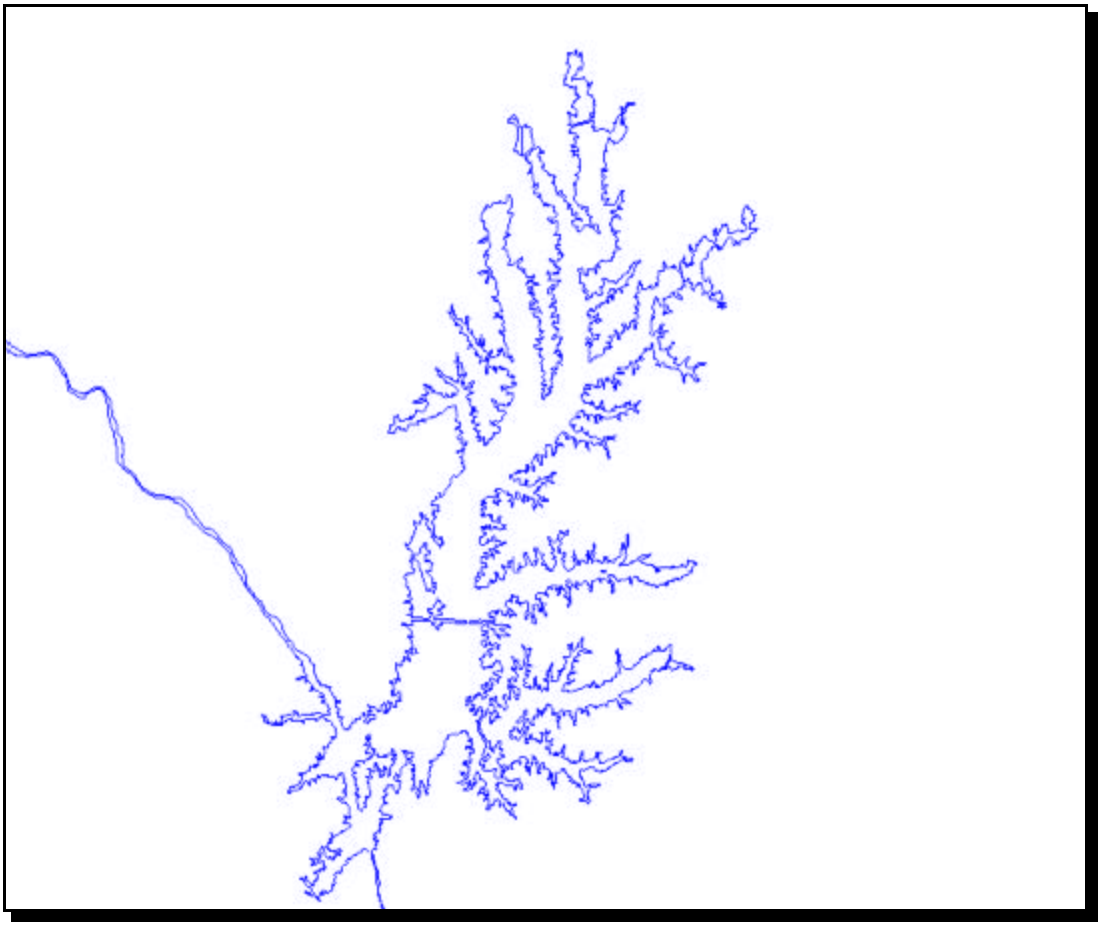
JORDAN LAKE WATER SUPPLY STORAGE ALLOCATION & INTERBASIN TRANSFER RECOMMENDATIONS

ROUND TWO



September 2000

Water Allocation Committee
Environmental Management Commission

Division of Water Resources
Department of Environment and Natural Resource

EXECUTIVE SUMMARY

The State of North Carolina has been assigned the use of the entire water supply storage in B. Everett Jordan Lake and, under GS 143-354(a)(11), can assign this storage to any local government having a need for water supply storage. Administrative rule T15A: 02G.0500 describes the specific procedures used when allocating the Jordan Lake water supply storage. The two main criteria for Jordan Lake water supply allocations are future water needs and availability of alternative water supplies. Also, the administrative rule requires the Environmental Management Commission (EMC or Commission) to coordinate the review of any allocation requests with the certification of any interbasin transfers that maybe required.

In June 1997, the Division of Water Resources (DWR or Division) held a public hearing on its recommendations for Jordan Lake Water Supply Storage Allocations for round two. In December 1997, the Commission adopted the recommendations of the Hearing Officer and the Director of the Division:

1. no allocation to the City of Durham;
2. no allocation to the City of Fayetteville;
3. no allocation to the City of Greensboro;
4. allocating 2.0 million gallons of water per day (mgd) to Holly Springs;
5. deferring its decision on allocations for Cary/Apex, Morrisville, and Wake/RTP until the interbasin transfer review process is completed; and
6. deferring its decision on Chatham and Harnett Counties' applications until the Commission takes action on those applications requiring interbasin transfer certification.

Allocation Recommendations

The Division of Water Resources' recommendations are summarized in Table 1 (below). The Division's allocation recommendations are consistent with the December 1997 EMC decision. The Division recommends:

1. no increase in Chatham County's existing allocation (currently 6.0 mgd);
2. no allocation to Harnett County;
3. allocating an additional 5.0 mgd to the Towns of Cary and Apex (for a total allocation of 21.0 mgd);
4. allocating 2.5 mgd to the Town of Morrisville; and
5. allocating 1.5 mgd to Wake County/Research Triangle Park.

The allocations to Cary/Apex, Morrisville and Wake/RTP involve interbasin transfers. Recommendations concerning these interbasin transfers are below.

Table 1. Jordan Lake Water Supply Storage Allocations for Round Two [a]

Applicant	Current Allocation (mgd)	Requested Additional Allocation (mgd)	Recommended Additional Allocation (mgd)	Interbasin Transfer Certification Required
Chatham County	6.0	7.0	0.0	No
Durham	none	25.0	0.0	No
Fayetteville	none	20.0	0.0	No
Greensboro	none	25.0	0.0	No
Harnett County	none	12.0	0.0	No
Holly Springs	2.0 [b]	4.5 [b]	0.0	No
Cary/Apex	16.0	29.0	5.0	Yes
Morrisville	none	4.5	2.5	Yes
Wake County/ Research Triangle Park	none	3.5	1.5	Yes
Total	24.0	130.5	9.0	

(a) Allocations obtained are actually a percentage of the water supply storage in Jordan Lake. However, since all (100 percent) of the water supply storage has an estimated safe yield of 100 mgd, allocations are conveniently expressed here 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.

(b) Holly Springs had requested an allocation of 4.5 mgd and was granted an allocation of 2.0 mgd in the December 1997 EMC decision.

Interbasin Transfer Recommendations

As part of their allocation requests, the Towns of Cary, Apex and Morrisville, and Wake County (for RTP South) have petitioned the EMC for an increase in the existing Cary/Apex interbasin transfer (IBT) certificate from 16 to 27 million gallons per day (mgd). The transfer diverts water from the Jordan Lake (Haw River) subbasin to the Neuse River subbasin.

To support their petition for transfer, the petitioners prepared an Environmental Impact Statement (EIS). The Cape Fear River Basin Model was use to assess the impact of the transfer on reservoir operations and downstream flows. Model runs for seven alternatives were evaluated for present and 2030 demands. The EIS determined that the transfer will not have any significant direct impacts on either the source or receiving basin. Secondary effects from growth, such as increased runoff, erosion and loss of open space, are expected to have negative impacts on water quality and fish and wildlife habitat. These impacts will be mitigated to a large extent through existing regulations and programs, as well as new initiatives.

The Division held a public hearing on the draft EIS on June 13, 2000. Following completion of a second public review, the petitioners will present their transfer petition and supporting documentation to the EMC Water Allocation Committee to forward to the full EMC. The EMC will consider the transfer requests at the same time as Jordan Lake allocations. If the EMC approves the project for hearing, a public hearing will be held following a 30-day public notice period. The EMC will make a final decision after reviewing the hearing officer's report.

Based on a careful review of the EIS and public record, the Division of Water Resources recommends that the EMC grant the petitioners' request for an IBT certificate of 27 mgd subject to the following conditions:

Condition No. 1. The Towns of Cary and Apex will manage the authorized transfer amount in such a way that none of the individual Jordan Lake water supply allocation holders (Cary/Apex, Morrisville, and Wake County) are prevented from fully using their respective allocations.

Condition No. 2. Prior to exceeding 80 percent of their permitted transfer amount, or 21.6 mgd on a maximum day basis, the Towns of Cary and Apex shall begin construction of the facilities required to return reclaimed water to the Cape Fear Basin. The Towns may be exempted from this requirement if they can demonstrate to the satisfaction of the Division of Water Resources that they can avoid exceeding their permitted interbasin transfer amount.

Condition No. 3. Prior to transferring water under this certificate, the Towns of Cary and Apex will work with the Division of Water Resources to develop a compliance and monitoring plan subject to approval by the Division. The plan will include methodologies and reporting schedules for reporting the following information: maximum daily transfer amounts, compliance with permit conditions, progress on mitigation measures, and drought management and reporting. A copy of the approved plan will be kept on file with the Division for public inspection. The Division of Water Resources will have the authority to make modifications to the compliance and monitoring plan, as necessary.

Condition No. 4. Prior to transferring water under this certificate, the Towns of Cary, Apex, and Morrisville, and Wake County (for RTP South) will develop individual water shortage response plans, subject to approval by the Division. The Towns of Cary and Apex will develop a drought management plan for the interbasin transfer, incorporating the individual water shortage response plans and subject to approval by the Division. The plans will tie specific actions to the percent storage remaining in each of the petitioners' Jordan Lake water supply accounts. A copy of the approved plans will be kept on file with the Division for public inspection. The Division of Water Resources will have the authority to approve modifications to the drought management plan, as necessary.

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BACKGROUND

In June 1997, the Division of Water Resources held a public hearing on its recommendations for Jordan Lake Water Supply Storage Allocations. In December 1997, the North Carolina Environmental Management Commission (EMC) adopted the recommendations of the Hearing Officer and the Director of the Division of Water Resources, deferring its decision on Chatham and Harnett Counties' applications until the Commission takes action on those applications requiring interbasin transfer certification. This document provides recommendations for those allocation requests involving interbasin transfer certification and the requests of Chatham and Harnett Counties.

Schedule

In May 1996, the Division of Water Resources (DWR) received a request to re-open the allocation process from the Towns of Cary and Apex for an increase in their water supply storage in B. Everett Jordan Lake. This was the first time since the initial allocation in 1988 that the allocation process had been opened. When such requests are received, it is Division policy to open the allocation process to anyone interested in either obtaining a new allocation or increasing an existing allocation.

When the request was received on May 8, 1996, the Division of Water Resources began an extensive notification effort, including:

- existing allocation holders and previous applicants;
- registered water withdrawers in the Cape Fear Basin;
- public water systems and waste water dischargers downstream of Jordan Lake; and
- municipal and county officials in each county in the Cape Fear River basin or within a 50-mile radius of Jordan Lake.

The Division of Water Resources held a public information meeting on June 27, 1996 to explain the allocation process in greater detail and to receive comments about the process. Based upon the applications received, the Division of Water Resources made recommendations for water supply storage allocations in a report in March 1997. With the approval of the EMC, a public hearing was held to discuss the proposed allocations in June 1997. After that public hearing, the EMC made a final decision for those allocations that did not involve interbasin transfer (i.e., Holly Springs). For allocations that involve an interbasin transfer (i.e., Cary/Apex, Morrisville, and Wake/RTP), the EMC decisions on both the allocation and interbasin transfer certification were deferred until completion of the interbasin transfer review process. The EMC also deferred decisions on allocations for Chatham and Harnett County at that time. A summary of that decision is shown in Figure 1. The final step for each applicant receiving an allocation will be entering into a repayment contract with the State for the water supply costs.

Figure 1. December 1997 Environmental Management Commission Decision

I. Jordan Lake Water Supply Storage Allocations [(a)]

Applicant	Current Allocation (mgd)	Requested Additional Allocation (mgd)	Recommended Additional Allocation (mgd)	Interbasin Transfer Certification Required
Chatham County	6.0	7.0	(b)	No
Durham	none	25.0	0.0	No
Fayetteville	none	20.0	0.0	No
Greensboro	none	25.0	0.0	No
Holly Springs	none	4.5	2.0	No
Cary/Apex	16.0	29.0	5.0	Yes
Morrisville	none	4.5	2.5	Yes
Wake County/ Research Triangle Park	none	3.5	1.5	Yes
Harnett County	none	12.0	(b)	

(a) Allocations obtained are actually a percentage of the water supply storage in Jordan Lake. However, since all (100 percent) of the water supply storage has an estimated safe yield of 100 mgd, allocations are conveniently expressed here 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.

(b) Chatham and Harnett Counties' allocation requests will be processed with those requests requiring interbasin transfer certification.

II. Delay final decision on those allocation requests requiring interbasin transfer certification under G.S. 143-215.22I (as indicated in the summary table above). The final decision will not be made until the interbasin transfer review is completed.

III. Modify the water supply storage contracts. Existing contracts specify the weekly average withdrawal hat cannot be exceeded by the allocation holder. The water supply storage contracts between the State and the allocation holders will be modified to base the contract on the use of the storage allocated, rather than on a maximum rate of withdrawal. The contract will also require the allocation holder to develop a drought and water shortage response plan acceptable to both the State and the U.S. Army Corps of Engineers.

ALLOCATION CRITERIA

The two main criteria for Jordan Lake allocations are future water needs and availability of alternative water supplies. Applications submitted in 1996 and 1997 contained the following information:

- projected population and water use
- safe yield estimates of current and alternative sources
- description of conservation and demand management practices
- outline of plan to use water from Jordan Lake
- plan for monitoring water quality
- cost of developing water supply facilities at Jordan Lake
- costs of alternative sources of supply

Water demand is computed on an average daily basis to correspond with the recommended contract changes and the reservoir safe yield estimate. The original 30 year planning horizon (the year 2025) was revised to a 20 year planning horizon (the year 2015) to allow for greater flexibility in making future allocations.

Future Water Needs

Applicants provided estimates of water use for the period 1995 through 2025. For each applicant, the Division also performed an independent analysis of future need. The analysis considered factors affecting water demand, including:

- population growth
- service area expansion
- conservation
- unaccounted water use
- interconnections
- industrial development

The independent analysis followed several general steps. First, the Division estimated future service population out to the year 2025. The starting point was the Office of State Planning (OSP) population forecast. In most cases, OSP estimates were modified to reflect additional information provided by the applicants.

The second step was to develop future per capita water use rates that include the effects of water conservation, industrial growth, and changing urban patterns. Conservation savings are expected to result from changes in plumbing codes, improved system maintenance, customer education, and adoption of water reuse.

In the third step, the Division estimated future water use by multiplying estimated service population by the future per capita rate. The analysis assumed all water use attributable to new population would be consumed at the future per capita rate. The analysis also assumed that water use by the current population would gradually attain the future per capita rate due to fixture

replacement and other conservation programs. The Division assumed “replacement” would occur at an annual rate of 3 percent.

The allocation process imposes a cost on both the State and local governments. Therefore, the Division applied an additional test to be sure applicants would not need to apply for an increased allocation for at least the next 5 to 10 years (year 2005). The Division used a common rule of thumb for water supply planning: when a water system’s average daily demand is at or exceeds 80 percent of their available yield, then a system needs to start expansion of their existing supplies. The Division applied this rule of thumb to the applicants’ 2005 projected average daily water demands to determine if there was adequate water for the next 10 years.

Alternatives

Applicants were required to provide information on alternative water supplies that could be developed in lieu of a Jordan Lake allocation. Alternatives may include bulk purchases from other suppliers, new reservoir and well development, and reservoir expansion. The list of alternatives should have included all potential sources that the system had previously evaluated. Systems were not required to perform new feasibility studies of other potential supplies. The Division evaluated each alternative based on financial cost and institutional difficulty of developing the resource in comparison with a Jordan Lake withdrawal. The Division also considered the impact of each alternative on interbasin transfer and other environmental impacts.

In cases where a system has a viable alternative to Jordan Lake, the Division has recommended an adjustment in the allocation request to account for the alternative supply.

Chatham and Harnett Counties

Chatham County had submitted a formal application in November 1996. They submitted updated information in February 1997, March 1997, May 2000, and July 2000. Harnett County did not submit a formal application during 1996-1997, but provided updates to their Local Water Supply Plan (LWSP) at the Public Hearing in June 1997, and again in July 2000. In both cases, DWR analyzed their future water needs based on a planning horizon of 2015. These analyses indicated that a detailed analysis of their alternative water supplies was unnecessary.

ALLOCATION RECOMMENDATIONS

Allocation Recommendations

The Division of Water Resources' recommendations are summarized in Table 1. The Division's allocation recommendations are consistent with the December 1997 EMC decision. Furthermore, the Division recommends no increase in Chatham County's existing allocation and no allocation to Harnett County. These systems have sufficient water supplies to satisfy their projected 2015 water demands, as demonstrated in Appendices A and B.

Table 1. Jordan Lake Water Supply Storage Allocations for Round Two [(a)]

Applicant	Current Allocation (mgd)	Requested Additional Allocation (mgd)	Recommended Additional Allocation (mgd)	Interbasin Transfer Certification Required
Chatham County	6.0	7.0	0.0	No
Durham	none	25.0	0.0	No
Fayetteville	none	20.0	0.0	No
Greensboro	none	25.0	0.0	No
Harnett County	none	12.0	0.0	No
Holly Springs	2.0 [(b)]	4.5 [(b)]	0.0	No
Cary/Apex	16.0	29.0	5.0	Yes
Morrisville	none	4.5	2.5	Yes
Wake County/ Research Triangle Park	none	3.5	1.5	Yes
Total	24.0	130.5	9.0	

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(b) Holly Springs had requested an allocation of 4.5 mgd and was granted an allocation of 2.0 mgd in the December 1997 EMC decision.

Watershed Diversions

The Jordan Lake watershed is that portion of the Haw River sub-basin upstream of Jordan Lake Dam. To protect the yield of Jordan Lake for water supply and water quality purposes, the current rules limit allocations that will result in diversions out of the lake's watershed to 50 percent of the total water supply yield, or 50 mgd. This provision is specific to the Lake's

watershed because water returned below the dam does not replenish the reservoir's water supply and water quality pools. The EMC 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.

This 50 mgd limit refers to annual average diversions, since yields are typically based on annual averages. Currently, 19.4 percent of the 100 mgd yield is diverted out of the Lake's watershed. Table 2 summarizes the estimated diversions out of the Lake's watershed, based on the 2015 demand projections and the recommended allocation amounts. As shown, 26.5 mgd of the 42.5 mgd total recommended allocation would be diverted out of the Lake's watershed as of 2015, leaving 23.5 mgd of the water supply storage still available for future allocations outside the Lake's watershed under the current 50 mgd limit.

This administrative rule has raised a number of water quality and public health issues during the allocation process. A computer model was developed as part of the interbasin transfer certification process. Division staff will use the model to determine if a joint study with the Corps, the Division of Water Quality, and the Division of Environmental Health is needed to reconsider the 50 percent rule. For this current, second round of allocations the limit does not need to be revised.

Table 2. Estimated 2015 Jordan Lake Watershed Diversions

System	Total Recommended Allocation (mgd) [1]	2015 Watershed Diversion (mgd) [2]
Chatham County	6.0	3.0
Durham	0.0	0.0
Fayetteville	0.0	0.0
Greensboro	0.0	0.0
Holly Springs	2.0	2.0
Harnett County	0.0	0.0
Cary/Apex	21.0	18.3
Morrisville	2.5	2.5
Wake/RTP South	1.5	1.2
Orange County [3]	1.0	1.0
OWASA [3]	10.0	0.0
TOTAL	**44.0**	**28.0**

[1] Includes existing allocation amounts
[2] Based on preferred alternative in the *Environmental Impact Statement for RTP South and the Towns of Cary, Apex, and Morrisville in Wake County*
[3] Existing allocation holder, but did not apply for additional allocation

INTERBASIN TRANSFER RECOMMENDATIONS

As part of their water supply allocation requests, the Towns of Cary, Apex and Morrisville, and Wake County (for RTP South) have petitioned the EMC for an increase in the Cary/Apex interbasin transfer (IBT) certificate from 16.0 to 27.0 million gallons per day (mgd). The transfer diverts water from the Jordan Lake (Haw River) subbasin to the Neuse River subbasin. The Division of Water Resources has reviewed the petitioners' request for a certificate and recommends that the Commission grant a certificate, with conditions, for the requested amount.

Statutory Authority

In 1993, the Legislature adopted the Regulation of Surface Water Transfers Act (GS 143-215.22I). The intention of the law is to regulate large surface water transfers between river basins by requiring a certificate from the Environmental Management Commission (EMC). In general, a transfer certificate is required for a new transfer of 2.0 million gallons per day (mgd) or more and for an increase in an existing transfer by 25 % or more, if the total including the increase is 2.0 mgd or more. The law, as amended, requires that an environmental assessment be prepared for all petitions for certification. The determination of whether an environmental impact statement is also required will be made in accordance with the State Environmental Policy Act (SEPA).

Before granting an IBT certificate, the EMC must consider the following seven criteria:

(1) The necessity, reasonableness, and beneficial effects of the transfer
(2) Detrimental effects on the source river basin, including cumulative effects of any transfers or consumptive use
(3) Detrimental effects on the receiving basin
(4) Reasonable alternatives to the proposed transfer
(5) Use of impounded storage
(6) Purposes and water storage allocations in a US-COE multi-purpose reservoir
(7) Any other facts or circumstances necessary to carry out law

A certificate will be granted for a transfer if the applicant establishes and the EMC concludes that the benefits of the proposed transfer outweigh the detriments of the transfer, and the detriments have been or will be mitigated to a reasonable degree. The EMC may grant the petition in whole or in part, or deny it, and may require mitigation measures to minimize detrimental effects.

Review Process

At its December 1997 meeting, the EMC voted to delay decisions on those allocation requests requiring an IBT certificate until all documentation has been completed for the IBT requests. Four of the Jordan Lake allocation requests (Towns of Cary, Apex, Morrisville, and Wake County/Research Triangle Park) will have an associated IBT totaling about 24 mgd in

2030. The Division recommended issuing a single certificate for this group of petitioners, since they share common treatment and discharge facilities.

The Division subsequently worked with the petitioners to develop the required environmental documentation. Due to the complexity of issues and concerns from downstream communities, the Division recommended that the petitioners prepare an Environmental Impact Statement (EIS). The key steps of the review process are shown below in Table 3.

In order to assess the impact of the transfer on reservoir operations and downstream flows, the petitioners participated in the development of a Cape Fear River Basin Model (additional discussion follows this section). Model runs for seven alternatives were evaluated for present and 2030 demands.

The Division held a public hearing on the draft EIS on June 13, 2000. Three speakers provided oral comments. An additional 21 written comments were received through the State Clearinghouse. The majority of comments cited downstream concerns such as water quality, adequate water supply, and economic equity. A summary of public comments is provided in Appendix D.

Table 3. Review Process for Cary, Apex, Morrisville, and Wake County (RTP South) Interbasin Transfer

Dates	Activity
1997	EIS Scoping
1997-2000	Development of Cape Fear Basin Model
December 1999	Draft EIS Submitted
December – June 2000	DENR Review
June - July 2000	60-Day Public Review and Public Hearing
August 2000	Final EIS Submitted
August - Sept. 2000	30-Day Public Review
September 2000	Record of Decision
September 2000	EMC Water Allocation Committee
October 2000	Full EMC
November 2000	EMC Holds Public Hearing
February 2001	EMC Issues Decision

Following completion of a second public review, the petitioners will present their transfer petition and supporting documentation to the EMC Water Allocation Committee to forward to the full EMC. The EMC will consider the transfer requests at the same time as Jordan Lake allocations. If the EMC approves the project for hearing, a public hearing will be held following a 30-day public notice period. The EMC will make a final decision after reviewing the hearing officer's report.

Evaluation

The Division of Water Resources has evaluated the applicants' petition and supporting EIS with respect to the seven criteria listed in the IBT law [GS 143-215.22I(f)]. A summary of this evaluation follows:

(1) Necessity, Reasonableness, and Benefits of the Transfer

The 27.0 mgd requested transfer amount is based on the petitioners' combined 2030 projected transfer of 24.1 mgd, plus 10% for contingencies. The transfer amount is consistent with the petitioners' requested Jordan Lake allocations, which the Division finds reasonable (see previous discussion). Note that the planning period for the IBT request extends beyond the planning period for allocations. It is assumed that the petitioners would need addition allocations or other new water supplies prior to 2030. This transfer amount also assumes that Cary/Apex will construct a regional water reclamation facility that will discharge to the Cape Fear River, therefore limiting the need for additional future transfers.

(2) Detrimental Effects on Source Basin

The Cape Fear River Basin Model was used to evaluate the transfer's direct environmental impacts to the Haw River subbasin, including the main stem of the Cape Fear River downstream to Fayetteville. As required under the IBT statute, local water supply plans were considered in developing the model. In addition, industrial and agricultural withdrawals were model inputs. A comparison of the seven alternatives showed that the proposed transfer will not have any significant impacts on Lake levels, water supply needs, or downstream flows compared to the other alternatives and base scenarios. Since wastewater assimilation is directly related to flows, no significant changes in wastewater assimilation are expected. Similarly, no impacts were identified for hydropower generation, navigation or recreation.

Secondary effects from growth such as increased runoff, erosion, and loss of open space are expected to have negative impacts on water quality and fish and wildlife habitat. These impacts will be mitigated to a large extent through existing regulations and programs, as well as new initiatives. The most notable of these initiatives is Cary's Open Space and Historic Resources Plan, which will identify and protect sites of high value. Cary proposes to spend $12 million to implement this initiative. See the IBT petition for more detailed information on mitigation measures.

(2a) Cumulative effect on Source Basin of any transfers or consumptive water use projected in local water supply plans

Local water supply plan data, including current and projected water use and water transfers, were used to develop the input data sets for the Cape Fear River Basin Model. The model was used to evaluate current and future scenarios of basin water use. The model runs demonstrated that there were no significant direct impacts, including cumulative impacts, due to the proposed transfer.

(3) Detrimental Effects on Receiving Basin

The proposed transfer will utilize existing permitted wastewater discharges to the Neuse River subbasin; therefore, no plant expansions will be required. Previous studies for the existing plants indicated no significant direct impacts to water quality on the receiving streams. Because stream flows in the Neuse River subbasin are not expected to change significantly due to the proposal, no impacts are likely to occur to navigation, recreation, or flooding.

Secondary effects from growth, such as increased runoff, erosion and loss of open space, are likely to negatively impact water quality and fish and wildlife habitat in the receiving basin, for the same reasons as in the source basin. Existing regulations and programs, as well as new initiatives will mitigate these impacts to a large extent.

(4) Alternatives to Proposed Transfer

The petitioners evaluated six alternatives to the proposed transfer. The alternatives considered include:

Alternative 1A: No IBT Increase and No Additional Jordan Lake Allocations

- No increase in the existing 16-mgd (average day basis) Jordan Lake allocation
- No increase in the existing IBT certificate (16 mgd on a maximum day basis)
- No construction of a regional treatment and water reclamation facility
- No other additional discharges to the source basin, in western Wake County

Alternative 1B: No IBT Increase with Additional Jordan Lake Allocations

- Increases in Jordan Lake water supply allocations
- No increase in existing IBT certificate (16 mgd on maximum day basis)

Alternative 2: Obtain Water from the Neuse River Basin

- No increase in existing IBT certificate (16 mgd)
- Regional Cape Fear WWTP
- Purchase of finished water from the Neuse River basin

Alternative 3: Increase Wastewater Discharges to Cape Fear River Basin

- No increase in existing IBT certificate (16 mgd)
- Additional Jordan Lake water supply allocations
- Relocation of existing Apex and Cary WWTP discharges to Cape Fear basin
- Regional Cape Fear WWTP

Alternative 4: Merger of Water and Sewer Utility Operations of Town of Cary and City of Durham

Alternative 5: No Regional Treatment and Water Reclamation Facility

Table 4 (below) compares the proposed transfer with the six alternatives. Factors used in the comparison of alternatives include:

- required increase in interbasin transfer
- direct and indirect impacts
- ability to meet future water needs
- capital cost
- construction of a regional water reclamation facility
- outside water purchases
- expansion of Cary/Apex water treatment plant

Except for Alternative 1A, which does not serve the projected water supply needs of the petitioners, the alternatives will not substantially reduce the expected impacts of the proposed transfer increase. The only significant impacts associated with the proposed transfer are secondary impacts associated with growth. All of the alternatives will have essentially the same growth related impacts due to high rates of regional growth. The Commission finds that the proposed alternative is the most feasible means of meeting the petitioners' long-term water supply needs while minimizing overall impacts and cost.

Table 4. Summary of Alternatives

Item	Alternatives						
	Proposed Action	**1A No Action**	**1B No Action**	**2 Water From Neuse**	**3 Move WWTP Discharges**	**4 Merger with Durham**	**5 No Regional WWTP**
Increase in IBT (mgd)	11	0	0	0	0	0	29
Significant Direct Impacts	No	No	No	Yes	Yes	No	Yes
Significant Secondary Impacts	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Jordan Lake Allocations	Yes	No	Yes	Yes	Yes	Yes	Yes
2030 MDD Water Demands (mgd)	53.6	19	43.8	53.6	53.6	53.6	53.6
Maximum IBT (mgd)	25[1]	16	16	16	16	19 (Neuse to Haw)	45
Total Capital Cost (million)	$225.7	$11.1	$206.6	$206.9	$279	$248	$84.0
Water Reuse	3.8 mgd	3.8 mgd	3.8 mgd	3.8 mgd	3.8 mgd	3.8 mgd	3.8 mgd
Construct Regional WWTP (2030 max month capacity)	18.0 mgd	No	18.0 mgd	18.0 mgd	18.0 mgd	18.0 mgd	No
Finished Water Purchases (2030 max day demand)	No	No	No	9.2 mgd	No	No	No
Expand Cary/Apex WTP (capacity beyond 40 mgd, max day basis)	20.0 mgd	No	9.0 mgd	9.0 mgd	20.0 mgd	20.0 mgd	20.0 mgd

Note: [1] Projected IBT in 2030 is approximately 25 mgd. The requested amount of 27 mgd includes some contingency.

(5) Impoundment Storage

This criterion is not applicable, as the petitioners do not have an impoundment.

(6) Jordan Lake Purposes/Water Supply

Jordan Lake is a multi-purpose reservoir constructed by the USCOE. The lake is designed to provide a water supply safe yield of about 100 mgd. Currently, only about one-third of the water supply has been allocated.

(7) Other Considerations

The petitioners are actively pursuing water conservation and reuse. The Towns of Cary and Apex provide finished water to several communities in their region.

Compliance and Monitoring

The Division requested the petitioners to include a compliance and monitoring plan as part of the petition document. The plan specifies the following reports:

(1) Calculation of daily IBT amount on a maximum daily basis, submitted monthly
(2) Status of compliance with permit condition No. 1, submitted annually
(3) Status of key elements in mitigation plan, submitted annually
(4) Drought management reporting and conditions, submitted during drought events

Permit Condition No. 3 requires the petitioners to have an approved compliance and monitoring plan prior to transferring additional water under this certificate. The Division will work with the petitioners to develop a finalized plan.

Drought Management Plan

The IBT statute requires that petitioners prepare a drought management plan. The plan must show what actions a certificate holder will take to protect the source basin during drought conditions. The IBT petition includes a description of the water shortage response policies for each of the four petitioners. Actions are tied to the number of days remaining in each party's Jordan Lake water supply pool. Note that RTP South does not operate a water system, but is contractually obligated to implement any conservation measures that Cary puts into effect.

Permit Condition No. 4 requires the petitioners to have an approved drought management plan prior to transferring additional water under this certificate. The Division will work with the petitioners to develop finalized plans.

Recommendation

After careful review of the Environmental Impact Statement and public record, the Division of Water Resources finds that the benefits of the transfer outweigh the detriments, and the detriments have been or will be mitigated to a reasonable degree. **The Division recommends that the Commission grant the applicant's request for an IBT certificate of 27 mgd, subject to the following conditions:**

Condition No. 1. The Towns of Cary and Apex will manage the authorized transfer amount in such a way that none of the individual Jordan Lake water supply allocation holders (Cary/Apex, Morrisville, and Wake County) are prevented from fully using their respective allocations.

Explanation: The Division has recommended that the Commission issue the transfer certificate jointly to the Towns of Cary and Apex, who own the facilities used to transfer the water. This arrangement provides some flexibility to the petitioners to maximize use of their authorized transfer amount. The above condition ensures that sufficient transfer permit capacity is available to each of the four petitioners to use their associated water supply allocations.

Condition No. 2. Prior to exceeding 80 percent of its permitted transfer amount, or 21.6 mgd on a maximum day basis, the Towns of Cary and Apex shall begin construction of the facilities required to return reclaimed water to the Cape Fear Basin. The Towns may be exempted from this requirement if they can demonstrate to the satisfaction of the Division of Water Resources that they can avoid exceeding their permitted interbasin transfer amount.

Explanation: The petitioners' requested transfer amount is based on the permitted discharge capacities of the South Cary, North Cary, and Apex WWTPs that discharge to tributaries of the Neuse River. The request assumes that additional wastewater flows would be discharged to the Cape Fear River through a new regional WWTP. The new plant would be needed prior to 2010 to meet projected flows. This condition is needed to insure orderly development of a regional WWTP plant.

This condition is also consistent with a provision of the IBT statute that requires facility planning. The statute specifies that when any transfer permitted under the law equals 80% of the maximum amount authorized, the applicant shall submit a plan to the Department specifying how the applicant intends to address future water needs [GS 143-215.22I(l)]. When the transfer equals 90% of the authorized amount, the applicant shall begin implementation of the submitted plan. Due to the recognized need for a regional facility that discharges to the Cape Fear River, the Division recommends that construction of a new facility commence earlier than that required under the law.

Condition No. 3. Prior to transferring water under this certificate, the Towns of Cary and Apex will work with the Division of Water Resources to develop a compliance and monitoring plan subject to approval by the Division. The plan will include methodologies and reporting schedules for reporting the following information: maximum daily transfer amounts, compliance with permit conditions, progress on mitigation measures, and drought management and reporting. A copy of the approved plan will be kept on file with the Division for public inspection. The Division of Water Resources will have the authority to make modifications to the compliance and monitoring plan, as necessary.

Explanation: The compliance and monitoring plans provide a mechanism for enforcing provisions in the permit. In addition, the Division of Water Resources will use this information to issue an annual status report for the certificate.

Condition No. 4. Prior to transferring water under this certificate, the Towns of Cary, Apex, and Morrisville, and Wake County (for RTP South) will develop individual water shortage response plans subject to approval by the Division. The Towns of Cary and Apex will develop a drought management plan for the interbasin transfer, incorporating the individual water shortage response plans and subject to approval by the Division. The plans will tie specific actions to the percent storage remaining in each of the petitioners' Jordan Lake water supply accounts. A copy of the approved plans will be kept on file with the Division for public inspection. The Division of Water Resources will have the authority to approve modifications to the drought management plan, as necessary.

Explanation: The drought management plan ensures that IBT certificate holders minimize impacts to the source river basin during drought conditions. The drought management plan is required under GS 143-215.22I(h).

MODEL RESULTS

The Cape Fear River Basin Model was used to determined the impacts of the Division of Water Resources' recommended allocations. The Cape Fear River Basin Model was developed through a multi-agency effort to assist decision makers involved in the allocation and interbasin transfer processes. MIKE BASIN modeling software was used to develop a graphical and numerical representation of water supply and demand in the Cape Fear Basin to help resolve conflicts and lead to an efficient use of water resources. The model includes the entire watershed from the headwaters down to Lock and Dam #1 near Wilmington.

Two model scenarios were developed for this purpose, a 1998 Scenario and a 2015 Scenario. The 1998 Scenario includes the best information available on water withdrawals and discharges during the year 1998. These conditions were then applied to the entire, 69 year period of record available for the model (1/1/1930-12/31/98).

The 2015 Scenario includes the Division's allocation recommendations, and projected water withdrawals and discharges for the year 2015. The 2015 Scenario also includes an operational Randleman Lake (as described in the *Environmental Impact Statement for Randleman Lake*) and the proposed regional wastewater treatment plant presented in the *Environmental Impact Statement for RTP South and the Towns of Cary, Apex, and Morrisville in Wake County*. These conditions were then applied to the entire, 69 year period of record available for the model (1/1/1930-12/31/98). See Appendix C for a more detailed description of this scenario.

A third model scenario, the Natural Scenario, is depicted in Figures 2, 3 and 4. This scenario models conditions as they would be if there were no reservoirs, and no withdrawals or discharges of any kind in the Cape Fear River Basin. These conditions were then applied to the entire, 69 year period of record available for the model (1/1/1930-12/31/98).

When reviewing the results of the model, it is important to remember that the scenarios presented should be compared with each other, not against the historic record. Comparing the results of the 1998 and 2015 scenarios indicates that the Division's recommended allocations would not negatively impact flows downstream of Jordan Lake, and would not negatively impact the reliability of the Lake's water quality pool. Figures 2, 3, and 4 depict modeled flows under the three scenarios at Lillington, Fayetteville, and the Wilmington intake above Lock and Dam #1. Note that flows in the Cape Fear River are virtually identical under the 1998 and 2015 scenarios, but that during drought conditions, flows are somewhat higher under the 2015 Scenario. Also note that flows are higher during drought conditions under the 2015 Scenario than the Natural Scenario.

Figure 5 depicts the relative reliability of the water quality pool under the 1998 and 2015 Scenarios. The chart displays the number of days in a given year that the water quality pool is depleted under a given scenario. The years depicted are the only years that this occurs during the 69 year period of record available for the model (1/1/1930-12/31/98). Note that the water quality pool is depleted less frequently under the 2015 Scenario than under the 1998 Scenario.

Figure 2. Modeled Flows at Lillington

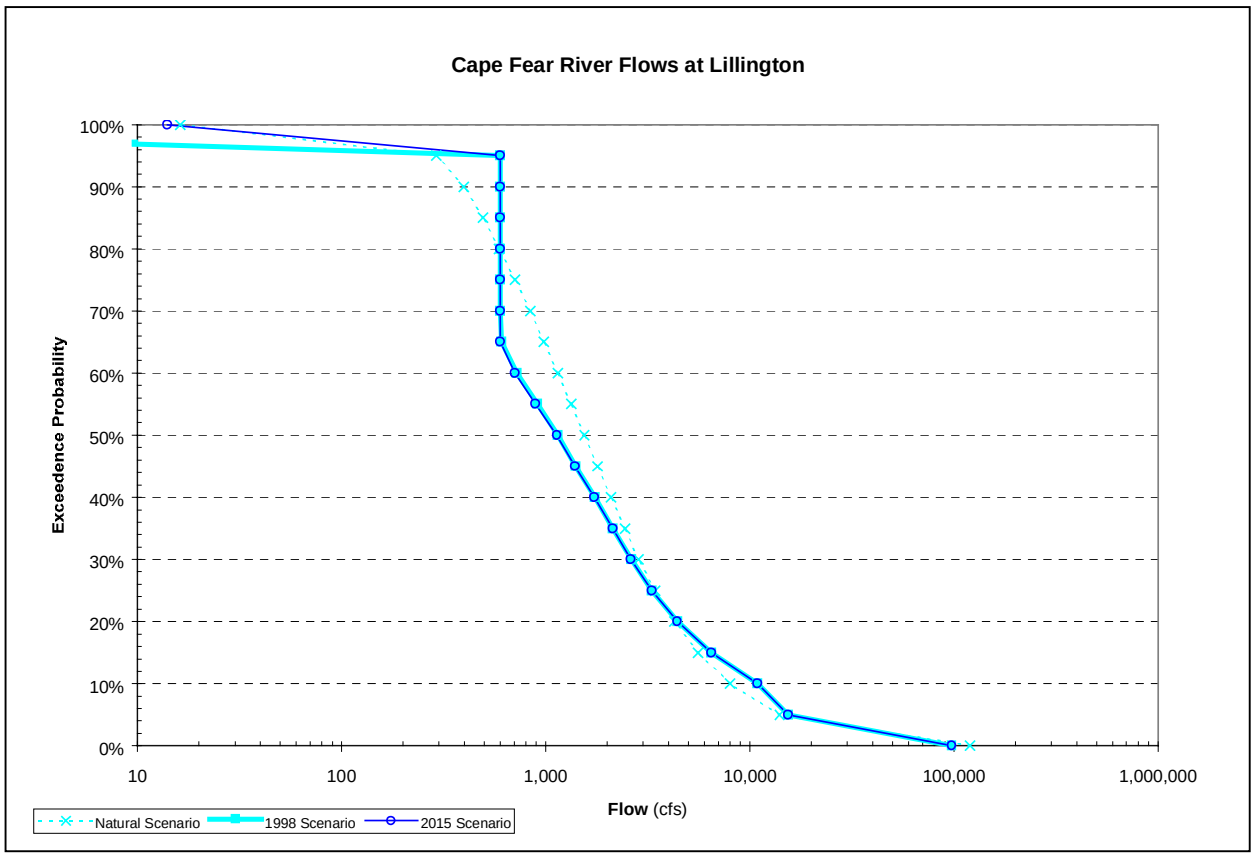


Figure 3. Modeled Flows at Fayetteville

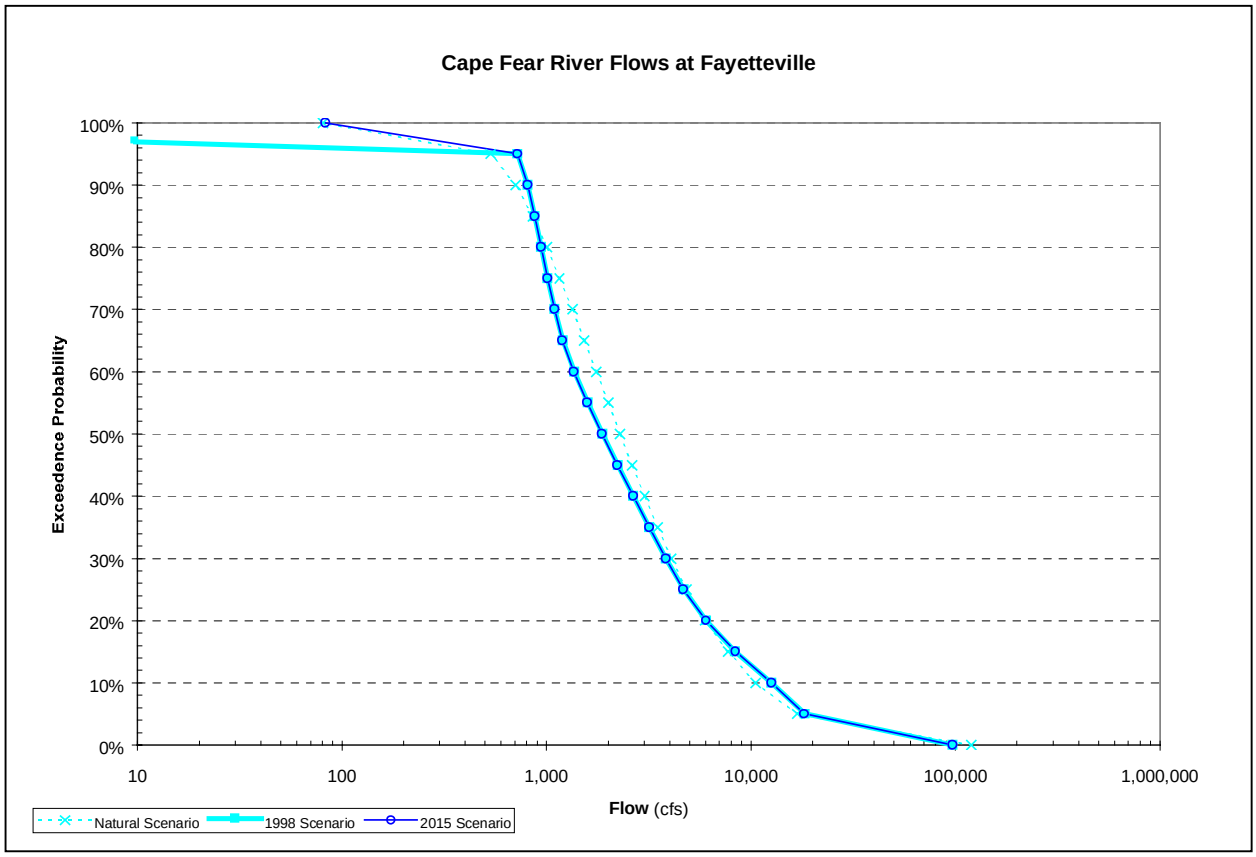


Figure 4. Modeled Flows Near Lock and Dam #1

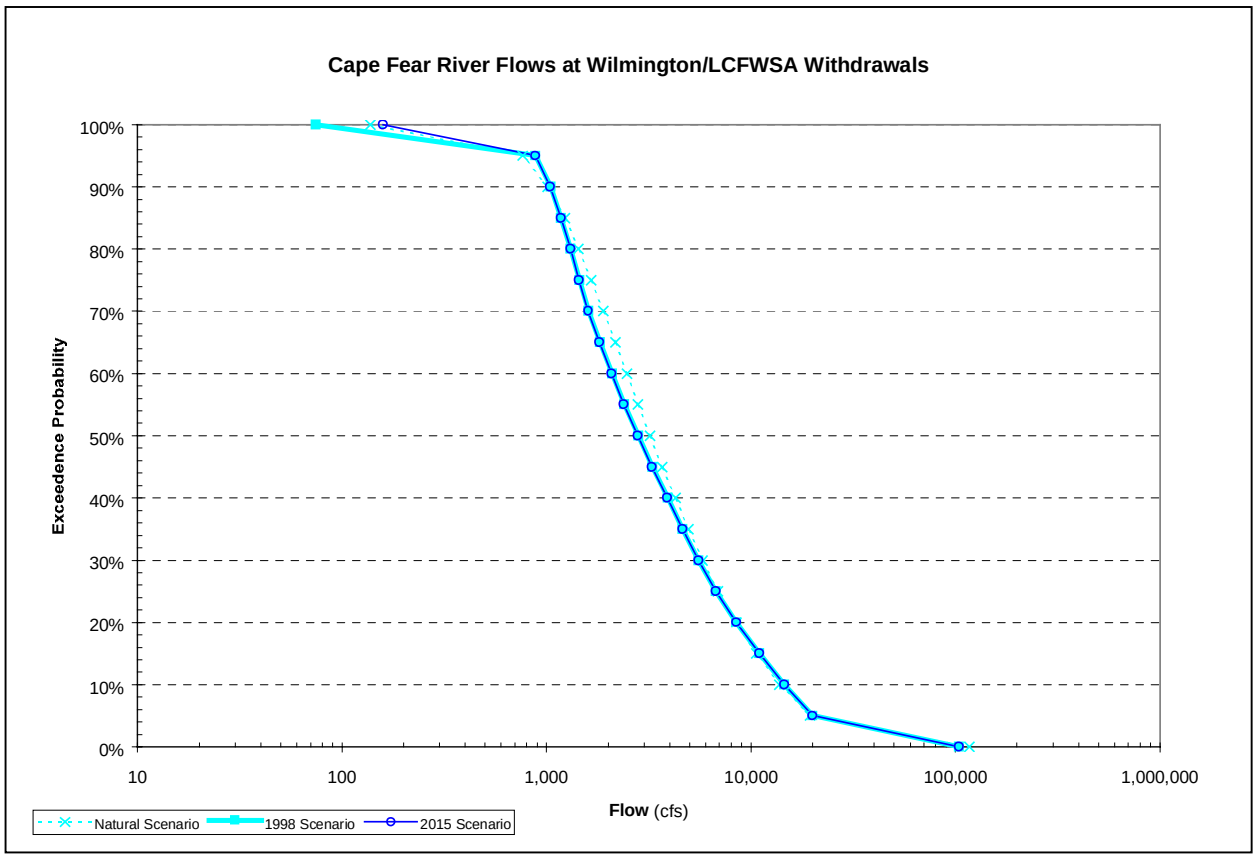
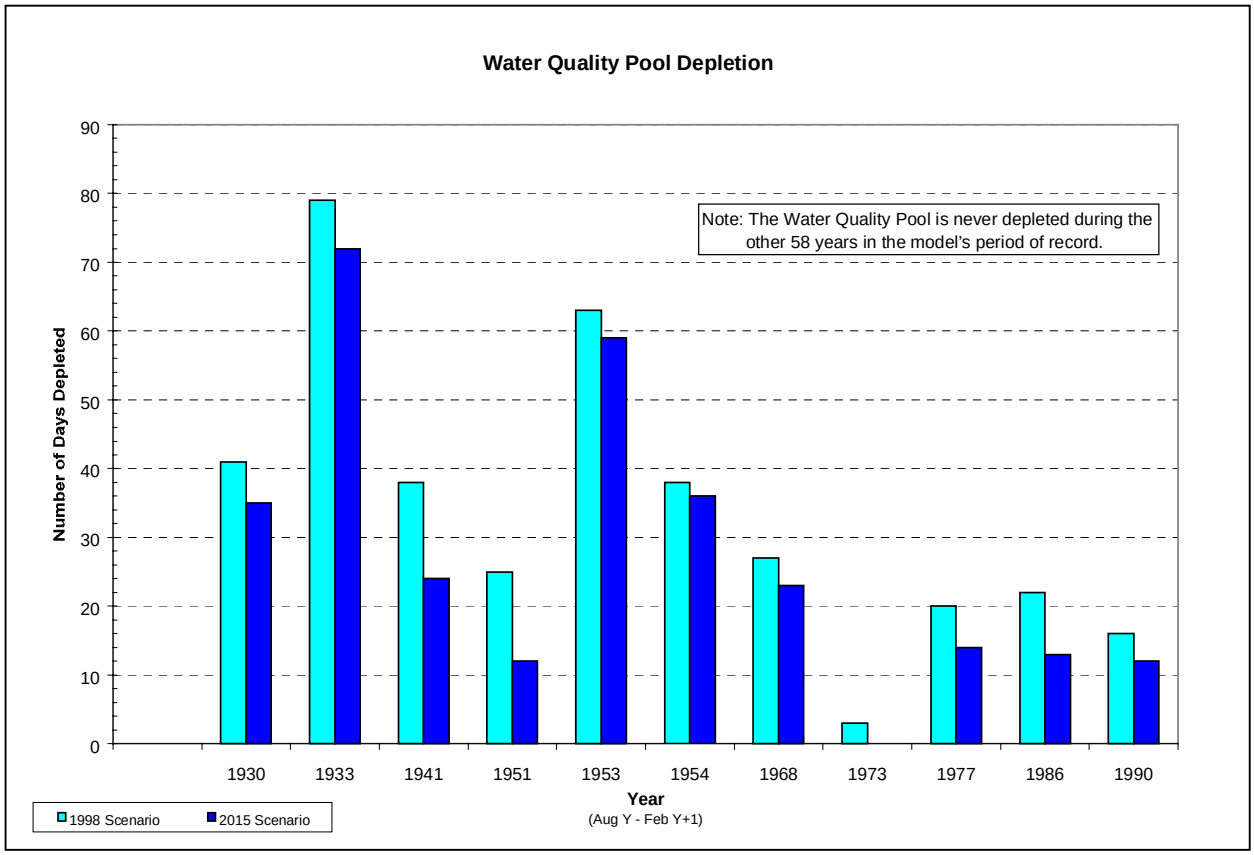


Figure 5. Modeled Jordan Lake Water Quality Pool Reliability



APPENDICES

APPENDIX A

Chatham County Needs Assessment

The Division finds that Chatham County water systems have no need of an increased Jordan Lake water supply storage allocation based on a 2015 planning horizon and information in the Chatham County Water Feasibility Study Update and the most recent Local Water Supply Plans. Total water demand is projected to be 2.96 mgd in the year 2015 (see Table A-1), based on an average day demand under their Aggressive Expansion Scenario. Chatham County currently has a Jordan Lake water supply storage allocation of 6.0 mgd, 3.04 mgd greater than the projected demand.

The Division also notes that Chatham County may fall under the requirements for an Interbasin Transfer Certificate in the future, depending upon its distribution of water from Jordan Lake to its proposed Southwest and Northwest Service Areas, and depending upon its sales of water from Jordan Lake to Siler City (see Interbasin Transfer section, p.A-5).

Table A-1: Total Water Demand

	2015 Demand (mgd)	2015 Supply (mgd)	**Deficit** (mgd)
Chatham County, All Service Areas [1]	2.96	6.00	**-3.04**
Siler City [2]	3.20	5.80	**-2.60**

Notes: [1] 2015 Demand from Table A-2. 2015 Supply = current Jordan Lake water supply storage allocation.
[2] 2015 Demand and 2015 Supply from Table A-5.

Demand Projections

The Division relied upon the Chatham County Water Feasibility Study Update for demand projections, considering its Aggressive Expansion Scenario. The Division compared the Study's five service areas with the current three service areas and their corresponding 1997 Local Water Supply Plans. The Division then calculated average daily demands for Chatham County based on the maximum daily demands and the maximum to average demand factors provided in the Study (see Tables A-2 and A-3).

Table A-2: Chatham County Service Area Demand

	1997 (mgd)[1]	2000 (mgd)[1]	2005 (mgd)[1]	2010 (mgd)[1]	**2015** (mgd)[1]	2020 (mgd)[1]	2025 (mgd)[1]
Northeast Service Area							
- Residential	0.48	0.57	0.76	1.01	1.31	1.64	2.02
- Commercial	0.09	0.10	0.14	0.17	0.21	0.26	0.31
- Unaccounted-for Water (10%)	0.06	0.07	0.09	0.12	0.15	0.19	0.23
- Treatment Losses (10%)	0.06	0.07	0.09	0.12	0.15	0.19	0.23
Subtotal	*0.68*	*0.81*	*1.07*	*1.42*	*1.82*	*2.28*	*2.79*
Southeast Service Area							
- Residential	0.04	0.05	0.06	0.07	0.09	0.11	0.13
- Commercial	0.02	0.02	0.03	0.03	0.05	0.05	0.06
- Unaccounted-for Water (10%)	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Subtotal	*0.07*	*0.07*	*0.10*	*0.12*	*0.15*	*0.18*	*0.21*
Central Service Area							
- Residential	0.00	0.00	0.02	0.05	0.08	0.12	0.16
- Commercial	0.00	0.00	0.01	0.02	0.03	0.05	0.07
- Unaccounted-for Water (10%)	0.00	0.00	0.00	0.01	0.01	0.02	0.02
Subtotal	*0.00*	*0.00*	*0.03*	*0.07*	*0.13*	*0.19*	*0.25*
Southwest Service Area							
- Residential	0.09	0.10	0.13	0.18	0.23	0.29	0.35
- Commercial	0.10	0.12	0.16	0.21	0.28	0.35	0.44
- Unaccounted-for Water (10%)	0.02	0.02	0.03	0.04	0.05	0.06	0.08
Subtotal	*0.21*	*0.24*	*0.32*	*0.43*	*0.56*	*0.70*	*0.87*
Northwest Service Area							
- Residential	0.03	0.04	0.06	0.10	0.14	0.18	0.24
- Commercial	0.02	0.04	0.06	0.10	0.14	0.20	0.26
- Unaccounted-for Water (10%)	0.00	0.01	0.01	0.02	0.03	0.04	0.05
Subtotal	*0.05*	*0.08*	*0.13*	*0.21*	*0.31*	*0.42*	*0.55*
Total County-Wide Demand	1.01	1.20	1.65	2.26	**2.96**	3.77	4.67

Source: Chatham County Water Feasibility Study Update (May 2000).

Notes: [1] Average Day Demand, computed by applying the Maximum to Average Demand Factors from table 3 to the Maximum Day Demand from table 3-12, Chatham County Water Feasibility Study Update (May 2000).

Table A-3: Chatham County Maximum to Average Demand Factors

	Current Service Areas [1]	M/ADF [2]
Northeast Service Area	North	
- Residential		2.41
- Commercial		1.62
Southeast Service Area	East	
- Residential		1.49
- Commercial		1.47
Central Service Area	East	
- Residential		1.49
- Commercial		1.47
Southwest Service Area	Southwest	
- Residential		1.57
- Commercial		1.64
Northwest Service Area	Southwest	
- Residential		1.57
- Commercial		1.64

Source: Chatham County Water Feasibility Study Update (May 2000).
Notes: [1] Current Service Areas were matched with Future Service Areas, based on figure 1 (Existing Water System) and figure 3 (Service Area Map), Chatham County Water Feasibility Study Update (May 2000).
[2] M/ADF = Maximum to Average Demand Factor. Data from table 3-11, Chatham County Water Feasibility Study Update (May 2000).

Water Sales

The Division considered all contractual sales listed in the Chatham County Local Water Supply Plans, then excluded contracts for emergency use (see Table A-4). The City of Durham contract mentioned in the North Chatham Plan was also excluded, as the Durham Local Water Supply Plan makes no mention of such a contract, and Durham is being considered for its own Jordan Lake allocation. The contract for 2.0 mgd with Siler City remains.

The Division then considered the 2015 projected water demands for Siler City (see Table A-5). Review of the Siler City Local Water Supply Plan indicates their current supply is adequate for their projected demands on an average day basis, even without purchasing water from Chatham County.

Table A-4: Chatham County Future Water Sales to Other Systems

	Contract Amount (mgd)	Contract Ends	Notes	**2015 Contract Amount** (mgd)
North Chatham Water System				
OWASA	2.0	Unk	emergency use	0.0
Durham	5.0	Unk	not shown in Durham LWSP	0.0
East Chatham Water System				
None				0.0
Southwest Chatham Water System				
Siler City	2.0	Unk		2.0
Total Future Sales Contracts Amount				**2.0**

Source: Data for Future Sales Contracts from table 7-F, Local Water Supply Plans for North Chatham Water System (10 Sep 98), East Chatham Water System (15 Sep 98), and Southwest Chatham Water System (15 Sep 98).

Table A-5: Town of Siler City Service Area Demand and Supply

	1997 ADD	2000 ADD	2010 ADD	2020 ADD	**2015** **ADD**	**2015** **MDD**[1]
Population [2]	5541	5868	6929	7601	7232	7232
Per Capita Demand (gpd)	141	141	141	141	141	141
Residential Demand (mgd) [3]	0.784	0.830	0.980	1.075	1.023	1.330
Commercial Demand (mgd) [4]	0.212	0.225	0.266	0.292	0.278	0.361
Industrial Demand (mgd) [5]	1.310	1.387	1.638	1.800	1.711	2.225
Backwash (mgd) [6]	0.033	0.035	0.041	0.045	0.043	0.056
Unaccounted-for Water (mgd) [7]	0.114	0.121	0.143	0.156	0.149	0.193
Service Area Demand (mgd)	2.453	2.598	3.068	3.368	**3.204**	**4.165**
Siler City Supply (mgd)	3.8	3.8	5.8	5.8	**5.8**	**5.8**
Water Demand Deficit (mgd)	-1.347	-1.202	-2.732	-2.432	**-2.596**	**-1.635**

Source: Data for 1997, 2000, 2010 and 2020 ADD from tables 7-A and 7-B, Local Water Supply Plan for Town of Siler City (reviewed 27 Jan 00).
Supply data from table 8-A, Local Water Supply Plan for the Town of Siler City (reviewed 27 Jan 00).

Notes: [1] Maximum Day Demand calculated by applying a Peak to Average Day Demand Factor of 1.3, from the LWSP-1997 Engineer Review.
[2] 2015 Population calculated based on a linear regression (α = 90.58531, β = -175297).
[3] 2015 Residential Demand calculated based on a linear regression (α = 0.0128, β = -24.7682).
[4] 2015 Commercial Demand calculated based on a linear regression (α = 0.003513, β = -6.80021).
[5] 2015 Industrial Demand calculated based on a linear regression (α = 0.021542, β = -41.6951).
[6] 2015 Backwash calculated based on a linear regression (α = 0.000525, β = -1.01478).
[7] 2015 Unaccounted-for Water calculated based on a linear regression (α = 0.001847, β = -3.57292).

Interbasin Transfer Issues

Chatham County faces potential interbasin transfers under a few conditions. If Chatham County supplies their Northwest or Southwest Service Areas with water from Jordan Lake, water is transferred from the Haw River Basin to the Deep River Basin. If Chatham County supplies Siler City with water from Jordan Lake, water is transferred from the Haw River Basin to the Deep River Basin. If the total amount transferred from the Haw River Basin to the Deep River Basin by the Chatham County system is 2.0 mgd or more on a maximum day basis, Chatham County will require an Interbasin Transfer Certificate.

Looking at the Chatham County Service Areas alone (without supplying water to Siler City), Chatham County would require an Interbasin Transfer Certificate sometime between 2020 and 2025 if Jordan Lake supplies the Northwest and Southwest Service Areas (see Table A-6). Considering Siler City alone (without supplying water to the Northwest and Southwest Service Areas), if Chatham County sells water from Jordan Lake to Siler City, Chatham County would require an Interbasin Transfer certificate for any maximum day amount of 2.0 mgd or more. These two scenarios are additive. If Chatham County develops a countywide system supplied by Jordan Lake, any water sold to Siler City accelerates Chatham County's need for an Interbasin Transfer Certificate.

Table A-6: Chatham County Demands by River Basin

		1997 MDD (mgd)[1]	2000 MDD (mgd)[1]	2005 MDD (mgd)[1]	2010 MDD (mgd)[1]	**2015 MDD** (mgd)[1]	2020 MDD (mgd)[1]	2025 MDD (mgd)[1]
Haw River Basin	*Northeast Service Area*							
	- Residential	1.15	1.37	1.82	2.44	3.15	3.96	4.86
	- Commercial	0.14	0.17	0.22	0.28	0.34	0.42	0.50
	- Unaccounted-for Water (10%)	0.13	0.15	0.20	0.27	0.35	0.44	0.54
	- Treatment Losses (10%)	0.13	0.15	0.20	0.27	0.35	0.44	0.54
	Subtotal	*1.55*	*1.84*	*2.44*	*3.26*	*4.19*	*5.26*	*6.44*
	Southeast Service Area							
	- Residential	0.06	0.07	0.09	0.11	0.13	0.16	0.19
	- Commercial	0.03	0.03	0.04	0.05	0.07	0.08	0.09
	- Unaccounted-for Water (10%)	0.01	0.01	0.01	0.02	0.02	0.02	0.03
	Subtotal	*0.10*	*0.11*	*0.14*	*0.18*	*0.22*	*0.26*	*0.31*
	Central Service Area							
	- Residential	0.00	0.00	0.03	0.07	0.12	0.18	0.24
	- Commercial	0.00	0.00	0.01	0.03	0.05	0.07	0.10
	- Unaccounted-for Water (10%)	0.00	0.00	0.01	0.01	0.01	0.03	0.03
	Subtotal	*0.00*	*0.00*	*0.05*	*0.11*	*0.18*	*0.28*	*0.37*
	Total Haw Basin Demand	**1.65**	**1.95**	**2.63**	**3.55**	**4.59**	**5.80**	**7.12**
Deep River Basin	*Southwest Service Area*							
	- Residential	0.14	0.16	0.21	0.28	0.36	0.45	0.55
	- Commercial	0.17	0.19	0.26	0.35	0.46	0.58	0.72
	- Unaccounted-for Water (10%)	0.03	0.04	0.05	0.06	0.08	0.10	0.13
	Subtotal	*0.34*	*0.39*	*0.52*	*0.69*	*0.90*	*1.13*	*1.40*
	Northwest Service Area							
	- Residential	0.04	0.06	0.09	0.15	0.22	0.29	0.38
	- Commercial	0.04	0.06	0.10	0.16	0.23	0.32	0.42
	- Unaccounted-for Water (10%)	0.01	0.01	0.02	0.03	0.05	0.06	0.08
	Subtotal	*0.09*	*0.13*	*0.21*	*0.34*	*0.50*	*0.67*	*0.88*
	Total Deep Basin Demand	**0.43**	**0.52**	**0.73**	**1.03**	**1.40**	**1.80**	**2.28**

Source: Chatham County Water Feasibility Study Update (May 2000).

Notes: [1] MDD = Maximum Day Demand. Data from table 3-12, Chatham County Water Feasibility Study Update (May 2000).

APPENDIX B

Harnett County Needs Assessment

The Division finds that the Harnett County Department of Public Utilities has no need of a Jordan Lake water supply storage allocation based on a 2015 planning horizon and information in the most recent Local Water Supply Plans. Total water demand is projected to be 13.314 mgd in the year 2015 (see Table B-1). The water supply available is estimated to be 32.32 mgd, 19.006 mgd greater than the projected demand (see Cape Fear River Supply section, p.B-6).

Table B-1: Total Harnett County Water Demand

	2015 Demand (mgd)	2015 Supply (mgd)	**Deficit** (mgd)
Harnett County Service Area [1]	11.050		
Town of Lillington [2]	0.865		
Town of Angier [3]	0.286		
Town of Coats [4]	0.254		
Town of Linden [5]	0.062		
Town of Fuquay-Varina [6]	0.796		
Total	13.314	32.32	**-19.006**

Notes: [1] Total from Table B-2.
[2] Total from Table B-4.
[3] Total from Table B-5.
[4] Total from Table B-6.
[5] Total from Table B-7.
[6] Total from Table B-8, less the total from Table B-9.

Demand Projections

Harnett County's latest Local Water Supply Plan (LWSP) was used as the data source for all demand projections, as well as the Local Water Supply Plans of subsidiary water systems. Given that water systems have traditionally calculated demand forecasts erring on the side of generosity for their LWSPs, the Division projections for 2015 should also err on the side of generosity. Harnett County's projected water demand for 2015 was accepted without detailed analysis. Projected water demands for some of their water sales to other systems were calculated by various methods, including linear regression of the respective system demand projections. The 2015 demand projections were then totaled for all systems considered (see Tables B-2 – B-9).

Table B-2: Harnett County Service Area Demand

	1998	2000	2010	2020	**2015**
Population [1]	69800	88500	127440	168221	152928
Per Capita Demand (gpd)	66.7	66.7	66.7	66.7	66.7
Residential Demand (mgd) [2]	4.656	5.903	8.500	11.220	10.200
Commercial Demand (mgd) [3]	0.08	0.1	0.35	0.35	0.35
Backwash (mgd) [3]	0.133	0.22	0.33	0.33	0.33
Unaccounted-for water (mgd) [3]	0.153	0.153	0.159	0.21	0.17
Service Area Demand [4]	5.022	6.376	9.339	12.110	**11.050**

Source: Data for 1998, 2000, 2010 and 2020 from tables 7-A and 7-B, Local Water Supply Plan for Harnett County Dept. of Public Utilities (07 Jul 00).

Notes: [1] 2015 Population from Harnett County Water Use Calculations for Year 1998, appendix to Local Water Supply Plan.

[2] 2015 Residential Demand = 2015 Population × 66.7 gpdpc

[3] 2015 Commercial Demand, Backwash, and Unaccounted-for water from Harnett County Water Use Calculations for Year 1998, appendix to Local Water Supply Plan.

[4] 2015 Service Area Demand = Residential Demand + Commercial Demand + Backwash + Unaccounted-for Water

Water Sales

Harnett County sells water to a number of systems. The Division considered all contractual sales, then excluded contracts for emergency use and contracts expiring prior to 2015 (see Table B-3). The Holly Springs contract was also excluded, as the Environmental Management Commission (EMC) granted Holly Springs a Jordan Lake allocation in December 1997. The water systems remaining were the Towns of Lillington, Angier, Coats, Linden and Fuquay-Varina.

The Division then considered the 2015 projected water demands for those systems buying water from Harnett County (see Tables B-4 – B-9).

Table B-3: Harnett County Future Water Sales to Other Systems

	Contract Amount (mgd)	Contract Ends	Notes
Lillington	2.0	2017	
Angier	2.02	perpetual	
Coats	0.72	perpetual	
Linden	0.25	perpetual	
Woodlake	0.144	1999	contract expires
Fuquay Varina	4.70	2029	
Holly Springs	8.50	2035	received JL allocation
Carolina Trace	0.10		no contract
Moore County	2.00		no contract
Chatham County	2.00		no contract
Wellons	0.50		no contract
Resort Development	0.80		no contract
Johnston County		perpetual	emergency use
Dunn	2.5	perpetual	emergency use
Erwin	1.0	perpetual	emergency use

Source: Data from tables 2-G and 7-F, Local Water Supply Plan for Harnett County Dept. of Public Utilities (07 Jul 00).

Table B-4: Town of Lillington Service Area Demand

	1997	2000	2010	2020	**2015**
Population [1]	3003	3323	4655	6523	5635
Per Capita Demand (gpd)	36.3	36.3	36.3	36.3	36.3
Residential Demand (mgd) [2]	0.109	0.121	0.169	0.237	0.205
Commercial Demand (mgd) [3]	0.018	0.022	0.033	0.049	0.041
Industrial Demand (mgd) [4]	0.233	0.281	0.422	0.634	0.534
Institutional Demand (mgd)	0.001	0.001	0.001	0.001	0.001
Unaccounted-for water (mgd)	0.084	0.084	0.084	0.084	0.084
Service Area Demand [5]	0.445	0.509	0.709	1.005	**0.865**

Source: Data for 1997, 2000, 2010 and 2020 from table 7-B and Appendix A, Local Water Supply Plan for Town of Lillington (17 Sep 98).

Notes: [1] 2015 Population calculated based on a linear regression (α = 152.5601, β = -301774).
[2] Residential Demand = Population $\times$ Per Capita Demand
[3] 2015 Commercial Demand calculated based on a linear regression (α = 0.001324, β = -2.62572).
[4] 2015 Industrial Demand calculated based on a linear regression (α = 0.017149, β = -34.0217).
[5] 2015 Service Area Demand = Residential Demand + Commercial Demand + Industrial Demand + Institutional Demand + Unaccounted-for Water

Table B-5: Town of Angier Service Area Demand

	1992	2000	2010	2020	**2015**
Population [1]	2265	2283	2504	2711	2600
Per Capita Demand (gpd)	70.13	70.13	70.13	70.13	70.13
Residential Demand (mgd) [2]	0.159	0.160	0.176	0.190	0.182
Commercial Demand (mgd) [3]	0.0425	0.0509	0.0639	0.0803	0.072
Industrial (mgd) [4]	0.0209	0.02174	0.02196	0.02218	0.0221
Institutional (mgd)	0.0017	0.0017	0.0017	0.0017	0.0017
Unaccounted-for water (mgd)	0.008	0.008	0.008	0.008	0.008
Service Area Demand [5]	0.232	0.242	0.271	0.302	**0.286**

Source: Data for 1992, 2000, 2010 and from Addendum #2, Local Water Supply Plan for Town of Angier (10 Mar 95).

Notes: [1] 2015 Population calculated based on a linear regression (α = 16.80248, β = -31256.6).
[2] Residential Demand = Population $\times$ Per Capita Demand
[3] 2015 Commercial Demand calculated based on a linear regression (α = 0.00135, β = -2.6487).
[4] 2015 Industrial Demand calculated based on a linear regression (α = 0.0000422, β = -0.06301).
[5] 2015 Service Area Demand = Residential Demand + Commercial Demand + Industrial Demand + Institutional Demand + Unaccounted-for Water

Table B-6: Town of Coats Service Area Demand

	1997	2000	2010	2020	**2015**
Population [1]	1800	1887	1900	2500	2249
Per Capita Demand (gpd) [2]	64.4	89.0	88.9	89.2	89.0
Residential Demand (mgd) [3]	0.116	0.168	0.169	0.223	0.200
Commercial Demand (mgd)	0	0	0	0	0
Backwash (mgd)	0	0	0	0	0
Unaccounted-for water (mgd) [4]	0.044	0.045	0.046	0.06	0.054
Service Area Demand [5]	0.160	0.213	0.215	0.283	**0.254**

Source: Data for 1997, 2000, 2010 and 2020 from tables 7-A and 7-B, Local Water Supply Plan for Town of Coats (14 Sep 98).

Notes: [1] 2015 Population calculated based on a linear regression (α = 27.58301, β = -53330.5).
[2] Per Capita Demand = Residential Demand / Population
[3] 2015 Residential Demand calculated based on a linear regression (α = .003792, β = -7.44037).
[4] 2015 Unaccounted-for water calculated based on a linear regression (α = .000648, β = -1.25172).
[5] 2015 Service Area Demand = Residential Demand + Commercial Demand + Backwash + Unaccounted-for Water

Table B-7: Town of Linden Service Area Demand

	1997	2000	2010	2020	**2015**
Population [1]	800	850	950	1060	1006
Per Capita Demand (gpd) [2]	60.7	60.6	60.7	60.7	60.7
Residential Demand (mgd) [3]	0.04852	0.05155	0.05762	0.06429	0.06100
Commercial Demand (mgd)	0.00058	0.00058	0.00058	0.00058	0.00058
Institutional Demand (mgd)	0.00013	0.00013	0.00013	0.00013	0.00013
Unaccounted-for water (mgd)	0.00001	0.00001	0.00001	0.00001	0.00001
Service Area Demand [4]	0.049	0.052	0.058	0.065	**0.062**

Source: Data for 1997, 2000, 2010 and 2020 from tables 7-A and 7-B, Local Water Supply Plan for Town of Linden (25 Nov 98).

Notes: [1] 2015 Population calculated based on a linear regression (α = 11.0023, β = -21163.9).
[2] Per Capita Demand = Residential Demand / Population
[3] 2015 Residential Demand calculated based on a linear regression (α = .000667, β = -1.28382).
[4] 2015 Service Area Demand = Residential Demand + Commercial Demand + Institutional Demand + Backwash + Unaccounted-for Water

Table B-8: Town of Fuquay-Varina Service Area Demand

	1997	2000	2010	2020	**2015**
Population [1]	6300	8760	18268	38942	29551
Per Capita Demand (gpd)					
Residential Demand (mgd)					
Commercial Demand (mgd)					
Backwash (mgd)					
Unaccounted-for water (mgd)					
Service Area Demand [2]	0.7187	1.0512	2.1922	4.6730	**3.546**

Source: Data for 1997, 2000, 2010 and 2020 from tables 7-A and 7-B, Local Water Supply Plan for Town of Fuquay-Varina (received 03 Nov 99).

Notes: [1] 2015 Population calculated based on a linear regression (α = 1391.882, β = -2775092).
[2] 2015 Service Area Demand calculated based on a linear regression (α = .168138, β = -335.251).

Table B-9: Town of Fuquay-Varina Future Water Purchases

	Amount (mgd)
Garner	0.750
Johnston County	2.000
Total Supply (less Harnett County)	**2.750**

Source: Data from tables 3-D and 8-A, Local Water Supply Plan for Town of Fuquay-Varina (received 03 Nov 99).

Cape Fear River Supply

The Division estimates that Harnett County can safely rely on a supply of 50 cfs from the Cape Fear River, or 32.32 mgd. This is based on the confidence interval allowed the US Army Corps of Engineers in meeting their 600 cfs target flow at the Lillington gage.

APPENDIX C

Cape Fear River Basin Model: 2015 Scenario

Summary

Conditions for the year 2015 were applied to the entire period of record in the model, 01/01/1930-12/31/1998. Jordan Lake is allocated in accordance with the recommendations made in December 1997. Agricultural withdrawals remain unchanged. Watersupply withdrawals and discharges are all increased by 50% as a default, with notable exceptions (below). Larger public systems are adjusted in accordance with their projections as reported in the Local Water Supply Plans (LWSP), or in accordance with the DWR analysis of their Jordan Lake application. Larger industrial systems (utilities) remain unchanged. Randleman Lake is represented in the model in accordance with available information from the Randleman EIS and associated LWSPs.

Jordan Lake:	Allocations based on December 1997 recommendations.
Durham:	No Jordan Lake allocation and no water supply withdrawals in the Cape Fear Basin. Increased Cape Fear wastewater discharges at existing WWTPs based on DWR demand projections and information provided by the City of Durham.
Cary/Apex:	Jordan Lake withdrawal with demand based on DWR projection. Discharge in accordance with preferred EIS alternative at a Regional WWTP just below Buckhorn Dam.
Chatham:	Northeast, Southeast and Central Chatham systems obtain their water from Jordan Lake with demand based on the latest Chatham County information. Goldston Gulf, Pittsboro and Siler City expand in accordance with their Local Water Supply Plans. Northwest and Southwest Chatham withdrawal water from a new Deep River WTP in the Carbonton area. Wastewater discharged at current ratios to existing WWTPs in North Chatham, Siler City and Pittsboro.
OWASA:	No Jordan Lake withdrawal. Increased withdrawals from University Lake and Cane Creek in accordance with LWSP, with corresponding discharges at existing WWTPs.
Orange:	No Jordan Lake withdrawal.
Morrisville:	Fully using allocation with pattern based on 1997 Local Water Supply Plan. No wastewater discharges in the Cape Fear apart from the Regional WWTP.
Holly Springs:	Fully using allocation with pattern based on 1997 Local Water Supply Plan. Allocation is released from Jordan and withdrawn from Cape Fear just above Lillington gage. No wastewater discharges in the Cape Fear apart from the Regional WWTP.
RTP:	Fully using allocation with pattern based on Cary/Apex. No wastewater discharges in the Cape Fear apart from the Regional WWTP.
Harnett:	No Jordan Lake allocation. Increased Cape Fear withdrawal based on DWR analysis of LWSPs. Increased wastewater discharges at Lillington, Angier and Fuquay-Varina WWTPs based on current pattern.
Sanford:	Increased withdrawal and discharge based on LWSP projections.
Fayetteville:	No Jordan Lake allocation. All future increases in demand withdrawn from Cape Fear River. All future increases in wastewater discharged at Cross Creek. Increased wastewater discharge at Spring Lake based on current pattern and LWSP projection.
Reidsville:	Increased withdrawal based on LWSP, with corresponding discharges at existing WWTPs.
Asheboro:	No water withdrawals in Cape Fear Basin. Increased wastewater discharge based on LWSP projection.

Graham/Mebane:	Graham, Mebane, Haw River and Green Level are supplied by Graham-Mebane Lake. Increased withdrawal based on LWSP projections. Corresponding increases in wastewater discharges at Graham and Mebane WWTPs.
Burlington:	Burlington, Gibsonville, Elon College and Alamance are supplied by both lakes. Withdrawals and discharges based on current pattern and LWSP projections.
Greensboro:	All future increase in demand is withdrawn from Randleman Lake, based on LWSP projections. All corresponding future increased wastewater discharged at T.Z. Osborne WWTP.
High Point:	No withdrawal from Randleman Lake. All future increase in demand is withdrawn from City and Oak Hollow Lakes. Corresponding increase in Highpoint wastewater is discharged at Eastside WWTP, along with wastewater from Jamestown and Archdale.
Jamestown:	All future demand is withdrawn from Randleman Lake, based on LWSP projections.
Archdale:	All future demand is withdrawn from Randleman Lake, based on LWSP projections.
Randleman:	All future increase in demand is withdrawn from Randleman Lake, based on LWSP projections. All wastewater is discharged at existing Randleman WWTP.
Wilmington:	Increased withdrawal from Cape Fear River in accordance with LWSP. Used same expansion rate for Lower Cape Fear WSA withdrawal.
Utilities:	CP&L's Cape Fear and Shearon Harris withdrawals and discharges remain constant.

Model Details

2015 Scenario
27 July 2000

MIKE BASIN Simulation ID:	all1
Simulation Start Time:	01/01/1930
Simulation End Time:	12/31/1998
Number of Analysis Years:	69
Simulation Interval:	1 day

Additional details are available upon request from the Division of Water Resources.

APPENDIX D

Summary of Public Comments Received
On Draft Environmental Impact Statement

The table on the following pages is taken from the *Final Environmental Impact Statement for RTP South and the Towns of Cary, Apex, and Morrisville in Wake County for the Increase in Interbasin Transfer from the Haw River Basin to the Neuse River Basin* (August 2000). This table summarizes the public comment on the *Draft Environmental Impact Statement for RTP South and the Towns of Cary, Apex, and Morrisville in Wake County for the Increase in Interbasin Transfer from the Haw River Basin to the Neuse River Basin* (December 1999).

Summary of Public Comments (from Final EIS)

Name/Organization	Date of Comment Submittal	Summary of Comments (letters attached)	Section of Response Summary Where Comments are Addressed
Mick Noland, Chief Operating Officer for City of Fayetteville Public Works Commission	Statement at public hearing: July 13, 2000	- IBT amount assumes construction of a proposed regional wastewater treatment plant with discharge to the Cape Fear River	III.A
		- The alternative to purchase water from Raleigh should be reevaluated	II.A
		- The model does not simulate the low flow conditions experienced in 1998	I.A
		- The Jordan Lake water quality pool is insufficient for downstream water quality needs	I.B
		- The current safe yield estimate of 100 mgd from Jordan Lake is questionable	I.C
		- EIS needs to provide information on whether the cumulative impacts of all water withdrawals and transfers are acceptable	I.D
		- EIS should be evaluated objectively without consideration of construction already underway on water treatment plant	IV.F
John Malzone, Cumberland County Chamber of Commerce	Statement at public hearing: July 13, 2000	- IBT may inhibit growth in the Fayetteville region	I. M
Elton Hendricks, President of Methodist College	Statement at public hearing: July 13, 2000	- If aggressive conservation was used as an assumption in the IBT, there may be significant direct impacts	III.B
		- Triangle should put the water back in the Cape Fear River after they use it.	I.E, IM, II.B
Senator Tony Rand, 24th District	Letter dated: July 13, 2000	- Triangle communities should put water back in Cape Fear River after they remove it	I.E, I.M, II.B
Lura S. Tally, former member of North Carolina Senate	Letter dated: July 7, 2000	- If Triangle communities do not replace water they remove from Cape Fear, they will cause problems downstream	I.E, I.H
Rollin S. Shaw, City Council Member, Fayetteville and Dr. Frank S. Shaw	Correspondence dated: July 30, 2000	- Cary should return water it removes from the Cape Fear	I.E, I.M, II.B
David Brook, Deputy State	Memorandum dated: July 3, 2000	- IBT will not impact property eligible for listing in National	N/A

Name/Organization	Date of Comment Submittal			Summary of Comments (letters attached)	Section of Response Summary Where Comments are Addressed
Historic Preservation Officer, NC Department of Cultural Resources				Register of Historic Places	
Rick Givens, Chairman, Chatham County Board of Commissioners	Letter dated:	July 18, 2000	-	Downstream users need assurance that there will be adequate water supply and adequate water quality	I.B, I.E, I.H
Larry B. Thomas, Director of Public Works, City of Sanford	Letter dated:	July 20, 2000	-	Transfer of water will have negative environmental impact on Cape Fear River Basin. Each transfer should not be reviewed individually.	I.B, I.D, I.E
			-	Transfer of water will have negative economic impact on Cape Fear River Basin	I.B, I.C, I.E
Mick Noland, Chief Operating Officer of Water Resources Division, Public Works Commission, City of Fayetteville	Letter dated:	July 27, 2000 *	-	Future agricultural water withdrawals should be described.	I.J
			-	Randleman Lake should be simulated in the model	I.K
			-	A modeling scenario should be included that compares the proposed alternative, with only current and recommended Jordan Lake allocations, to the Base 1998 case.	I.L
Hugh T. Caldwell, Director of Public Utilities, City of Wilmington	Letter dated:	July 27, 2000	-	The proposed IBT may impact downstream water quality and assimilative capacity	I.E, I.H
			-	The EIS did not consider the affects of Durham obtaining an allocation from Jordan Lake	I.O
Rodney Tart, Director, Harnett County Department of Public Utilities	Letter dated:	July 31, 2000	-	EIS indicates there will be minimal impact on downstream water supply at Lillington. Does not object to the IBT. However, as growth continues, water resources will become more limited. Therefore, plans should begin to return water to the Cape Fear	II.B
			-	Support DWR's efforts to develop a comprehensive model of future Cape Fear River use	IV.G
Hal Broadfoot, citizen of Fayetteville	Correspondence dated:	July 13, 2000	-	Triangle financing its growth by using water resources that	I.G

Name/Organization	Date of Comment Submittal		Summary of Comments (letters attached)	Section of Response Summary Where Comments are Addressed
			belong to downstream users	
				IV.D
			- Fayetteville, unlike upstream neighbors, have invested in state-of-the-art water and wastewater treatment	
Reid Gannt, citizen of Fayetteville	Correspondence dated:	July 13, 2000	- Allowing this interbasin transfer will be disastrous for Cape Fear River	I.E, I.H
Marie Tinnin Stewart, citizen of Fayetteville	Correspondence dated:	July 13, 2000	- Build a treatment plant that will correct the interbasin transfer prior to withdrawing more water from Jordan Lake	II.B
Scott M. Bigelow, citizen of Lumberton	Correspondence dated:	July 13, 2000	- What conservation measures are being undertaken in Triangle?	II.C
			- Build a new WWTP that discharges to the Cape Fear	II.B
			- Look at 100 year drought; in drought impacts of pollution are amplified	I.D
			- Did study account for pollution in Cape Fear?	I.H
			- Good planning would dictate that state grow in areas where there are resources to support the growth	IV.A
			- Legislature should fund study to ensure that North Carolina will not experience the water problems of the west	IV.B
			- Use supply and demand to dictate who gets water	IV.E
			- Make the IBT certificate temporary. If water quality in the Cape Fear declines, revoke or cut back the transfer	I.I
			- Hold hearing downstream in Cape Fear and not in Cary	I.N
			- Triangle does not need water	IV.C
Colonel W. S. Crumlish, USA Retired, Corps of Engineers	Letter dated:	July 11, 2000	- Water should remain in Cape Fear Basin	I.E
Walter D. Dietrich, citizen of Fayetteville	Letter dated:	July 16, 2000	- State has underestimated [sic] the drinking water capacity of Jordan Lake	I.C

Name/Organization	Date of Comment Submittal			Summary of Comments (letters attached)	Section of Response Summary Where Comments are Addressed
			-	Interbasin transfer should not be allowed; plant that will return water to Cape Fear River should be built first	II.B
James and Jenny Rosser, citizens of Fayetteville	Correspondence dated:	July 30, 2000	-	Apex should return water it removes from the Cape Fear	II.B
Maryann and Bob McCoy, citizens of Fayetteville	Correspondence dated:	July 30, 2000	-	Cary should return water it removes from the Cape Fear	II.B
D. R. Himocks, Jr., citizen of Fayetteville	Correspondence dated:	July 31, 2000	-	Towns that remove water from the Cape Fear should return it to avoid situation similar to Colorado River	II.B, IV.B

* Many of the comments submitted in this letter were identical to the oral statement provided on July 13, 2000 at the public hearing. Only those comments that were not included in the July 13, 2000 statement are summarized in this table.