THE STATE OF THE CHATTAHOOCHEE RIVER – A CALL TO ACTION

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Abstract. The expanding use of Lake Lanier and the Chattahoochee River as a supply source for municipal and industrial raw water is a dilemma that continues to spark controversy, hardship and litigation. The demands placed on the upper river system and Lake Lanier creates cascading impacts downstream into the middle Chattahoochee region and on into the lower Chattahoochee region. Can the forecast demands of the Metro Atlanta Region be met without creating harm to downstream Stakeholders? Are there sufficient inventories of water to support the forecast demands, continue to support a thriving economy at Lake Lanier, meet the environmental needs of the river and provide downstream flows to support the other reservoirs and the continued growth of economies in the middle and lower Chattahoochee River Region?

INTRODUCTION

The demands placed on the Chattahoochee River for water supply, recreation, environment and wastewater effluent assimilation have grown to the point that accommodating all these uses is not possible during droughts. The maximum limit of available water in storage in the Federal reservoir at Lake Lanier and the Chattahoochee River is exhausted even if return flows re-entering the system in these reaches are accounted for in the Critical Yield analysis. In addition to the immediate problem of where to find additional source water to meet the increasing demands in these reaches, is the problematic issue of how to mitigate downstream impacts caused by the increasing demand utilization? The final draft allocation formula submitted by the State of Georgia in the now defunct Apalachicola-Chattahoochee-Flint ("ACF") Compact Negotiations presented findings that indicated that all water supply demands in the Metro Atlanta region would be met through the year 2030 and that Lake Lanier elevations would remain significantly higher than any historical elevation experienced in 1981, 1986-1988 and 1998-2000 droughts, even with more than doubling of demands. However, in order for this scenario to work, West Point Lake would suffer devastating draw downs in order to make up for shortages in the system. These draw downs would establish precedence at West Point Lake for the total collapse of all economic and social benefits derived from the original development of the US Army Corps of Engineers project and its authorized purposes.

POSITION OF THE STATE OF GEORGIA IN THE FINAL PUBLICLY PRESENTED DRAFT ACF FORMULA

The final publicly available Draft ACF Allocation Formula prescribed reservoir operations, withdrawal demands, wastewater returns and interbasin transfers that would meet the growing thirst of Metro Atlanta. In addition to meeting the water supply demands for the next 25 years (until the year 2030), the modeling of the Draft Allocation Formula also predicted that if a drought similar in intensity to that of 1998 through 2001 were to happen again that water levels at Lake Lanier would be maintained significantly higher than historical **(See Figure 1)**.

However, for both of these significant results to occur simultaneously, the Chattahoochee System downstream of Atlanta must "pick up the slack." In fact, as a result of the nearly doubling of consumptive use in the Metro region

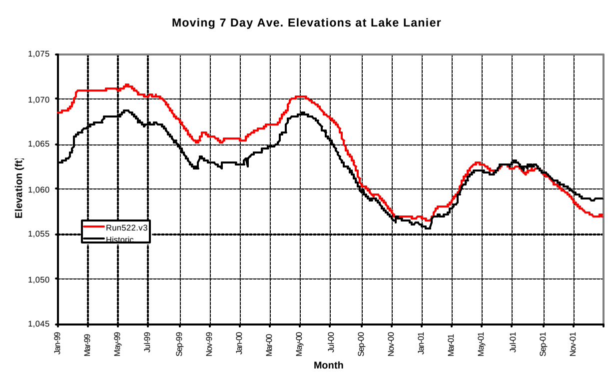

Figure 1. Lake Lanier Historical (Black line) vs. Modeled (Red line) Elevations using the forecast demands and operating guidelines defined in the last State of Georgia Draft Allocation Formula.

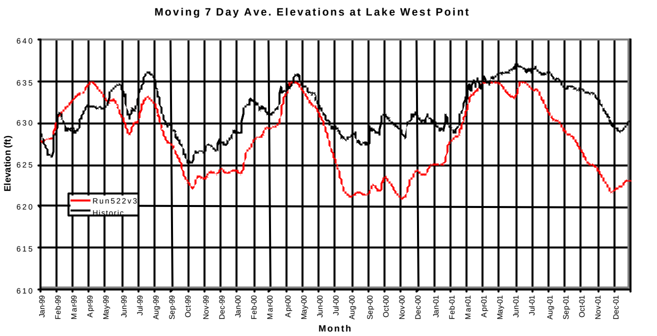

Figure 2. Lake West Point Historical (Black line) vs. Modeled (Red line) Elevations using the forecast demands and operating guidelines defined in the last State of Georgia Draft Allocation Formula.

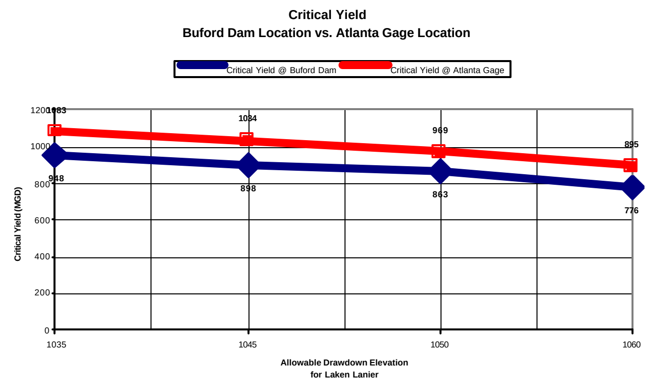

Figure 3. Critical Yield Analysis at Buford Dam and at Atlanta Gage.

without commensurate increases in treated wastewater returns, West Point Lake must release water to support all downstream uses. The reliance on West Point Lake to meet downstream demands, without releases from Lake Lanier, causes the elevation of West Point Lake to suffer severely. During the same time that Lake Lanier is maintained above its historical levels, the storage at West Point Lake is depleted to a point that West Point Lake's elevation is at the Bottom of Conservation, Elevation 620 **(See Figure 2)**.

At Elevation 620, West Point Lake is totally drained, rendering it useless to recreation, water supply, Fish & Wildlife or any other beneficial use. Compounding the drawdown problem is that the Lake, according to modeling, will stay at this elevation for as long as seven (7) months, negatively influencing all potential business and residential development in the region centered around the lake.

VIARABLES IMPACTING THE ABILITY OF THE SYSTEM TO SUPPORT ALL DEMANDS

The most significant variables affecting the ability of the Chattahoochee River to serve all of the Stakeholders are the withdrawal demands, treated wastewater returns, consumption, reservoir elevations, instream flow requirements, and interbasin transfers. These variables represent the most significant contributors to the system's ability to meet Stakeholders' needs. The system cannot supply sufficient water to meet these needs if the amount of water needed exceeds the ***Critical Yield*** of the river. The critical yield is defined as the maximum available flow that can be supplied by the system from the beginning of a drought through the end of the drought **(See Figure 3)**. The critical yield can be modified by operational restrictions being placed on Lake Lanier, such as, requiring that the reservoir be held above some predetermined evaluation. As an example, the critical yield of the system at Buford Dam is 948 MGD using the full storage of the Lake Lanier (Elv. 1070 – Elv. 1035). However, if operational restrictions are placed on the reservoir to limit the drawdown to Elevation 1050, the critical yield at Buford Dam is reduced to approximately 863 MGD and at Peachtree Creek to 969 MGD. Based on current forecast demands (Buford and Peachtree Creek = 705 MGD), the required environmental flow (485 MGD) and taking credit for forecasted returns that do not exist at this time (186 MGD), there is insufficient yield (Critical yield maintaining Elevation 1050 = 969 MGD) to support the sustainability of the system.

Demands = 705MGD+485MGD–186MGD = 1,004 MGD
Critical Yield = 969 MGD

The current instream flow requirements were developed over 30 years ago in response to the development of the original National Pollutant Discharge Elimination System ("NPDES") limits placed on permitted discharge points. The 750 cfs required minimum flow has not been modified or re-evaluated in light of continuing increases in returns and the impacts of stormwater returns. Should this minimum flow requirement be increased to account for added pollutant and temperature loadings, this increase in minimum flow will only exacerbate the already critical shortage of available water.

The current wastewater return data has nearly 80% of the total wastewater returns occurring downstream of the Buford and Peachtree Creek reaches. With only 20% of the available returns occurring in the Buford and Peachtree Creek reaches, these returns do very little to help with the shortfall in yield. The 80% of total wastewater returns should not be misinterpreted to mean that 80% of withdrawals are returned to the system. In fact, on an average basis, the best return rate that can be expected at the present time is 50%-60%. This return is suspect during droughts and seasonal dry periods and is further influenced by the inclusion of stormwater returns

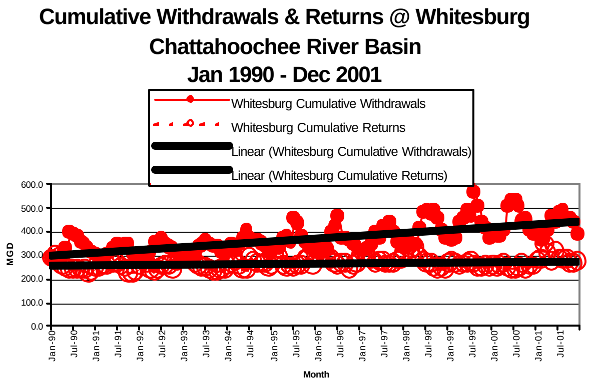

Figure 4. Cumulative Withdrawals and Returns at Whitesburg Reach. Note: Seasonal variation of returns due to stormwater influence and seasonal variation in withdrawals due primarily to human nature.

that are captured by the Combined Sewer Operation ("CSO") in the Peachtree Creek and Whitesburg reach **(See Figure 4)**.

AVERAGE ANNUAL WITHDRAWALS, AVERAGE ANNUAL RETURNS AND PROBLEMS ASSOCIATED WITH USING OTHER DATA

The last publicly available documents reflecting negotiating strategies and draft allocation formula were highly dependent on using Average Annual Withdrawals and Average Annual Return Rates. Using Average Annual Withdrawals and Returns is very risky when attempting to capture impacts to systems and reaches within the system, particularly when defining usage at the upper end of the availability envelope. The Average Annual Withdrawals forecasted for the Peachtree Creek Reach have risen from 366 MGD to as high as 425 MGD. However, neither of these numbers reflects the seasonal variation that occurs as individual usage increases well above the Average Annual in the summer months. Nor does this capture the seasonal variation of wastewater returns, either. Unfortunately, the increase in seasonal withdrawals occurs simultaneously with the lowest return rates **(See Figure 5).**

If the 425 MGD Average Annual Withdrawal is assumed to be an accurate forecast of future demands in the Peachtree Creek reach and the seasonal use pattern that exists today remains relatively consistent, then the Peak Monthly usage associated with the 425 MGD Annual Average would be near 625 MGD. The corresponding returns to the Peachtree Creek reach would be, as presently forecast, approximately 175 MGD. This

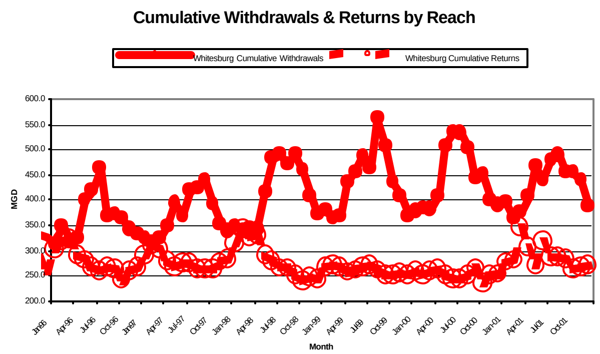

Figure 5. Cumulative Withdrawals and Returns for the Whitesburg Reach for Period covering the 1998 thru 2001 Drought. Note stability of returns during the drought period.

equates to a consumptive use in the reach of 450 MGD (700 cfs) and a return rate of less than 30%.

There is similar seasonal variation in withdrawals and returns that occur in the Buford reach, Lake Lanier. In fact, this seasonal variation occurs in most all of the reaches of the system. Some are even more pronounced than these two examples. The lower Chattahoochee is considerably impacted by seasonal variations in withdrawals and returns due primarily to agricultural irrigation withdrawals. The irrigation withdrawals in the lower Chattahoochee are not as significant as those in the lower Flint. However, any reduction in the flows in the lower Chattahoochee due to irrigation withdrawals must be made up by making additional releases from West Point.

These seasonal variations create significant planning and operational difficulties for users in the reaches. However, impacts and difficulties caused by "over use" in the reach are not confined to that reach. Significant downstream impacts are created, not by the downstream users, but as a result of the shortage of water flowing downstream created by the upstream "over use."

SOLUTIONS TO SHORTAGES

The total volume of water in a river system is finite. While, from year to year, it may fluctuate due to droughts, meteorology and modifications to land use, the long-term average remains fairly consistent. Impacts to the available water include usage, ability to return water to the system, and the amount of storage available to "bank" water from high water periods for use in low water periods. However, as we have seen, once the critical yield is reached, there is no other place to go for new supplies except to turn to interbasin transfers. Conservation, both pricing and non-pricing techniques, may defer the shortage for a time but conservation does not "make new water" for the system. Only importation of water from a nearby system "makes" new water. However, there is considerable downside to the option of interbasin transfers.

Interbasin transfers between adjacent watersheds shift the burden of responsibility and attention away from immediate focus and places undue responsibility on the adjacent watershed and the ability of those watersheds to function in their normal context. Small interbasin transfers may not appreciably impact the donating stream. However, the transfer of water in the volumes necessary to create significant impact on the receiving stream, as is the case with transfers out of the Coosa system into the Chattahoochee system, create significant and immediate problems, as well as long-term problems that are irreversible. The current concept is to transfer up to 150 MGD (230 cfs) out of the Coosa System into the Chattahoochee system. Transfers of this amount of water, along with the withdrawals for use in basin, create management problems with ability to maintain reservoir elevations in Lake Allatoona, minimum flow requirements in the Coosa system, and constrains the future development potential downstream of Lake Allatoona. While this additional water delivered to the Chattahoochee system may sustain growth in Metro Atlanta for a few additional years, its impact to the Coosa system has not been quantified in terms of lost economic opportunity.

The current Per Capita use in the Metro Atlanta region exceeds 135 Gallons per Day. The Per Capita use rate drives the demand forecast. During the drought periods or unusually dry periods, the Per Capita use rate can exceed 160 Gallons per Day. During the droughts a large component of the Per Capita use can be attributed to the landscape irrigation that occurs in the Metro region. One of the single most effective tools for extending the available source water is to reduce the Per Capita use. The first step is to reduce the Per Capita use that, in turn, slows the growth rate of demands and then there must be further Per Capita reductions that actually decrease the total demand. Reduction of this magnitude will require significant community "buy-in," as well as, implementation of ***permanent*** pricing and non-pricing conservation techniques.

Lastly, the future of the region can only be sustained if ***practical planning*** is undertaken before the source of water is totally consumed. The current demands, level of returns, consumption and losses have placed our planning horizon squarely in front of us, in the near-term, not 30 years in the future. We are attempting to develop strategies and policies for the future while working at the outer edge of the "water source envelope." All indications show that we are near or at the critical yield of the system and that future growth can only be accomplished through significant conservation, interbasin transfers and reuse. None of these three issues has been thoroughly defined, tested, or successfully applied. There are political, as well as, technical ramifications associated with each issue that must be resolved before their effectiveness can be reasonably forecasted. If the future sustainability of source water is dependent on any one, or a combination of these issues, and there is failure to implement any of the actions prior to the expected growth, then there is risk of shortage creating economic ripple effects throughout the economy of the region. Defining the future and basing it on the outer edge of the "availability envelope" is, at best, dangerous and if only one assumption is in error, there will be ramifications to the existing population, unavoidable downstream consequences, and continued suspicion and mistrust from downstream Stakeholders.

CONCLUSIONS

The water supply situation in the Upper Chattahoochee River has reached critical mass. Planning for the future requires the allocation of all available supplies. There is no buffer to protect against increased growth rates, unsuccessful conservation implementation or increases in the depth and duration of a drought. The forecast growth can only be accomplished with significant interbasin transfers, which are not a guarantee, politically or technically. The increase in return rates, which would significantly improve the supply problem, can only be accomplished with major financial investment; some estimates approach $3 Billion. This is investment above and beyond that required to solve the City of Atlanta's aging sewer problem estimated to cost upwards of $2 Billion, itself. Lack of resolution to these Upper Chattahoochee issues, or hording of water supplies as a resolution, creates significant cascading problems downstream. While the economic impact of water shortages in the Upper Chattahoochee River are staggering, the same economic harm will be felt in communities downstream. The absolute dollars may differ significantly but the percentage of influence on the total regional economy will be just as devastating.

SOLUTIONS

There are many possible technical solutions to the problem of water availability. However, coming to a consensus decision on the "right" set solutions has become a political "hot potato." Politics aside, the following are a list of possible starting points to resolution. However, for these to work, we as a region, must recognize and accept that "we" do not own water, we do not penalize one area of the basin while benefiting another, we can not design for our future on variables that fall at the outer edge of availability.

- We must accelerate the regional water supply only reservoir concept.
- We must accept that the volume of water is finite and that there is a limit to sustainable growth.
- We must not continue to perform analyses with Average Annual data.
- We must increase the return rates relative to withdrawals.
- We must explore the opportunity to increase storage in Federal reservoirs by at least one foot during the early Spring and Summer.
- We must not define policy or operating guidelines that benefit one region while creating additional stress in other regions.
- We must improve the quality of data through the design and installation of a basinwide monitoring system.

REFERENCES

1. 2003 Draft Georgia ACF Allocation Formula Proposal.
2. Withdrawal and return data from Georgia EPD.
3. U.S. Army Corps of Engineers' developed unimpaired flow set.
4. U.S. Army Corps of Engineers Water Control Plan for ACF and West Point Lake Reservoir Regulation Manual.