

Development of Sediment Quality Objectives for California Bays and Estuaries

Scientific Steering Committee Conference Call May 25, 2006

Summary of Call and SSC Comments

Call participants (SSC and project representatives)

Peter Landrum (NOAA)
Todd Bridges (U.S. Army Corps of Engineers)
Bob Van Dolah (South Carolina Department of Natural Resources)
Ed Long (ERL Environmental)
Brock Bernstein
Chris Beegan (SWRCB)
Steven Bay (SCCWRP)
Stephen Weisberg (SCCWRP)

Others present

Bruce Thompson (San Francisco Estuary Institute)
Dave Montagne (Los Angeles County Sanitation Districts)
Ananda Ranasinghe (SCCWRP)
Lisa Haney (Los Angeles County Sanitation Districts)

Call Summary

Peter Landrum described the goal and format for the call. The purpose of the call is to resolve issues regarding the benthic indicators that were identified by the SSC at the last meeting. Specifically, the SSC is asked to determine whether the recommendations of the SQO project science team regarding the selection of benthic indices are logical and reasonable from a scientific perspective.

Steve Weisberg reviewed results of the benthic indicator development effort that were presented at previous SSC meetings. Comments from the SSC at the February 2006 meeting indicated that the indicator development approach (examine several types of benthic indices) and evaluation process (compare accuracy and bias relative to a validation dataset evaluated by nine experts) was reasonable. However, the SSC took issue with the science team's recommendation regarding the specific combination of benthic indices to use and requested more documentation and a description of the rationale to support the recommendation.

The results of recent analyses to support the science team's recommendations (provided in the background document distributed to the SSC prior to the call) were described by Steve Weisberg. The new analyses examined the accuracy and bias of all possible combinations of the five candidate benthic index approaches. The analyses included the RIVPACS approach, as requested by the SSC. The science team recommended using a combination of four benthic indices for evaluating evidence of benthic community disturbance: BRI, IBI, RBI, and RIVPACS. This combination had the highest accuracy and low bias, which were within the

range of results for the experts. Two other combinations of three or four indices had similar accuracy and bias results for the validation dataset, but the science team judged the recommended combination a better choice for two reasons: 1) it did not include the BQI, which was considered by the science team to be potentially unreliable; and 2) it included the IBI which is an approach currently used in San Francisco Bay and elsewhere. The use of four indices will also generate additional data to facilitate future comparisons of index performance and refinement of the benthic indicator approach. This recommendation differs from that provided at the February SSC meeting, which was to use a combination of three indices (BRI, IBI, and RBI).

Discussion

Several issues regarding the results and recommendations were discussed:

- **Some other indices/combinations have a lower bias than the recommended combination; should bias be given greater weight in the recommendations?**

The science team considered classification accuracy to be a major important measure of index performance. It was also important to minimize a negative bias (incorrectly classifying a station as nondisturbed) for the index combination, so that any errors would tend to be environmentally protective.

- **The index approach evaluates a station based on a single sample, whereas benthic macrofaunal populations are dynamic and responsive to non-contaminant factors. Can an index approach provide a reliable assessment of the status of the benthic community?**

While the abundance of individual species can vary over time due to a variety of noncontaminant factors, studies in California and elsewhere have shown that benthic indices based on community composition are relatively robust to these influences and can provide an accurate measure of benthic community disturbance. The design of the SQO benthic indicator program will minimize these confounding factors by using a variety of indices that are based on community parameters, and constraining indicator use to specific time periods and habitat types. This issue will be more of a challenge to address as benthic indices are developed for more variable habitats, such as upper reaches of estuaries.

- **There is uncertainty as to whether the benthic indices respond to chemical factors, physical factors, or both.**

The benthic indices currently available cannot distinguish among disturbance caused by chemical contamination, organic enrichment, or physical factors. The benthic disturbance LOE will reflect all these factors, which is why a multiple line of evidence approach is needed to differentiate sediment quality impacts due to contaminants.

- **How were the thresholds used to classify status for each index established?**

Two approaches for threshold development were investigated: based on 1) recommendations of the particular index development team and 2) statistical optimization. Classification accuracy of the 36 “Gold Standard” samples was evaluated and the set of thresholds with best results was selected. Developer-recommended thresholds were used for the BRI and IBI and optimized thresholds were used for the BQI, RBI and RIVPACS.

- **Are the indices robust with respect to temporal and small-scale spatial variability?**
There are limited data for California bays to investigate this question. Our analyses indicated all of the indices were stable with respect to these types of variability.
- **Some indices, such as the BRI, rely on individual species tolerance scores and the results may be biased if these scores are not available for many of the species present in the sample.**
This is a valid concern for the BRI and BQI, which are calculated using pollution tolerance scores for many species. This issue will be addressed in the technical document. QA guidance will be provided to enable the analyst to detect and resolve this situation, should it occur.
- **Some SSC members preferred index combination #24 (BRI+RBI+RIVPACS) due to less complexity (3 vs. 4 indices) and exclusion of IBI, which had a strong negative bias.**
The same data is used for the calculation of each index, so there is no difference in data requirements and only a small increase in analytical effort to calculate 4 vs. 3 indices. The calculations can also be automated and the science team will work to provide a simplified electronic tool to facilitate the analysis. The more significant challenge is to have high quality and consistent taxonomic information, which is needed for all index approaches and regardless of the specific index combination used. It is not yet known whether the use of either combination #24 and #26 will result in a significant difference in accuracy or bias of the final MLOE assessment; this analysis will be conducted and communicated to the SSC to assist in distinguishing between these two index combinations.

SSC comments and recommendations regarding the benthic line of evidence

The SSC agreed on the following conclusions and recommendations:

- The use of indices to assess benthic community status is the best approach at this time. Concerns expressed by the SSC regarding the applicability of benthic indices for assessing disturbance to the benthos should be discussed in the technical report.
- A combination of benthic indices should be used to determine the benthic disturbance line of evidence for the assessment of the direct effects of contaminated sediments.
- Index combinations 26 and 24 are the best choices for the program; a decision regarding which of these combinations to use should be made after evaluation of the impact of using each combination on the final MLOE validation results.

Other SSC comments

- The conference call format was effective for dealing with this topic and should be used to address the remaining issues regarding the MLOE framework and chemical indicators. A PowerPoint presentation should be provided to guide the results presentation, in addition to the background technical documentation.

- The Advisory Committee should be invited to participate in future conference calls. The open format of previous SSC meetings is an important component of the SQO review process and should not be abandoned in the conference calls.
- The need for a conference call to address unresolved issues for the toxicity indicators was discussed. The only major issue in dispute appears to be whether to use *Ampelica abdita* as one of the recommended test species. Review of previous SSC discussions indicated that a majority recommendation (but not complete consensus) was reached to concur with the science team's recommendation: do not use *Ampelisca* as one of the primary tests for the assessing toxicity, but allow its use as an additional test method. A conference call to focus on other toxicity indicator issues is not needed in the short-term. The SSC will review and discuss the toxicity technical report as part of its planned future activities.
- A physical meeting prior to the August 5 release of the draft policy is not needed from the perspective of the SSC. The key issues should be able to be resolved using conference calls.
- The SSC is supportive of holding a physical meeting to provide a final "stamp of approval" for the SQO program elements. Such a meeting would probably be most effective if it followed the review of the technical documents and the receipt of public comments on the draft policy.