Comment 2: TP and TSS delivery factors above 1

The Draft Final calibration assigns delivery factors to watersheds to represent the effect of transport between the edge-of-stream and the edge-of-tide. A significant number of watersheds in Maryland have phosphorus delivery factors greater than one, which means that the load delivered to the Bay is larger than the edge-of-stream load. Phosphorus delivery factors greater than one, which were not used in Phase 5, are an innovation in the calibration methodology which had not been explicitly discussed by the Modeling Workgroup, and their interpretation presents a challenge to using the Phase 6 model assign loads to sources under the management applications of the P6 model. For the purposes of restoration plan development, a straightforward application of the delivery factors to upstream sources presents a challenge: it implies that one phosphorus pound from wastewater discharged into a non-tidal river could result in two phosphorus pounds at the tidal interface. Other strategies for attributing the additional load delivered to the Bay to other upstream sources may present some of the same problems in gaining stakeholder acceptance that plagued the Phase 5 model from the use of regional factors. On the other hand, although delivery factors larger than one are generated in the model by a net increase in phosphorus from instream sources in the simulation of large rivers, MDE is reluctant to attribute the difference between loads to the Bay and edge-of-stream loads to streambank erosion or other streambank processes in the absence of corroborating evidence of the contribution streambank sources in specific watersheds. Rather than representing the accurate quantification of streambank phosphorus loads, the difference between delivered loads and edge-of-stream loads is generally more likely to stem from the uncertainty in model estimates of these loads.

Sediment delivery factors greater than one are equality problematic for the management application of the Phase 6 model. In Maryland sediment delivery factors can range up to more than a factor of six. Although sediment delivery factors larger than one were used in Phase 5, their use in Maryland in Phase 6 is more prevalent, and higher values occur in more watersheds with a higher profile, like the above fall line in the Patuxent River.

MDE would like to see a discussion and review of the use of phosphorus and sediment delivery factors greater than one before finalizing the Phase 6 Model. MDE advocates an approach that builds on the assumption that phosphorus delivery factors should tend toward one in riverine systems. About half of the watersheds below fall line in Maryland with phosphorus or sediment delivery factors greater than one have no calibration data. At some of the RIM stations whose watersheds have delivery factors larger than one, Phase 6 has larger average annual loads than WRTDS. It may be possible to adjust the calibration methodology to minimize the number of watersheds with delivery factors greater than one while still meeting the standards for an acceptable calibration. Additional information is provided in the attached slides from ICPRB.

Here is the CBPO proposed resolution:

Delivery factors are the result of calibration methods that are directed by the modeling workgroup. This comment is essentially asking for an open-ended investigation of calibration methods which the partnership does not have time for.

Here is a summary of the verbal response I gave during the last WQGIT call

In the Draft Final model, TP, TSS and, occasionally, TN delivery factors were calculated to be greater than 1. While some delivery factors may be adjusted down due to minor calibration adjustments, we anticipate that delivery factors above 1 will still be present for TP, TSS and in a few limited instances, for TN in the final P6 model. In these instances, we propose capping the delivery factors for wastewater (municipal, industrial, CSO) at 1. While is is conceptually understandable that in-stream processes may cause loads to increase between the EOS and EOT, and that this load increase could be a function of anthropogenic alterations to the watershed, it is challenging to understand how this would be affected by wastewater discharges.