Dear Dr. Beck:   
  
(Please read this entire eMail as a lot of information is provided.)   
  
Our reviewers have evaluated your paper, “Numerical and qualitative contrasts of two statistical models for water quality change in tidal waters” (JAWRA-16-0152-P), submitted to the Journal of the American Water Resources Association. While they found much to like and believe the paper can become publishable, they also had comments which must be addressed.   
  
Please pay particular attention to comments from reviewer 1 and the Associate Editor as you revise your manuscript.   
  
The comments of the Associate Editor and reviewer(s) are included at the bottom of this letter. You do not have to agree with each comment, but you must address it, and, where appropriate, revise your manuscript to anticipate a similar comment from readers. Any supplemental files provided by a reviewer are available to you from within your Author Center > My Manuscripts/Manuscripts with Decisions queue. Clicking the "view decision letter" link brings up the decision letter with the attachments not found here. [Scroll to the end to find them at the bottom left.]   
  
To revise your manuscript, log into https://mc.manuscriptcentral.com/jawra and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.   
  
You will be unable to make your revisions on the originally submitted version of the manuscript. Instead, revise your manuscript using a word processing program and save it on your computer. Please highlight the changes to your manuscript within the document by using the track changes mode in MS Word or by using bold or colored text. The tracked version should be uploaded as a Supplementary File for Review. The untracked final version should be uploaded as the Main Document. If you opt to use bold or colored text instead of a tracked file, you may upload this as the Main Document.   
  
Once the revised manuscript is prepared, you can upload it and submit it through your Author Center.   
  
When submitting your revised manuscript, you will respond to the comments made by the reviewer(s) in the space provided. You may either enter text in the box provided or attach a separate file outlining your responses. In order to expedite the evaluation of the revised manuscript, please be as specific as possible in your response to the reviewer(s).   
  
IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.   
  
Because we are trying to facilitate timely publication of manuscripts submitted to the Journal, your revised manuscript should be uploaded by 30-Nov-2016. If it is not possible for you to submit your revision within this timeframe and you need an extension, or if you wish to withdraw the paper, please contact Ms. Susan Scalia at susan@awra.org. When requesting an extension, please specify how much time is needed.   
  
Once again, thank you for submitting your manuscript to the Journal of the American Water Resources Association. I look forward to receiving your revision.   
  
Sincerely,   
  
Parker J. Wigington, Jr., Ph.D.   
Editor-in-Chief, Journal of the American Water Resources Association   
JAWRA-editor@awra.org   
  
  
  
MANAGING EDITOR'S INSTRUCTIONS TO AUTHOR:   
[Note: any changes requested by the managing editor do not need to be tracked in the revision or reported in the response to comments.]   
  
The following need to be addressed:   
  
1] Per JAWRA style, combine pages 1 & 2 into a single title page with the Title, List of Authors, Author Information [inserted directly following the author list], Abstract, and Key Terms.   
  
2] The Appendices need to be handled differently as access to them is via two different methods.   
  
Current Appendix S1: as this will be available via download per a link in the text, this will not be part of the online version of the article, hence it should be listed as Appendix A following the Conclusions and preceding the Supporting Information [SI] section.   
  
Current Appendix S2: this will be part of the online version of the article and should be retained in the SI section and renamed Appendix B.   
  
3] The equation numbering in the second Appendix should not continue from the main text. Renumber the equations using the prefix 'B'. For example, Equation 8 should be Equation B1. The figure should be named Figure B1.   
  
3] For the SI section, reword the introductory sentence as provided here:   
------------------------------   
Supporting Information   
  
Additional supporting information may be found online under the Supporting Information tab for this article: Appendix B: Additional material describing the simulation of daily discharge and chl-a time series.   
------------------------------   
  
Note: the supporting information material is not copyedited or typeset: ensure the file is formatted for ease of use by readers, proofread, and ready for publication.   
  
4] Delete the duplicate version of the SI figure: as it is found in the SI file [Appendix S2], it does not need to be [and should not be] submitted separately.   
  
  
  
ASSOCIATE EDITOR'S COMMENTS TO AUTHOR:   
  
Associate Editor   
Comments to the Author:   
Thank you for resubmitting "Numerical and qualitative contrasts of two statistical models for water quality change in tidal waters." The manuscript presents a useful comparison between two statistical techniques. The one detailed review suggests that two major issues need to be tackled before the manuscript can be re-considered for publication: (1) more rigorous assessment of predictive performance of the two modeling approaches and (2) clearer description of differences (and similarities) between the two statistical techniques - suitable for a JAWRA (i.e. scientific but not necessarily statistcial) audience. Reviewer 1 outlines these issues in detail and provides a thoughtful set of additional comments aimed at improving the manucript. Please note that if you chose to make these revisions, the manuscript will likely be sent for re-review by the original or by different reviewers. Thank you for your submission.   
  
  
  
REVIEWER(S)' COMMENTS TO AUTHOR:   
  
Reviewer: 1   
  
Recommendation: Return to the author for **major revisions**. (You likely will be asked to review the response.)   
  
Comments:   
General comments:   
  
In this study, the authors compare the use of GAMs and WRTDS for modeling trends in estuarine water quality. The comparison is accomplished by applying both models to historical chlorophyll data collected at various locations in the Patuxent River Estuary. A primary finding of this study is that both models perform similarly in terms of matching observed data and in quantifying trends/relationships, with a couple of minor exceptions. Some interesting qualitative comparisons related to model computational performance and interpretability are also provided. In general, the manuscript is well conceived, organized, and written, and will be of interest to researchers/managers faced with the challenging tasks of interpreting environmental data to assess trends. While I have requested major revisions, I think the revisions will be fairly straightforward to implement.   
  
In the abstract, the authors state that the models were compared based on “predictive performance against the observed data” (page 2, line 20). By this, the authors mean the fit of the calibrated models to the observed data. However, I don’t think this method of determining “predictive performance” is appropriate, particularly for non-parametric models (or semi-parametric, in the case of WRTDS), which can be easily overfit to the observed data during calibration, if desired. The authors somewhat acknowledge this on page 25 (line 40), but overall the manuscript indicates that the RMSE of the calibrated model is a valid predictive performance metric. For example, the abstract discusses the “predictive abilities” of the models (page 2, line 34). In the study, overfitting is mitigated to some degree through cross-validation algorithms used during calibration, but these algorithms are presented as a black box, and it would be hard to prove equivalency between the two models. Therefore, the “predictive abilities” of these models can only be assessed through a thoughtful validation exercise (separate from calibration) reflecting the time scale over which predictions are desired and relevant. Validation is an important and expected component of any predictive modeling exercise, and this is particularly true for non-parametric models. If the authors wish to make statements about the predictive abilities of these models, then they need to test the models in a more rigorous way.   
  
The study also aims to compare the “statistical foundation of each model”, but I found this comparison to be somewhat lacking. The explanation of the GAM (page 10) relies on a lot of jargon that isn’t explained or referenced. I don’t think the intended audience of this article is familiar with “knots” or “spline basis”, for example, and more description would be useful. I also note that GAMs often make use of LOESS smoothing functions (as an alternative to splines); an advantage of GAMs is that they are neutral in terms of which smoothing function to apply. For example, see Faraway, J. J. (2016). Extending the linear model with R, among others. So the contrast between GAMs and WRTDS at page 12 (line 13) is not so compelling. Also, it seems both models are “additive” in that they are summing up the different smooth components. So, perhaps the differences in “statistical foundation” between GAMs and WRTDS are more subtle than the authors suggest? I expect there are important differences between GAMs and WRTDS, but the comparison may need to be revised, and should rely less on jargon, given the intended audience.   
  
Specific comments:   
  
Page 10, Line 44. GAM “parameters” are mentioned here, but the nature of these parameters needs to be clearly described. What parameters, besides the smoothing parameter, are included in a GAM model?   
  
Page 11, Line 23. This section indicates that WRTDS is based on a “single set” of model parameters. But as described elsewhere, there is a unique set of “parameters” for each prediction point. Revise to clarify.   
  
Page 14, Line 23. A comparison between two model outputs is not really an error. I suggest calling this something else, like root mean square difference (RMSD).   
  
Page 14, Line 37. I’d recommend dividing by [½ the sum of GAM predictions plus ½ the sum of WRTDS predictions]. This would avoid any irregularities associated with arbitrarily choosing one or the other model to average over.   
  
Pages 16-17. The description of the pseudo data generation is hard to follow. I recommend adding a flow chart or outline to help guide the reader through it.   
  
Page 19, Line 13. Clarify what variables these half-window widths apply to.   
  
Page 19, Line 20. “seasonal (annual proportion)” is unclear.   
  
Page 19, line 27-30. This is jargon-heavy. And again, I’m not sure what is meant by “parameters” in the context of a spline-based GAM model. Do the authors mean “variables”?   
  
Page 24, lines 42-45. The “suggestion that GAMS are not separating the effect of flow and time” may not be obvious to readers. Explain.   
  
Page 26, line 30. I understand the authors’ point here, but I think it’s a bit extreme to say that conventional modeling approaches “mold the data to the model”. In conventional regression, the model is still fit to the data. Suggest rewording.   
  
Page 26, line 34. I don’t understand how GAMs could be considered “over-constrained”. Splines can be very flexible. More explanation is required to justify this assertion.   
  
Page 26, line 44. I don’t think “theories” is the right word here, as if statistical theories were developed specifically to describe water quality in the Patuxent River Estuary. Suggest revising.   
  
Figure 5: This figure could probably go in supporting information (at least most of it).   
  
Figure 7: “no flow” category name is confusing and inconsistent with text. Also, x-axis numbers are wrong in either the top or bottom panels, I think.   
  
  
Additional Questions:   
**Originality**. Does this paper add to our existing body of knowledge? Does it, for example, demonstrate new methods, use robust or unique data, show a novel application, or develop a case study of a relevant issue? If a review, does it present a topical and insightful summary of the state of our knowledge? : Yes, this is a case study comparing two cutting-edge approaches for water quality trend analysis.   
  
**Technical Quality**. Is the paper technically sound? Are assumptions reasonable and clearly stated? Do computations seem correct? Are conclusions properly supported by interpreted data?: Overall technical quality is good, but some revision and/or clarifications of conclusions is warranted. See my general comments.   
  
**Methods and Data**. Were appropriate techniques used in the study? Are methods explained adequately? Are there other methods that should be applied? Are all data sources clearly identified?: Overall good, but some clarification of GAM methodology would be helpful. See my general comments.   
  
**Title, Abstract, and Key Words**. Does the title characterize the paper in a way that will be useful for indexing? Does the abstract provide a concise and accurate summary of the work in a way that potential readers can use it to decide if they want to read the entire work? Are the key words well chosen? Provide suggestions.: Good.   
  
**Organization and Readability**. Is it written for a multidisciplinary audience, and with a minimum of scientific jargon? [Note: Your charge is not to rewrite or copy edit a submission.] Are the ideas organized and presented in a logical sequence containing the basic information, interpretation of that information, and results or conclusions of the interpretations?: Good, but some jargon needs to be addressed.   
  
**Multidisciplinary**. Does the paper present ideas derived from multiple disciplines? Or, if based primarily upon a single discipline, does it have applications to other disciplines?: Pretty good, water quality and statistical modeling.   
  
**Literature Cited**. Does the discussion of earlier works document how this work adds to the body of knowledge? Are the relevant contributions of others cited?: Sufficient.   
  
**Tables and Figures**. Are the figures and tables effective supplements to the text? Should any be reduced or deleted?: Very good. One could be put in supporting information I think.   
  
**Equations**. If equations are used, are they clear and understandable? Should any be deleted? : Sufficient.   
  
  
Reviewer: 2   
  
Recommendation: Return to the author for **minor revisions** to be reviewed by the Editor.   
  
Comments:   
(There are no comments.)   
  
Additional Questions:   
**Originality**. Does this paper add to our existing body of knowledge? Does it, for example, demonstrate new methods, use robust or unique data, show a novel application, or develop a case study of a relevant issue? If a review, does it present a topical and insightful summary of the state of our knowledge? : Yes. the authors applied two approaches in water quality trend analysis and provided the detailed comparison of the two, which is very useful in water quality modeling.   
  
**Technical Quality**. Is the paper technically sound? Are assumptions reasonable and clearly stated? Do computations seem correct? Are conclusions properly supported by interpreted data?: The paper is technically sound, assumptions are clearly stated and reasonable. computation looks right and conclusions supported by the data.   
  
**Methods and Data**. Were appropriate techniques used in the study? Are methods explained adequately? Are there other methods that should be applied? Are all data sources clearly identified?: The techniques used in this study are appropriate, methods are addressed adequately. data sources have been identified clearly.   
  
**Title, Abstract, and Key Words**. Does the title characterize the paper in a way that will be useful for indexing? Does the abstract provide a concise and accurate summary of the work in a way that potential readers can use it to decide if they want to read the entire work? Are the key words well chosen? Provide suggestions.: Yes, all of the above is adequate.   
  
**Organization and Readability**. Is it written for a multidisciplinary audience, and with a minimum of scientific jargon? [Note: Your charge is not to rewrite or copy edit a submission.] Are the ideas organized and presented in a logical sequence containing the basic information, interpretation of that information, and results or conclusions of the interpretations?: yes   
  
**Multidisciplinary**. Does the paper present ideas derived from multiple disciplines? Or, if based primarily upon a single discipline, does it have applications to other disciplines?: I think so.   
  
**Literature Cited**. Does the discussion of earlier works document how this work adds to the body of knowledge? Are the relevant contributions of others cited?: yes, it is adequate.   
  
**Tables and Figures**. Are the figures and tables effective supplements to the text? Should any be reduced or deleted?: Tables and figures are appropriate. lengthy titles are used both for figures and tables, think about how to make more concise.   
  
**Equations**. If equations are used, are they clear and understandable? Should any be deleted? : yes