Multiple Models for Management in the Chesapeake Bay

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Scientific and Technical Advisory Committee

to the Chesapeake Bay Program

Don’s M3.2 blog
or
random tweets from day 1

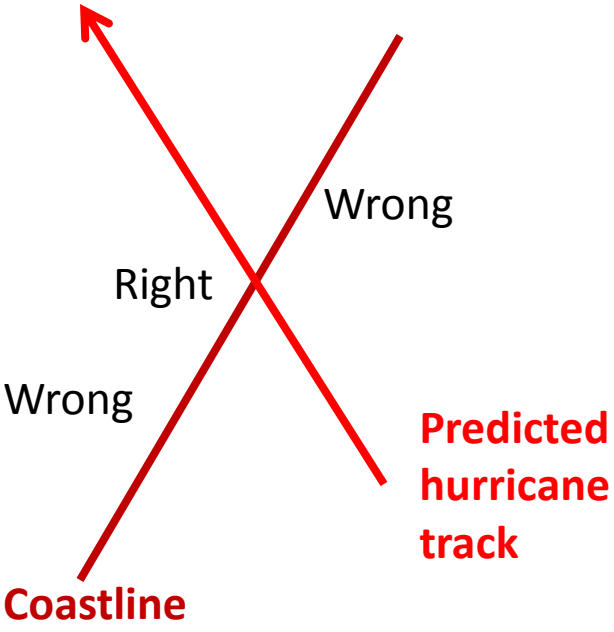
Uncertainty

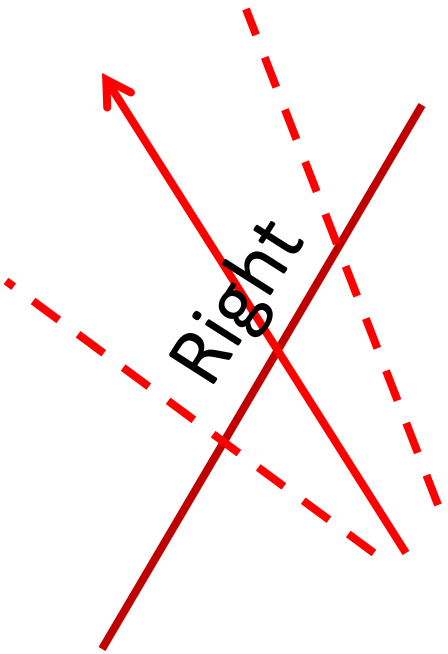
- Uncertainty (confidence) is the central issue
- Modelers agree on the need to estimate uncertainty
- Ideally, decisions balance uncertainty and risk tolerance

Quantifying uncertainty

- Simple models can estimate prediction uncertainty, many complex simulations can’t
- MM is another way to explore uncertainty

Not presenting uncertainty creates ways to be wrong!





CBP managers

- Understand scientific value of MM
- Are wary of MM for setting limits and allocating loads
- Implicit in this is a willingness to give up the best science for setting limits and allocating loads

Costs of MM

- Models are cheap
- Data is **expensive**
- [Implementation is really, really expensive]

An education problem

- One important roadblock to MM is convincing decision makers, jurisdictions, and the public that they really want to know the uncertainty

MM case studies

- 3 “TMDL” examples using MM
  - GL, GOM, Neuse
- The CBP has gone far beyond other programs in pushing the TMDL uphill to watersheds and jurisdictions
- MM absolutely integral in climate, weather, and sea level rise studies
- MM average better than any single model

SM example

- AQ model is a modular community model
- Modules “compete” to be the best representation of a process
- There is no sharp line between MM (multiple modeling) and MM (modular modeling)
- CBP may apply modular modeling in analysis of PQUAL vs AGCHEM

Model diversity is more important than multiplicity

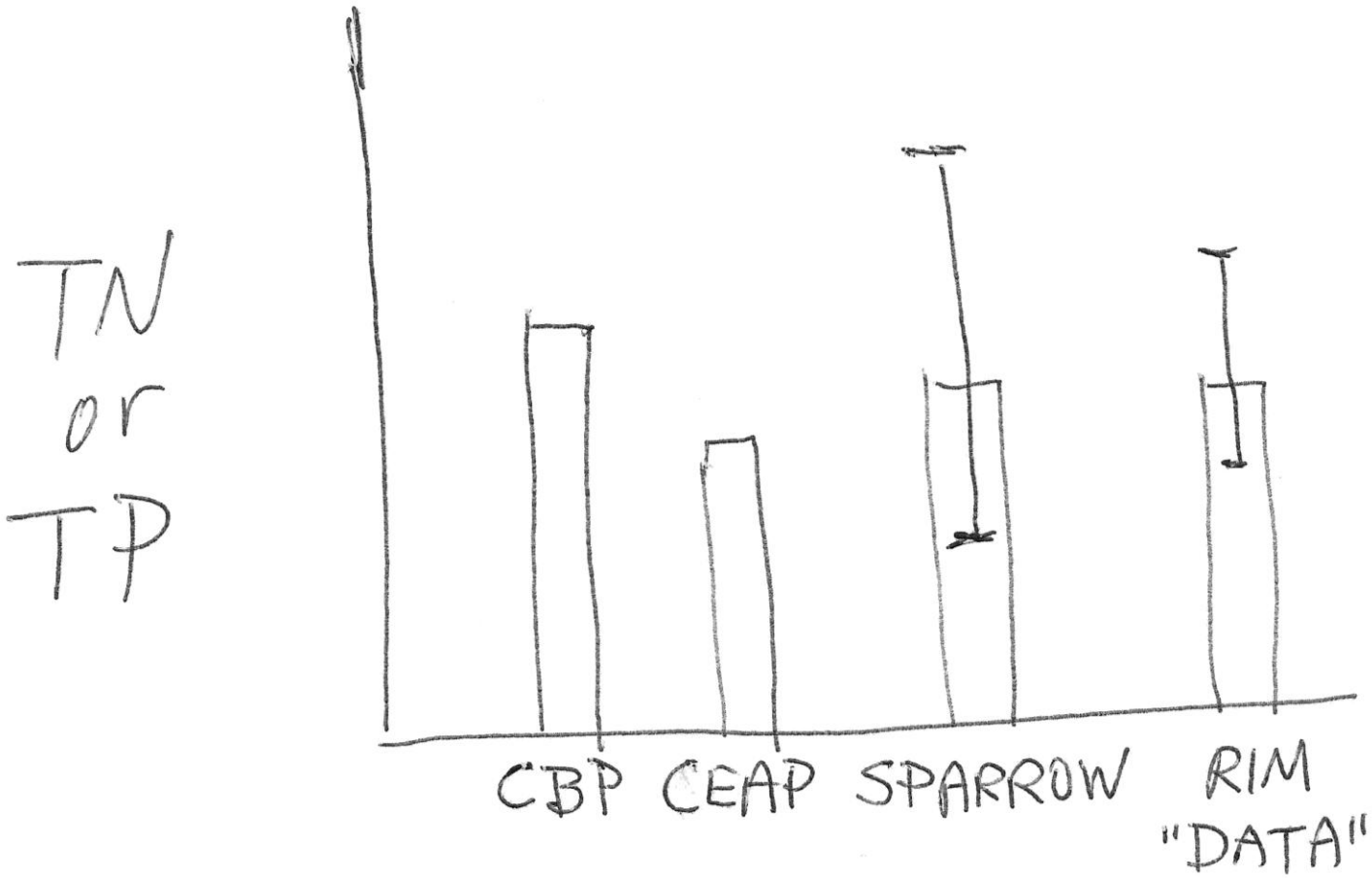
Bay MM

- There is a set of hydrodynamic/wq models right now
- Already been compared to CBP model & supported its skill
- Teed up for shallow water pilot project
- Could add CB BayesNET for price of a PhD student?

Wtsd MM

- There is a set of watershed models
- CBP-Sparrow-MODIS/UMCES model of nitrate export from forests

Wtsd MM possible right now



Social science insight

- Everyone uses multiple models, many qualitative, not scientific
- Participatory approaches can incorporate those viewpoints
- Non-science perspectives are part of decision context, not part of the science

Friction about CBP models

- Little controversy over the AQ model
- Scientists used to complain about the estuarine model, but not the public
- Everyone argues about the watershed model, more now than before

Adaptive management

- Response to uncertainty
- Demands flexibility
- There is a tension between consistency/fairness and flexibility

Court challenges are one measure of confidence