

**2006 ANNUAL REPORT on INTERBASIN TRANSFERS**  
**For**  
**RTP South and the Towns of Cary, Apex, and Morrisville**

Prepared for:

**Town of Apex**

**Town of Cary**

**Town of Morrisville**

**RTP South/Wake County**

Submitted to:

**North Carolina Division of Water Resources**

**April 2006**

**Prepared by:**

Leila R. Goodwin, P.E.

Water Resources Manager

Town of Cary

P.O. Box 8005

Cary, NC 27512-8005

919-462-3846

leila.goodwin@townofcary.org

---

# Table of Contents

---

Executive Summary.....	ES-1
1. Jordan Lake Allocation Monitoring.....	1-1
2. IBT Monitoring.....	2-1
3. Compliance with Certificate Conditions .....	3-1
Appendix A: Daily Tracking of Combined Jordan Lake Water Supply Allocations for 2006.....	A-1
Appendix B: Daily Interbasin Transfer Estimates for 2006.....	B-1

## Executive Summary

The 2006 Annual Report on Interbasin Transfers for RTP South and the Towns of Cary, Apex, and Morrisville includes monitoring data for daily tracking of IBT amounts and combined Jordan Lake allocations held by the certificate holders.

The Town of Cary and Morrisville merged their utility systems on April 3, 2006. Cary is responsible for providing billing and system maintenance for water and sewer services to Morrisville customers. Morrisville continues to hold their Jordan Lake water supply allocation.

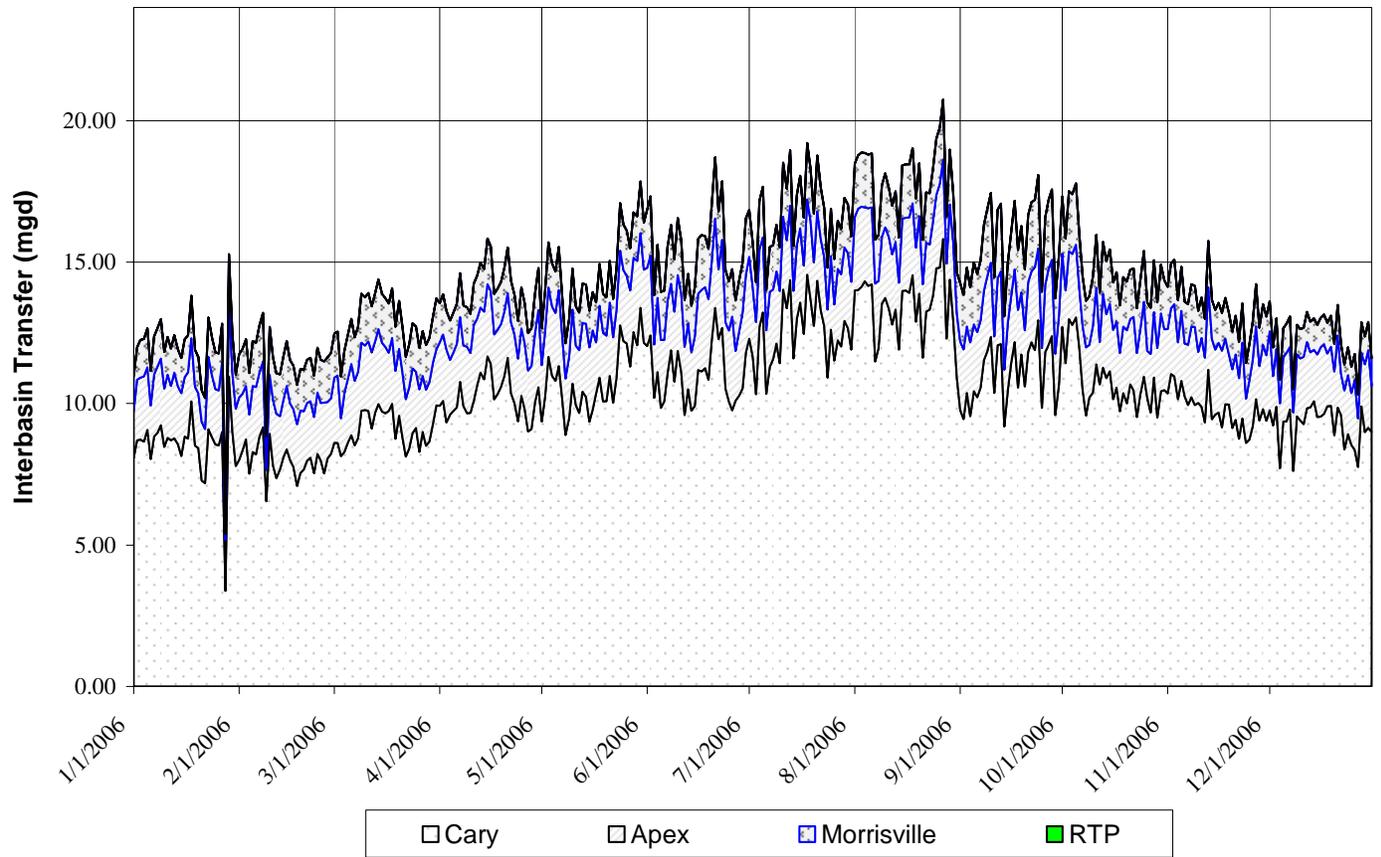
In 2006, the certificate holders complied with all conditions of their IBT certificate. The maximum daily IBT amount for Cary, Apex, Morrisville, and RTP South was 20.8 million gallons per day (mgd). The annual average IBT amount was 14.3 mgd. IBT amounts and a summary of Jordan Lake withdrawals are provided in Table ES-1. The daily IBT amounts in 2006 for Cary, Apex, Morrisville, and RTP South are shown in Figure ES-1.

TABLE ES-1.  
Summary of InterBasin Transfers for Cary, Apex, Morrisville and RTP South

Calendar Year	Withdrawal from Haw Subbasin (mgd) <sup>1</sup>		Total Return to Haw Subbasin (mgd)		Interbasin Transfer (mgd)		IBT as % of Certificate
	Average Annual	Max. Day	Average Annual	Max. Day	Average Annual	Max. Day	Max.
1998	10.8	15.7	1.7	3.5	9.0	14.3	90%
1999	9.2	15.6	1.6	4.2	7.6	12.9	81%
2000	7.3	14.2	1.1	4.4	6.2	11.8	74%
2001 <sup>2</sup>	9.7	18.8	2.8	9.4	6.8	15.0	63% <sup>3</sup>
2002	16.9	29.2	3.5	10.3	13.5	22.5	94%
2003	15.9	22.7	2.5	5.5	13.4	17.8	74%
2004	17.0	25.5	2.8	6.1	14.2	22.6	94%
2005	18.4	26.1	3.8	8.1	14.5	19.6	82%
2006	17.6	25.9	3.3	6.6	14.3	20.8	87%

1. Includes water use by Cary, Apex, Morrisville, and RTP South.
2. Withdrawals in 2001 were unusually high due to construction activities at the Cary/Apex WTP and do not reflect actual potable water demands.
3. Permitted IBT amount increased from 16 mgd to 24 mgd in July 2001. The maximum day IBT of 15.0 mgd occurred after the permitted amount increased to 24 mgd.

Figure ES-1: Daily Interbasin Transfer for Cary, Apex, Morrisville and RTP South  
[Haw Sub-Basin to Neuse Sub-Basin]



---

## 1.0 Jordan Lake Allocation Monitoring

The combined Jordan Lake water supply allocation for Cary, Apex, Morrisville, and RTP South can be tracked on a daily basis. Daily tracking of the combined Jordan Lake allocation for the period January 1, 2006 through December 31, 2006 is included in [Appendix A](#). The water supply pools for each allocation holder were full on January 1, 2006.

Cary and Morrisville have had a long standing arrangement through which Morrisville buys its drinking water from Cary and also receives wastewater treatment from Cary.

In 2000, a county-funded study recommended that Cary and Morrisville merge their water and sewer systems. After studying different scenarios for meeting future water and wastewater treatment needs, the two communities decided in 2005 to move forward with a regional partnership that would combine their utility services.

The Town of Cary began providing billing and system maintenance for water and sewer services to Morrisville customers beginning April 3, 2006. Morrisville continues to hold their Jordan Lake water supply allocation. For purposes of reporting on Jordan Lake allocations and IBT, Cary and Morrisville measurements will continue to be reported separately.

For 2006, the maximum day withdrawal for all certificate holders was 25.9 mgd, which occurred on August 27. The average daily withdrawal for all certificate holders was 17.6 mgd during 2006 (Table 1-1).

TABLE 1-1  
Summary of Jordan Lake Withdrawals<sup>1</sup>

Year	Average Annual Withdrawal (mgd)	Maximum Daily Withdrawal (mgd)
19982	10.8	15.7
1999 <sup>2</sup>	9.2	15.6
2000	7.3	14.2
2001	9.7	18.8
2002	16.9	29.2
2003	15.9	22.7
2004	17.0	25.5
2005	18.4	26.1
2006	17.6	25.9

- 
1. Withdrawals from Jordan Lake at the Cary/Apex raw water intake. Includes water use by Apex, Cary, Morrisville and RTP South. Does not include water use by Durham.
  2. Includes water use by Holly Springs from 1/1/98 to 6/30/99
-

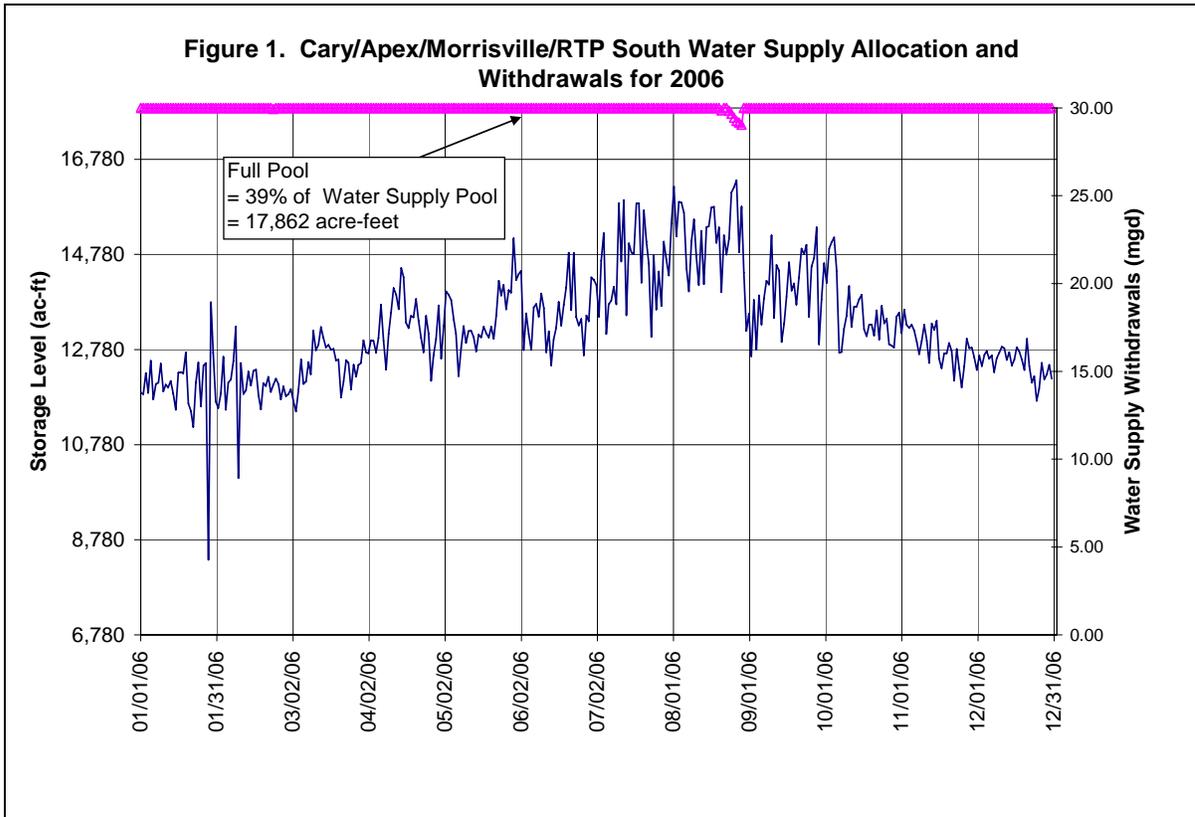
Table 1-2 presents historical water use for the certificate holders (Cary, Apex, Morrisville, and RTP South) based on finished water produced at the Cary/Apex WTP plus purchases. In 2006, finished water demands averaged 15.7 mgd and the maximum day demand was 24.0 mgd. The maximum day peaking factor was 1.53 in 2006.

TABLE 1-2  
Summary of Finished Water Demands

Year	Average Annual Demand (mgd)	Maximum Daily Demand (mgd)	Maximum Day/Average Day Peaking Factor
1998 <sup>2</sup>	12.2	20.1	1.64
1999 <sup>2</sup>	12.6	21.5	1.70
2000	13.0	21.6	1.66
2001	14.1	22.0	1.56
2002	14.9	25.6	1.72
2003	14.0	19.9	1.43
2004	14.8	25.8	1.74
2005	15.6	22.6	1.45
2006	15.7	24.0	1.53

1. Includes finished water delivered to the distribution system by the Cary/Apex WTP.
2. Includes water use by Holly Springs from 1/1/98 to 6/30/99.

Water use for Morrisville and RTP South is not measured on a daily basis. Therefore, accurate daily tracking of Jordan Lake water supply allocations can only be performed for the combined Jordan Lake water supply allocation for Cary, Apex, Morrisville, and RTP South. Figure 1 shows the partners' combined water supply withdrawals and the allocation storage level for 2006. The minimum storage level for the combined allocation was 98.0% occurring on August 29, 2006. The average percent storage was 99.98% for 2006.



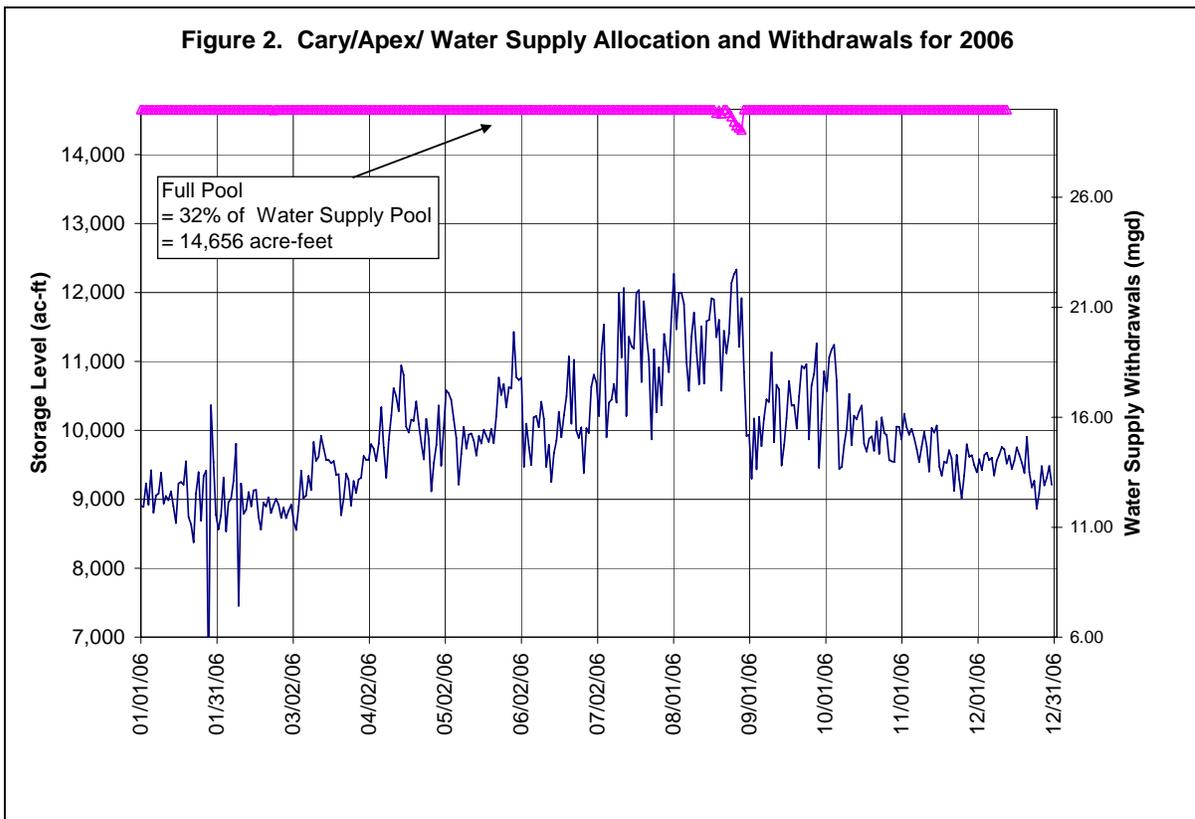
Individual Jordan Lake water allocations are estimated on a daily basis using monthly Morrisville and RTP South water usage records. Daily water use for Morrisville is estimated from monthly or more frequent retail meter readings by assuming that water usage variations between meter readings follow the same patterns as the total combined water use ("Net Cary" use). Daily water use for RTP South is estimated similarly using monthly retail meter readings. By assuming that water usage trends throughout the month follow similar patterns as Cary. For a given day, the ratio of daily Net Cary water use to average net Cary water use for the period between meter readings is applied to Morrisville and RTP South metered water use.

Levels in individual water supply pools are calculated on a daily basis using daily water use estimates and daily lake inflows. Lake inflow data is obtained from the US Army Corps of Engineers and allocated to each water supply pool according to the percentage allocation held. Any inflow amount that would fill the allocated storage above 100 percent is not stored. Any time the elevation in Jordan Lake is at or above 216 feet mean sea level, the water supply pools are reset to 100 percent full. If any allocation holder or larger pool has

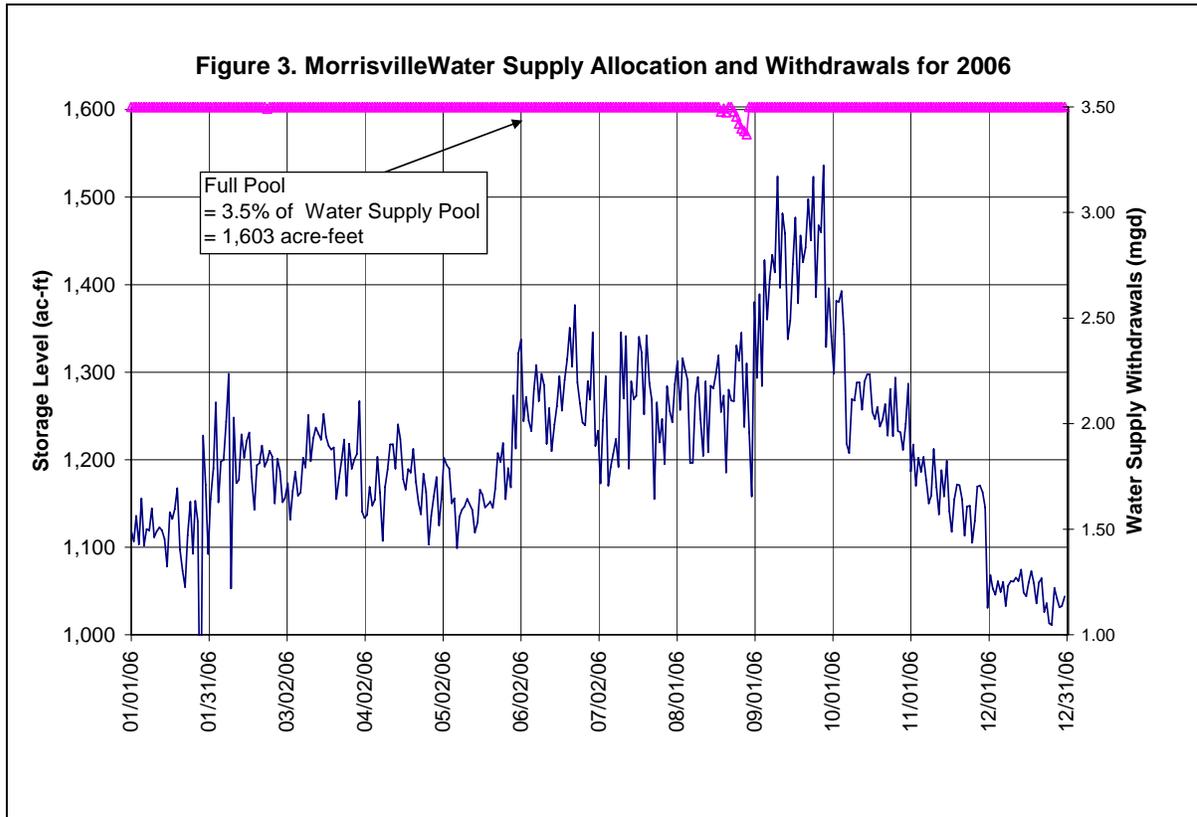
excess inflow, it is first distributed within that pool to another user, if needed, before being “spilled”.

The daily Cary/Apex withdrawal amounts are estimated by subtracting the estimated daily Morrisville and RTP amounts from the metered total daily use; Cary amounts are then estimated by subtracting the daily recorded Apex use from the remainder.

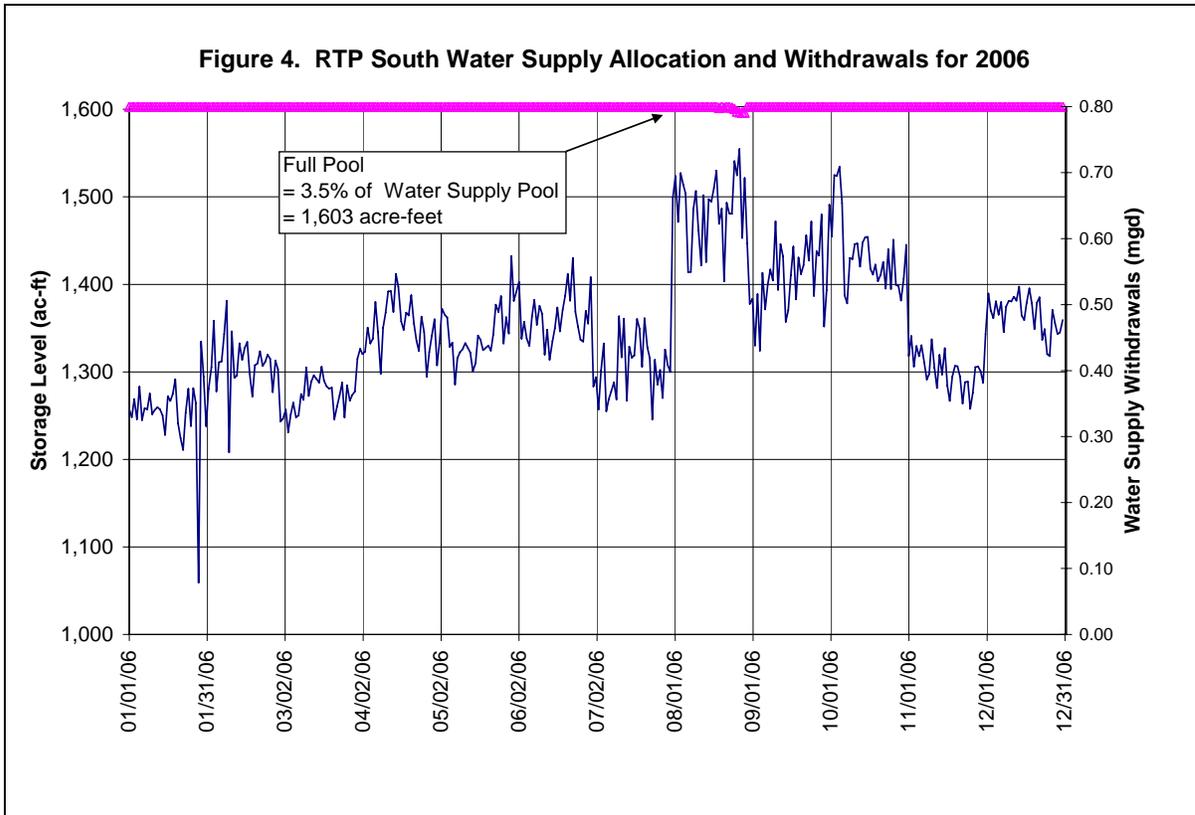
Cary/Apex holds a water supply storage allocation equal to 32 percent of the water supply pool or 14,656 acre-feet. Figure 2 shows the Cary/Apex water supply withdrawals and the allocation storage level for 2006. The minimum storage level for the Cary/Apex allocation was 98.0% occurring on August 29, 2006. The average percent storage was 99.98% for 2006.



Morrisville holds a water supply storage allocation equal to 3.5 percent of the water supply pool or 1,603 acre-feet. Figure 3 shows the Morrisville water supply withdrawals and the allocation storage level for 2006. The minimum storage level for the Morrisville allocation was 98.1% occurring on August 29 2006. The average percent storage was 99.98% for 2006.



RTP South holds a water supply storage allocation equal to 3.5 percent of the water supply pool or 1,603 acre-feet. Figure 4 shows the RTP South supply withdrawals and the allocation storage level for 2006. The minimum storage level for the RTP South allocation was 99.6% occurring on August 29 2006. The average percent storage was 99.99% for 2006.



---

## 2.0 IBT Monitoring

Daily IBT estimates for the certificate holders are included in [Appendix B](#). Estimates are provided for the period January 1, 2006 through December 31, 2006. *The maximum day IBT transfer during the calendar year 2006 was 20.79 mgd, which occurred on August 27, 2006.* This represents 87 percent of the permitted IBT transfer under the certificate approved by the EMC on July 12, 2001. The annual average IBT transfer was 14.3 mgd during calendar year 2006.

The average daily consumptive use was 15% for the period January 1, 2006 through December 31, 2006. Historical consumptive use is shown in [Table 2-1](#).

The distribution of consumptive uses between the Haw, Cape Fear, and Neuse River subbasins for 2006 was based on historical water use in each basin as determined by billing records for each certificate holder. For 2006, it was assumed that 25% of water use occurred in the Haw subbasin, 0.6% of water use occurred in the Cape Fear subbasin, and 74.4% of water use occurred in the Neuse River subbasin. The certificate holders track historical use by assigning a subbasin to each customer. Data on the distribution of water use between subbasins for each entity from 2000 through 2006, based on billing records, is shown in [Table 2-2](#).

In 1998, 1999, and 2000 Apex and Cary implemented mandatory irrigation restrictions due to water supply limitations and IBT permit restrictions. The Town of Morrisville asked residents to voluntarily conserve water beginning in 1998, and implemented mandatory water use restrictions in July 1999. The restrictions reduced consumptive water use from what would normally be expected during those years. In 2002 all the Towns had mandatory restrictions because of regional drought conditions, but they were implemented after June, which was when all-time high water use occurred. Apex continued stage II water restrictions through December 29, 2005 when they returned to stage I, or voluntary water conservation measures. Starting April 3<sup>rd</sup> 2006 the Cary and Morrisville utility systems merged, as part of this merger Morrisville adopted Cary's water conservation ordinances and Cary staff began education and enforcement in both Cary and Morrisville. Cary continues to have a year round conservation program which includes: alternate day watering, prohibition of water waste, a rain sensor requirement on all irrigation systems, and an increasing block rate structure.

TABLE 2-1  
 Historical Consumptive Use for Cary, Apex, Morrisville, and RTP South

Year	Average Daily Finished Water Demand (mgd)	Average Daily Consumptive Use (mgd)	% Consumptive Use
19981	12.2	2.4	19.7%
1999 <sup>1</sup>	12.6	2.1	16.7%
2000	13.0	1.8	13.8%
2001	14.1	2.0	14.7%
2002	14.9	3.0	20.1%
2003	13.9	1.4	10.0%
2004	14.8	2.2	14.9%
2005	15.6	2.7	17.3%
2006	15.7	2.3	14.6%

1. Includes some water use by Holly Springs. Holly Springs purchased water from Apex in 1998 and 1999.

TABLE 2-2

Distribution of Water Billed to Retail Customers by River Subbasin

Year	Cary			Apex					Morrisville <sup>1</sup>			RTP South		
	Total Water Use (mgd)	Water Use in Haw (mgd)	% Use in Haw	Total Water Use (mgd)	Water Use in Haw (mgd)	% Use in Haw	Water Use in Cape Fear (mgd)	% Use in Cape Fear	Total Water Use (mgd)	Water Use in Haw (mgd)	% Use in Haw	Total Water Use (mgd)	Water Use in Haw (mgd)	% Use in Haw
2000 <sup>(1)</sup>	9.29	0.82	8.8%	1.65	0.82	49.9%	0.07	4.3%	0.86	0.05	6.20%	0.27	0.27	100%
2001	10.73	1.07	10.0%	1.88	1.03	54.8%	0.08	4.3%	1.05	0.06	6.20%	0.31	0.31	100%
2002	10.23	1.23	12.0%	2.15	1.29	60.0%	0.08	3.7%	1.18	0.14	11.2%	0.39	0.39	100%
2003	9.02	0.75	8.3%	1.94	1.15	59.3%	0.073	3.8%	1.10	0.15	14.0%	0.36	0.36	100%
2004	9.69	1.21	12.5%	2.12	1.28	60.2%	0.080	3.8%	1.26	0.19	14.9%	0.35	0.35	100%
2005	10.38	1.47	14.2%	2.25	1.40	62.2%	0.092	4.1%	1.32	0.21	16.1%	0.44	0.44	100%
2006	9.79	1.15	11.8%	2.20	1.35	61.5%	0.085	3.9%	1.36	0.22	16.1%	0.41	0.41	100%

1. Water use by basin for the Town of Morrisville is unavailable for 2000, and so the percentage was assumed to be the same as in 2001.

Table 2-3 shows the combined water use for each of the certificate holders and the percentage water use in the Haw and Cape Fear River Subbasins.

**TABLE 2-3**  
Historical Water Use in the Haw and Cape Fear River Subbasins for Cary, Apex, Morrisville, and RTP South

<b>Year</b>	<b>Total Billed Water Use (mgd)</b>	<b>Water Use in Haw Subbasin (mgd)</b>	<b>Percent Use in Haw Subbasin</b>	<b>Water Use in Cape Fear Subbasin (mgd)</b>	<b>Percent Use in Cape Fear River Subbasin</b>
2000	12.07	1.97	16.3%	0.07	0.6%
2001	13.97	2.47	17.7%	0.08	0.6%
2002	13.95	3.05	21.8%	0.08	0.6%
2003	12.42	2.41	19.4%	0.07	0.6%
2004	13.42	3.03	22.5%	0.08	0.6%
2005	14.39	3.53	24.5%	0.09	0.6%
2006	13.75	3.13	22.7%	0.09	0.6%

1. Water use by basin for the Town of Morrisville is unavailable for 2000, and so the percentage was assumed to be the same as in 2001.

For purposes of calculating daily IBT amounts in 2006, the certificate holders used 25% for the portion of their water use that occurred in the Haw subbasin and 0.6% as the portion used in the Cape Fear subbasin. For purposes of calculating daily IBT amounts in 2007, the certificate holders estimate that 25% of their water use will occur in the Haw subbasin and that 0.6% of their water use will occur in the Cape Fear subbasin.

---

### 3.0 Compliance with Certificate Conditions

A summary of the conditions of the IBT certificate dated July 12, 2001 along with the current status of compliance for each is provided below.

#### Condition 1 (2010 Required Return)

*The holders of the certificate, after 2010, shall return water supplied from the Haw River Basin used in the Neuse River Basin to either the Haw or Cape Fear River Basins as described below.*

- a) *Any water use in the Neuse Basin in excess of 16 million gallons per day adjusted on an average daily basis shall be returned.*
- b) *Water used for consumptive purposes in the Neuse Basin will not be subject to this condition*

Compliance with this condition is not required until after 2010. However, the calculations for determining compliance with Condition 1 are shown in Table 3-1. Note that revised calculations for 2001 result in different values than were included in the 2001 Annual Report.

Cary, Apex and Morrisville are implementing the Western Wake Regional Water Reclamation Facility, and Holly Springs is participating in the effluent discharge facilities to the Cape Fear River below Buckhorn Dam. The project partners have acquired the land for the wastewater treatment plant site; the Partners have selected and begun working with a design team for the raw wastewater conveyance facilities, treatment facility, effluent pump station, effluent transmission main and effluent discharge structure on the Cape Fear River. Land and easement acquisition activities are continuing for the other parts of the system, including the pipelines from pump stations to the plant site and from the plant site to the Cape Fear River discharge point. The Partners' are working with the U.S. Army Corps of Engineers on an Environmental Impact Statement which will also meet the environmental documentation needs for the State Environmental Policy Act. More information about the status of the project can be found at the Western Wake Partners' website at <http://www.westernwakepartners.org>.

The Town of Cary entered into an agreement with Durham County to pump wastewater to the Triangle Wastewater Treatment Plant beginning April 19, 2005. When the Western Wake County Regional Water Reclamation Facility is completed, flow will be rerouted there.

TABLE 3-1  
Summary of Compliance with Certificate Condition No. 1

Year	Neuse Finished Water from the Haw (mgd)	Peaking Factor	16 mgd MDD adjusted to ADD	Consumptive Use Factor (%)	Neuse Consumptive Use (from the Haw) (mgd)	Required Return if After 2010 (mgd)	Amount Returned (mgd)
	(a)	(b)	(c)=16/(b)	(d)	(e)=(a)*(d)	(f)=(a)-(c)-(e)	(g)
2001	6.8	1.64	9.8	20%	1.4	0.0	0.0
2002	13.5	1.64	9.8	20%	2.7	1.0	0.0
2003	13.4	1.64	9.8	20%	2.7	1.0	0.0
2004	14.2	1.64	9.8	20%	2.8	1.6	0.0
2005	14.5	1.64	9.8	20%	2.9	1.9	0.3
2006	14.3	1.64	9.8	20%	2.9	1.7	0.5

a = Average annual transfer from Haw to Neuse (see Table B-1)

b = Peaking factor specified in Certificate for first year, and to be approved by DWR thereafter

d = Percent consumptive use specified in Certificate for first year and to be approved by DWR thereafter

g = Average annual wastewater discharges and water reuse in Haw and Cape Fear Basins (see Table B-1)

## Condition 2 (Facilitate Allocation Use)

*The holders of this certificate shall manage the authorized transfer amount in such a way that none of the individual petitioners (Towns of Cary, Apex, Morrisville, and Wake County [for RTP South]) are prevented from fully using their respective Jordan Lake water supply allocations.*

The IBT was not a limitation on Jordan Lake withdrawals for any of the allocation holders in 2006.

## Condition 3 (Disaggregation of IBT Amount)

*If the certificate holders discontinue their cooperative service agreement with each other, the maximum day permitted transfer will be adjusted by the Division of Water Resources based on the 2030 projected of each applicant at that time.*

The cooperative service agreements between the certificate holders have remained in effect during 2006.

---

## **Condition 4 (Compliance and Monitoring Plan)**

*Prior to transferring water under this certificate, the holders of this certificate shall work with the Division of Water Resources to develop compliance and monitoring plan subject to approval by the Division. The plan shall include methodologies and reporting schedules for reporting the following information: maximum day transfer amounts, compliance with permit conditions, progress on mitigation measures, 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 shall have the authority to make modifications to the compliance and monitoring plan as necessary to assess compliance with the certificate.*

Cary, Apex, Morrisville, and RTP South submitted a Compliance and Monitoring Plan concurrent with the submittal of the 2001 report. In 2003 the Division of Water Resources agreed to modify the submittal date of each annual report to be May 1 of the following year.

## **Condition 5 (EMC Consideration of Impacts)**

*If either the EIS is found at a later date to be incorrect or new information becomes available such that the environmental impacts associated with this transfer are substantially different from those projected impacts that formed the basis for the above Findings of Fact and this certificate, the Commission may reopen the certificate to adjust the existing conditions or require new conditions to ensure that the detriments continue to be mitigated to a reasonable degree.*

This condition requires no action by the certificate holders.

## **Condition 6 (Intake Access)**

*The Towns of Cary and Apex shall be required to provide access at their existing intake site to other Jordan Lake water allocation holders that need access to utilize their allocation to the extent that this additional use is determined to be feasible by the Division of Water Resources. The cost associated with getting the necessary permits, engineering design, and associated construction costs are the responsibility of the allocation holder(s) requesting the access and not Cary and Apex.*

The Town of Cary has continued to provide retail water service to RTP South and starting April 3<sup>rd</sup> 2006 has merged utility services with the Town of Morrisville. The Towns of Cary and Apex have also entered into an agreement to allow Chatham County access to the Cary/ Apex raw water intake on Jordan Lake.

## **Condition 7 (Drought Management Plan)**

*Prior to transferring water under this certificate, the Towns of Cary, Apex, and Morrisville, and Wake County (for RTP South) shall develop individual water shortage response plans subject to approval by the Division. The holders of this certificate shall 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 shall tie specific water conservation actions to the percent storage remaining in each of the petitioners' Jordan Lake water supply accounts. A copy of the approved plans shall be kept on file with the Division for public inspection. The Division of Water Resources shall have the authority to approve modifications to the drought management plan as necessary.*

Water Shortage Response Plans for each certificate holder were submitted as attachments to the 2001 Annual Report.

---

## Condition 8 (Stream Buffer Rules)

*Within six months from the effective date of this certificate, the Towns of Cary, Apex, and Morrisville, and Wake County (for RTP South) shall enact ordinances similar to or more protective than the Neuse River buffer rules (15A NCAC 2B.0233) for the parts of their jurisdictions that are within the Jordan Lake watershed. These buffer requirements shall be subject to approval by the Division of Water Resources after consultation with the Division of Water Quality and shall be adopted as local ordinances.*

Each Town's buffer ordinance was submitted with the 2001 Annual Report.

In 2004 there was one change:

1. The Town of Morrisville put 370,312 feet of 50-foot wide stream buffers under a conservation easement.

In 2006 there were three changes:

1. The Town of Apex approved amendments to UDO Section 6.1.11 Riparian Buffers which clarified the zones for riparian buffers associated with perennial streams Zone 1 of the perennial buffer was defined as the inner 60 feet and zone 2 as the outer 40 feet.
2. The Town of Apex clarified the uses permitted within riparian buffers to allow new stormwater ponds (excluding dry ponds) that control nitrogen and associated stormwater outfalls in zone 2 of the riparian buffer provided that diffuse flow is met through zone 1 of the buffer. This is the outer 20 feet for an intermittent stream buffer (50 feet) and the outer 40 feet for a perennial stream buffer (100 feet).
3. Wake County (for RTP South) adopted a Unified Development Ordinance (UDO) on April 17th 2006, which repealed and replaced the existing Zoning and Subdivision Ordinances. The UDO consolidates development regulations into a single document.

---

**Appendix A:**  
**Daily Tracking of Combined Jordan Lake Water Supply**  
**Allocations for 2006**

---

## Appendix B

---

### Daily Interbasin Transfer Estimates for 2006