



June 23, 2011

Mr. Allen Barnes, Director
Georgia Department of Natural Resources
Environmental Protection Division
2 Martin Luther King Jr. Drive
Suite 1152, East Floyd Tower
Atlanta, Georgia 30334

SUBJECT: Comments on Initial Draft Recommended Regional Water Plans

Dear Director Barnes:

We are writing on behalf of the Georgia Industry Environmental Coalition, Inc. (GIEC) regarding the ten Initial Draft Recommended Regional Water Plans that the Georgia Environmental Protection Division (EPD) released on May 9, 2011 for public review and comment.

GIEC has reviewed the initial draft plans and provides the following comments and concerns for consideration by EPD as the plans are undergoing further EPD review before consideration for adoption by the Director.

1. For unregulated streams, the draft plans assume daily instream "flow-regime criteria" determined by EPD as the monthly "unimpaired" 7Q10 low flow or the "natural inflow", whichever was lower for a 68-year period (1939-2007) of unimpaired daily flows that were synthesized by EPD. It is not clear from the plans if one year of the synthesized unimpaired record was used as a surrogate for the unimpaired daily "natural inflow" but the entire 68-year period of unimpaired record was apparently used for making the monthly 7Q10 determinations. Use of synthesized "unimpaired" flows for such a long historic period (i.e., 1939 - 2007) for current purposes of 7Q10 determinations can be a significant problem if the underlying historic flow regime has itself shifted over time in which case older record periods are not reliable indicators of current and probable future low-flow conditions. The reasons for shifting low-flow conditions over time can include reservoir construction and diversions in the upstream area of the basin, urban expansion with increasing impervious area and reduced stream base flow contribution, land use and land cover changes affecting evapotranspiration, increasing amounts of upstream consumptive use, lowered ground water tables resulting from increasing ground water withdrawals, and climatic shifts. The USGS Surface Water Branch Technical Memorandum 79.06 illustrates the variability of low-flow frequency curves based on different periods of historic record. (See <http://water.usgs.gov/osw/pubs/memos/sw79.06.attachment.html>.)

To be certain, there have been significant on-the-ground changes across Georgia since 1940 that have undoubtedly influenced or impaired the instream flow regime in many, if not most, Georgia streams. For example, the population of Georgia has grown more than three fold since 1940, as illustrated by Figure 1 showing the magnitude and distribution of Georgia's population growth between 1940 and 2010. Further, today's use of agricultural irrigation, as illustrated by Figure 2 showing the inferred magnitude and distribution of



Letter to EPD Director Barnes
June 23, 2011
Page 2 of 5

permitted agricultural water use across Georgia in 2011, is very different than 1940 conditions when large-scale agricultural irrigation was virtually nonexistent in Georgia. The point is, there are real and permanent changes that are today's reality as the appropriate starting point for water planning using more realistic instream flow regime criteria. **We submit that to now essentially ignore today's reality by proposing post facto to use unimpaired flow regime criteria as the basis for water plans and water supply allocations would be a critical water supply policy mistake for water users in Georgia and we urge you to reconsider as follows.**

If contemporary estimates of low-flow statistics are needed for current forward-looking planning purposes, and we believe that is the case, then low-flow frequency analysis should be based on a period of actual streamflow record that is long enough to be statistically robust (e.g., at least 10 years of record for determination of 10-year-return low flows) but not so long as to reflect long past basin conditions that are no longer applicable today. With these considerations in mind, using the most recent 20 years of actual streamflow record (e.g., 1991 through 2010) would be an appropriate contemporary period of record for estimating monthly 7Q10 flows as they now actually exist. Of course, using the 7Q10 statistic as a basis for setting flow-regime criteria carries with it the inherent 1-in-10 risk, or 10-percent probability, that the actual 7-day low flow observed in any one month will be less than the 7Q10 flow for that month, and it carries an even greater risk that actual daily flows will be less than the 7Q10. This inherent risk of actual flows dropping below the 7Q10 level should be noted in the water quantity gap analysis of the plans in order to put the number and percentage of calculated shortfall days in better perspective.

2. The draft water plans cite use of the 2001 DNR Interim Instream Flow Policy as a rationale for setting monthly 7Q10 flow regime criteria for unregulated streamflows in each of the regional plans. The original context of the DNR Interim Instream Flow Policy is important to understand in considering the potential implications of now applying that DNR Policy for overall flow-regime criteria in the context of the draft regional water plans.

The DNR Interim Instream Flow Policy is applicable to new (after April 1, 2001) non-farm surface water withdrawal applications. It is not applicable to intermittent agricultural irrigation withdrawals that neither give nor receive instream flow protection under the DNR Interim Instream Flow Policy, and the policy is not applicable to ground water withdrawals. Municipal and industrial surface water withdrawals that are subject to the DNR Interim Instream Flow Policy are typically required to pass the lesser of the actual "inflow" at the point of withdrawal or the "non-depletable flow." The non-depletable flow consists of the monthly 7Q10 flow plus an additional flow amount specifically calculated to protect water availability for downstream permitted non-farm surface water withdrawals that typically have required low flow limits imposed on them by their withdrawal permits. In other words, for municipal and industrial permits that are subject to the DNR Interim Instream Flow Policy, if the stream reaches a certain low flow level, permittees may not withdraw any water from the



Letter to EPD Director Barnes
June 23, 2011
Page 3 of 5

stream and must instead rely on off-stream stored water or other permitted water sources until suitable streamflow levels return that support resumption of permitted withdrawals. Importantly, the DNR Interim Instream Flow Policy is based on the use of actual flows for the stream inflow values and monthly 7Q10 determinations and is decidedly not based on the use of "unimpaired flows" as is proposed by EPD for flow-regime criteria in the draft regional plans. While we support the DNR Interim Instream Flow Policy as a reasonable basis for flow-regime targets in the draft plans, it must be based on the use of actual contemporary streamflow records and not based on the use of synthetic unimpaired flows.

In contrast to municipal and industrial permittees that are subject to the DNR Interim Instream Flow Policy, farm withdrawal permittees are typically authorized to withdraw at any streamflow level. We are concerned that the practical effect of now imposing unimpaired monthly 7Q10 criteria as flow-regime targets in the regional water plans is that all withdrawals (municipal, industrial and agricultural) would essentially be subjected to new unimpaired flow regime criteria. The enormity of adopting an "unimpaired flow-regime policy" is exemplified by the magnitude (>800 MGD) of the unimpaired streamflow "gap" as calculated by EPD for the Flint River at Bainbridge. EPD's unimpaired flow regime requirement tends to create higher minimum instream flows than the actual available low-flow regimes can support and still maintain existing uses in developed regions. This proposed unimpaired flow-regime approach increases instream flow protection levels but it reduces water available for consumptive use and, thereby, increases reservoir storage/yield requirements to meet water supply needs for everyone.

We think adoption of the "unimpaired flow-regime policy" is a major strategic mistake and urge EPD to instead apply the DNR Interim Instream Flow policy as originally intended using *actual contemporary streamflow records* rather than using *synthetic historic "unimpaired" flows* as the draft plans now propose.

3. There are a number of remaining technical uncertainties about the water quantity modeling and associated assumptions used in the draft plans. The sheer magnitude of the calculated streamflow shortfall in the Flint River at Bainbridge serves to highlight the interrelated nature of water management among planning regions. Any actual shortfall in streamflow contribution to the downstream Apalachicola River from the Flint River must necessarily be offset by the use of stored water from the large Federal reservoirs on the Chattahoochee River (in another planning region) in order to maintain minimum downstream flow criteria in the Apalachicola River at Jim Woodruff Dam. In effect, stored water from the Chattahoochee subsidizes or augments streamflow shortfalls from the Flint River because there are no large storage reservoirs on the Flint River and the majority of water used in the Flint Basin is through agricultural water withdrawal permits that do not include instream flow protection criteria as a condition of withdrawal.



On a shorter planning horizon, the conversion of Flint basin surface water withdrawals to ground water sources would seem logical in combination with a program to identify and convert to deeper aquifers those areas where current groundwater withdrawals from the Floridan aquifer are known to be highly connected to the surface water system. The selective use of groundwater pumping to seasonally augment instream low flows may also have merit in some areas. Whatever is used for instream flow regime criteria, verification of any "calculated gaps" should include a peer-reviewed surface water and groundwater hydrologic budget for the region that is based on a credible data base and reasonable assumptions. The current draft plans do not provide such a water-balance verification. (See attached "Water Balance Considerations".) **It seems reasonable for the State to insist that all regional plans include a commitment to begin closing whatever verified "streamflow gap" may exist at the downstream boundary of a water planning region.**

4. The draft plans assume septic tank systems and land application systems are 100-percent consumptive of water based on the unsupported assertion that the water they return to streams is not returned within a time frame that offsets the water withdrawal they represent. We believe this "time-frame rationale" fundamentally misrepresents the ongoing and continuous nature of the significant base flow returns to streams that septic tank systems and land application systems represent statewide. Our position is supported in recent reports, including *Onsite Wastewater and Land Application Systems: Consumptive Use and Water Supply* by D.E. Radcliffe, L.T. West, L.A. Morris, and T.C. Rasmussen (http://apps.caes.uga.edu/urbanag/WasteManagement/Consumptive_water_use.pdf) and *Influence of Septic Wastewater-Treatment Systems on Base Flow in Southeastern Gwinnett County, Georgia, October 2007*, by Mark N. Landers and Paul D. Ankcom (http://www.gwri.gatech.edu/uploads/proceedings/2009/5.5.1_Landers.pdf). Notably, some of the draft plans indicate that more than half of the municipal and industrial wastewater generated is treated in septic tank systems or land application systems. To ignore the base-flow returns from such a large proportion of generated wastewater overstates consumptive use amounts in those plans. And in some plans, the consumptive use assumption for septic tank systems and land application systems appears to have given rise to a wastewater management strategy favoring the use of point source discharges on the mistaken premise that septic tank systems and land application systems are harmful to streamflows. Such a point-source strategy for streamflow improvement would be very costly to implement in terms of additional sewer infrastructure and treatment capacity requirements and yet such a strategy would not yield proportionate streamflow benefits because septic tanks and land application systems already support base flow returns to streams.

We suggest that the plans note that as a "simplifying and conservative assumption" stream base flow returns from septic tank systems and land application systems have not been accounted for in the initial plans and will be included in future plan updates. The "time-frame rationale" should not be included in any of the plans as it provides no substantive value and otherwise serves to hurt technical credibility of the plans.



Letter to EPD Director Barnes
June 23, 2011
Page 5 of 5

The ten draft plans provide a great deal of basic descriptive information and analyses in one place and will serve as a useful reference source in that regard. However, much of the modeling and associated assumptions, along with the nagging lack of a credible data base in many settings, makes the plans generally unsuitable for specific permitting purposes.

The ten draft plans and the Metro plan will need to be integrated and optimized on a statewide scale to build a Statewide Water Plan that is not unduly constrained by regional boundaries or myopic views about the need for ample water supplies to meet all reasonable future water needs statewide. The Statewide Water Plan will need to be much more than just the sum of eleven different regional plans. We are concerned that without a well-integrated state water plan, some parts of the state may suffer recurrent water shortfalls causing economic stagnation or decline even as other regions enjoy a water surplus. The key to a successful Statewide Water Plan is to invent and optimize solutions at the right scale.

We appreciate your consideration of our comments. If there is any additional information that we can provide, please do not hesitate to contact the GIEC office at 770-421-3520.

Sincerely,

GEORGIA INDUSTRY ENVIRONMENTAL COALITION, INC.

Gregory L. Jones *with permission*
Vice Chair, Board of Directors
Chair, Water Resources Workgroup

Tammy R. Wyles *with permission*
Chair, Board of Directors

Attachment: Water Balance Considerations
Figure 1: 1940-2010 Population Percent Change
Figure 2: 2011 Inferred Annual Agricultural Use



WATER BALANCE CONSIDERATIONS

Water accounting

In the fields of hydrology and water-resources engineering, the terms "Hydrologic Balance", "Hydrologic Budget", "Water Balance", and "Water Budget" all mean essentially the same thing...an accounting of water inflows to, outflows from, and change in water storage within a prescribed hydrologic unit of interest over a given time period.

Inputs, outputs and storage

The so-called Hydrologic Equation or Water Balance Equation is the equation that balances the total water budget based on the principles of mass conservation and continuity. In simple form, all water inputs minus all outputs must equal the net change in internal water storage within the specified hydrologic unit over a given time interval.

Accounting complications

Although simple in concept, water balance accounting is not so easy in practice. The single largest inflow term, precipitation, is reasonably well defined from the network of statewide precipitation measurement stations. However, the single largest outflow term, evapotranspiration, is not amenable to direct measurement and is constantly changing in space and time as a function of prevailing wind, temperature, land cover, vegetation conditions, and soil moisture. Evapotranspiration is also subject to change as land use changes over time with development. Even USGS streamflow measurements, the gold-standard of water data, are only accurate to within plus-or-minus five percent. Water balance spreadsheets are not a precise accounting tool but they are the best fundamental starting point for sound water planning and future water use allocations.

Run the numbers and check the balance

Despite all the water-balance vagaries, it is still important to run the numbers with the best data available on a water-accounting spreadsheet so that the input and output terms involved and just how far off the water-balance may be in comparison to measured USGS streamflows can be clearly seen. A basic test of a water balance is how much water remains "unaccounted for" at the downstream outflow point. In water balance accounting, it is not uncommon for this unaccounted-for-water term to be very large (and either positive or negative) in comparison to the man-made upstream water diversions and water returns. Herein lies the problem of budgeting or allocating future water for particular uses without first knowing the total water balance situation for the whole hydrologic unit.

First allocated = best served

If the overall water budget is unknown or is found to be substantially out of balance, it is quite risky to prematurely start allocating water for particular uses. Moreover, the sequence in which water allocations are made without a reliable water balance becomes critical. The first water use allocated will be the best served water use because it is being allocated from an uncertain but typically large total amount of water. However, the second and successive uses allocated will be increasingly at risk of running out of water during future dry periods because the available amount in the overall water budget was unknown or substantially uncertain at the outset. As in financial banking, the first checks written on an account will clear the bank but the last checks written will bounce if the account is initially under funded and becomes overdrawn.

Remainder-term allocations = most at risk

If water use allocations are to be made without a reliable water balance at the outset, it seems only prudent that the most critical uses should be allocated first and not relegated to an uncertain "whatever-is-left" remainder term. As now proposed, EPD's unimpaired instream flow-regime policy puts instream flow requirements first in line for water allocations and leaves all other water uses, including municipal, industrial, and agricultural water supply, with whatever is left.