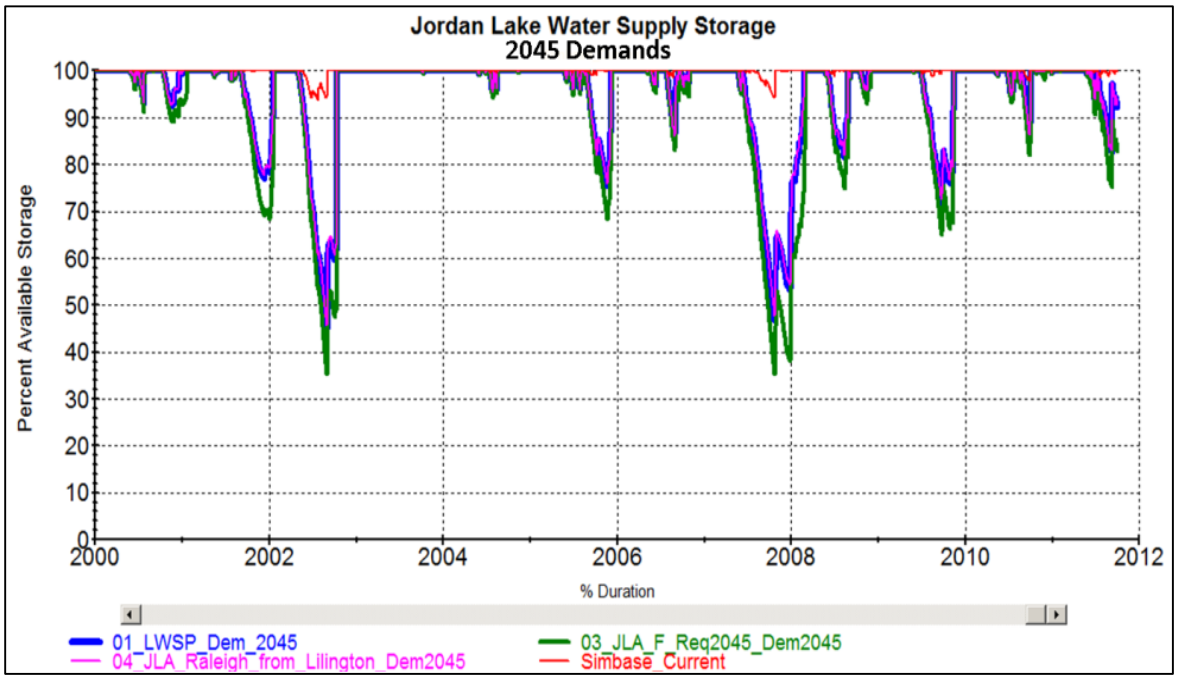


Table 15 Jordan Lake Water Level and Water Supply Storage Minimums

Jordan Lake Water Level and Water Supply Storage Minimums							
Model Scenario	Jordan Lake Water Level		Jordan Lake Water Supply Pool Critical Period (<100%)				
	Minimum Level, feet mean sea level	Date of Minimum Level	Minimum Water Supply Storage %	Minimum Water Supply Period	Days in Minimum Supply Period	Longest Critical Period	Days in Critical Period
Simbase_Current	209.7	8/30/2002	90.9	7/9/1953 - 12/9/1953	154	7/9/1953 - 12/9/1953	154
01_LWSP_Dem2045	208.0	12/1/1953	42.2	7/7/1953 - 1/15/1954	193	5/17/1933 - 3/4/1934	292
03_JLA_F_Req2045_Dem2045	207.4	12/1/1953	28.7	5/17/1934 - 3/5/1934	293	5/17/1934 - 3/5/1934	293
04_JLA_Raleigh_Lilington_Dem2045	208.0	12/1/1953	43.1	7/7/1953 - 1/15/1954	193	7/7/1953 - 1/15/1954	193

Water Quality/Flow-augmentation Pool Evaluation

The B. Everett Jordan Project includes storage to augment river flows downstream to avoid water quality standards violations estimated during design of the project. Water is released from the flow augmentation pool to maintain streamflows of 600 ± 50 cubic feet per second at the U.S. Geological Survey's streamflow gage in the Cape Fear River at Lillington. In 2008 the Army Corps of Engineers adopted a Drought Contingency Plan that provides for reductions in the flow target as storage in the water quality pool declines during periods of low inflows to the reservoir. A copy of the Drought Contingency Plan is included in the Cape Fear River Water Supply Evaluation as Appendix A and can also be found on the Division's website at www.ncwater.org/?page=317.

Modeling for this evaluation indicates storage in the flow augmentation pool is likely to be lower than in the 2010 basecase scenario for about 3 percent to 36 percent of the days in the historic flow record. About 3 percent of days in the record flow-augmentation storage is about equal to or greater than levels indicated by the Simbase_Current scenario.

Figure 10 and Table 16 show the minimum values for the flow augmentation pool storage and dates when the flow conditions produced the minimum values. The improvement in the minimum storage conditions is the product of changes in water sourcing for some utilities, wastewater discharge changes and implementation of minimum releases from Randleman Reservoir. Table 16 also shows the estimated minimum daily average flows at the Lillington streamflow gage for each of the model scenarios.

Figure 9 Duration of Jordan Lake Water Quality/Flow Augmentation Storage

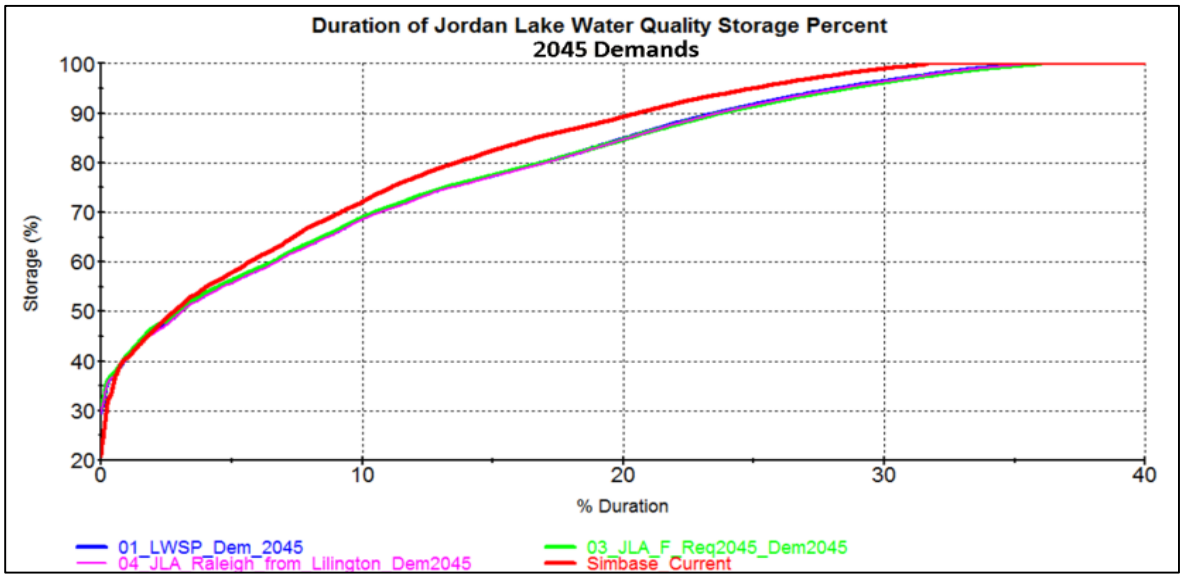
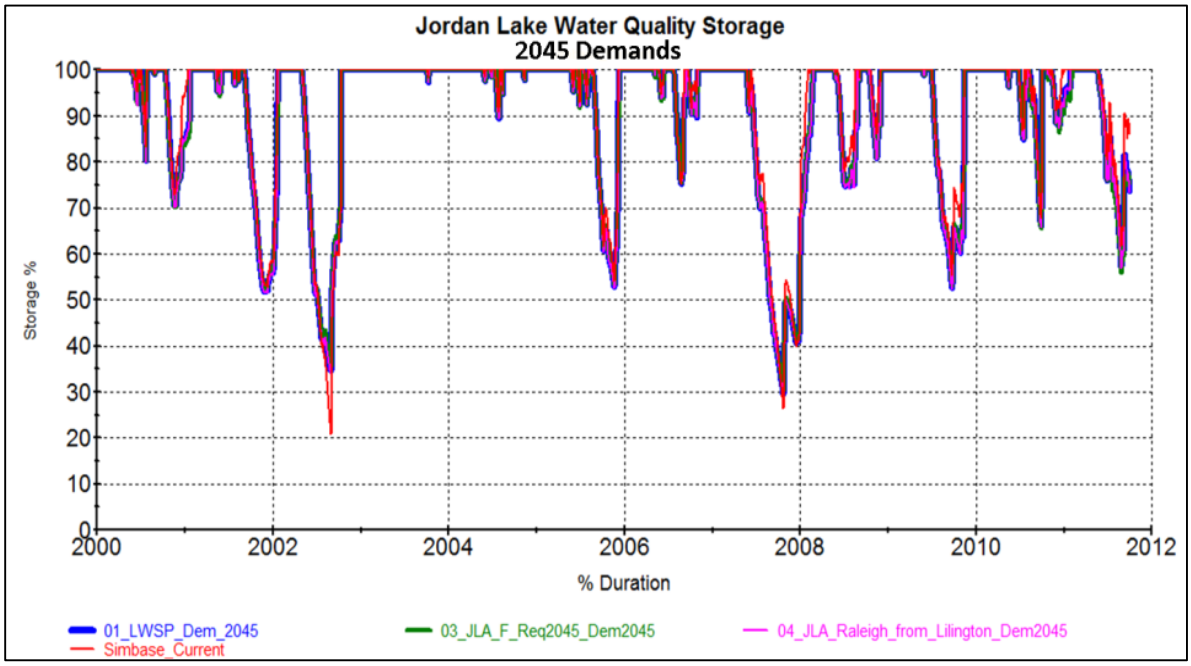


Figure 10 Jordan Lake Water Quality/Flow Augmentation Storage (flows from 2000 to 2011)



Based on the modeling results during the extreme low flow conditions in the historic record about 30 percent of the flow augmentation pool storage remained. Modeling results suggest there is enough storage available in the flow augmentation pool to compensate for lower than historic flow conditions if in the future flows diverge from the range seen from 1930 to 2011.

Table 16 Jordan Lake Water Quality Pool Storage & Lillington Streamflow Minimums

Jordan Lake Water Quality Storage and Lillington Streamflow Minimums						
Model Scenario	Jordan Lake Water Quality Pool (Flow Augmentation Pool)		Streamflow at Lilington ** (cubic feet per second)			
	Minimum Water Quality Storage %	Date of Minimum Water Quality Storage	Lowest daily average flow, cfs	Date of Lowest Flow	Years with 1 or more days <600 cfs	Total number of days * <600 cfs
Simbase_Current	20.8	8/30/2002	284.6	10/1/2007	61	4,274
01_LWSP_Dem2045	29.5	10/23/2007	171.1	8/19/2002	64	4,987
03_JLA_F_Req2045_Dem2045	30.1	10/23/2007	174.5	8/19/2002	65	4,974
04_JLA_Raleigh_Lilington_Dem2045	29.3	10/23/2007	167.6	8/19/2002	64	5,010
Note: *The flow record used for these model scenarios contains a total of 29,858 days in the period of record.						
Note: **The flow target at the Lillington gage is 600 cfs +/- 50 cfs. The count in these columns will include periods when flows were estimated to be between 550 and 600 cfs, not technically a violation of the target						

Review of Allocations off the Jordan Lake Watershed

The rules regulating water supply allocations from Jordan Lake include the following charge to the Environmental Management Commission.

"To protect the yield of Jordan Lake for water supply and water quality purposes, the Commission will limit water supply allocations that will result in diversions out of the lake's watershed to 50 percent of the total water supply yield. The Commission may review and revise this limit based on experience in managing the lake and on the effects of changes in the lake's watershed that will affect its yield."

Table 17 presents estimations of what percentage of the water supply pool would be diverted off the Jordan Lake watershed if all the requested allocations were approved. With this set of allocations and the available information about the location of water usage and wastewater discharges more than 50 percent of the allocated water supply pool may be diverted off the reservoir's watershed. If this combination of allocations are approved by the Environmental Management Commission the current rule limiting diversion off the watershed will have to be amended.

Table 17 Off the Jordan Lake Watershed Diversion for all Requested Allocations

Requested Allocations - Destination of Jordan Lake Water Use			
Applicant	Requested Allocation Percent	Percent of Water Supply Pool	
		On Jordan Lake Watershed	Off Jordan Lake Watershed
Cary Apex Morrisville RTP	46.2	13.2	33
Chatham Co North*	13	11	2***
Durham*	16.5	16.5**	
Holly Springs	2		2
Hillsborough	1		1
OWASA*	5	5	
Orange Co	1.5		1.5
Pittsboro*	6	6	
Raleigh	4.7		4.7
Fayetteville	10		10
Total Percent	105.9	48.8%^	51.2%^
Total Percent of Water Supply Pool off the Watershed			51.2%^
* Western Intake Partners		** Discharge capacity exceeds allocation	
^ Adjusted to 100%		*** Haw River Basin off Jordan Lake watershed	

Table 18 summarizes the estimates of off-the-watershed use of water from the water supply pool based on the Division of Water Resources' allocation recommendations. DWR does not recommend allocations from the Jordan Lake water supply pool for the City of Raleigh or the Fayetteville Public Works Commission. The volume of water Raleigh proposes to have released from the reservoir to be withdrawn from and returned to the Cape Fear River should be available

at the proposed location without supplementing streamflows with a release from the water supply pool. Hydrologic modeling indicates that Fayetteville PWC has sufficient water available at its intake location to meet future demands. If Fayetteville PWC continues to discharge similar percentages of water withdrawals as treated wastewater into the backwater of Lock & Dam #3, then increased withdrawals will have minimal effects on streamflows. Without an allocation to Fayetteville PWC diversions off the watershed of Jordan Lake will remain below the 50 percent threshold in the allocation rules. If the recommended allocations are approved there is no need at this time to reassess the criteria limiting allocations off the watershed of Jordan Lake to 50 percent of the total water supply yield.

Table 18 Off the Jordan Lake Watershed Diversion for Recommended Allocations

Recommended Allocations - Destination of Jordan Lake Water Use			
Applicant	Recommended Allocation Percent	Percent of Water Supply Pool Allocated	
		On Jordan Lake Watershed	Off Jordan Lake Watershed
Cary Apex Morrisville RTP	46.2	13.2	33
Chatham Co North*	13	11	2***
Durham*	16.5	16.5**	
Holly Springs	2		2
Hillsborough	1		1
OWASA*	5	5	
Orange Co	1.5		1.5
Pittsboro*	6	6	
Raleigh	0		4.7
Fayetteville	0		
Total Percent	91.2	51.7	44.2
Total Percent of Water Supply Pool off the Watershed			44.2%
* Western Intake Partners		** Discharge capacity exceeds allocation	
		*** Haw River Basin off Jordan Lake watershed	

Variations in streamflows

A frequent question that arises during any discussion of the impacts of increasing future water demands is; what will be the impacts to streamflows? The impacts to low flow conditions associated with various Jordan Lake allocation options are discussed in this section. Table 19 summarizes the 7Q10 estimates for the Cape Fear River below Jordan Lake Dam and Table 20 presents the same information for the Neuse River below Falls Lake Dam.

When considering how much water is reliably available at a particular location on a river low-flow conditions become the critical measure. The predictable low flow may be an issue for

determining a potential waste load allocation for a wastewater discharge or it may be an issue for determining the amount of water available for a public water supply withdrawal. A common measure of low flows for these evaluations is what is called the 7Q10 flow. The 7Q10 is a statistically calculated estimate of the lowest 7-day average flow expected to occur once in ten years, based on the historic flow record. The 7Q10 value varies with the length of flow record used and with the beginning and end dates used for defining each year in the record. The calculations that produced the values for this evaluation are derived from model generated flows based on the Climatic Year which encompasses the twelve months between April 1st and March 30th for the period from 1930 to 2011.

There is a 10 percent chance this level of flow can occur in any year. This level of flow has a high enough probability of occurrence that it has become a benchmark in a variety of flow evaluations to define conditions that happen frequently enough to be considered likely to occur but is not the historic minimum flow.

Model derived estimates cannot be compared to the 7Q10 calculations derived from the historic streamflow gage data. The model derived calculations are based on the hypothetical situations that are created by passing the 81 years of flow information through the hydrologic model representing the infrastructure and management protocols being used today or expected to be used in the future. For example, the streamflow records for 1955 reflect what actually happened in that year, prior to construction of Jordan Lake. The hydrologic model shows what conditions may be given the current and planned infrastructure and management protocols during the recurrence of the 1955 hydrologic conditions.

Twelve scenarios for the Cape Fear – Neuse River Basins Hydrologic Model were used for this evaluation of variations in model-generated 7Q10 flows. The model scenarios and associated flow estimates are discussed in Appendix E of the Cape Fear River Water Supply Evaluation. The evaluations done to develop allocation recommendations focused on withdrawals and water supply options proposed to meet expected demands in 2045. Tables 19 and 20 show the 7Q10 flow estimates of the four model scenarios described in Table 14.

The scenario designated as "04_JLA_Raleigh_Lillington_Dem2045", models DWR's allocation recommendations where Raleigh's requested allocation amount is withdrawn from the Cape Fear River in the vicinity of Lillington, with no water supply release from Jordan Lake; Fayetteville PWC continues to withdraw water from its existing locations with no water supply release from Jordan Lake; and the other applicants withdraw their requested Jordan Lake water supply allocations as described in their applications.

As water withdrawals increase to meet higher future demands one would expect that the residual streamflows and the resulting 7Q10 estimates may decline. However, changes in sources and the magnitude and location of wastewater returns produce changes in water availability that result in 7Q10 estimates that increase and decrease between model scenarios at locations throughout the basins. Appendix E in the Cape Fear River Water Supply Evaluation presents the flow variations for withdrawals needed to meet the expected water system demands in 2035, 2045 and 2060. The estimated 7Q10 values at fourteen locations in the Cape Fear and Neuse River Basins are

presented for each model scenario in Tables 19 and 20. For each location the lowest value is shown in bold typeface.

The modeling results are products of the data and assumptions used in the Cape Fear – Neuse River Basins Hydrologic Model. Changes to the input data and revisions of the assumptions used will produce different results. A useful way to interpret the data in these tables is to compare the values under the various model scenarios to the "Simbase_Current" scenario values to see how resource conditions may change in the future compared to conditions resulting from meeting 2010 water demands. The variations in 7Q10 estimates appear to be driven by the increasing water withdrawals expected to be needed to meet future water demands rather than the differences produced by the specific water allocation options modeled.

Table 19 Cape Fear River 7Q10 Estimates Below Jordan Lake

Model Estimates of 7Q10 Flows below Jordan Lake in Cubic Feet per Second (cfs)							
Scenario Number	Model Scenario	Cape Fear Nodes					
		Buckhorn Dam	Lillington Gage	L&D #3	L&D #2	Above L&D #1	L&D #1
2	01_JLA_LWSP_Dem2045	**240**	251	385	413	363	283
8	03_JLA_F_Req2045_Dem2045	**240**	253	400	428	378	298
10	04_JLA_Raleigh_Lilington_Dem2045	241	248	382	410	360	280
11	Simbase-current	308	310	428	449	396	348
Model Estimates of 7Q10 Flows below Jordan Lake in Million Gallons per Day (mgd)							
Scenario Number	Model Scenario	Cape Fear Nodes					
		Buckhorn Dam	Lillington Gage	L&D #3	L&D #2	Above L&D #1	L&D #1
2	01_JLA_LWSP_Dem2045	**155**	162	249	267	234	183
8	03_JLA_F_Req2045_Dem2045	**155**	164	259	277	244	193
10	04_JLA_Raleigh_Lilington_Dem2045	156	160	246	265	233	181
11	Simbase-current	199	200	277	290	256	225
The minimum value at each location is shown in **Bold**							

Table 30 Neuse River 7Q10 Estimates Below Falls Lake

Model Estimates of 7Q10 Flows below Falls Lake in Cubic Feet per Second (cfs)									
		Neuse Nodes							
Scenario Number	Model Scenario	Clayton Gage	Johnston Co Intake	Smithfield Gage	HF Lee Energy Complex	Goldboro Intake	NRWASA Intake	Kinston Gage	Weyerhaeuser Intake
2	01_JLA_LWSP_Dem2045	244	237	234	258	256	257	260	301
8	03_JLA_F_Req2045_Dem2045	242	235	232	258	253	255	258	298
10	04_JLA_Raleigh_Lilington_Dem2045	237	231	227	255	251	252	255	296
11	Simbase-current	**203**	**203**	**202**	**245**	250	256	259	**290**
	Model Estimates of 7Q10 Flows below Falls Lake in Million Gallons per Day (mgd)								
		Neuse Nodes							
Scenario Number	Model Scenario	Clayton Gage	Johnston Co Intake	Smithfield Gage	HF Lee Energy Complex	Goldboro Intake	NRWASA Intake	Kinston Gage	Weyerhaeuser Intake
2	01_JLA_LWSP_Dem2045	158	153	151	167	166	166	168	194
8	03_JLA_F_Req2045_Dem2045	156	152	150	166	163	165	167	193
10	04_JLA_Raleigh_Lilington_Dem2045	153	149	147	165	162	163	165	191
11	Simbase-current	**131**	**131**	**130**	**158**	162	165	167	**187**
The minimum value at each location is shown in **Bold**									

Recommendation Summary

The Division of Water Resources staff reviewed the information in each allocation application for water supply storage in Jordan Lake. The ability to meet expected water demands in 2045 from current water sources and sources supplemented by new or increased allocations from Jordan Lake were evaluated using the Cape Fear – Neuse River Basins Hydrologic Model. Key to this analysis is the desire for reliable drinking water sources for the citizens served by the applicants within the context of existing rules and statutes. The current allocations, requested allocations and DWR recommended allocations are shown in Table 13.

Assuming that the local government entities submitting applications are the best judges of the amount of water needed to reliably provide drinking water to the expected number of customers to be served in 2045, DWR staff concluded Fayetteville Public Works Commission is the only applicant not in need of additional raw water supplies. DWR's modeling analysis indicates that Fayetteville PWC is not expected to face water quantity related supply shortages in meeting the expected demand in 2045 from current raw water sources. The Cape Fear River Water Supply Evaluation shows that Fayetteville PWC is not likely to face water quantity related shortages meeting their expected demands in 2060 from their current sources.

The other applicants demonstrated needs for additional raw water sources because of demands that are expected to exceed available water supplies or the need to provide redundant sources to provide system redundancy to meet essential water needs if their other water sources are compromised.

The City of Raleigh documented the need for additional sources of raw water to meet expected future customer demands. Raleigh Public Utilities Department requested an allocation of 4.7 percent of the water supply pool, assumed to provide 4.7 million gallons per day. Raleigh's application presented two reasonable options for accessing the requested allocation.

The first option is to receive treated drinking water through a connection to an existing allocation holder. Because of the late timing of Raleigh's decision to submit an application the necessary arrangements to utilize this option were not confirmed in the application. Without a mechanism to return water from Jordan Lake to the Haw River Basin or Cape Fear River Basin exercising this option would require Raleigh to get permission for an interbasin transfer from the Environmental Management Commission. Raleigh has not initiated the process for approval of an interbasin transfer. The rules governing allocation of water from the water supply pool in Jordan Lake state: *"For applicants whose discharge or intake represents a diversion pursuant to G.S. 153A-285 or 162A-7, the Commission will coordinate the review of the diversion with the review of the allocation request."* G.S. §153A-285 and §162A-7 have been superseded by §143-215.22L. *Regulation of surface water transfers*. This rule appears to limit the ability to grant an allocation to the City of Raleigh that would result in a surface water transfer without a review and presumably the granting of permission from the Environmental Management Commission for an interbasin transfer from the Haw River Basin to the Neuse River Basin.

The second option presented by Raleigh is to have any approved allocation released from Jordan Lake Dam to be withdrawn from the Cape Fear River in the vicinity of Lillington. This proposal includes construction of an additional pipeline to return treated wastewater to the Cape Fear River near the point of withdrawal to avoid the need for an interbasin transfer approval. DWR staff's evaluation of this proposal suggests that the requested volume of water is likely available from this location without the need to supplement streamflows by releasing water from the water supply pool. The proposal to return treated wastewater to the vicinity of the withdrawal essentially negates the effects of the withdrawal. Raleigh's use of water from this location is likely to have minimal measureable effects on flows or water availability from the Cape Fear River below the discharge location. Therefore, DWR staff does not recommend an allocation from the water supply pool for the City of Raleigh.

DWR staff recommends approval of the requested allocation percentages for the remaining applicants. Staff recognizes that some portion of these allocations may not be used in the immediate future. However, approving the requested allocations for Durham, Pittsboro, Chatham County and the Orange Water and Sewer Authority will provide these entities with the assurances of access to sufficient water supplies to pursue the development of an additional raw water intake and water treatment plant on Jordan Lake. The only raw water intake on Jordan Lake can only withdraw about 80 million gallons per day. Without an additional intake about 20 percent of the water supply pool would remain inaccessible to local governments.

The recommended allocations leaves 7.8 percent of the water supply pool unallocated to be addressed in a future round of allocations. There exists a significant level of uncertainty associated with projecting conditions in 30 years from today's vantage point. The expected economic development and growth in water demand may or may not become a reality. Some

factors influencing growth and development within water utility service areas can be influenced by local government policies. However, there are many factors beyond local control. The allocation rules provide the Environmental Management Commission the ability to "*…assign, reassign, or transfer allocations based on the applicants' or holders' need(s) and alternative water sources available (as defined in the application requirements), the existing or proposed average degree of utilization of the resource (relative to the total allocation application),…"* This authority gives the Commission the ability to redistribute allocations from the water supply pool if it becomes prudent to do so in the future. The results of this round of allocations can be revisited if the Commission requests that action.

During the discussion of staff's allocation recommendations by the Water Allocation Committee of the Environmental Management Commission a question was raised about staff's interpretation of the need for Raleigh to be pursuing a certification for an interbasin transfer in order to receive a water supply allocation.

The rules governing allocations of Jordan Lake water supply storage in sub-section (h) includes the following language: "For applicants whose discharge or intake represents a diversion pursuant to G.S. 153A-285 or 162A-7, the Commission will coordinate the review of the diversion with the review of the allocation request." The statutes cited are the precursors of the current statute regulating surface water transfers. The Committee's interpretation of the phrase "will coordinate" does not prevent the assignment of an allocation if the impacts of a surface water transfer had not been evaluated prior to or were not being evaluated simultaneously with the application for a water supply allocation.

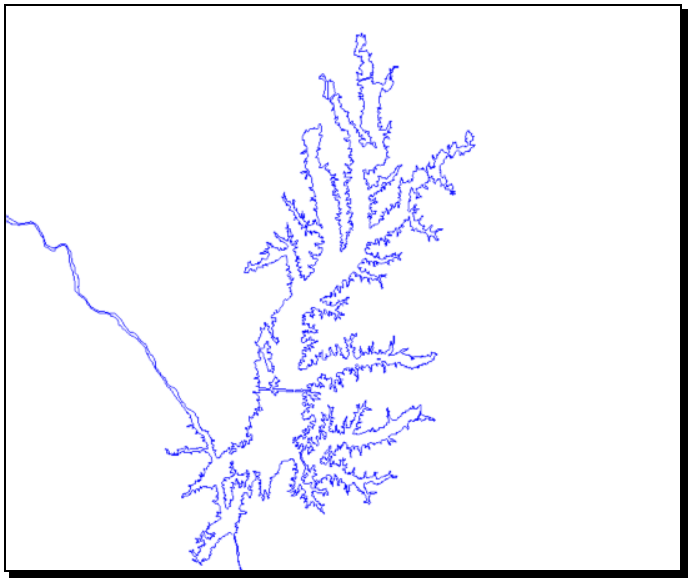
The Water Allocation Committee approved for public comment the Draft Jordan Lake Water Supply Allocation Recommendations and the supporting Draft Cape Fear River Water Supply Evaluation with the inclusion of the City of Raleigh's requested 4.7 percent allocation included in the recommendations. The following table lists the draft allocation recommendations approved for public comment by the Water Allocation Committee on January 13, 2016.

Allocation of Jordan Lake Water Supply Pool			
Applicant	Current Allocation	Requested Allocation	Draft Recommendation
	Allocation Percent	Allocation Percent	Allocation Percent
Cary Apex Morrisville RTP	39	46.2	46.2
Chatham County-North*	6	13	13
Durham*	10	16.5	16.5
Fayettteville PWC	0	10	0
Hillsborough	0	1	1
Holly Springs	2	2	2
Orange County	1	1.5	1.5
Orange Water&Sewer Authorit	5	5	5
Pittsboro*	0	6	6
Raleigh	0	4.7	4.7
Total Percent	63	105.9	95.9
* Western Intake Partners			

Appendix A

JORDAN LAKE
WATER SUPPLY STORAGE ALLOCATION
APPLICATION GUIDELINES

Round Four



Draft

June 3, 2013

Revised February 18, 2014

Division of Water Resources

Department of Environment and Natural Resources

INTRODUCTION

North Carolina General Statute GS 143-354(a)(11)[4] gives the Environmental Management Commission (EMC or Commission) the authority to allocate to local governments any interest in water supply storage held by the State in federal reservoirs. The State controls and allocates about 33 percent of the conservation pool in B. Everett Jordan Lake which is storage dedicated to water supply. The amount of water available from this storage capacity has been estimated at 100 million gallons per day (MGD).[5] Administrative rule 15A NCAC 2G.0503 requires applicants for a water supply allocation from Jordan Lake to provide information substantiating the requested allocation amount. The Division of Water Resources (DWR or Division) developed these guidelines to assist local governments in preparing their application for a Jordan Lake water supply storage allocation.

North Carolina General Statute 143-355(l) requires each unit of local government "that provides public water service or that plans to provide public water service" to prepare and update a Local Water Supply Plan (LWSP). Therefore, all applicants for an allocation should have an approved Local Water Supply Plan on file with the Division. All applicants must have an updated LWSP based on calendar year 2012. For the application process, applicants will be asked to supplement their 2012LWSP information to provide the additional information needed to evaluate an allocation request.

Local water supply plans will be submitted to DWR using the online submission program available on the Division's website at www.ncwater.org. Applicants' 2012 local plan submission must include a map of the existing and expected future service areas that is consistent with the information provided to support an allocation request.

The intent of these guidelines is to provide a common format and common content for allocation requests. Applications should be concise and complete.

The Jordan Lake water supply allocation application will consist of an introductory letter, the general application including the JLA-4 workbook, and a copy of the applicants LWSP that is consistent with the allocation request. Applicants may provide any supporting documents in

[4] (11) The Commission is authorized to assign or transfer to any county or municipality or other local government having a need for water supply storage in federal projects any interest held by the State in such storage, upon the assumption of repayment obligation therefor, or compensation to the State, by such local government. The Commission shall also have the authority to reassign or transfer interests in such storage held by local governments, if indicated by the investigation of needs made pursuant to subsection (a)(1) of this section, subject to equitable adjustment of financial responsibility.

[5] Allocations are made as a percentage of the water supply storage in Jordan Lake. However, since the available supply of the entire (100 percent) water supply storage is estimated to be 100 MGD. For convenience allocations are sometimes expressed in terms of MGD. For example, a 6.0 MGD allocation actually represents an allocation of 6.0 percent of Jordan Lake's water supply storage.

additional appendices. The letter, application contents, and LWSP update are discussed in further detail below. A description of the costs associated with a Jordan Lake water supply storage allocation and the rules for allocation are included in this document.

INTRODUCTORY LETTER

The applicant must provide an introductory letter that includes the following:

1. A commitment to all financial obligations related to receiving an allocation from Jordan Lake
2. The total Level I and Level II allocation requested, stated as a percent of total water supply storage[6]
3. Description of any regional partnerships in which the applicant is participating
4. Any additional information that would be helpful in evaluating the application and documenting the applicant's need to obtain a water supply allocation from Jordan Lake.

APPLICATION CONTENTS

The applicant is required to provide detailed information describing its projected water supply needs, current water supply sources, alternative water supply possibilities, and plans for obtaining water from Jordan Lake should it receive an allocation. This information must be consistent with the applicant's LWSP Update. The application will include the following sections:

Section I – Water Demand Forecast

Section II – Conservation & Demand Management

Section III – Current Water Supply

Section IV – Future Water Supply Needs

Section V – Water Supply Alternatives

Section VI – Plans to Use Jordan Lake

[6] Level I allocations are based on projected water supply needs for a 20-year planning period and the withdrawal must be initiated within 5 years. Level II allocations are based on projected water supply needs for a 30-year planning period.

SECTION I – WATER DEMAND FORECAST

Defensible decisions about allocations require realistic estimates of water system needs. Therefore, the demand projections contained in the local plans must be supplemented to provide additional details on the magnitude and timing of customer demands. DWR has prepared the accompanying JLA-4 workbook for consistent presentations of system demands and the various alternative sources that may be used to meet them.

User Sectors

Demands will be forecast using a disaggregated method based on water use sectors represented in the applicant's customer base.

The applicant must provide a complete description of its user sectors and the customer types included in those sectors and subsectors used in the application. Demands for unique customers may be estimated separately. For example, if an applicant has an unusually water-intensive industrial customer the applicant may project demand for that customer separately taking into consideration its particular usage patterns. The applicant will then project the water demands for each of its user sectors from 2010 to 2060 in five year increments. The "Population & Demand Projections" worksheet in the JLA-4 workbook has a table to enter this information.

Sector	Subsector	Description
Residential	Single Family	May be disaggregated by applicant.
	Multi Family	
Commercial		Disaggregated as appropriate by applicant, and explicitly defined.
Industrial		Disaggregated as appropriate by applicant, and explicitly defined.
Institutional		Disaggregated as appropriate by applicant, and explicitly defined.
Unique	(Specify)	Any large, unique customer that has a justifiable usage rate different from the norm for its typical sector. Each such customer must be specified.

Sector Projections

No specific methodology for estimating growth in service population is required. However, applications must include descriptions of the methodology and calculations used to arrive at the growth projections for the various user sectors used. Growth projections should be consistent with conditions reflected in the boundaries shown on the service area map submitted with the applicant's 2012 LWSP.

The number of *residential* users may be projected based on the number of dwelling units or population. The number of *nonresidential* users may be projected based on the square footage of building space, per employee, or any other reasonable method. The projection may be a function of a local land use plan or a function of the population. If an applicant has users with unique water demands that need to be calculated differently from other users with similar types of water use then those demands may be projected as appropriate. All projections for unique water users must be explained in detail.

DWR will review projections against various benchmarks. For example, a population projection for a particular utility's service area would not be expected to exceed the population projection for the county in which the utility is located unless the service area extends into a neighboring county. Service area build-out, based on local land use plans or stated economic development policies, may also be used to analyze demand projections.

Usage Rates

The applicant will calculate a usage rate for each of its user sectors and subsectors and apply these rates to their projections for each sector and subsector. When applying a usage rate to a sector or subsector projection, the applicant will adjust the usage rate to reflect the potential results of reasonable water conservation efforts within each sector taking into consideration the applicant's plans to reduce long term drinking water demands required by General Statute 143-355(l) as amended by Session Law 2011-374. The applicant's explanation of demand management and water conservation adjustments must be consistent with information provided in their LWSP and Section II of the application.

DWR will review usage rates for each sector based on historic information and reasonable standards, accounting for best practices and conservation.

After projecting the water demand for each sector, the applicants will calculate the resulting service area demand projections.

Total Demand

The applicant determines the total service area demand for each projection year by the following method:

1. Sum the projected demand for each sector and subsector.
2. Add a percentage for *system processes*.
3. Add a percentage for *unaccounted-for* water.

The JLA-4 workbook contains a table to compile this information.

Adjustment	Description
System Processes	Any water use that is not included in the sector breakdown that can be accounted-for by temporary metering or estimating usage can be included in this category. This category could include: filter backwash, line flushing, fire suppression, training activities, etc. Explain what was included and how the final amount was determined.
Unaccounted-For	That portion of the total surface water, groundwater and purchased water that is supplied to the water system that is not accounted for in the water use sector summaries or system process water estimates, but not to exceed 10%.

Bulk Water Sales

The applicant may choose to include bulk water sales to other governmental entities in its allocation request as an existing sale or require a bulk water purchaser to submit its own allocation request. Inclusion as a bulk sale must be based on a long-term, contractual relationship between the two entities. Bulk water purchasers included in an application must have an updated 2012 LWSP (including a service area map) that supports the demand projections included in the application.

Bulk water sales to entities that are not required to complete a LWSP will be included in the appropriate user sector, and their demand projected accordingly over the period of the existing contracts. The applicant's updated 2012 LWSP must include contract amounts and expiration dates for all sale arrangements.

Summary

Applicants will supplement the demand projections in their LWSP using the "Population & Demand Projections" worksheet in the included JLA-4 workbook. The table breaks down water

demand into the following categories: residential, commercial, industrial, institutional, system processes, and unaccounted-for water in five-year increments over a 50-year planning period.

SECTION II – CONSERVATION & DEMAND MANAGEMENT

Demand management and water conservation programs provide valuable tools to manage the average and peak demands experienced by a water system. The applicant will describe and provide documentation of current and planned demand management and water conservation programs and how these initiatives will affect usage rates for each of their user sectors. A water conservation program will include the following elements:

1. Water conservation policy or ordinance
2. Water conservation pricing
3. Leak detection and repair
4. Annual water audits
5. Public education program, including a specific outdoor water use education program
6. Evaluation of plumbing retro-fit program to replace older less efficient water fixtures
7. Evaluation of the potential to use reclaimed water.

SECTION III – CURRENT WATER SUPPLY

The applicant must list all surface water, groundwater, and purchased water sources currently available to the water system in the water supply sources section of its LWSP.

Available Supply

Each application shall describe the available supply from each source based on the following criteria and standards.

For *reservoirs* included in the combined Cape Fear - Neuse River Basin Hydrologic Model the potential yield of a reservoir will be the "period-of-record" yield[7] as estimated by the model. For *reservoirs* not included in the Cape Fear - Neuse River Basin Hydrologic Model, applicants will use the USGS Annual Mass Curve Analysis method, based on a 50-year return period, to

[7] The "period-of-record" yield is estimated using the historical flow record included in the model and increasing the demand on the reservoir until the specified demand level cannot be fully met for every day in the flow data record. The demand level that first creates a total depletion of the useable storage is designated as the "period-of-record" yield for that reservoir.

determine the available supply.[8] This amount should be reduced by the amount required for minimum releases and any reductions in available storage since construction. The Division will provide assistance to estimate minimum releases for proposed reservoirs.

For *groundwater*, applicants will determine the available supply based on a pump test completed no earlier than 2005. The well yield is the maximum amount of water in gallons per minute that can be pumped from a well such that the water level achieves equilibrium (stabilizes) above the pump intake. Based on the resulting well yield estimate, the available supply is the amount of water that the well can provide during 12 hours of pumping.[9]

For run-of-river sources, applicants will use the results of an instream flow study, when such is available, to determine the available supply. If the results of an instream flow study are not available for a given source, the applicant's available supply is assumed to be 20% of the 7Q10 flow as determined using the basecase scenario of the appropriate river basin hydrologic model if there are no other intakes in close proximity. Applicants that wish to explore the possibility of a larger available supply estimate for a run-of-river intake from an unregulated stream should contact the Division of Water Resources to discussed options.

Purchased Water

The applicant will use the contract maximum as the measure of the available supply of purchased water. Only contracts for regular use (i.e., routine, continuous use; not emergency use) will be considered. Similarly, water systems selling water to other systems must include the maximum contract amount as part of their water demand projections.

SECTION III –FUTURE WATER SUPPLY NEEDS

The applicant will summarize its water demand forecast, current water supply, and future water supply needs in the LWSP and supplement that information by completing the "Population & Supply-Demand Projections" worksheet in the JLA-4 workbook.

SECTION IV – ALTERNATIVE WATER SUPPLY OPTIONS

The applicant will describe the various alternative scenarios evaluated to satisfy future water supply needs. Descriptions should provide enough detail so the reader can develop an understanding of the timing of each component and other key factors affecting alternative selection. The JLA-4 workbook provides individual worksheets to summarize the various sets of alternative projects that could meet the identified supply shortages.

[8] The Annual Mass Curve Analysis method is described in *Storage Analyses for Water Supply* (Riggs, H.C. and Clayton H. Hardison. 1973. Techniques of Water-Resources Investigations of the United States Geological Survey. Washington, DC: United States Government Printing Office. Chapter B2).

[9] This is in accordance with the Rules Governing Public Water Systems, 15A NCAC 18C.0402(g).

Alternative scenarios will be presented as sets of possible projects. Each set of projects will provide sufficient water to meet the projected demands through 2060 consistent with demands shown in the LWSP. Jordan Lake water supply will be included as one of the possible projects among the various combinations of projects within the set alternatives.

The applicant will compare the various supply alternatives based on the criteria discussed below. The JLA-4 workbook includes a worksheet labeled "Supply Alternatives Summary" to record the rankings of each alternative. Alternatives will be analyzed using the criteria and standards described below.

Scope of Supply Alternatives

For any set of projects that constitute a supply alternative that includes the transfer of surface water between river basins designated by GS 143-215.22G that would require a certificate under GS 143-215.22L, the Regulation of Surface Water Transfers Act, or an increase in a surface water transfer approved under a prior statute the application shall include two variations for this alternative. In addition to the alternative requiring a new or expanded surface water transfer, the application shall include an alternative describing facilities necessary to avoid the transfer. Copies of the referenced statutes are included in this document.

DWR encourages applicants to consider the following possibilities when exploring their options for meeting future demands, although not all of these options will be relevant for any given applicant. For example, aquifer storage and recovery is probably not a relevant option for most applicants in the vicinity of Jordan Lake.

Potential options include:

- Groundwater
  - Wells
  - Aquifer Storage and Recovery
- Surface Waters
  - Offstream Storage
  - Reservoir Expansions
  - New Reservoirs
  - New Stream Intakes or Expanded Stream Intakes
- Reclaimed Water Use
- Bulk Water Purchase

Categories for Supply Alternative Comparisons

Available Supply

The applicant must determine the available supply for each alternative using the same methodology as presented in Section II. For alternatives that are analyzed as unfavorable (i.e., receive the least favorable rating) for five or more criteria, applicants may use the Draft-Storage-Frequency Relations method for reservoirs.[10]

Environmental Impacts

The applicant will estimate the environmental impacts of any project, and compare them with the environmental impacts associated with developing a Jordan Lake water supply. The applicant should consider only direct environmental impacts. The applicant will classify the expected environmental impacts of each project as either *More than*, *the Same as*, or *Less than* a Jordan Lake water supply allocation.

The applicant may also include a discussion of each alternative's sustainability with respect to resource management.

Water Quality Classification

The applicant will provide the water quality classification designated by the Division of Water Quality for each surface water source included in the alternatives. The classification provides a measure of existing water quality protection for surface water sources. Applicants do not need to provide the classification for ground water supplies.

Timeliness

Timeliness refers to the ability of a project to be operational prior to when its contribution to the system's supply will be needed. The timeliness of a given project may justify its inclusion or exclusion from a set of projects for a given alternative. The timeliness of a given project may also justify its order within a set of projects for a given alternative.

Interbasin Transfer

The applicant will estimate surface water transfers regulated by the Regulation of Surface Water Transfers Act (GS 143-215.22L) for each alternative using the maximum daily average for a calendar month in million gallons per day. The applicant will estimate the consumptive losses in each basin within the system's service area. The applicant will use a maximum daily average for a calendar month consistent with their LWSP. The applicant will estimate the quantity to be transferred between a source basin and receiving basin for each time period when the volume of the transfer would change due to implementation of a specific supply alternative. In addition the applicant will calculate the surface water transfer as the maximum daily average for a calendar

[10] The Draft-Storage-Frequency Relations method is described in *Evaluation of Reservoir Sites in North Carolina: Regional relations for estimating the reservoir capacity needed for a dependable water supply* (Arteaga, F.E. and E.F. Hubbard. 1975. U S Geological Survey Water Resources Investigations 46-74. Raleigh, NC: US Department of the Interior)

month for the year 2045. The applicant will indicate if a transfer might exceed a grandfathered transfer amount, might require a minor modification to an existing IBT certification, or might require a full IBT certification process. If the proposed surface water transfer would require an increase in an existing transfer certification or approval of a new transfer certification describe the volume and timing of the desired certification.

Regional Partnerships

The applicant will discuss the possibilities of developing regional partnerships for any project. For every project with the potential for partners, the applicant will provide a list of the prospective partners. The applicant should provide any documentation supporting such partnerships in an appendix.

Technical Complexity

The applicant will discuss the relative technical complexity of implementing each project. The applicant will summarize the technical complexity as *Not Complex*, *Complex*, or *Very Complex* and generally justify the rating. For example, a project limited to building a transmission line to convey purchased water might be rated "not complex," while a project to build a new reservoir would be "very complex."

Institutional Complexity

The applicant will discuss the relative institutional complexity of implementing each project. The applicant will consider current and anticipated statutory and regulatory constraints, including such issues as water supply reclassification and environmental review requirements. The applicant will summarize the institutional complexity of each project as *Not Complex*, *Complex*, or *Very Complex* and generally justify the rating. For example, expanding a water supply intake up to the capacity of a previously estimated available supply determination might be rated "not complex," while a new water supply source that requires reclassification or a surface water transfer certificate might be rated "very complex."

Political Complexity

The applicant will discuss the relative political complexity of implementing each project. The applicant will consider such issues as the likely acceptance by publicly elected officials and anticipated public perceptions. The applicant will summarize the political complexity of each project as *Not Complex*, *Complex,* or *Very Complex* and generally justify the rating.

Public Benefits

The applicant will discuss any expected secondary public benefits such as recreation associated with each project. The applicant will summarize the expected public benefits as *None*, *Few*, or *Many*.

Consistency with Local Plans

The applicant will discuss each project's consistency with its local comprehensive land use plans, growth management plans, and capital improvement plans. The applicant may also discuss

the consistency of a given alternative with the community's stated economic development policies. The applicant should support its analysis with selected, relevant citations from its plans in an appendix in the application.

Costs of Alternatives

Applicants will calculate the costs associated with an alternative as the capital costs associated with implementing the components of an alternative. The cost will be expressed both as total capital costs and capital costs per million gallons per day of water provided. Applicants are not required to do a detailed cost analysis for alternatives that are analyzed as unfavorable (i.e., receive the least favorable rating) for five or more criteria.

The Division does not require applicants to calculate costs at the level of detail necessary to complete a facility design proposal. For example, the Division does not expect applicants to determine an exact route for a transmission pipeline. The Division requires applicants to address each of the elements discussed below and provide cost estimates for each element that is relevant for each alternative. For example, an applicant may estimate the cost of a transmission pipeline by determining an average cost per unit length based on previous projects, estimating the length based on a general route, and adding some factor for possible deviations from that general route.

Capital costs include the cost of facilities and equipment, to include the water supply, water supply intake, transmission to a water treatment plant, the water treatment plant, and transmission to the service area distribution system (but not the distribution system within the service area). Capital costs include construction costs, land acquisition costs, engineering costs, legal and administrative costs, the cost of meeting regulatory requirements, and a general contingency of 10%. Land acquisition costs include land acquisition and directly related costs. Applicants must include justification for the cost per acre they use for estimating land acquisition costs. The annual capital cost of a project will be computed in year 2010 dollars. For alternatives that include an interbasin transfer the applicant should include an estimate of the cost associated with getting approval for the transfer from the Environmental Management Commission.

O&M costs include the costs of labor, repair, power, chemicals, supplies, and administration. The annual O&M cost for each project computed in year 2010 dollars.

For alternatives that involve transferring treated wastewater to a different basin, the incremental difference in costs associated with building the same wastewater treatment capacity to discharge back to the source basin must be included. The incremental difference in costs will include the capital costs and O&M costs associated with transmission to the wastewater treatment plant, the wastewater treatment plant, and transmission to the receiving waters.

The a*nnual cost* of any project is the sum of yearly capital costs (i.e., the total capital cost of the project, divided by the life of the project), O&M costs, and the annual cost of capital recovery (i.e., the cost of repaying the debt associated with the capital costs). Applicants will use an interest rate of 3.225% for capital recovery.[11] Applicants will assume a 25-year life for equipment and a 50-year life for pipelines and structures for replacement costs and salvage

[11] The interest rate for repayment of the capital investment in B. Everett Jordan Lake

value. The applicant will add the replacement costs associated with a project if the replacement occurs before 2060.

Total present worth is calculated by summing the net present value of annual costs over the 2010-2060 planning period, assuming a discount rate of 1.295%, less the salvage value of facilities and equipment at 2060.[12]

Unit costs are expressed as an annual average. The average annual unit cost will be calculated by dividing the annual cost of each alternative in Year 2010 dollars by the related annual water demand and should be expressed in $/1000 gallons. The annual unit water costs will be calculated in 5-year increments according to expected annual deliveries for the life of the project.

For *Jordan Lake*, the costs of developing the proposed withdrawal should be estimated as described above. Costs will include an estimate of the required annual repayment for the allocation and costs related to developing water supply facilities such as intakes, treatment plants, transmission lines, etc. A summary of the annual costs and repayment requirements associated with an allocation of water supply storage in Jordan Lake is presented later in this document.

Supply Alternatives Summary

Applicants will summarize their analysis of alternatives in the "Supply Alternatives Summary" worksheet of the JLA-4 workbook. The total supply of an alternative is the sum of the available supplies of its constituent projects. Applicants will summarize surface water transfers for each alternative as the maximum amount that might be transferred during the planning horizon. Regional partnerships for a given alternative may be summarized as either *yes* or *no*. An alternative's consistency with plans may be summarized as either *yes* or *no*. The total cost of an alternative is the sum of the total present worth of its constituent projects. The unit cost of an alternative is the sum of the unit costs of its constituent projects.

Example of JLA4 – Supply Alternatives Summary worksheet

Alternatives	Summary Description
Alternative 1	
Alternative 2	
Alternative 3	
(etc.)	

[12] The discount rate is based on an average of the inflationary factors projected for water and sewer for the five fiscal years from 2009-10 by the Office of State Budget and Management (Instructions for Preparation of the 2009-2011 Recommended State Budget, July 2008, Section 5, Attachment 5-9).

	Alternatives				
	Example	1	2	3	4
Allocation Request (%)	24				
Estimated Supply (MGD)	24				
Environmental Impacts	Same				
Water Quality Classification	WS-III				
Interbasin Transfer (MGD)	3				
Regional Partnerships	Yes				
Technical Complexity	Complex				
Institutional Complexity	Not Complex				
Political Complexity	Very Complex				
Public Benefits	Few				
Consistency with Local Plans	Yes				
Total Cost ($ Millions)	12.7				
Unit Cost ($/1000 gallons)	2.12				

SECTION V – PLANS TO USE JORDAN LAKE

Applicants are required to explain their plans to use water from Jordan Lake if an allocation is approved. These plans will include the total Level I and Level II allocation requested as a percent of storage.

Level I allocations are based on projected water supply needs for a 20-year planning period and a stated intent to begin withdrawing water within 5 years. Level II allocations are assigned for water supply needs based on a 30-year planning period. For example, if an applicant determines that their 20-year total system deficit is 6 MGD and the 30-year total system deficit is 10 MGD, the Level I request could be for 6 MGD and the Level II request should be for the additional 4 MGD.

This section will include the location of any proposed intakes, water treatment plants and wastewater discharges. Also, details on any plans to enter into cooperative agreements in which the applicant would share facilities or the cost of facilities with another allocation holder or water system shall be described in the application. A discussion of the proposed schedule of development of the source shall also be addressed in this section.

Raw and Finished Water Quality Monitoring Plan

Applicants will explain their plans for monitoring the quality of the raw and finished water that would be withdrawn and produced from Jordan Lake. This monitoring will be in accordance with the requirements of the North Carolina Department of Environment and Natural Resources, Division of Water Resources – Public Water Supply Section, and the United States Environmental Protection Agency.

Costs of a Jordan Lake Allocation

Jordan Lake was financed and constructed by the federal government through the US Army Corps of Engineers. Storage space for municipal and industrial water supply was included at the request of state and local officials with the understanding that the costs associated with this water supply storage would be paid for by the actual users. The result of that arrangement is that the management plan for Jordan Lake dedicates 33 percent of the conservation pool, or 45,800 acre feet, for water supply storage.

North Carolina General Statute 143-215.38 authorized the State, acting through the Environmental Management Commission (EMC), to assume repayment responsibilities for the costs associated with providing water supply storage in Jordan Lake. These costs fall into three basic categories: capital costs including interest, operating costs, and administrative costs. The total cost for each percent of water supply allocated from Jordan Lake varies with a number of parameters, the key ones being when the allocation is granted and when water is expected to be withdrawn. The rules governing allocation of water supply storage require the state to recover the complete federal capital and interest costs associated with a Level I allocation by 2012. Thereafter, the cost of future Level I allocations will be based on the initial capital cost and accrued interest as well as the accrued operating expenses associated with the percent of storage.

Capital and Interest Costs

Capital costs are based on the Jordan Lake construction costs of approximately $89 million, excluding funds budgeted specifically for recreational lands and facilities. Since the project's cost is shared among several project purposes, the Corps estimated that 4.6% of the construction cost is attributable to water supply. Including interest accrued during project construction, $4.388 million represents the original investment cost for the water supply provided by the reservoir. Based on this figure, the initial capital cost is $43,880 for each one percent of water supply storage.

In 1992, the State began making interest payments at a rate of 3.225% on the unallocated portion of the Jordan Lake water supply. As stated above, all of these interest payments will be passed on to the eventual holders of the water supply storage.

The estimated cost for a new Level 1 allocation made in 2015 is $91,041 per percent of water supply storage. In future years entities that receive a new Level I allocation in this round of allocations will be billed for operation and maintenance expenses based on the percentage of storage in the allocation.

Holders of Level II allocations are required to make the annual interest payments on the capital costs associated with the allocation percentage, along with a similar proportion of operating expenses, until their allocation is converted to Level I.[13]

Operating Costs

In addition to the costs incurred to construct the project, there are continuing expenses for operation and maintenance (O&M), and periodic expenses for replacement and rehabilitation of facilities at the reservoir. Current and future allocation holders are required to pay a proportional share of these operating expenses. Allocation holders must also reimburse the State for payments made to cover operating expenses since the Corps started charging for these expenses in 1992. The estimated accrued operating expenses for a new Level I allocation of one percent made in 2014 is $13,034 which would be added to the capital and interest payment.

The water supply proportional share of operation and maintenance costs is estimated by the Corps to be 5.4% of the total expenses. For example, in 2011 $109,258 was attributed to annual operation and maintenance costs associated with water supply. Thus, $1,092.58 was attributed to each one percent of water supply storage. The average annual O&M cost for 2007-2011 is $777 per percent of storage. Since 1992, the Corps has been charging the State the full 5.4% of operation and maintenance costs associated with water supply storage. Future allocation holders must reimburse the State for the actual operation and maintenance charges for their allocations since 1992.

Replacement Costs

The proportional share of replacement costs attributed to water supply is estimated by the Corps to be 2.8% of the total expense. These costs are more difficult to budget because they are not incurred on a regular basis. The Corps estimated an annual equivalent project replacement expense of approximately $66,000.[14] The proportion of these annual replacement costs charged against water supply storage is approximately $1,800 in total, or $18 per percent of storage. Until the Corps starts incurring replacement costs and passing these costs on to the State (they have not

[13] Level I allocations are based on projected water supply needs for a 20-year planning period and the withdrawal must be initiated within 5 years. Level II allocations are based on projected water supply needs for a 30-year planning period.

[14] It is important to note that replacement costs will fluctuate from year to year based on actual expenses incurred by the Corps.

through 2011), allocation holders will not have any additional reimbursement costs associated with replacement costs.

Rehabilitation Costs

The proportional share of major rehabilitation costs attributed to water supply is also estimated by the Corps to be 2.8% of the total expense. Annual rehabilitation costs can be estimated at about $30,092.86 based on costs incurred in 1995 and 1996. At this rate the proportion of the annual rehabilitation costs charged against water supply storage amounts to approximately $843 or $8.43 per percent of storage. Future allocation holders must reimburse the State for the actual rehabilitation payments made on their allocations since 1992. The Corps has not billed the state for any rehabilitation expenses since 1996. When rehabilitation expenses are incurred in the future they will be distributed proportionally to allocation holders.

Cost Summary

Based in the figures presented in the discussions above a new one percent Level I allocation of water supply storage made in 2015 is estimated to cost the holder $91,041. This figure includes: $43,880 of capital cost, $32,548 in accrued interest, $13,775 in accrued O&M costs, $34 in accrued rehabilitation costs, and $26 estimated costs for annual rehabilitation and replacement costs. In addition a fixed $250 administration fee is added to each bill. Based on the figures used for these estimates, in subsequent years the cost of a one percent Level I allocation can be expected to be in the neighborhood of $2,200 based on historical O&M and interest costs.

The cost of a new one percent Level II allocation made in 2015 is also estimated to be about $2,200 annually, based on the same figures. At the time a Level II allocation is converted to a Level I allocation the holder can expect to make a payment of at least $91,041 for each one percent of storage allocated. This covers the capital cost and accrued expense up to the time the Level II allocation is made. After that date the allocation holder will be paying the O&M and interest payments annually. These estimates are presented as a table below.

Table 1. Example of Payment Responsibilities for Allocation Holders (per percent of storage allocated).

Estimates for Year	2015		2015
	New 1% Level I		New 1% Level II
Allocation Level	I	I	II
	1st Year	Subsequent Years	1 st Year
Capital Cost [1]	$ 43,880.00	$ -	$ -
Accrued Interest on Capital [2]	$ 32,547.99	$ -	$ -
Total Capital Cost [3]	$ 76,427.99	$ -	$ -
Interest Portion of Capital Payments [4]	$ -	$ 1,415.13	$ 1,415.13
Annual O&M Cost [5]	$ 777.30	$ 777.30	$ 777.30
Accrued O&M Costs [6]	$ 13,775.07	$ -	
Annual Rehabilitation Cost [7]	$ 8.43	$ 8.43	$ 8.43
Accrued Rehabilitation Costs [8]	$ 33.98		
Replacement Cost [9]	$ 18.00	$18.00	$18.00
Total Cost per PERCENT [10]	$ 91,040.76	$ 2,218.85	$ 2,218.85
Additional Fixed Cost per Acct. [11]	$ 250.00	$ 250.00	$ 250.00

Notes:
1. $4,388,000 for 45,800 acre-feet of storage.
2. 3.225% interest paid annually on the original capital cost for the years 1992-2014, compounded annually.
3. Total Capital Cost = Capital Cost + Accrued Interest on Capital.
4. The interest on $43,880 at 3.225% interest rate.
5. The estimated annual O&M (operation and maintenance) cost, based on an average of actual O&M costs for the years 2007-2011.
6. The total of actual O&M costs for the years 1992-2011 and estimates for 2012, 2013 and 2014.
7. The estimated annual rehabilitation cost, based on an average of actual rehabilitation costs for the years 1995-1996.
8. The total of actual rehabilitation costs for the years 1992-1999. Payback assumes either a lump sum, or 20 equal annual payments at a 3.225% interest rate.

9. Replacement cost is based on the Corps estimate of the average annual replacement cost. Note that there is no accrued replacement cost, as the State has not been billed for such as of year 2011.

10. Total Cost per percent of storage = (Total Capital Cost or Interest Portion of Capital Payments) + Annual O&M Cost + Accrued O&M Cost + Annual Rehabilitation Cost + Accrued Rehabilitation Costs + Replacement Cost.

11. An additional administrative charge of $250 is added to each allocation holder's bill.

Reference Material

Jordan Lake Allocation Rules

STATE OF NORTH CAROLINA ADMINISTRATIVE CODE

TITLE 15A. DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

CHAPTER 2. ENVIRONMENTAL MANAGEMENT

SUBCHAPTER 2G. WATER RESOURCES PROGRAMS

SECTION .0500. ALLOCATION OF JORDAN LAKE WATER SUPPLY STORAGE

.0501 INTRODUCTION

To increase the availability of municipal and industrial water supplies, the State of North Carolina requested the U.S. Army Corps of Engineers to designate 32.62 percent of the Jordan Lake conservation storage, between the elevations 202 mean sea level (msl) and 216 msl, as water supply storage.

The State, acting through the Environmental Management Commission, will assign to local governments having a need for water supply capacity any interest held by the State in such storage, with proportional payment by the user to the State for the state's associated capital, interest, administrative and operating costs.

Upon signing the water supply storage contract with the U.S. Army Corps of Engineers, the Commission will apply the following procedures in allocating Jordan Lake water supply storage.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.38 through 143-215.43; 143-354(a)(11); 143B-282; Eff. March 1, 1988.

.0502 DEFINITIONS

As used throughout this Subchapter:

(1) "Capital costs" means initial costs of the project;

(2) "Commission" means Environmental Management Commission;

(3) "Department" means the North Carolina Department of Natural Resources and Community Development;

(4) "Division" means the Division of Water Resources;

(5) "Effective date of allocation" means the date the Commission approves the allocation;

(6) "Interest costs" means interest accrued on the unpaid balance;

(7) "Local government" means any city, county, authority, sanitary district, metropolitan water district, or other local unit;

(8) "Operating costs" means Jordan Lake's state and federal operating, maintenance, replacement, and administrative costs associated with water supply storage;

(9) "State" means the state of North Carolina; and

(10) "Water supply storage" means storage of water for municipal or industrial use.

History Note: Statutory Authority G.S. 143-354(a)(11); Eff. March 1, 1988.

.0503 FORMAL APPLICATION

(a) The Commission may receive initial allocation requests from local governments beginning on this Section's effective date. In order to be reviewed, applications must contain the following information:

(1) Projected population and water use, including a detailed map of the existing and projected water service areas;

(2) A listing of water sources presently available, including estimated yields of these sources;

(3) An analysis of the yield, quality, and cost of alternative sources of water supply other than Jordan Lake that could meet or partially meet projected needs, including regionalization of systems;

(4) A description of conservation and demand-management practices to be used;

(5) An outline of plans to use water from Jordan Lake, including proposed location of intake and water treatment plant(s), location of wastewater treatment plant(s), any proposed sharing of facilities or other cooperative arrangements with other local governments, and a proposed schedule of development;

(6) A plan for monitoring the quality of the raw and finished water in accordance with the requirements of North Carolina's Department of Human Resources and the U.S. Environmental Protection Agency;

(7) The estimated cost of developing water supply facilities at Jordan Lake, also costs of alternative sources of supply; and

(8) A letter of intent to enter into a financial commitment for Jordan Lake water storage.

(b) The Commission or the department may request such additional information as may be reasonably necessary for a complete understanding of the allocation request.

(c) Local governments may apply for two levels of allocation: Level I allocations are for applicants which have demonstrated an immediate need and will commence withdrawals within five years of the effective date of allocation; Level II allocations are for applicants with documented longer range needs for water.

(d) The applicant should include in the application the assumptions and the methodology used to develop projections. The Commission will assist applicants by providing a copy of departmental procedures for projecting water supply demands and determining yields.

(e) Using departmental procedures for projecting water supply demands and determining yields, the department will provide the Commission an independent assessment of the applicant's water supply needs.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-354(a)(11); 143B-282; Eff. March 1, 1988.

.0504 ALLOCATION OF WATER SUPPLY STORAGE

(a) The segment of Jordan Lake proposed for a water supply withdrawal must be classified by the Commission as a drinking water source prior to any allocation of Jordan Lake water supply storage. Prior to the first allocation of water supply storage at Jordan Lake, the Commission shall hold one or more public meetings on the amount(s) requested by each applicant, the suitability of Jordan Lake water for public water supply use, the availability of alternative water sources, and the best utilization of the water resources of the region. For future allocation decisions, additional public meetings may be held as determined by the Commission.

(b) The Commission will assign Level I allocations of Jordan Lake water supply storage based on an intent to begin withdrawing water within five years of the effective date of allocation, on consideration of projected water supply needs for a period not to exceed 20 years, and on the design capacity of the associated withdrawal and treatment facilities.

(c) The Commission will make Level II allocations of Jordan Lake water supply to applicants based on projected water supply needs for a period not to exceed 30 years.

(d) The Commission will initially keep 50 percent of the water supply storage unallocated to meet future water supply needs as they develop.

(e) If additional storage is requested by holders of Level II allocations, these parties must submit an application addendum to the Commission for review.

(f) When holders of Level II allocations have documented an immediate need and wish to commence withdrawals within five years, their Level II allocations will be changed to Level I upon review and approval by the Commission.

(g) The department will issue a notice that it has received applications for Level I and Level II allocations and requests for increases in allocations, with a 30-day period for comment. If there

is significant public interest, the department may hold a public meeting to obtain comments and information, with appropriate notice.

(h) To protect the yield of Jordan Lake for water supply and water quality purposes, the Commission will limit water supply allocations that will result in diversions out of the lake's watershed to 50 percent of the total water supply yield. The Commission may review and revise this limit based on experience in managing the lake and on the effects of changes in the lake's watershed that will affect its yield. For applicants whose discharge or intake represents a diversion pursuant to G.S. 153A-285 or 162A-7, the Commission will coordinate the review of the diversion with the review of the allocation request.

(i) Where applications for allocations exceed storage capacity, the Commission will assign, reassign, or transfer allocations based on the applicants' or holders' need(s) and alternative water sources available (as defined in the application requirements), the existing or proposed average degree of utilization of the resource (relative to the total allocation application), the level of financial commitment (relative to the applicant's or holder's total costs in developing Jordan Lake as a water supply source), the effects on the lake's yield, and the level of sharing facilities or other cooperative arrangements with other local governments.

History Note: Statutory Authority G.S. 143-54(a)(11); 143-215.3(a)(1); 143B-282; 153A-285; 162A-7; Eff. March 1, 1988.

.0505 NOTIFICATION AND PAYMENT

(a) The Commission will notify applicants of the decisions made regarding their allocation requests.

(b) Recipients of Level I allocations are required to pay a proportional share of the state's total water supply storage capital and interest costs over a term suitable to the recipient and the Commission, but by 2012. Interest rates will vary with the payback term, and will be based on the state recovering the total federal capital and interest costs associated with water supply storage by 2012. After 2012, the Commission may review and adjust repayment requirements to assure equitable and efficient allocation of the resource. Level I recipients are also required to pay annually a proportional share of operating costs.

(c) Holders of Level II allocations are required to pay a proportional share of the project's water supply storage interest and operating costs.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-354(a)(11); 143B-282; Eff. March 1, 1988.

.0506 RECIPIENTS' REQUIREMENTS

(a) Holders of Level I allocations must provide documentation meeting the requirements of the North Carolina Environmental Policy Act, G.S. 113A-1 thru 113A-10, at the time the holders propose to build facilities to use water from Jordan Lake. Such documentation shall include the

environmental impacts of the proposed withdrawal, treatment, distribution, and disposal of the holders' allocated water.

(b) Local governments must install and maintain suitable meters for the measurement of water withdrawn, report these withdrawals to the department on a monthly basis, and obtain the department's approval for the design, location, and installation of associated withdrawal facilities.

(c) Holders of Level I and Level II allocations must pay the required capital, interest, and operating costs when due.

History Note: Statutory Authority G.S. 113A-1 through 113A-10; 143-215.3(a)(1); 143-354(a)(11); 143B-282; Eff. March 1, 1988.

.0507 LOSS OF ALLOCATION

(a) The Commission will review the Level I and Level II allocations at five year intervals, beginning on the effective date of the first allocation.

(b) Level I allocations will be reviewed for possible reassignment if the recipient does not begin to withdraw water within five years of the effective date of allocation or is not using and withdrawing the water as proposed in the application.

(c) Level I and Level II allocations will be rescinded upon failure by the local government to meet the regulation requirements in .0506 (a), (b), and (c).

(d) The Commission may adjust, reassign, or transfer interests in water supply storage held by local governments, if indicated by an investigation of needs or changes in the project's water supply storage capacity. Capital, interest, and operating costs will be equitably adjusted to reflect the allocation recipients' proportion of total capacity.

Holders of Level I and Level II allocations will receive appropriate refunds for any payments made if their allocations are adjusted, reassigned, or otherwise amended with the approval of the Commission. Rescinded allocations will not be refunded.

(e) The Commission shall hold a public meeting to obtain comments and information regarding the proposed loss of allocation.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-354(a)(11); 143B-282; Eff. March 1, 1988.

Session Law 2011-374

Extracted from copy of Session Law 2011-374 through the General Assembly website on September 26, 2012

GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2011

SESSION LAW 2011-374

HOUSE BILL 609

AN ACT TO PROMOTE THE DEVELOPMENT OF WATER SUPPLY RESERVOIRS AND OTHER WATER SUPPLY RESOURCES, TO PROVIDE THAT FUNDS FROM THE CLEAN WATER MANAGEMENT TRUST FUND MAY BE USED TO PRESERVE LANDS FOR THE DEVELOPMENT OF WATER SUPPLY RESERVOIRS, AND TO IMPROVE THE EFFICIENCY OF USE OF NORTH CAROLINA'S WATER RESOURCES.

Whereas, S.L. 2007-518 directed the Environmental Review Commission to study the allocation of surface water resources and their availability and maintenance in the State; and

Whereas, pursuant to this directive, the Environmental Review Commission commissioned a study and report on water allocation issues and policy options; and

Whereas, the resulting water allocation report included a recommendation that the State create an expedited regulatory process for the construction of new water supply reservoirs; and

Whereas, the resulting water allocation report found that certain areas of the State, including the Piedmont, are expected to experience significant population growth over the next 30 years and do not have adequate water supplies to support the expected growth; Now, therefore,

The General Assembly of North Carolina enacts:

PART III. IMPROVE THE EFFICIENCY OF USE OF NORTH CAROLINA'S WATER RESOURCES

SECTION 3.1. G.S. 143-355(l) reads as rewritten:

"(l) Local Water Supply Plans. – Each unit of local government that provides public water service or that plans to provide public water service and each large community water system shall, either individually or together with other units of local government and large community water systems, prepare a local water supply plan and submit it to the Department for approval. The Department shall provide technical assistance with the preparation of plans to units of local government and large community water systems upon request and to the extent that the Department has resources available to provide assistance. At a minimum, each unit of local government and large community water system shall include in local water supply plans all information that is readily available to it. Plans shall include present and projected population, industrial development, and water use within the service area; present and future water supplies; an estimate of the technical assistance that may be needed at the local level to address projected water needs; current and future water conservation and water reuse programs, including a plan for the reduction of long-term per capita demand for potable water; a description of how the local government or large community water system will respond to drought and other water shortage emergencies and continue to meet essential public water supply needs during the emergency; and any other related information as the Department may require in the preparation of a State water

supply plan. A unit of local government or large community water system shall submit a revised plan that specifies how the water system intends to address foreseeable future water needs when eighty percent (80%) of the water system's available water supply based on calendar year average daily demand has been allocated to current or prospective water users or the seasonal demand exceeds ninety percent (90%). Local plans shall be revised to reflect changes in relevant data and projections at least once each five years unless the Department requests more frequent revisions. The revised plan shall include the current and anticipated reliance by the local government unit or large community water system on surface water transfers as defined by G.S. 143-215.22G. Local plans and revised plans shall be submitted to the Department once they have been approved by each unit of local government and large community water system that participated in the preparation of the plan."

SECTION 3.2. G.S. 143-355.4(b) reads as rewritten:

"(b) To be eligible for State water infrastructure funds from the Drinking Water State Revolving Fund or the Drinking Water Reserve or any other grant or loan of funds allocated by the General Assembly whether the allocation of funds is to a State agency or to a nonprofit organization for the purpose of extending waterlines or expanding water treatment capacity, a local government or large community water system must demonstrate that the system:

…

(7) Has implemented a consumer education program that emphasizes the importance of water conservation and that includes information on measures that residential customers may implement to reduce water consumption."

Surface Water Transfer Statutes

§ 143-215.22G. Definitions.

In addition to the definitions set forth in G.S. 143-212 and G.S. 143-213, the following definitions apply to this Part.

(1) "River basin" means any of the following river basins designated on the map entitled "Major River Basins and Sub-basins in North Carolina" and filed in the Office of the Secretary of State on 16 April 1991. The term "river basin" includes any portion of the river basin that extends into another state. Any area outside North Carolina that is not included in one of the river basins listed in this subdivision comprises a separate river basin.

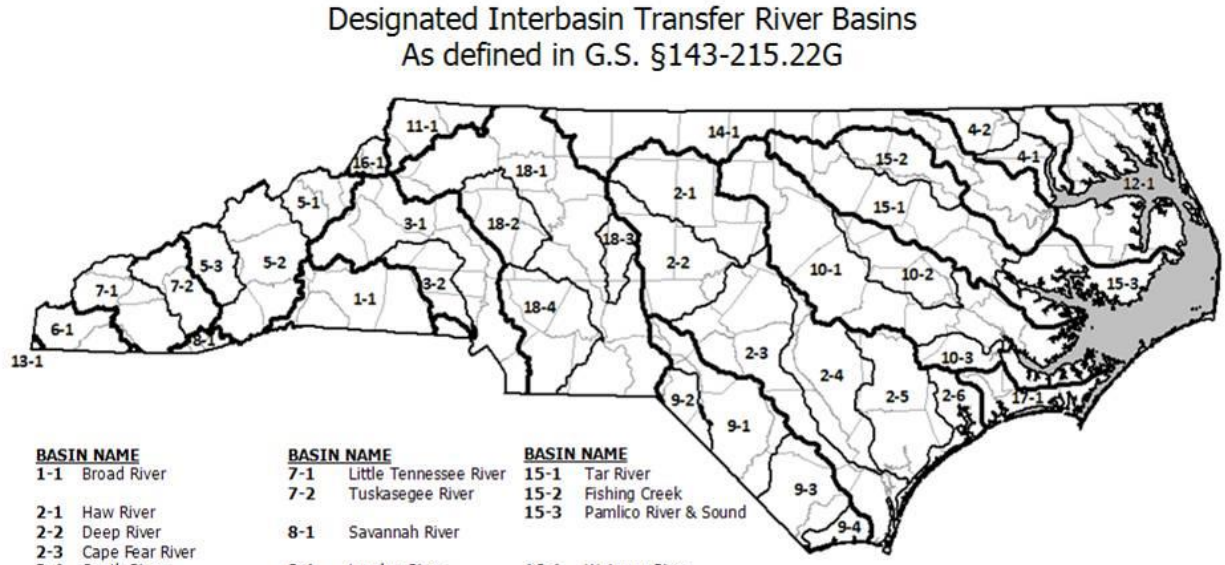
a.	1-1	Broad River.
b.	2-1	Haw River.
c.	2-2	Deep River.
d.	2-3	Cape Fear River.
e.	2-4	South River.
f.	2-5	Northeast Cape Fear River.
g.	2-6	New River.
h.	3-1	Catawba River.
i.	3-2	South Fork Catawba River.
j.	4-1	Chowan River.
k.	4-2	Meherrin River.
l.	5-1	Nolichucky River.
m.	5-2	French Broad River.
n.	5-3	Pigeon River.
o.	6-1	Hiwassee River.
p.	7-1	Little Tennessee River.
q.	7-2	Tuskasegee (Tuckasegee) River.
r.	8-1	Savannah River.
s.	9-1	Lumber River.
t.	9-2	Big Shoe Heel Creek.
u.	9-3	Waccamaw River.
v.	9-4	Shallotte River.
w.	10-1	Neuse River.
x.	10-2	Contentnea Creek.
y.	10-3	Trent River.
z.	11-1	New River.
aa.	12-1	Albemarle Sound.
bb.	13-1	Ocoee River.
cc.	14-1	Roanoke River.
dd.	15-1	Tar River.
ee.	15-2	Fishing Creek.
ff.	15-3	Pamlico River and Sound.
gg.	16-1	Watauga River.
hh.	17-1	White Oak River.
ii.	18-1	Yadkin (Yadkin-Pee Dee) River.
jj.	18-2	South Yadkin River.
kk.	18-3	Uwharrie River.
ll.	18-4	Rocky River.

(2) "Surface water" means any of the waters of the State located on the land surface that are not derived by pumping from groundwater.

(3) "Transfer" means the withdrawal, diversion, or pumping of surface water from one river basin and discharge of all or any part of the water in a river basin different from the origin. However, notwithstanding the basin definitions in G.S. 143-215.22G(1), the following are not transfers under this Part:

a. The discharge of water upstream from the point where it is withdrawn.

b. The discharge of water downstream from the point where it is withdrawn. (1991, c. 712, s. 1; 1993, c. 348, s. 1; 1997-443, s. 15.48(b).)



BASIN NAME		BASIN NAME		BASIN NAME	
1-1	Broad River	7-1	Little Tennessee River	15-1	Tar River
		7-2	Tuskasegee River	15-2	Fishing Creek
2-1	Haw River			15-3	Pamlico River & Sound
2-2	Deep River	8-1	Savannah River		
2-3	Cape Fear River				
2-4	South River	9-1	Lumber River	16-1	Watauga River
2-5	Northeast Cape Fear River	9-2	Big Shoe Heel Creek		
2-6	New River	9-3	Waccamaw River	17-1	White Oak River
		9-4	Shallotte River		
3-1	Catawba River			18-1	Yadkin River
3-2	South Fork Catawba River	10-1	Neuse River	18-2	South Yadkin River
		10-2	Contentnea Creek	18-3	Uwharrie River
4-1	Chowan River	10-3	Trent River	18-4	Rocky River
4-2	Meherrin River				
		11-1	New River		
5-1	Nolichucky River				
5-2	French Broad River	12-1	Albemarle Sound		
5-3	Pigeon River				
		13-1	Ocoee River		
6-1	Hiwassee River				
		14-1	Roanoke River		

§ 143-215.22L. Regulation of surface water transfers.

Copied from the DWR website on September 26, 2012

(a) Certificate Required. – No person, without first obtaining a certificate from the Commission, may:

(1) Initiate a transfer of 2,000,000 gallons of water or more per day from one river basin to another.

(2) Increase the amount of an existing transfer of water from one river basin to another by twenty-five percent (25%) or more above the average daily amount transferred during the year ending 1 July 1993 if the total transfer including the increase is 2,000,000 gallons or more per day.

(3) Increase an existing transfer of water from one river basin to another above the amount approved by the Commission in a certificate issued under G.S. 162A-7 prior to 1 July 1993.

(b) Exception. – Notwithstanding the provisions of subsection (a) of this section, a certificate shall not be required to transfer water from one river basin to another up to the full capacity of a facility to transfer water from one basin to another if the facility was in existence or under construction on 1 July 1993.

(c) Notice of Intent to File a Petition. – An applicant shall prepare a notice of intent to file a petition that includes a nontechnical description of the applicant's request and an identification of the proposed water source. Within 90 days after the applicant files a notice of intent to file a petition, the applicant shall hold at least one public meeting in the source river basin upstream from the proposed point of withdrawal, at least one public meeting in the source river basin downstream from the proposed point of withdrawal, and at least one public meeting in the receiving river basin to provide information to interested parties and the public regarding the nature and extent of the proposed transfer and to receive comment on the scope of the environmental documents. Written notice of the public meetings shall be provided at least 30 days before the public meetings. At the time the applicant gives notice of the public meetings, the applicant shall request comment on the alternatives and issues that should be addressed in the environmental documents required by this section. The applicant shall accept written comment on the scope of the environmental documents for a minimum of 30 days following the last public meeting. Notice of the public meetings and opportunity to comment on the scope of the environmental documents shall be provided as follows:

(1) By publishing notice in the North Carolina Register.

(2) By publishing notice in a newspaper of general circulation in:

a. Each county in this State located in whole or in part of the area of the source river basin upstream from the proposed point of withdrawal.

b. Each city or county located in a state located in whole or in part of the surface drainage basin area of the source river basin that also falls within, in whole or in part, the area denoted by one of the following eight-digit cataloging units as organized by the United States Geological Survey:

03050105 (Broad River: NC and SC);
03050106 (Broad River: SC);
03050107 (Broad River: SC);
03050108 (Broad River: SC);
05050001 (New River: NC and VA);
05050002 (New River: VA and WV);
03050101 (Catawba River: NC and SC);
03050103 (Catawba River: NC and SC);
03050104 (Catawba River: SC);
03010203 (Chowan River: NC and VA);
03010204 (Chowan River: NC and VA);
06010105 (French Broad River: NC and TN);
06010106 (French Broad River: NC and TN);
06010107 (French Broad River: TN);
06010108 (French Broad River: NC and TN);
06020001 (Hiwassee River: AL, GA, TN);
06020002 (Hiwassee River: GA, NC, TN);
06010201 (Little Tennessee River: TN);
06010202 (Little Tennessee River: TN, GA, and NC);
06010204 (Little Tennessee River: NC and TN);
03060101 (Savannah River: NC and SC);
03060102 (Savannah River: GA, NC, and SC);
03060103 (Savannah River: GA and SC);
03060104 (Savannah River: GA);
03060105 (Savannah River: GA);
03040203 (Lumber River: NC and SC);
03040204 (Lumber River: NC and SC);
03040206 (Lumber River: NC and SC);
03040207 (Lumber River: NC and SC);
03010205 (Albemarle Sound: NC and VA);
06020003 (Ocoee River: GA, NC, and TN);
03010101 (Roanoke River: VA);
03010102 (Roanoke River: NC and VA);
03010103 (Roanoke River: NC and VA);
03010104 (Roanoke River: NC and VA);
03010105 (Roanoke River: VA);
03010106 (Roanoke River: NC and VA);
06010102 (Watauga River: TN and VA);
06010103 (Watauga River: NC and TN);
03040101 (Yadkin River: VA and NC);
03040104 (Yadkin River: NC and SC);

03040105 (Yadkin River: NC and SC);
03040201 (Yadkin River: NC and SC);
03040202 (Yadkin River: NC and SC).

c. Each county in this State located in whole or in part of the area of the source river basin downstream from the proposed point of withdrawal.

d. Any area in the State in a river basin for which the source river basin has been identified as a future source of water in a local water supply plan prepared pursuant to G.S. 143-355(l).

e. Each county in the State located in whole or in part of the receiving river basin.

(3) By giving notice by first-class mail or electronic mail to each of the following:

a. The board of commissioners of each county in this State or the governing body of any county or city that is politically independent of a county in any state that is located entirely or partially within the source river basin of the proposed transfer and that also falls within, in whole or in part, the area denoted by one of the eight-digit cataloging units listed in sub-subdivision b. of subdivision (2) of this subsection.

b. The board of commissioners of each county in this State or the governing body of any county or city that is politically independent of a county in any state that is located entirely or partially within the receiving river basin of the proposed transfer and that also falls within, in whole or in part, the area denoted by one of the eight-digit cataloging units listed in sub-subdivision b. of subdivision (2) of this subsection.

c. The governing body of any public water supply system that withdraws water upstream or downstream from the withdrawal point of the proposed transfer.

d. If any portion of the source or receiving river basins is located in another state, all state water management or use agencies, environmental protection agencies, and the office of the governor in that state upstream or downstream from the withdrawal point of the proposed transfer.

e. All persons who have registered a water withdrawal or transfer from the proposed source river basin under this Part or under similar law in an another state.

f. All persons who hold a certificate for a transfer of water from the proposed source river basin under this Part or under similar law in an another state.

g. All persons who hold a National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit for a discharge of 100,000 gallons per day or more upstream or downstream from the proposed point of withdrawal.

h. To any other person who submits to the applicant a written request to receive all notices relating to the petition.

(d) Environmental Documents. – The definitions set out in G.S. 113A-9 apply to this section. The Department shall conduct a study of the environmental impacts of any proposed transfer of water for which a certificate is required under this section. The study shall meet all of the requirements set forth in G.S. 113A-4 and rules adopted pursuant to G.S. 113A-4. An environmental assessment shall be prepared for any petition for a certificate under this section. The determination of whether an environmental impact statement shall also be required shall be made in accordance with the provisions of Article 1 of Chapter 113A of the General Statutes; except that an environmental impact statement shall be prepared for every proposed transfer of water from one major river basin to another for which a certificate is required under this section. The applicant who petitions the Commission for a certificate under this section shall pay the cost of special studies necessary to comply with Article 1 of Chapter 113A of the General Statutes. An environmental impact statement prepared pursuant to this subsection shall include all of the following:

(1) A comprehensive analysis of the impacts that would occur in the source river basin and the receiving river basin if the petition for a certificate is granted.

(2) An evaluation of alternatives to the proposed interbasin transfer, including water supply sources that do not require an interbasin transfer and use of water conservation measures.

(3) A description of measures to mitigate any adverse impacts that may arise from the proposed interbasin transfer.

(e) Public Hearing on the Draft Environmental Document. – The Commission shall hold a public hearing on the draft environmental document for a proposed interbasin transfer after giving at least 30 days' written notice of the hearing in the Environmental Bulletin and as provided in subdivisions (2) and (3) of subsection (c) of this section. The notice shall indicate where a copy of the environmental document can be reviewed and the procedure to be followed by anyone wishing to submit written comments and questions on the environmental document. The Commission shall prepare a record of all comments and written responses to questions posed in writing. The record shall include complete copies of scientific or technical comments related to the potential impact of the interbasin transfer. The Commission shall accept written comment on the draft environmental document for a minimum of 30 days following the last public hearing. The applicant who petitions the Commission for a certificate under this section shall pay the costs associated with the notice and public hearing on the draft environmental document.

(f) Determination of Adequacy of Environmental Document. – The Commission shall not act on any petition for an interbasin transfer until the Commission has determined that the environmental document is complete and adequate. A decision on the adequacy of the environmental document is subject to review in a contested case on the decision of the Commission to issue or deny a certificate under this section.

(g) Petition. – An applicant for a certificate shall petition the Commission for the certificate. The petition shall be in writing and shall include all of the following:

(1) A description of the facilities to be used to transfer the water, including the location and capacity of water intakes, pumps, pipelines, and other facilities.

(2) A description of all the proposed consumptive and nonconsumptive uses of the water to be transferred.

(3) A description of the water quality of the source river and receiving river, including information on aquatic habitat for rare, threatened, and endangered species; in-stream flow data for segments of the source and receiving rivers that may be affected by the transfer; and any waters that are impaired pursuant to section 303(d) of the federal Clean Water Act (33 U.S.C. § 1313(d)).

(4) A description of the water conservation measures used by the applicant at the time of the petition and any additional water conservation measures that the applicant will implement if the certificate is granted.

(5) A description of all sources of water within the receiving river basin, including surface water impoundments, groundwater wells, reinjection storage, and purchase of water from another source within the river basin, that is a practicable alternative to the proposed transfer that would meet the applicant's water supply needs. The description of water sources shall include sources available at the time of the petition for a certificate and any planned or potential water sources.

(6) A description of water transfers and withdrawals registered under G.S. 143-215.22H or included in a local water supply plan prepared pursuant to G.S. 143-355(l) from the source river basin, including transfers and withdrawals at the time of the petition for a certificate and any planned or reasonably foreseeable transfers or withdrawals by a public water system with service area located within the source river basin.

(7) A demonstration that the proposed transfer, if added to all other transfers and withdrawals required to be registered under G.S. 143-215.22H or included in any local water supply plan prepared by a public water system with service area located within the source basin pursuant to G.S. 143-355(l) from the source river basin at the time of the petition for a certificate, would not reduce the amount of water available for use in the source river basin to a degree that would impair existing uses, pursuant to the antidegradation policy set out in 40 Code of Federal Regulation § 131.12 (Antidegradation Policy) (1 July 2006 Edition) and the statewide antidegradation policy adopted pursuant thereto, or existing and planned consumptive and nonconsumptive uses of the water in the source river basin. If the proposed transfer would impact a reservoir within the source river basin, the demonstration must include a finding that the transfer would not result in a water level in the reservoir that is inadequate to support existing uses of the reservoir, including recreational uses.

(8) The applicant's future water supply needs and the present and reasonably foreseeable future water supply needs for public water systems with service area located within the source river basin. The analysis of future water supply needs shall include agricultural, recreational, and industrial uses, and electric power generation. Local water supply plans prepared pursuant to G.S. 143-355(l) for water systems with service area located within the source river basin shall be

used to evaluate the projected future water needs in the source river basin that will be met by public water systems.

(9) The applicant's water supply plan prepared pursuant to G.S. 143-355(l). If the applicant's water supply plan is more than two years old at the time of the petition, then the applicant shall include with the petition an updated water supply plan.

(10) Any other information deemed necessary by the Commission for review of the proposed water transfer.

(h) Settlement Discussions. – Upon the request of the applicant, any interested party, or the Department, or upon its own motion, the Commission may appoint a mediation officer. The mediation officer may be a member of the Commission, an employee of the Department, or a neutral third party but shall not be a hearing officer under subsections (e) or (j) of this section. The mediation officer shall make a reasonable effort to initiate settlement discussions between the applicant and all other interested parties. Evidence of statements made and conduct that occurs in a settlement discussion conducted under this subsection, whether attributable to a party, a mediation officer, or other person shall not be subject to discovery and shall be inadmissible in any subsequent proceeding on the petition for a certificate. The Commission may adopt rules to govern the conduct of the mediation process.

(i) Draft Determination. – Within 90 days after the Commission determines that the environmental document prepared in accordance with subsection (d) of this section is adequate or the applicant submits its petition for a certificate, whichever occurs later, the Commission shall issue a draft determination on whether to grant the certificate. The draft determination shall be based on the criteria set out in this section and shall include the conditions and limitations, findings of fact, and conclusions of law that would be required in a final determination. Notice of the draft determination shall be given as provided in subsection (c) of this section.

(j) Public Hearing on the Draft Determination. – Within 60 days of the issuance of the draft determination as provided in subsection (i) of this section, the Commission shall hold public hearings on the draft determination. At least one hearing shall be held in the affected area of the source river basin, and at least one hearing shall be held in the affected area of the receiving river basin. In determining whether more than one public hearing should be held within either the source or receiving river basins, the Commission shall consider the differing or conflicting interests that may exist within the river basins, including the interests of both upstream and downstream parties potentially affected by the proposed transfer. The public hearings shall be conducted by one or more hearing officers appointed by the Chair of the Commission. The hearing officers may be members of the Commission or employees of the Department. The Commission shall give at least 30 days' written notice of the public hearing as provided in subsection (c) of this section. The Commission shall accept written comment on the draft determination for a minimum of 30 days following the last public hearing. The Commission shall prepare a record of all comments and written responses to questions posed in writing. The record shall include complete copies of scientific or technical comments related to the potential impact of the interbasin transfer. The applicant who petitions the Commission for a certificate under this

section shall pay the costs associated with the notice and public hearing on the draft determination.

(k) Final Determination: Factors to be Considered. – In determining whether a certificate may be issued for the transfer, the Commission shall specifically consider each of the following items and state in writing its findings of fact and conclusions of law with regard to each item:

(1) The necessity and reasonableness of the amount of surface water proposed to be transferred and its proposed uses.

(2) The present and reasonably foreseeable future detrimental effects on the source river basin, including present and future effects on public, industrial, economic, recreational, and agricultural water supply needs, wastewater assimilation, water quality, fish and wildlife habitat, electric power generation, navigation, and recreation. Local water supply plans for public water systems with service area located within the source river basin prepared pursuant to G.S. 143-355(l) shall be used to evaluate the projected future water needs in the source river basin that will be met by public water systems. Information on projected future water needs for public water systems with service area located within the source river basin that is more recent than the local water supply plans may be used if the Commission finds the information to be reliable. The determination shall include a specific finding as to measures that are necessary or advisable to mitigate or avoid detrimental impacts on the source river basin.

(3) The cumulative effect on the source major river basin of any water transfer or consumptive water use that, at the time the Commission considers the petition for a certificate is occurring, is authorized under this section, or is projected in any local water supply plan for public water systems with service area located within the source river basin that has been submitted to the Department in accordance with G.S. 143-355(l).

(4) The present and reasonably foreseeable future beneficial and detrimental effects on the receiving river basin, including present and future effects on public, industrial, economic, recreational, and agricultural water supply needs, wastewater assimilation, water quality, fish and wildlife habitat, electric power generation, navigation, and recreation. Local water supply plans prepared pursuant to G.S. 143-355(l) that affect the receiving river basin shall be used to evaluate the projected future water needs in the receiving river basin that will be met by public water systems. Information on projected future water needs that is more recent than the local water supply plans may be used if the Commission finds the information to be reliable. The determination shall include a specific finding as to measures that are necessary or advisable to mitigate or avoid detrimental impacts on the receiving river basin.

(5) The availability of reasonable alternatives to the proposed transfer, including the potential capacity of alternative sources of water, the potential of each alternative to reduce the amount of or avoid the proposed transfer, probable costs, and environmental impacts. In considering alternatives, the Commission is not limited to consideration of alternatives that have been proposed, studied, or considered by the applicant. The determination shall include a specific finding as to why the applicant's need for water cannot be satisfied by alternatives within the receiving basin, including unused capacity under a transfer for which a certificate is in effect or

that is otherwise authorized by law at the time the applicant submits the petition. The determination shall consider the extent to which access to potential sources of surface water or groundwater within the receiving river basin is no longer available due to depletion, contamination, or the declaration of a capacity use area under Part 2 of Article 21 of Chapter 143 of the General Statutes. The determination shall consider the feasibility of the applicant's purchase of water from other water suppliers within the receiving basin and of the transfer of water from another sub-basin within the receiving major river basin. Except in circumstances of technical or economic infeasibility or adverse environmental impact, the Commission's determination as to reasonable alternatives shall give preference to alternatives that would involve a transfer from one sub-basin to another within the major receiving river basin over alternatives that would involve a transfer from one major river basin to another major river basin.

(6) If applicable to the proposed project, the applicant's present and proposed use of impoundment storage capacity to store water during high-flow periods for use during low-flow periods and the applicant's right of withdrawal under G.S. 143-215.44 through G.S. 143-215.50.

(7) If the water to be withdrawn or transferred is stored in a multipurpose reservoir constructed by the United States Army Corps of Engineers, the purposes and water storage allocations established for the reservoir at the time the reservoir was authorized by the Congress of the United States.

(8) Whether the service area of the applicant is located in both the source river basin and the receiving river basin.

(9) Any other facts and circumstances that are reasonably necessary to carry out the purposes of this Part.

(l) Final Determination: Information to be Considered. – In determining whether a certificate may be issued for the transfer, the Commission shall consider all of the following sources of information:

(1) The petition.

(2) The environmental document prepared pursuant to subsection (d) of this section.

(3) All oral and written comment and all accompanying materials or evidence submitted pursuant to subsections (e) and (j) of this section.

(4) Information developed by or available to the Department on the water quality of the source river basin and the receiving river basin, including waters that are identified as impaired pursuant to section 303(d) of the federal Clean Water Act (33 U.S.C. § 1313(d)), that are subject to a total maximum daily load (TMDL) limit under subsections (d) and (e) of section 303 of the federal Clean Water Act, or that would have their assimilative capacity impaired if the certificate is issued.

(5) Any other information that the Commission determines to be relevant and useful.

(m) Final Determination: Burden and Standard of Proof; Specific Findings. – The Commission shall grant a certificate for a water transfer if the Commission finds that the applicant has established by a preponderance of the evidence all of the following:

(1) The benefits of the proposed transfer outweigh the detriments of the proposed transfer. In making this determination, the Commission shall be guided by the approved environmental document and the policy set out in subsection (t) of this section.

(2) The detriments have been or will be mitigated to the maximum degree practicable.

(3) The amount of the transfer does not exceed the amount of the projected shortfall under the applicant's water supply plan after first taking into account all other sources of water that are available to the applicant.

(4) There are no reasonable alternatives to the proposed transfer.

(n) Final Determination: Certificate Conditions and Limitations. – The Commission may grant the certificate in whole or in part, or deny the certificate. The Commission may impose any conditions or limitations on a certificate that the Commission finds necessary to achieve the purposes of this Part including a limit on the period for which the certificate is valid. The conditions and limitations shall include any mitigation measures proposed by the applicant to minimize any detrimental effects within the source and receiving river basins. In addition, the certificate shall require all of the following conditions and limitations:

(1) A water conservation plan that specifies the water conservation measures that will be implemented by the applicant in the receiving river basin to ensure the efficient use of the transferred water. Except in circumstances of technical or economic infeasibility or adverse environmental impact, the water conservation plan shall provide for the mandatory implementation of water conservation measures by the applicant that equal or exceed the most stringent water conservation plan implemented by a community water system, as defined in G.S. 143-355(l), that withdraws water from the source river basin.

(2) A drought management plan that specifies how the transfer shall be managed to protect the source river basin during drought conditions or other emergencies that occur within the source river basin. Except in circumstances of technical or economic infeasibility or adverse environmental impact, this drought management plan shall include mandatory reductions in the permitted amount of the transfer based on the severity and duration of a drought occurring within the source river basin and shall provide for the mandatory implementation of a drought management plan by the applicant that equals or exceeds the most stringent water conservation plan implemented by a community water system, as defined in G.S. 143-355(l), that withdraws water from the source river basin.

(3) The maximum amount of water that may be transferred on a daily basis, and methods or devices required to be installed and operated that measure the amount of water that is transferred.

(4) A provision that the Commission may amend a certificate to reduce the maximum amount of water authorized to be transferred whenever it appears that an alternative source of water is available to the certificate holder from within the receiving river basin, including, but not limited to, the purchase of water from another water supplier within the receiving basin or to the transfer of water from another sub-basin within the receiving major river basin.

(5) A provision that the Commission shall amend the certificate to reduce the maximum amount of water authorized to be transferred if the Commission finds that the applicant's current projected water needs are significantly less than the applicant's projected water needs at the time the certificate was granted.

(6) A requirement that the certificate holder report the quantity of water transferred during each calendar quarter. The report required by this subdivision shall be submitted to the Commission no later than 30 days after the end of the quarter.

(7) Except as provided in this subdivision, a provision that the applicant will not resell the water that would be transferred pursuant to the certificate to another public water supply system. This limitation shall not apply in the case of a proposed resale or transfer among public water supply systems within the receiving river basin as part of an interlocal agreement or other regional water supply arrangement, provided that each participant in the interlocal agreement or regional water supply arrangement is a co-applicant for the certificate and will be subject to all the terms, conditions, and limitations made applicable to any lead or primary applicant.

(o) Administrative and Judicial Review. – Administrative and judicial review of a final decision on a petition for a certificate under this section shall be governed by Chapter 150B of the General Statutes.

(p) Certain Preexisting Transfers. – In cases where an applicant requests approval to increase a transfer that existed on 1 July 1993, the Commission may approve or disapprove only the amount of the increase. If the Commission approves the increase, the certificate shall be issued for the amount of the preexisting transfer plus any increase approved by the Commission. A certificate for a transfer approved by the Commission under G.S. 162A-7 shall remain in effect as approved by the Commission and shall have the same effect as a certificate issued under this Part. A certificate for the increase of a preexisting transfer shall contain all of the conditions and limitations required by subsection (m) of this section.

(q) Emergency Transfers. – In the case of water supply problems caused by drought, a pollution incident, temporary failure of a water plant, or any other temporary condition in which the public health, safety, or welfare requires a transfer of water, the Secretary of Environment and Natural Resources may grant approval for a temporary transfer. Prior to approving a temporary transfer, the Secretary shall consult with those parties listed in subdivision (3) of subsection (c) of this section that are likely to be affected by the proposed transfer. However, the Secretary shall not be required to satisfy the public notice requirements of this section or make written findings of fact and conclusions of law in approving a temporary transfer under this subsection. If the Secretary approves a temporary transfer under this subsection, the Secretary shall specify conditions to protect other water users. A temporary transfer shall not exceed six

months in duration, but the approval may be renewed for a period of six months by the Secretary based on demonstrated need as set forth in this subsection.

(r) Relationship to Federal Law. – The substantive restrictions, conditions, and limitations upon surface water transfers authorized in this section may be imposed pursuant to any federal law that permits the State to certify, restrict, or condition any new or continuing transfers or related activities licensed, relicensed, or otherwise authorized by the federal government. This section shall govern the transfer of water from one river basin to another unless preempted by federal law.

(s) Planning Requirements. – When any transfer for which a certificate was issued under this section equals or exceeds eighty percent (80%) of the maximum amount authorized in the certificate, the applicant shall submit to the Department a detailed plan that specifies how the applicant intends to address future foreseeable water needs. If the applicant is required to have a local water supply plan, then this plan shall be an amendment to the local water supply plan required by G.S.143-355(l). When the transfer equals or exceeds ninety percent (90%) of the maximum amount authorized in the certificate, the applicant shall begin implementation of the plan submitted to the Department.

(t) Statement of Policy. – It is the public policy of the State to maintain, protect, and enhance water quality within North Carolina. It is the public policy of this State that the reasonably foreseeable future water needs of a public water system with its service area located primarily in the receiving river basin are subordinate to the reasonably foreseeable future water needs of a public water system with its service area located primarily in the source river basin. Further, it is the public policy of the State that the cumulative impact of transfers from a source river basin shall not result in a violation of the antidegradation policy set out in 40 Code of Federal Regulations § 131.12 (1 July 2006 Edition) and the statewide antidegradation policy adopted pursuant thereto.

(u) Renewal of Certificate. – A petition to extend or renew a certificate shall be treated as a new petition. (1993, c. 348, s. 1; 1997-443, ss. 11A.119(a), 15.48(c); 1997-524, s. 1; 1998-168, s. 4; 2001-474, s. 28; 2007-484, s. 43.7C; 2007-518, s. 3; 2008-125, s. 1; 2008-198, s. 11.5; 2010-155, ss. 2, 3; 2011-398, s. 50.)