DRBC Modeling Expert Panel: Meeting Summary & Recommendations
December 12-13, 2012

The Modeling Expert Panel met with the DRBC's Water Quality Advisory Committee (first half of day 1) and with DRBC staff over two days in December 2012. The following captures the breadth of the discussions and key recommendations from the Expert Panel, with material organized into topical areas.

I. Screening model

- focused on the specifics of existing 1-D combo hydrodynamic and water quality models being used by DRBC for other efforts in the estuary
- considered various combinations of 2-D and 3-D for screening purposes
- extensive discussions on advection and dispersion, and efforts to get both the salinity and the stratification in the Bay simultaneously modeled correctly
- greater emphasis placed on screening model performance in D.O. sag zone for urban portions of estuary than in performance of screening model in the Bay with stratification

Recommendations

I.a. Model – develop a screening model to use in combination with a 3-D model or model hybrid

I.b. Model –use DYNHYD/WASP as screening model combination

I.c. Model – evaluate making the dispersion coefficient a function of river flow

I.d. Model – investigate inclusion of temperature as a state variable in screening model

I.e. Model – consider inclusion of sediment diagenesis in screening model

I.f. Model - include sulfate as a state variable

I.g. Data Compilation – avoid aggregating parameters (e.g., TN instead of NO3, NO2, TKN, NH3) in data collection & data management

II. Dissolved Oxygen

- reviewed patterns of depressed D.O. in the freshwater tidal river
- reviewed patterns of depressed D.O. at depth in the Delaware Bay below the ETM
- consensus that modeling D.O. makes sense here for multiple reasons:
    (i) apparent anthropogenic depression in D.O.
    (ii) D.O. at times violates current water quality standards
    (iii) D.O. at levels with possible negative biological effects
    (iv) D.O. integrates many estuarine processes and serves as a key tracer in models

Recommendations

II.a. Models – include a focus on Dissolved Oxygen

II.b. Monitoring – need a better understanding of spatial and temporal extent of D.O. depression in the Delaware Bay, particularly in the bottom waters in the channel

III. Optical modeling of light attenuation

- discussion on value and challenges with advanced optical modeling, including approaches used in the Chesapeake

Recommendation

III.a. Models – use an optical model based on partial attenuation coefficients rather than an advanced model based on optical properties such as absorption and scattering

III.b. Monitoring - add PAR to routine monitoring and pair with Secchi depth measurements

IV. Sediment transport

- discussion of multiple-class approaches for sediment transport, its role in capturing light attenuation, and the adequacy of 1-class or perhaps 2-class approaches

Recommendation

IV.a. Models –preferable to pursue 1 or 2 sediment classes rather than a fully differentiated (e.g., 4-class) sediment transport model

V. Sediment diagenesis

- discussion of evolution and value, and the challenges in collecting sufficient data
- further discussion expected at future meetings

Recommendation

V.a. Models – necessary and now routine to include sediment diagenesis in water quality models

V.b. Models – as diagenesis is considered for the screening model, evaluate its value by running the model with and without the diagenesis

VI. Complexity in modeling phytoplankton

- range of approaches discussed, and need to match complexity of patterns in a given system
- variable vs. fixed stoichiometry discussed along with approaches for modeling
- related to phytoplankton, discussed zooplankton and how modeling zooplankton interactions would not be constructive

Recommendations

VI.a. Models – simplify to the greatest extent appropriate based on data for bloom patterns and bloom composition

VI.b. Models – focus on fixed stoichiometry

VI.c. Data Assessment – evaluate existing phytoplankton, chlorophyll, and productivity data; determine number of peaks and whether we have enough data to associate peaks with distinct phytoplankton groups

VII. Data Collection & Assessment

- reviewed existing data summaries and evaluated additional data collection possibilities

Recommendations

VII.a. Monitoring – add PAR (down to 1% ambient) to routine monitoring and pair with Secchi depth

VII.b. Monitoring – need a better understanding of spatial and temporal extent of D.O. depression in the Delaware Bay, particularly in the bottom waters in the channel

VII.c. Data Analysis – perform a comprehensive assessment of primary production data

VII.d. Data Analysis – develop a longitudinal profile of sulfate observations

VIII. Communication

- discussed products from prior Expert Panels, and options for describing deliberations from meetings and the Expert Panel recommendations

Decision

VIII.a. Communication – within one week of each meeting, DRBC will summarize discussion and their understanding of recommendations; Expert Panel will then review and edit to match their understanding, upon which the meeting summary will be finalized

IX. Charge to Expert Panel

- need to set expectations articulated, and ideas for scope and breadth of charge discussed

Action Item

IX.a. Charge – DRBC staff to develop language for discussion at next meeting