Year of Phase 7 Model Review

July CBP Modeling Workgroup Quarterly Review
July 8, 2025

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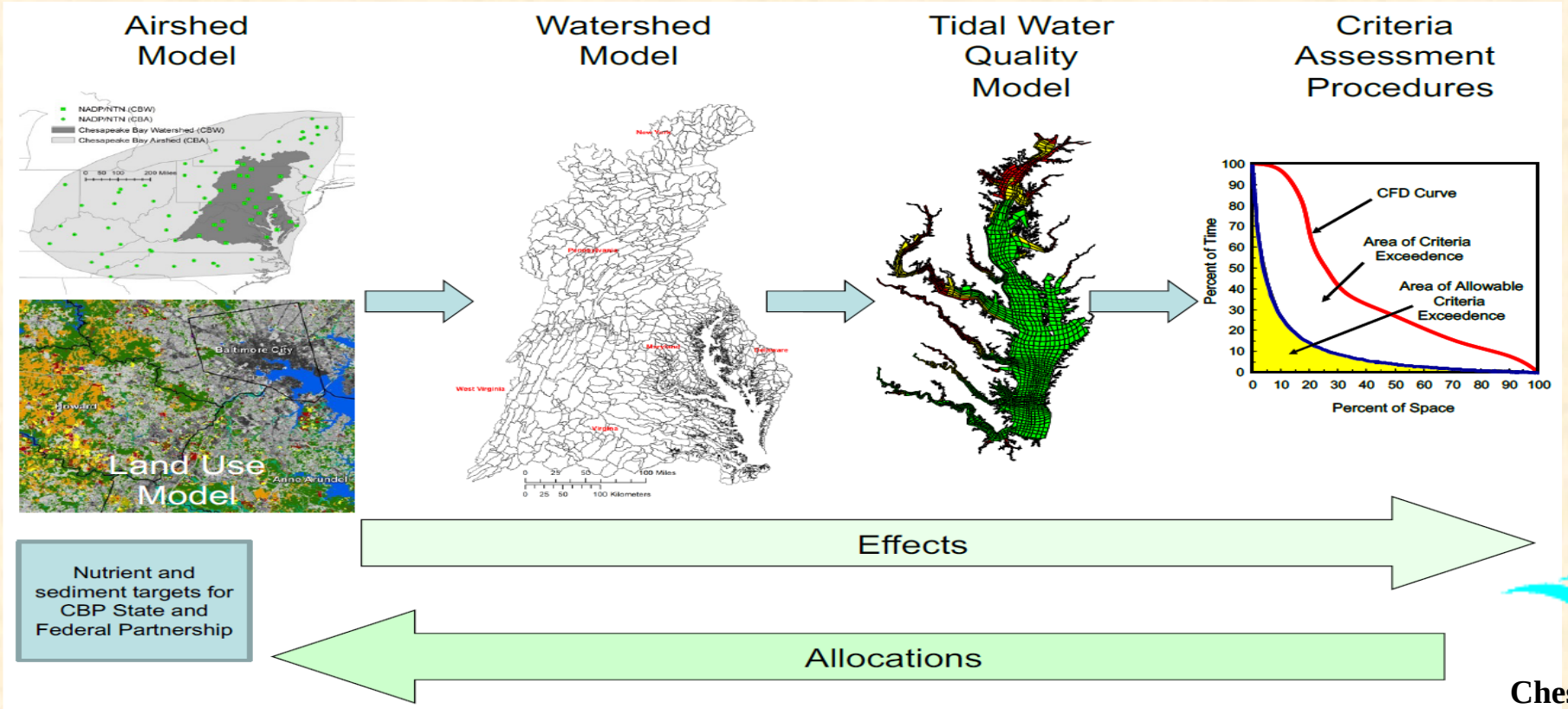

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Motivation for Model Peer Review

STAC model peer reviews are an important component of a wider CBP partnership review of the Phase 7 Models. Previously, the Phase 5 models and other tools used in the initial 2010 TMDL and the Phase 6 Models used in the 2017 Midpoint Evaluation were reviewed by STAC. The STAC reviews were requested by the CBP partnership and have provided multiple benefits. The reviews have built confidence in the tools, increased knowledge of the tools both in the CBP and STAC, and have provided suggestions on future phases of the modeling.

In addition, EPA requires peer reviews for regulatory models

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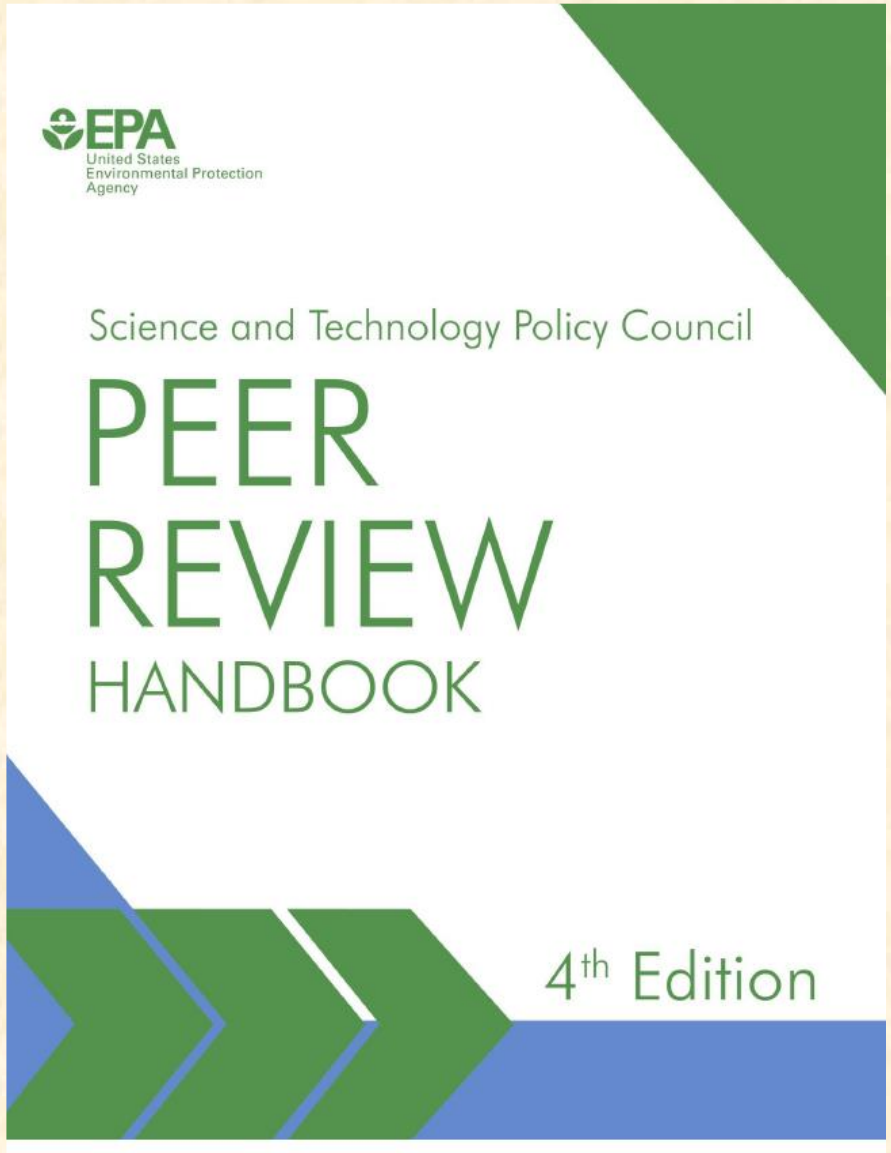
A Peer Review Handbook

EPA's Science Advisory Board (SAB) has provided recommendations for model peer review as part of its guidance on using and evaluating models for environmental decision making.

The recommendations are found in various EPA documents, such as the Peer Review Handbook and Guidance on Development, Evaluation, and Application of Environmental Models. The SAB regularly updates its recommendations.

U.S. Environmental Protection Agency
Peer Review Handbook 4th Edition October 2015
https://www.epa.gov/sites/default/files/2020-08/documents/epa_peer_review_handbook_4th_edition.pdf



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Key Elements of SAB's Recommendation for Model Peer Review

Formal and independent review: The SAB emphasizes that scientific models, should undergo formal independent third-party peer reviews. Reviewers should be selected based on their experience and independence (without direct involvement in developing the work being reviewed).

Clear purpose and focus: Reviewers should receive a clear charge outlining the review's purpose, the intended use of the material and decision making, and the key scientific and technical issues to be addressed. The review should focus on the model's technical aspects such as its theoretical basis, assumptions, data quality, and performance.

Documentation and improvement: The process should involve modelers evaluating reviewer comments and using them to approve the final product and documenting the review process recommendations and their responses.

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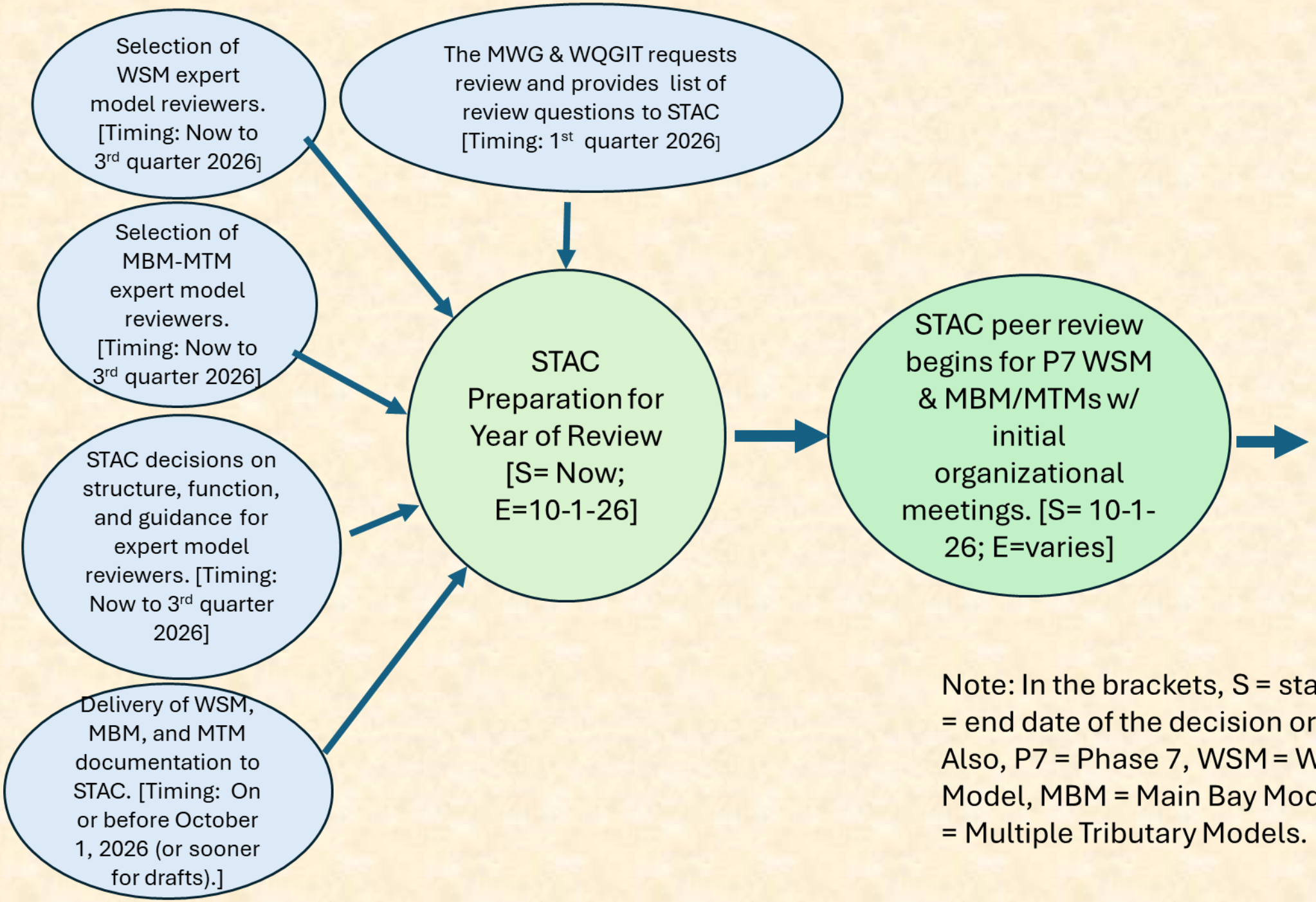
Key Elements of SAB's Recommendation for Model Peer Review

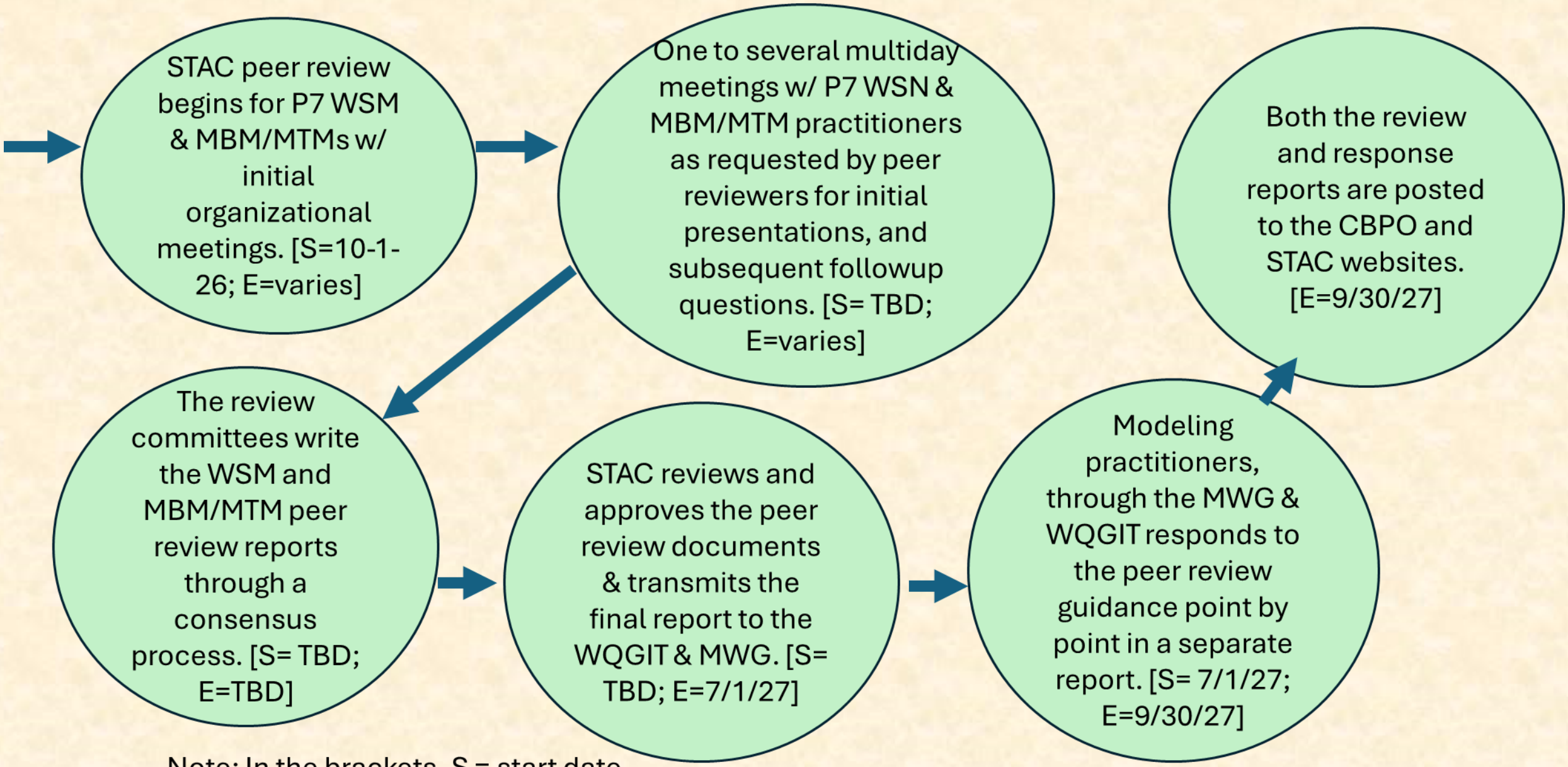
Consideration of application and limitations: The review should assess the model's application niche and the conditions under which its use is scientifically defensible, thereby helping users understand its limitations.

Key review elements: Critical elements of model peer review could include the modeling purpose, theoretical basis, parameter evaluation, data quality assumptions, performance measures, documentation, and retrospective analysis (backcast scenarios).

Planning integration: Peer review should be integrated into the planning and modeling timeline with adequate schedules and resources.



Note: In the brackets, S = start date and E = end date of the decision or process. Also, P7 = Phase 7, WSM = Watershed Model, MBM = Main Bay Model, and MTM = Multiple Tributary Models.



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CBP Management P7 Review Conducted by WQGIT

The CBP management review runs in parallel to the STAC model peer review. The management review is less structured than the scientific model peer review and generally involves a review, through the MWG and WQGIT, of the appropriateness of model applications and findings to management and/or future environmental conditions in the Chesapeake watershed and/or Bay.

Generally, the Phase 7 model approval will be guided by the principle of the Phase 7 being overall as good or better than the previously approved and vetted Phase 6 model.

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Any Fatal Errors Will Be Corrected

A fatal error is a mistake, technical inconsistency or gap, a failure to follow the science, or any error by the Modeling Team.

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Potential Peer Review Questions for the WSM

Relative loading rates are used for similar land uses based on literature as documented in Section 5. Please comment on the methods used to determine relative loads.

Given the approach used and data available, do the sensitivities to nutrient inputs documented in Section 6 reflect our best understanding of the current condition of nutrient load processing and attenuation on the landscape?

The partnership developed methods to deal with climate change in the Watershed Model based on the results of three STAC workshops as documented in Section 15. Are there improvements to these methods that may better simulate the effects of climate change on nutrient and sediment delivery to the Bay?

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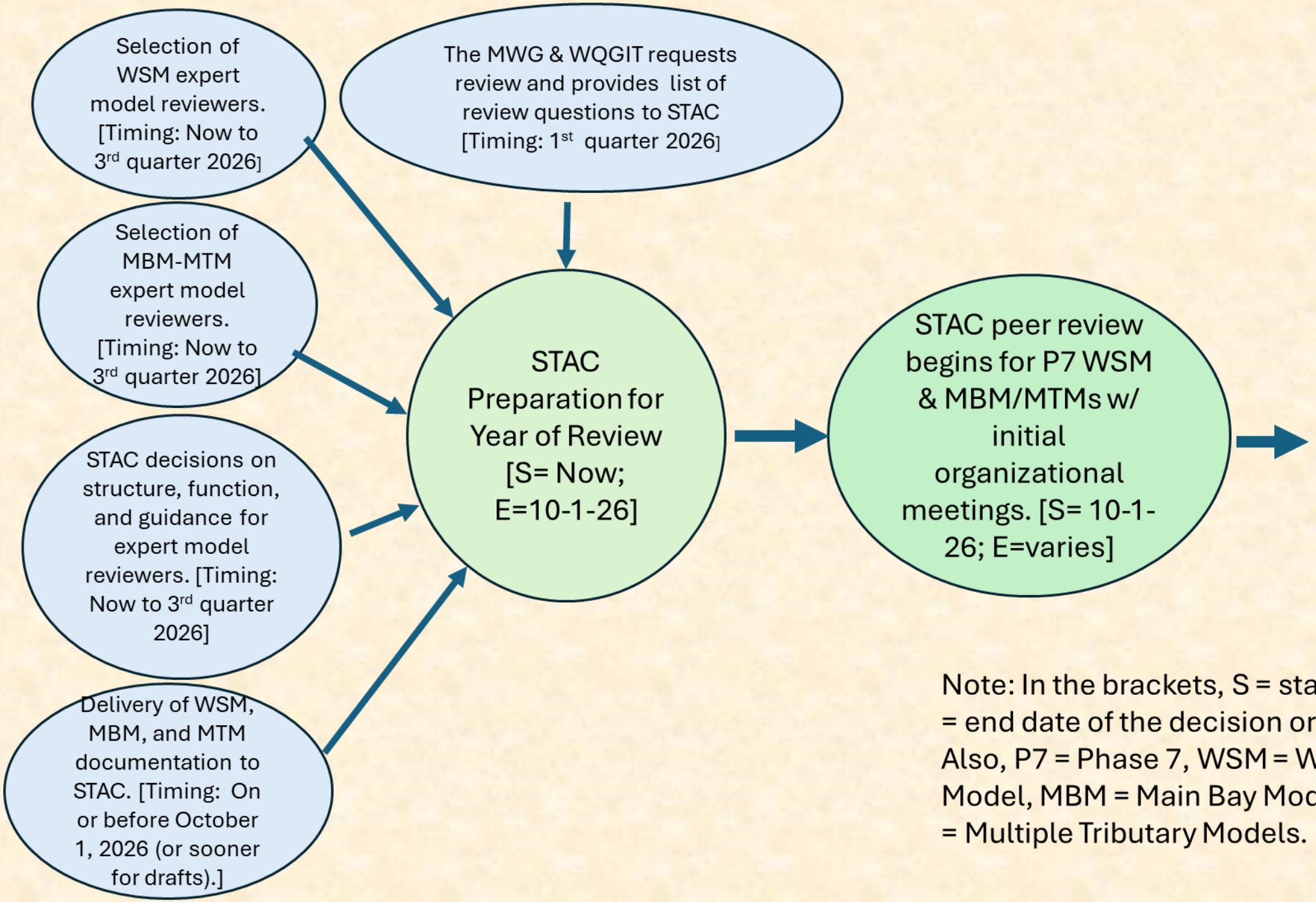
Potential Peer Review Questions for the MBM/MTM

Questions from the Phase 6 review:

Please comment on the overall appropriateness of the approach taken in the application of G1, G2, and G3 organic behavior in the water column and sediment of the WQSTM. Is the applied approach appropriate? What could be done to improve the representation of the various organic decay rates in the WQSTM?

Given the current state of modeling, research, and monitoring on the increased net transport of nutrients and sediment out of the Lower Susquehanna reservoir system, please comment on the scientific rigor of the WQSTM approach used to represent the increased nutrient and sediment loads on Chesapeake water quality standards of DO, chlorophyll, and clarity/SAV. Is the representation of nutrients and sediment under all states of flow, including moderate and extreme flow events, sufficiently well simulated for the condition of reservoir infill?

Please comment on the overall appropriateness of the approach taken for estimating and representing future sea level rise (SLR). Is the approach sufficiently scientifically defensible and appropriate for preliminary application? Please feel free (but not obligated) to also comment, for the longer-term consideration of the CBP, on how you believe the estimate and representation of SLR can be improved.



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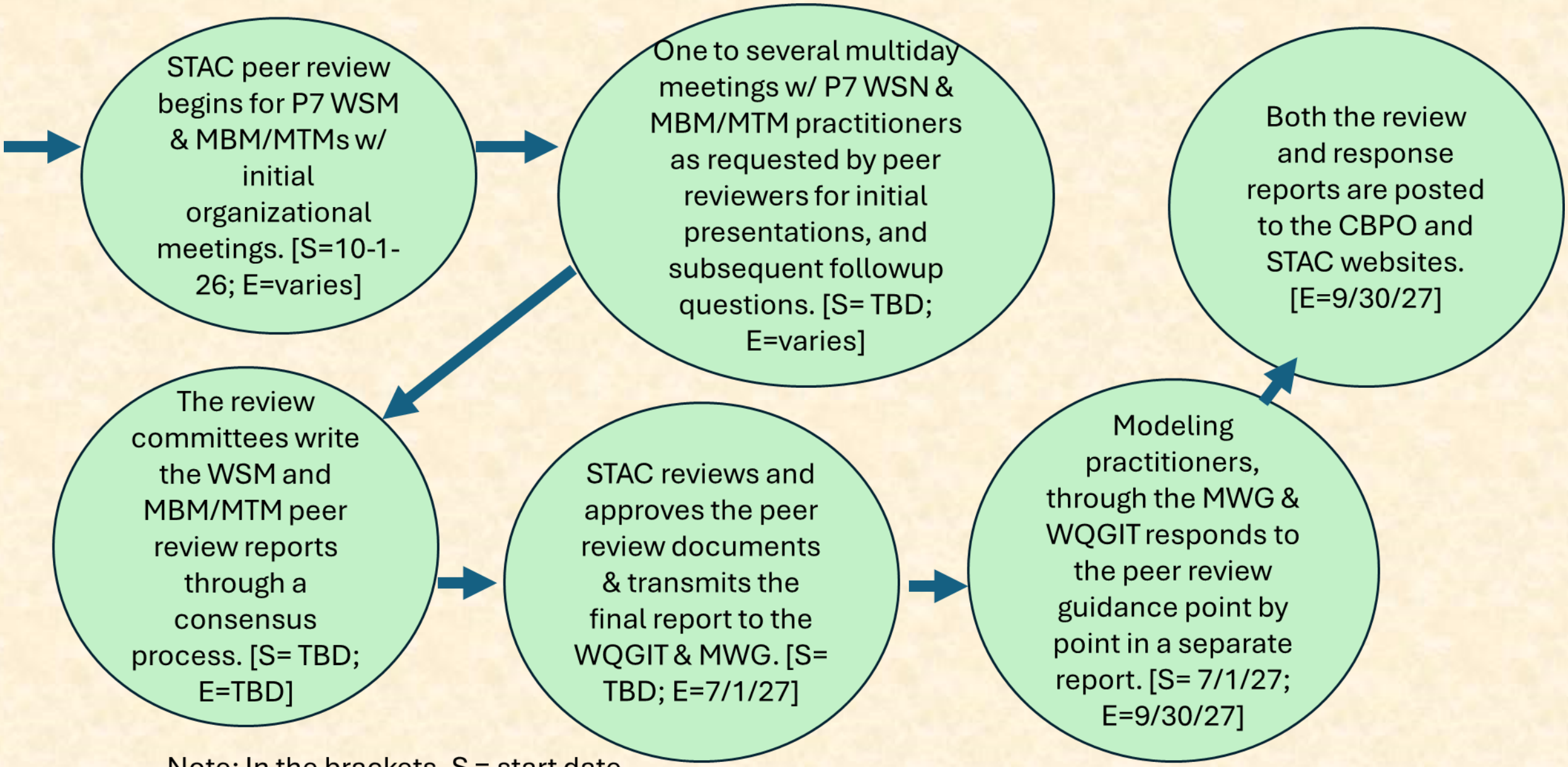

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