

SALEM AND BEVERLY WATER SUPPLY BOARD

THOMAS W. KNOWLTON, Superintendent

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April 3, 2012

*BY FACSIMILE
AND FIRST CLASS MAIL*

Kathleen Baskin, P.E.
Director of Water Policy
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, 9th floor
Boston, Massachusetts 02114

Dear Ms. Baskin:

The Salem and Beverly Water Supply Board submits the following comments on the Sustainable Water Management Initiative (SWMI) Framework Summary, dated February 3, 2012. The Board is a wholesale supplier of water to the Cities of Salem and Beverly, and relies entirely on surface waters for its source of supply.

1. The Framework should not apply to surface water suppliers until the Commonwealth has more specifically addressed the impacts of surface water withdrawals on the resources of the Commonwealth.

The SWMI Framework has been developed based, in part, on an evaluation of the impacts of depletion of August streamflow *by groundwater withdrawals* on the fisheries resources of the Commonwealth. The analysis also indicates that impervious cover, channel slope, and percentage of wetlands within 250 feet of a river channel were also relevant factors affecting the fluvial fisheries resources. No work has yet been done to quantify the impacts of surface water withdrawals on the fisheries resources, even though surface withdrawals account for almost 80% of the water withdrawn in the basins studied by the SWMI.

At present the Framework requires surface water suppliers to undertake the following:

- a. For all surface water suppliers, implement Standard Conditions 1-8, including possibly the development of drought and demand management plans, and evaluation of the feasibility of releases.
- b. For requests for permitted volumes above the defined baseline, suppliers will need to mitigate impacts commensurate with the impact of the withdrawal, develop a drought and demand management plan, and evaluate the feasibility of implementing releases.

The most important of these conditions is the assessment and mitigation of impacts, the development of a drought and demand management plan and the evaluation of releases¹. However, since the SWMI initiative has been unable to quantify the impacts of surface withdrawals on fisheries resources, it is unclear how individual suppliers could undertake such an evaluation. And, if it is not possible to articulate the impacts of surface water withdrawals, it then follows that there is no objective method for assessing mitigation, or establishing the streamflow criteria that are necessary to develop drought and demand management plans.

For these reasons, the Board suggests that the Commonwealth turn its efforts to developing more specific guidance on these issues for surface water suppliers. When these are more fully developed, they can be incorporated into the SWMI process.

2. The Safe Yield Analysis conducted under the SWMI process is inconsistent with the definition of Safe Yield as contained in the Water Management Act, is too simplistic, and has ignored the results of several studies conducted by the USGS for the Commonwealth. The analysis should be redone to correct these deficiencies.

- a. Under the Water Management Act, Safe Yield is defined as:

the maximum dependable withdrawals that can be made continuously from a water source including ground or surface water during a period of years in which the probable driest period or period of greatest water deficiency is likely to occur; provided, however, that such dependability is relative and is a function of storage and drought probability

However, the definition proposed as part of the SWMI process establishes a volume of water that appears to reflect some measure of the amount of water available to be continuously withdrawn in a drought year, adds an increment of water for storage in excess of one year, and then reduces that amount by an environmental protection factor.

The Board believes that the Act does not authorize the wholesale adoption of an environmental protection factor as part of the definition of Safe Yield. Rather, environmental protection is one of the competing withdrawals and uses that must be balanced under Section 3 of the Water Management Act for the purpose of “managing ground and surface water in the Commonwealth as a single hydrological system”.

- b. The method adopted for calculating the yield of reservoir storage is too simplistic, is an artifact of the unconventional approach to determining safe yield that SWMI has adopted and ignores the results of other studies conducted by USGS for DEP that have quantified the safe yield of over 30 reservoirs. It significantly under-estimates the yield of these reservoirs by an amount of over 110 million gallons per day.

Many reservoirs have been sized and designed specifically to provide short term within-year storage for the purpose of meeting demands. These reservoirs represent a valuable resource that should not be so cavalierly discounted.

¹ The Board also has specific concerns with other aspects of the standard conditions which have been discussed with the DEP as part of ongoing permitting efforts. These are not repeated here.

The safe yield calculation contained in Appendix A of the SWMI Framework Safe Yield discounts any water in storage that is less than one year's demand. It justifies this approach for two reasons –

- i. First because the water has already been “counted” in the major basin safe yield, and should not be double counted. It is incorrect to say that stored water would thus be “double counted”. The Safe Yield has been defined (exclusive of storage considerations) as the Q90 flow value for a synthetic year where every month is in a drought condition. Any flow “above” the Q90 flow has not yet been “included” in the Q90 flow. Indeed, to the extent that water exists in storage in the “drought year”, if that water were released to the river, it would have the effect of increasing the Q90 flow of the river.
- ii. Secondly, it suggests that under certain conditions, there would be little water left in storage at the end of the drought. While that is true, it is the classic definition of safe yield, and it is entirely consistent with the definition as described in the Act. If water were left in storage “at the end of the drought”, it presumably would have been available to be “continuously withdrawn” at some level, and should be counted towards basin safe yield.

The failing of the SWMI method is amply demonstrated by comparing the yield of the various reservoir systems as presented in *Refinement and Evaluation of the Massachusetts Firm-Yield Estimator Model Version 2.0* USGS SIR 2011-5125 and in *Simulated Effects of the 2003 Permitted Withdrawals and Water-Management Alternatives on Reservoir Storage and Firm Yields of Three Surface-Water Supplies, Ipswich River Basin, Massachusetts SIR 2004-5122* to the yields presented in the Table on page 8 of 33 in the SWMI appendices. For 31 of the reservoirs studied in those reports, the SWMI methodology results in zero system yield, while the reports indicate a total yield of 79.1 MGD. For two other systems, SWMI understates their yield by 33.4 MGD. In aggregate, the SWMI methodology appears to understate the yield of 33 reservoirs by over 110 MGD. While we do not necessarily agree with the methodologies adopted in the two USGS reports, it nonetheless points out the serious shortcomings of the SWMI methodology.

The Board believes that the USGS studies should be used in the SWMI process. We see no reason to use incorrect numbers for these systems when EEA knows their yields to be otherwise.

3. The Safe Yield Analysis should not include demands associated with sources that have effectively been abandoned.

Several suppliers in the Ipswich River Basin have fully or partially abandoned their sources of supply and/or have made arrangements to purchase their water elsewhere. These include the Towns of Reading, North Reading and Wilmington. In assessing the demands on the safe yield of the Ipswich River, the demands of these communities satisfied from other sources should not be included, or those other sources should be added to the yield of the Ipswich system.

4. EEA should provide information on the calculation of Flow Levels and Biological Classification for each sub-basin.

Sub-basin flow levels and classification are important to understanding the impact of the SWMI framework on suppliers. While the recently issued SWMI map provides some information on fisheries, it provides no details on the underlying attributes of the basins and nested sub-basins that result in the biological classification or flow levels of individual sub-basins. This information should be made available, either in Excel or GIS format.

5. The selection of the breakpoints between the various classes of flow and biology should be better explained and documented.

In reviewing the information contained in the SWMI Framework Appendix C, it is unclear as to how the interplay of the various factors influencing fluvial relative abundance (FRA) were evaluated. Virtually all of the charts are displayed with August percent alteration as the primary driving factor. Yet of all four variables tested, this was the least important in determining FRA, with the others being between 3 and 9 times more important. Moreover, it is clear that overall FRA was not the driving factor in establishing breakpoints, but rather the response of two species, Brook Trout and Blacknose Dace. This then raises the following questions:

- a. Has the use of a limited set of species biased the breakpoints because not all waters of the Commonwealth can support coldwater fisheries such as the Brook Trout? Does the use of Blacknose Dace introduce other biases?
- b. If natural factors such as channel slope and wetlands are the dominant force in determining the FRA in a basin or sub-basin, how was this taken into account ?

We have also noted that some minor adjustments seem to have been made between the initial and final versions of the breakpoints. The rationale associated with these changes should be presented. If the changes are based on "best professional judgment", that judgment should be written up so that the logic can be better understood.

In summary, classification is a technically complicated undertaking, yet the analysis and documentation –especially figure 7 – seem to say that if only the August streamflow were not so depleted, then the fisheries would be fine. From the information presented in the USGS reports, this appears to be a wholly incorrect conclusion.

6. Fisheries Modeling

Considerable use is made of the results of the USGS efforts on the analysis of factors affecting riverine fish assemblages in Massachusetts. That document is fairly complicated from a technical perspective, and many of the underlying concepts require an advanced understanding of statistics as applied to biological systems. Nonetheless, some aspects of the document give us concern.

For example, the report indicates that the models can account for only 18 % of the variability in observed fish abundance data. This is a low value. While this may be in line with other similar studies reported in the literature, it leaves open the question as to whether it is a sufficiently accurate basis for major water resource decisions.

We believe the acceptability of the report and of its application through the SWMI process would be enhanced if the Commonwealth invested in an independent peer review of the document and of

the Commonwealth's application of its findings. Although the report may have gone through the USGS' internal peer review, that is a closed process that is not disclosed to the public, and it would not have covered the subsequent application of the concepts as developed by the SWMI staff. The SWMI process should be subject to an open, independent external peer review.

7. Streamflow Criteria

The SWMI framework report contains an appendix that describes the derivation of the streamflow criteria for seasons of the year other than August. The methodology indicates that the flow levels were essentially derived based on the summer data, adjusted to one flow level less.

This appears to be entirely unsupported by any data. Has EEA undertaken analyses of seasonal data on stream flow, withdrawals or other variables on fisheries populations to support the extrapolation of the data to other times of the year? It seems to us that in the deep summer, when water is least abundant, it is reasonable to expect that it might be a limiting factor on fisheries health. And, we are sure that during some other time of year, flow might be important, but there is nothing to suggest that it is as important as in the summer. At the very least, we suggest that the following be undertaken:

That statistics be developed for various streams that reflect the variability of natural flow in a river system. Certainly the natural variability of flows in October, January and April far exceed the values proposed for seasonal criteria. This information should be used to inform the development of seasonal criteria.

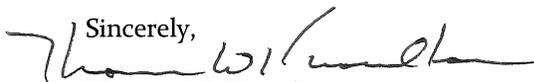
Literature surveys should be conducted to determine the relevant environmental factors influencing fisheries survival during non-summer months.

Subsequent to the completion of the above, a formal data collection and analysis program should be developed to fill in the gaps.

Streamflow criteria will be very important to all water resource issues, and it will be critical to get these correct. Simply declaring the natural hydrograph to be a goal is insufficient; carried to the extreme, maintaining the natural hydrograph means that no water can be diverted for use by humans.

In conclusion, we feel that the SWMI process, as presently structured, contains conclusions flawed by ignoring important studies for which the Commonwealth has paid a great deal of money. This flawed process, if implemented, will greatly increase the cost of water to many citizens of the Commonwealth. Further, it will reduce the economic competitiveness of communities in the Commonwealth that depend on adequate water supplies to keep and attract residential, commercial and industrial development. Finally, it will limit communities' legitimate rights to already constructed water supplies that were intentionally protected in the Water Management Act.

Should you have any questions on the above, please do not hesitate to contact me.

Sincerely,

Thomas W. Knowlton
Superintendent