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Submitted via Email on December 5, 2018

Biostimulatory/Biointegrity Project Science Advisory Panel
(c/o Jesse Maxfield - State Water Board)

Re: Recommendations to the Biostimulatory/Biointegrity Policy Science Advisory Panel on their review of technical products developed by the State Water Board

Dear Science Panel Members

This letter is submitted on behalf of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) and is intended to provide recommendations to the Science Advisory Panel during their review and discussion of technical products developed to support the State Water Resources Control Board's (State Water Board) Biostimulatory and Biointegrity Policy. SCVURPPP is an association of 13 cities and towns¹ in the Santa Clara Valley, unincorporated Santa Clara County and the Santa Clara Valley Water District. Along with other San Francisco Bay Area public agencies, SCVURPPP participants share a common National Pollutant Discharge Elimination System (NPDES) permit to discharge municipal stormwater to receiving water bodies in the San Francisco Bay Area. Since its inception, SCVURPPP has been a recognized leader in stormwater management in the San Francisco Bay region, and continues to be dedicated to protecting and improving the quality of our water bodies and beneficial uses.

Our Program has followed and actively participated in the State Water Board's Biointegrity/Biostimulatory Policy development process for a number of years, and our staff serves as one of the stakeholder representatives for the California Stormwater Quality Association (CASQA). Our initial comments and recommendations provided in this letter are based on a preliminary review of the technical documents provided by State Water Board. These comments are mostly directed at the policy implications of the technical documents that we believe the Science Advisory Panel should consider during their deliberations. More specific comments are also provided that relate to technical issues and uncertainties in the technical documents that could affect the successful and practical/cost-effective implementation of future Biostimulatory/Biointegrity policies. In addition to the initial comments provided below, our Program also supports comments being submitted verbally by CASQA at the December 12-13, 2018 Science Advisory Panel meeting.

It is SCVURPPP's understanding that the charge of the Science Advisory Panel is to provide technical input to the State Water Board staff and its Technical Science Team on the soundness of the methods used and

¹ Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga and Sunnyvale

conclusions derived, as described in the technical documents. Input from the Science Advisory Panel will help inform policy decisions eventually made by the State Water Board. Based on our Program’s review of the technical documents, the science and tools currently presented and the manner by which they are presented do not provide the information necessary for the State Water Board to make informed decisions on policies that will greatly affect municipalities throughout California. As a result, we recommend that the Science Advisory Panel request additional information be incorporated into the technical documents before policy decisions are considered by the State Water Board. The types of information that should be included in the documents are described in our comments and are consistent with California Water Code requirements, which include consideration of the achievability of proposed objectives, reasonable protection of Beneficial Uses, and development of implementation programs to achieve proposed objectives.²

GENERAL COMMENTS

1. **Premature incorporation of policy-based opinions and decisions in the technical documents that will improperly influence and constrain a future State Water Board public hearing process to develop the State policy**

The technical documents consistently identify numeric “thresholds” and “targets” as part of the data analyses. The use of these terms implies that policy decisions have already been made regarding reasonable protection of beneficial uses, potentially precluding alternative approaches or alternative thresholds and targets from being considered. In the documents, “thresholds” generally refer to numeric values associated with the distribution of biological indicator scores at reference sites. For example, a California Stream Condition Index (CSCI) score of 0.79, which is based on the 10th percentile of reference scores, is identified as an important threshold for biological condition in streams. This threshold is often inappropriately referred to in the technical support documents as a “biological target” in the context of policy decisions or management goals. Other alternative thresholds to this CSCI score are discussed in much less detail in the reports, suggesting that this CSCI score is the only threshold that should be considered by the State Water Board. Additional examples of misleading use of the terms “threshold” and “target” include, the Landscape Development manuscript (Beck et al.), which applies a CSCI score of 0.79 to represent a potential management target for evaluating the extent of constrained channels in California; and the methods section of Mazar et al., where eutrophication thresholds are set at “concentrations corresponding 90% relative probabilities, reflecting policy makers’ tolerance for risk of failing to meet biointegrity goals.”

Recommendation to Science Advisory Panel: SCVURPPP asks the Science Advisory Panel to request removal of language and concepts from the technical documents that are presumptuous and would likely constrain policy decisions eventually made by the State Water Board. Additionally, we request that the Science Advisory Panel provide guidance to the authors of the

² California Water Code Section 13241 states that “Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following: (a) Past, present, and probable future beneficial uses of water; (b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto; (c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area; (d) Economic considerations; (e) The need for developing housing within the region; and (f) The need to develop and use recycled water.

technical documents on developing science-based perspectives that explore a range of options, including the sensitivity of potential policies to this range, that may later be used to inform policy determinations.

2. **Clearly articulate the California Water Code requirements as they relate to the data, analysis and recommendations provided in the technical support documents**

Because the science and analysis conducted and described in the technical documents was funded by the State Water Board and in support of the development of Biostimulatory/Biointegrity polices, an overview of the Water Code requirements that the State Water Board is obligated to meet when setting water quality objectives (or equivalent enforceable metrics) should be articulated in each of the documents to provide a regulatory setting. Those requirements include consideration of the achievability of proposed objectives and the reasonable protection of beneficial uses. Those requirements also include the development of a program of implementation, describing the nature of actions required to achieve proposed objectives.

The Science Advisory Panel should provide input regarding the type of information needed to address the Water Code requirements, particularly for waters that are deemed to be either likely or possibly constrained (i.e., will not achieve desired biological conditions). These may include channels in developed landscapes; ephemeral or intermittent channels, and channels where dry season flow is controlled by reservoir releases or wastewater treatment plant discharges. The Science Advisory Panel should also provide technical input on policy options for dealing with waters that are likely or possibly constrained.

Initial evaluation of channels in Santa Clara County using the *Channels in Developed Landscapes Tool* developed and described in one of the technical support documents (Beck et al.) indicate that approximately 50% of urban stream miles are “likely constrained.” The Science Advisory Panel should consider the applicability of biological condition metrics and eutrophication indicator thresholds in highly developed channel landscapes with the understanding that the State Water Board has indicated that objectives will not differ between constrained and unconstrained channels.

Recommendation to Science Advisory Panel: Provide input to the State Water Board and authors on the types of information that would be needed (or should be considered) when developing policy options, consistent with the California Water Code.

3. **Applicability of technical analyses to different temporal and spatial scales**

The technical support documents utilized existing statewide datasets to develop algal indices and evaluate associations between eutrophication indicators and biological conditions. The CSCI was developed using the similar datasets. All analyses were conducted on data collected during the spring index period (April – July), a time when there is typically base flow conditions in California streams. The analyses conducted and described in these documents did not include data from other seasons or hydrological flow conditions. Because different hydrologic conditions and flow regimes can likely impact the fate and transport of biostimulatory constituents, the technical support documents should more fully describe how data collected during different hydrologic conditions (e.g., high flows during wet season) and in streams with different flow regimes (e.g.,

ephemeral streams that have insufficient flow to sample during spring index period) would affect the relationships between biological condition and biostimulatory constituents and the conclusions drawn about eutrophication thresholds.

Additionally, the science and tools presented in the technical support documents do not adequately address data trends and relationships at spatial scales finer than an entire region. The technical support documents should provide additional data analyses at the regional and watershed scales. Our Program's recent evaluation of benthic macroinvertebrate bioassessment data collected over a seven-year time period (2012 – 2018) shows highly variable relationships (both negative and positive) between biological conditions and eutrophication indicators at the watershed scale. Therefore, conclusions are being drawn by the authors of the technical support documents based on analysis conducted at statewide or large regional scales, and not at spatial scales where management decisions are ultimately made.

Recommendation to Science Advisory Panel: Provide input to the State Water Board and authors of the Technical Support Documents on additional tools and pilot studies that could be conducted (or considered) to better evaluate data at spatial and temporal scales than have been explored to-date.

SPECIFIC COMMENTS

1) Eutrophication indicator thresholds are not strongly correlated to biological integrity indices for California wadeable streams.

Based on our initial review of the eutrophication indicator threshold manuscript by Mazor et al. (in prep), the results show poor relationships (low signal / high noise) between eutrophication indicators and biological endpoints. The regression model approach used in the analyses did not adequately account for other mitigating factors. There were several statements made throughout interpretation of model results describing "strong" and "significant" relationships, but these do not appear to be supported by the data (or from a statistical basis) and/or it is unclear what "significant and strong" mean in the context they are being used. Overall, the approach of using relative probabilities to determine eutrophication thresholds may be appropriate, but the method is deficient in addressing factors contributing to the variability in the underlying data and without statistical analysis to support the approach.

Because Mazor et al. (in prep) could be used as the basis to develop numeric water quality objectives or interpret narrative objectives, upon which 303(d) listings (or de-listings) and resulting Total Maximum Daily Loads (TMDLs) could be based, the authors should make it clear that the observed correlations are not necessarily causation. The data do appear to support eutrophication indicator values above which high CSCI scores are not observed, however, there is substantial variability in the data and the relationships may not be causative.

Analyses conducted by our Program show that both eutrophication indicators and CSCI scores are more strongly associated with development patterns (i.e., imperviousness in the watershed) than they are with each other. Reducing eutrophication indicator levels below the identified "thresholds" may not improve biological integrity or protect beneficial uses, yet would likely require the expenditure of considerable public resources to achieve. Additional investigation needs to be conducted to confirm that CSCI scores and other indices of biological integrity are

responsive to changes in eutrophication indicator levels within individual watersheds and at larger regional scales.

Recommendation to Science Advisory Panel: Request that the State Water Board and its Technical Science Team consider other data analyses that would better evaluate correlations between eutrophication indicators and biological endpoints at watershed and regional scales.

2) Available technical information does not support the use of a non-predictive algal index for complex environments

Our review of the algal index paper (Theroux et al. in prep) indicates that additional information and analyses may be needed to develop an algal index with the precision and accuracy for policy development. The paper states “the paucity of trait attributes available for algae species contributes to the inability to develop predictive models for individual metrics, and that trait attributions for sensitive taxa should be a priority focus of future studies.” The lack of information on trait attributes appears to influence the type of metrics that were ultimately used in the algal index.

Additionally, the algal index proposed (i.e., MMI) is primarily composed of increasing metrics (responding to increasing perturbation) and does not include metrics that increase when perturbation occurs in streams (i.e., loss of rare and sensitive taxa). A more balanced index that includes both increasing and decreasing metrics should be included in the algal index.

We also observed that the selected algal metrics do not perform well across a range of environmental gradients, such as ‘sands and fines’ and conductivity. Furthermore, considering that the MMI is an interim product, we are concerned that algal thresholds derived from the MMI may be prematurely incorporated into State Water Board policies without review, proper testing at the appropriate spatial scales, and refinement.

Recommendation to Science Advisory Panel: Provide input to the State Water Board on the precision and accuracy of the proposed MMI and consider the implications of using the proposed algal index in a regulatory context. Provide perspectives to the State Water Board on the benefits and challenges of using alternative indices (e.g., diatom only index).

3) Context for the potential use of the tools described in the *Prioritizing Management Goals for Stream Biological Integrity within the Developed Landscape Context* (Beck et al. in prep) is not provided and refinements to assumptions and statistical analyses are needed

Our initial review of the channel in developed landscapes paper (Beck et al) suggests the Stream Classification and Priority Explorer (SCAPE) tool does not have the precision and accuracy needed to support policy development. Sensitivity analyses indicated contrasting results of the extent of streams in each of the four categories depending on the choice of prediction interval width (e.g. 95th percentile vs. others). Further analyses should investigate the optimal prediction interval without causing major shifting of categories. Notably, shifting of categories (e.g. constrained to unconstrained) varied widely at the regional level.

Additionally, it appears that the SCAPE tool model results were not interpreted in a manner consistent with the statistical technique employed. Specifically, the model performance should

address the range in condition, whereas the performance is only interpreted in the context of accuracy in prediction of median prediction scores: “Model performance statewide indicated generally good agreement between observed CSCI scores and the median prediction...”. However, the landscape model analysis is based upon random forest that “...evaluate the conditional response across the range of values that are expected”. Further analysis should consider how well the model performs under varying levels of conditions (very high and very low scores) in addition to the midpoint of the distribution of condition scores. Furthermore, it is unclear from the methods if the data were adequately stratified to evaluate model performance at the regional scale. Considering all of these issues, we have substantial concerns about the method and that it will not be sensitive to regional differences in condition scores.

Recommendation to Science Advisory Panel: Provide technical perspectives to the State Water Board on the issues described above, and more broadly, how this tool could be used to support policy development and/or implementation. Request that the State Water Board’s Technical Science Team refine the assumptions and analyses as described above.

Thank you for the opportunity to provide input on the technical support documents and our perspectives to the Technical Advisory Panel. We hope that you the Technical Advisory Panel will consider these comments and our recommendations when deliberating on December 12-13, 2018 and during subsequent input on the development of the State Water Board’s Biostimulatory/Biointegrity policy. Please contact me directly at (510) 832-2852 (x109) should you have questions regarding our comments and recommendations.

Sincerely,

Chris Sommers
EOA, Inc.

Member of the Biointegrity/Biostimulatory Policy Stakeholder Advisory Group
Monitoring and Assessment Coordinator - Santa Clara Valley Urban Runoff Pollution Prevention Program