

Water Allocation Program Advisory Committee Streamflow Committee

Goals and Objectives

The goal of the subcommittee is “to develop flow standards, including site specific standards, that allows for maximum sustainable use and are protective of the biological, chemical and physical integrity of those waters.”

The objectives were developed to direct the work of the subcommittee and are as follows:

- Establish an interim instream flow standard applicable to new withdrawals and for planning purposes.
- Determine acceptable methodologies for measurement and estimation of instream flows to establish site specific standards.
- Identify gaps in streamflow gaging and other data
- Establish scientific framework to create long-term watershed specific instream flow protocols.
- Identify funding needs and sources
- Develop recommendations on implementation of instream flow standards.

In addition, guiding principles were also established which facilitate the actions of the subcommittee and are as follows:

- The focus of the subcommittee will be to apply the "best science" available in developing streamflow standards which provide for maximum sustainable use and are protective of the biological, chemical and physical integrity of the State's waters.
- Development of the streamflow standard is not in itself regulatory in nature. Any future adoption of the streamflow standards in regulation will allow for full public participation and follow the Administrative Procedures Act requirements.

The mission, objectives and guiding principals were used to develop a set of work tasks for the subcommittee which can be found in Appendix A.

Recommendations

On September 4, 2003 the streamflow subcommittee had consensus on six recommendations, as follows:

1. Watershed specific instream flow protocol is the preferred approach for establishing instream flow standards in Rhode Island. The Subcommittee recognizes that this will take several years to develop and implement. Consequently, the Subcommittee recommends the use of a simplified reconnaissance level method in the interim. The interim method would only be used for new withdrawals and planning purposes.
2. As watershed specific standards are being developed, the subcommittee recommends use of an interim standard for new withdrawals and planning purposes. The subcommittee has considered a wide range of alternatives, and has found none substantially superior to the RIABF interim standard proposed by DEM. The subcommittee wants to further evaluate the RIABF as the interim standard.
3. Site specific empirical stream flow methodologies should continue to be accepted as an alternative to the interim method. The R2 Cross and Wetted Stream Perimeter Methods appear to be acceptable methodologies however, the subcommittee recommends the establishment of guidance in application of these methodologies.
4. The Subcommittee recommends development of a watershed specific standard that quantifies the relationship between instream flow and critical stream resources and acknowledges existing uses. The subcommittee recognizes that these recommendations are costly and recommends that funding should be made available for this process.
5. The subcommittee recognizes that the stream gaging network needs to be improved and that stream gaging is a vital part of managing streamflow. The subcommittee recommends a statewide stream gaging network that has at least one long-term continuous gage for each 12 digit HUC delineation.

6. The subcommittee recommends that during periods of drought or water emergency, use of water, normally within protected minimum flows or levels, be allowed as necessary to protect public health and safety and to prevent widespread economic harm, provided every precaution has been taken to prevent permanent impairment of the biological, chemical, or physical integrity of the water source.

Overview of Committee Process and Summary of Technical Presentations and Findings

On **November 19, 2002** the Office of Water Resources gave a power point presentation of their idea of how to establish an interim streamflow standard for Rhode Island. A copy of the presentation and handout were distributed. The proposed interim standard is available in Appendix B of this document and presents this idea of an interim standard in more detail. The subcommittee was also given a table which outlines the Ecological Responses to alterations of components of flow, the Rhode Island Water Works Association Flow Allocation Policy Position, the Regulated Riparian Model Code – part of chapter 1, and other miscellaneous documents not directly related to this issue. Discussion ensued about how to apply an interim standard and DEM replied that it would be applied to new withdrawals and for planning purposes. There was also discussion on the purpose and objectives covering a range of perspectives. Agricultural interests stated that that basin specific flow standards were necessary and that the subcommittee's goal ought to be to find the money to support the necessary research.

On **December 10, 2002**, Ralph Abele of the USEPA gave a presentation about the effort of other New England States in setting streamflow requirements and registration programs. The group agreed that the final goal of basin specific standards is the way to go. Agriculture interests are concerned that an interim standard will be applied to existing users and also that it will become a final standard due to the lack of funds to perform basin specific studies. DEM explained that an interim standard is needed for new applications and for planning purposes. Existing users would be evaluated by the basin specific standards.

On **January 14, 2003**, OWR staff responded to questions by Committee members on the proposed interim standard.

On March 17, 2003 a brief overview of the development of the RI ABF was given. A copy of that presentation was available as an attachment to the minutes. The presentation and accompanying discussion resulted in some interesting questions, which will be presented to the TAC for further consideration as part of their review (Attachment X?). The group also decided to begin developing site-specific guidance for use in RI. It was decided that the subcommittee should solicit presentations of the various flow-setting and management methodologies from individuals who have applied them in the field. This educational process would provide the group with a good foundation for making decisions on what site-specific methodologies and approaches are appropriate for use in RI.

On April 30, 2003 Dave Armstrong of the USGS gave a presentation to the streamflow subcommittee on the R2Cross, wetted perimeter, RVA, Tennant, and ABF methods. In this presentation he laid out that there are different classes of instream flow setting techniques:

- standard setting: desktop, rule-of-thumb methods; uses predefined formulas and existing information; assumes certain flow is generally protective of all habitats; conservative
- mid-range: same as standard setting but requires some field work, usually hydraulic data
- monitoring/diagnostic: assesses conditions and how they change over time; field work requirements vary; assumes certain stream flow is protective of habitat in general
- incremental: analyzes variables to assess different flow management alternatives; targets specific species and determines flow necessary to protect those species

Dave Armstrong gave a brief review of the methods used in studies on Queen/Usquepaug, Ipswich and selected sites on the Charles and Assabet Rivers, as follows:

R2-Cross method, developed in Colorado, is a mid-range standard setting method. The method assumes that if riffles, which are important habitats for macroinvertebrates and reproduction for some fish, are maintained then there will also be good habitat elsewhere in the stream. The streamflow required to protect the riffles is determined from flows that meet mean depth, % of wetted perimeter and mean stream velocity

at stream width. However, this method only addresses summer minimum flows to maintain riffles. The natural hydrograph for the remainder of the year is not taken into account.

Stream Bankfull width (ft)	Mean Depth (ft)	% of bankfull wettered perimeter	Mean Velocity (ft/s)
1-20	0.2	50	1.0
21-40	0.2 - 0.4	50	1.0
41-60	0.4 - 0.6	50 – 60	1.0
61-100	0.6 - 1.0	≥ 70	1.0

Wettered perimeter, a mid-range standard setting method, requires field work to gather hydraulic data. This method is based on the same assumption as for R2CROSS. Wettered perimeter is the width of the streambed and banks in contact with water at a particular cross section. The method determines the flow needed to maintain the riffles as the breakpoint in the wetted perimeter vs. discharge curve. The weakness of the method is that the breakpoint in the curve is affected by the channel characteristic; shape, presence of rocks and sandbars, altered or constructed banks and backwater effects from downstream. In addition because this method produces flows necessary to maintain the riffles, it only addresses summer minimum flows. The natural hydrograph for the remainder of the year is not taken into account.

On **May 12, 2003**, Ralph Abele of the USEPA gave an Overview of the Connecticut Interim and Long-Term Streamflow Approaches. Copies of the proposed long-term approach for Connecticut in which they recommended a framework for quantifying the relationship between instream flow and habitat suitability was distributed at the meeting (Appendix C). Also Mr. Phil Zariello presented an overview of the Ipswich River HSPF Model. He discussed the management strategies investigated for the Ipswich to meet water demand and maintain adequate flow.

On **June 2, 2003**, the technical advisory committee met to discuss the RIABF. As of this date the Office of Water Resources is still responding to the discussions and questions raised during the meeting and to the written submittals. The final list of participants in the technical advisory committee meeting is found in Appendix D.

On **July 23, 2003** a presentation of MesoHABSIM was given by Piotr Parasiewicz of Cornell University. MesoHABSIM is a further development of PHABSIM (physical habitat simulation), which describes the distribution of the physical parameters that are relevant to fish; flow, depth, velocity, substrate and cover. At the scale of hydromorphologic units of riffles, pools and runs, MesoHABSIM takes this model further by predicting the biology, based on the broad range of physical parameters. In addition, it has been adapted to be applied more broadly spatially, over an entire river or watershed instead of being limited to a portion of a river.

At the **August 19, 2003** meeting, it was questioned how standards would be applied, specifically during times of water shortages. The discussion revolved around the model riparian code language. Committee members were referred to page 46, Item 2 of the code refers to actions taken during water “emergencies”. It was noted that the term “emergencies” should not be equated with “shortages”. Additionally, opportunities should be made available for potentially new users, such as AmGen.

Appendix X?

Questions posed to the Technical Advisory Committee reviewing the proposed RIABF interim standard:

1. The NE ABF is based on using the median of the monthly average flows. The RI ABF is based on the median of the monthly median flows. The reasoning for selection of different flow statistics relates to the effect of watershed size on stream hydrographs. The NE ABF uses gages from very large watersheds that have a better ability to “absorb” the effects of large summer storms because they have more tributaries and associated wetlands, etc than smaller watersheds. These large watersheds generally do not exist in Rhode Island. In the smaller watersheds that are more typical of Rhode Island's watersheds, large summer storms produce more runoff, which are seen as spikes in the hydrograph, which in turn affect the flow averages. The median of the monthly median flows is seen as a more representative low flow statistic for use in RI's smaller watersheds. *What biological effects do these two phenomenon, and the associated statistics used by USFWS and RI have in relation to habitat impact due to the amount of water available? What are the implications of the different flow statistics on the biological community?*
2. The RI ABF includes a minimum target instream flow equivalent to the 4B3 flow. The EPA recognizes the 4B3 flow as a biologically based flow that protects aquatic habitat from chronic toxicity in relation to instream pollutant concentrations by providing an adequate time period for recovery of the aquatic community before the next "incursion" occurs. *Can this flow also be used to protect against the stresses on the aquatic habitat as a result of low flows?*
3. A 4B3 flow is used for determining pollutant concentrations from a direct discharge into a river. Exceedance of those concentrations that would theoretically occur once every 3 years would be limited to a certain reach of the river downstream from the discharge, potentially causing mortality to organisms. The unaffected reaches of the river would hypothetically provide organisms that would repopulate the impacted reaches. *If this flow were used as a target minimum low flow, would the entire river be impacted such that repopulation would not successfully occur?*

In addition to these questions, there were questions on the flow duration curves that were handed out in the January meeting. Gages such as Wood River at Acadia show very low percent exceedance of the 4B2 flow in relation to areas that are more impacted such as the Chipuxet and the Wood River At Wood River Junction. In addition, concerns were raised that according to the flow duration curves the 4B2 flows are not met on average 30% of the time. It is felt that this is too conservative particularly for farmers. OWR staff will further evaluate the data and report back to the subcommittee.