Phase 7 Watershed Model Plans

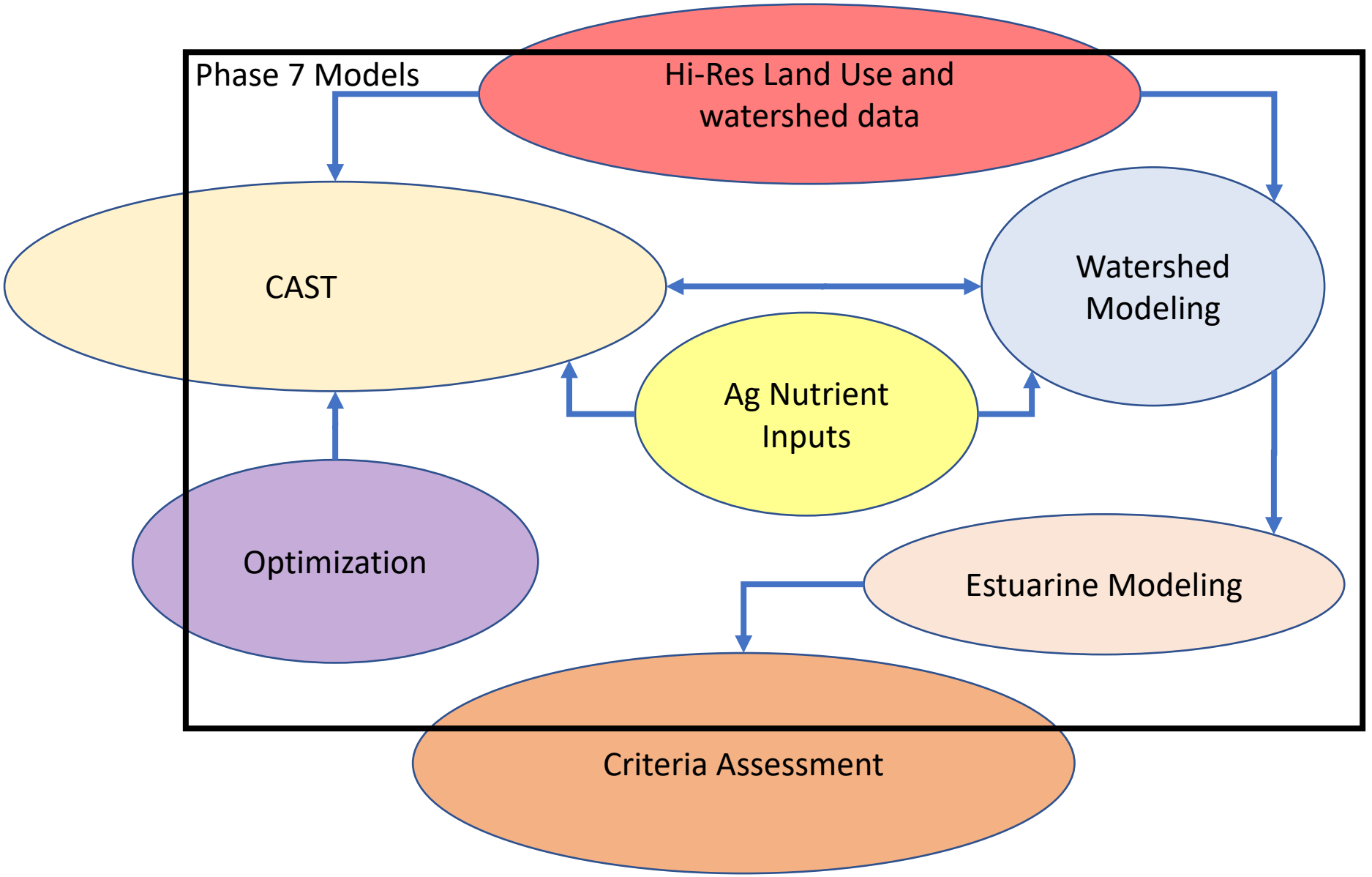
CBPO Staff

Gopal Bhatt, Isabella Bertani, Lewis Linker and others

MWG

1/10/2023

Phase 7 Development Tracks



Web page

- Overview
- Seven Projects
  - Descriptions
  - Documents
- Linked from
  - Modeling Workgroup
  - WQGIT
  - Many WQGIT WGs

Phase 7 Model Development | Ch

chesapeakebay.net/what/programs/modeling/phase_7_model_development

CBPO Scheduler | Sign in to Concur... | Citi Commercial Car... | Chesapeake Bay Ge... | https://gis.chesape... | Priority Agricultural... | Priority Agricultural... | Mid-Atlantic IDF Cu...

Chesapeake Bay Program
Science. Restoration. Partnership.

Search

Discover the Chesapeake | Learn the Issues | State of the Chesapeake | Take Action | In the News | Who We Are | What We Do

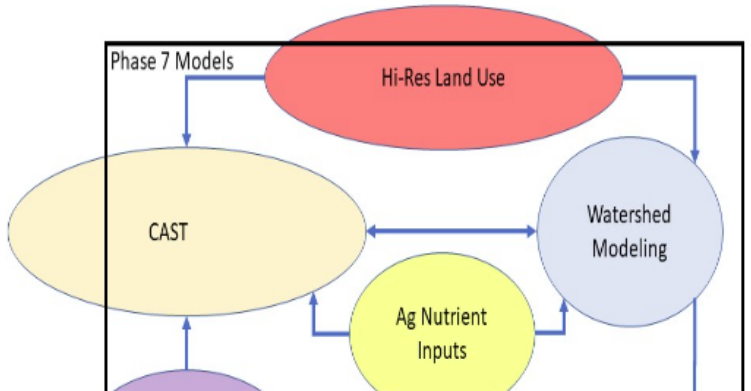
WHAT WE DO > PROGRAMS & PROJECTS > PHASE 7 MODEL DEVELOPMENT

Phase 7 Model Development

The Chesapeake Bay Program is updating its modeling and analysis tools used in the Chesapeake Bay TMDL.

Currently in development, the Phase 7 Modeling Tools will be used by the partnership to inform decisions related to nutrient and sediment reduction goals outlined in the Chesapeake Bay Watershed Agreement. Integral to this updated suite of tools is the ability to project climate change effect through 2035. The model, which will be ready for use by 2027, consists of six interrelated projects:

1. High Resolution Land Use
2. Chesapeake Assessment Scenario Tool (CAST)
3. Optimization
4. Agricultural Inputs
5. Watershed Modeling
6. Estuarine Modeling
7. Criteria Assessment



Modeling

Phase 7 Model Development

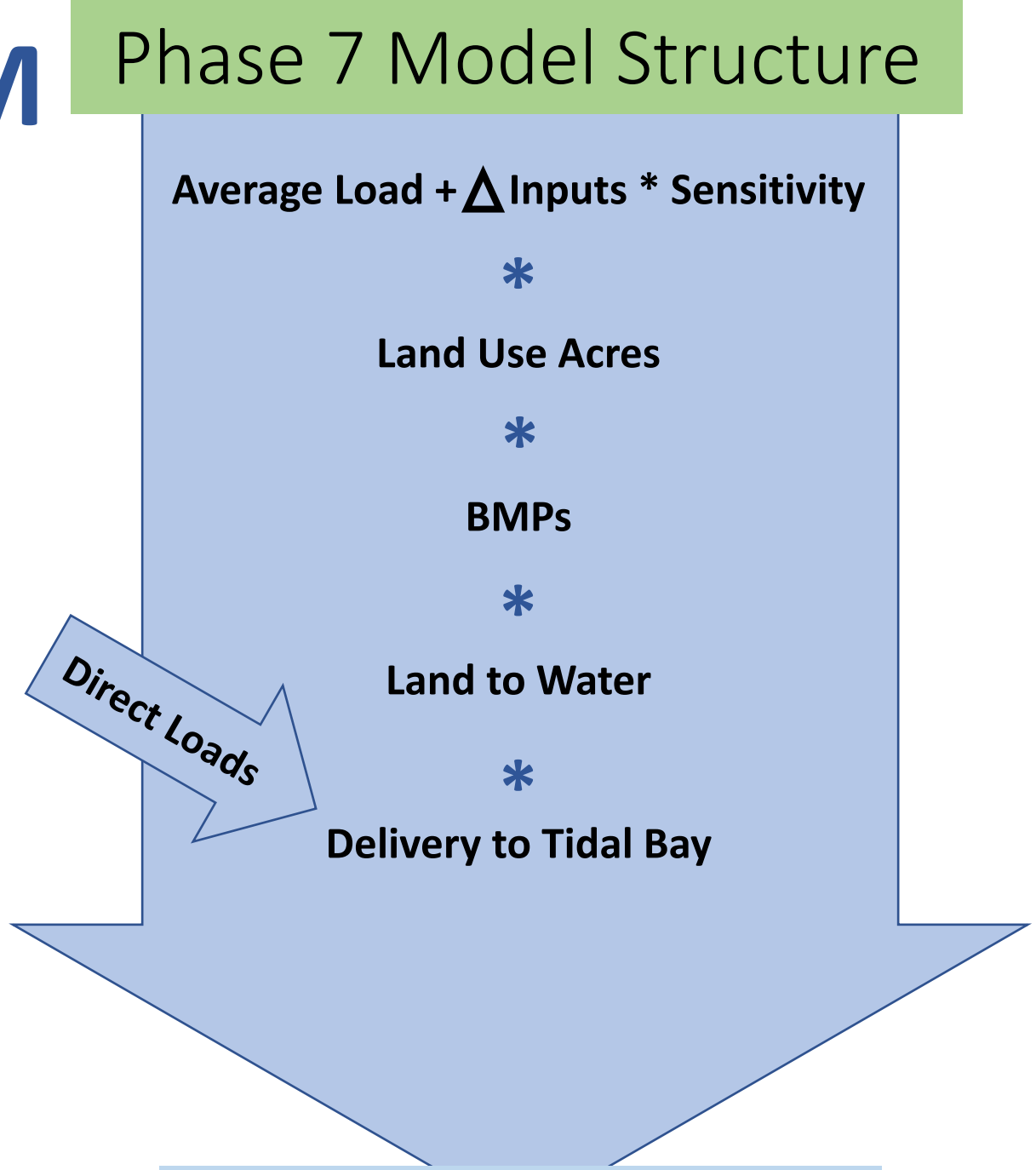
Programs & Projects

Modeling
Monitoring
Quality Assurance
Resource Lands Assessment
Chesapeake Bay TMDL
Watershed Implementation Plans
BMP Verification

Cast/CalCast/DM

Phase 7
CAST

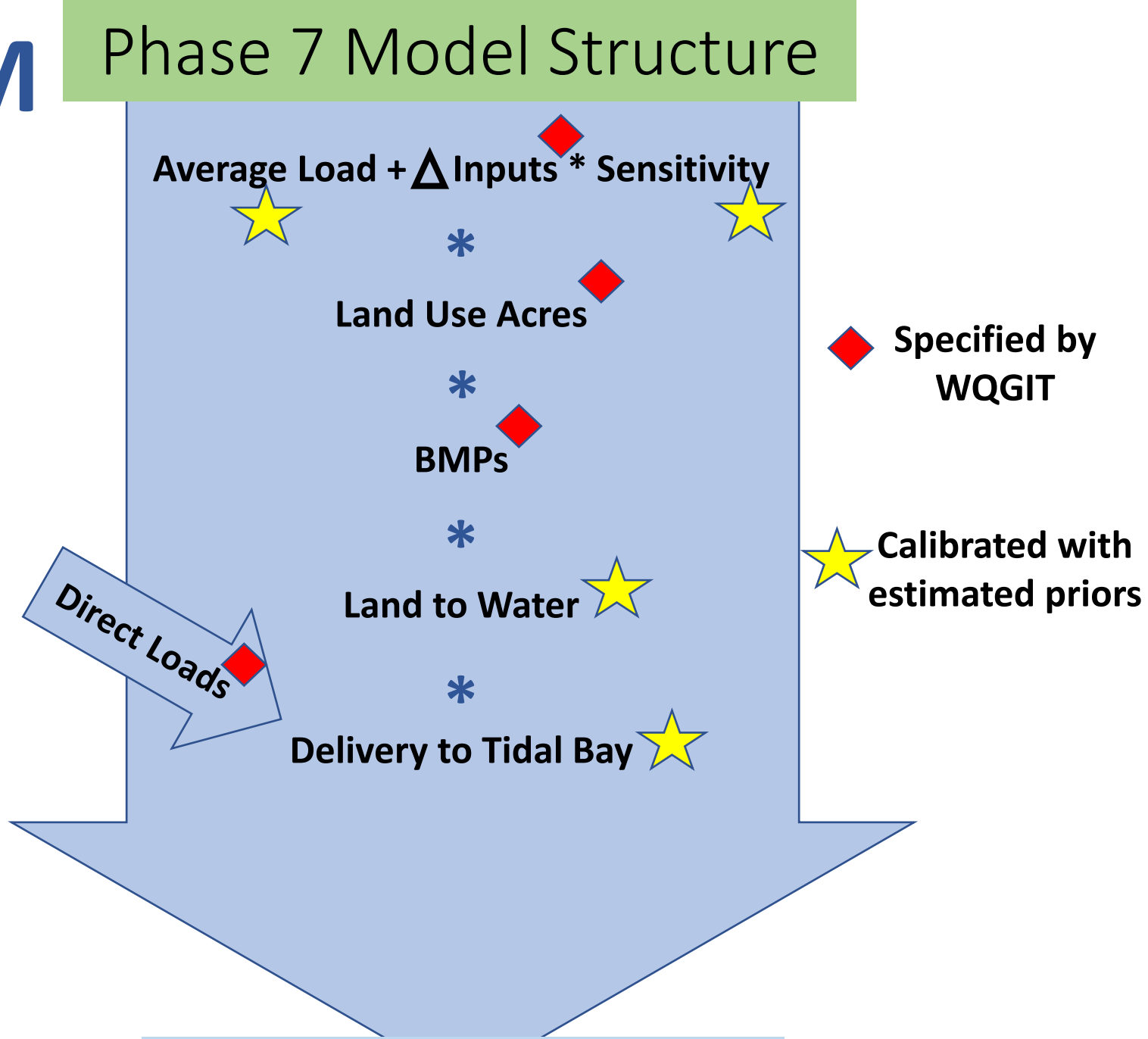
Deterministic
Scenario Tool:
1 set of loads for 1 set of inputs



Cast/CalCast/DM

Phase 7
CalCAST

Tool for finding parameters that best match observations

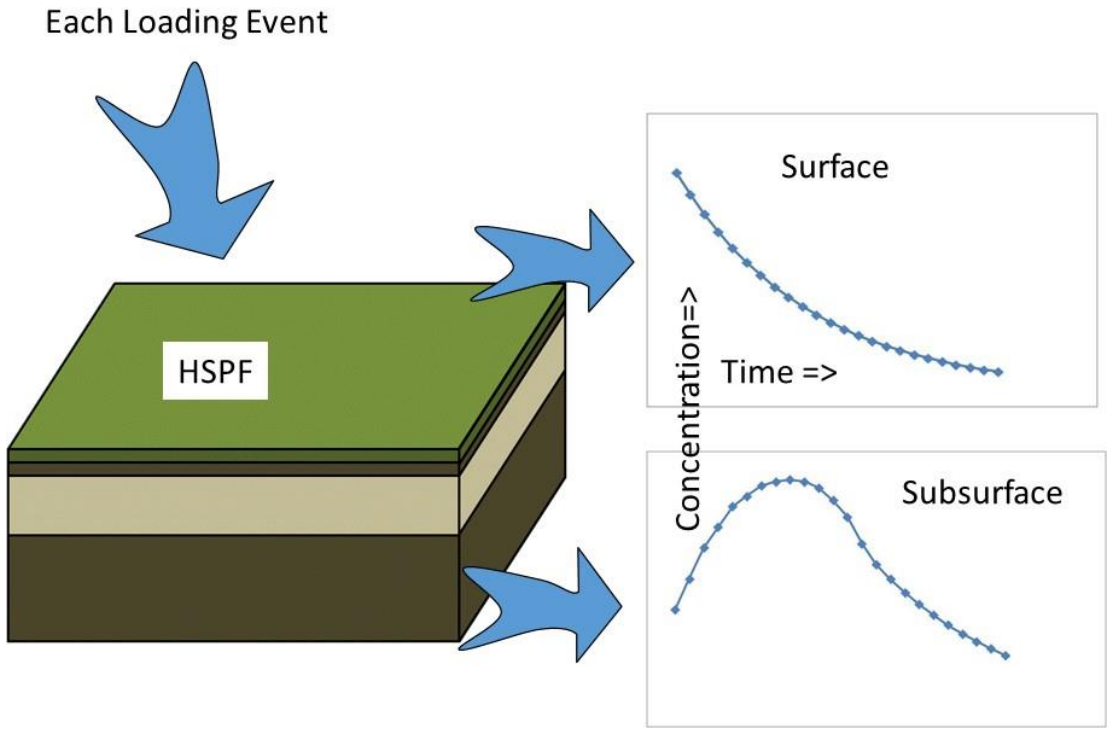


Cast/CalCast/DM

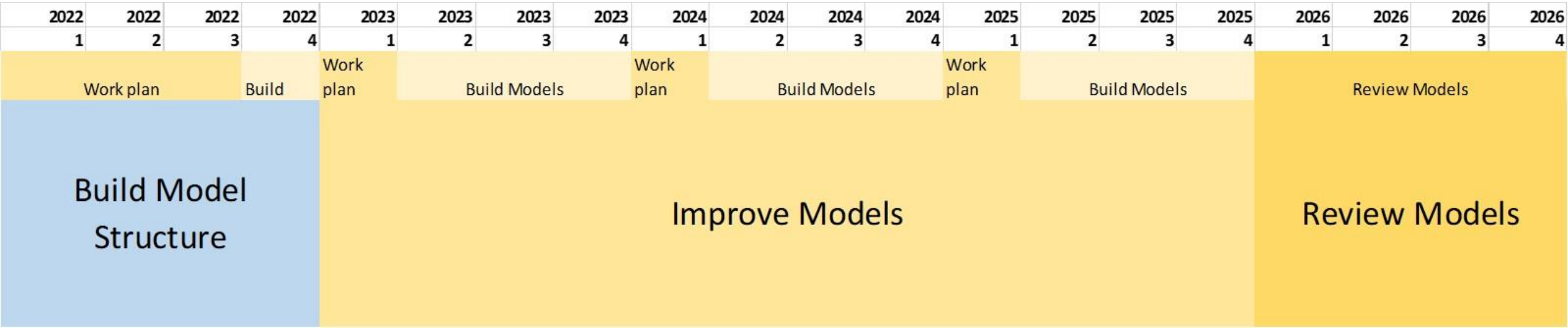
Phase 7
Dynamic Model

Tool for

- loading estuarine models
- Comparing against observations
- Other potential collaborative projects



Watershed Model Plan – Big Picture



Goals for the end of 2025

- Model Structure
  - CalCAST and the Dynamic Model run at the NHD scale for flow, sediment, and nutrients
  - CAST running on scale of WQGIT's choosing
- Output quality - Improvement on phase 6
  - Spatial apportionment of loads by land use and region
  - Change in loads over time due to
    - Management actions
    - Climate change
  - Accuracy of spatial and temporal loads to the estuary in calibration period
- Documentation – all 20 sections complete

Watershed Model Plan – Year 2 - 2023

- Continue development of CalCAST (Isabella) and the Dynamic Watershed Model (Gopal)
- Investigate and incorporate new load sources (Gary +)
  - Tidal shoreline erosion
    - including boat wakes?
  - Tidal flooding
  - Boat Discharges
- Update CSO model (Isabella)
- Literature review of loading rates by land use
- Improve land to water factors
- Improve reservoir simulation

Help on the way
ORISE watershed modeler
to join team this year

New or revised direct load sources

- Boat Discharges
- Tidal shoreline erosion
  - including boat wakes?
- Tidal flooding
- CSOs
- Grey Infrastructure

Boat Discharges

- BMP panel on boat discharge loads and a pump-out BMP convened and issued a draft report in 2018
- WWTWG tentatively approved
- WQGIT sent back to WWTWG
- WWTWG has not met much since then
- …Trail growing cold
- Modeling team developed loads in 2021
- Need approval

Boat Pump-Out Expert Panel Report

A Presentation to the CBP Water Quality Goal Implementation Team
July 23, 2018

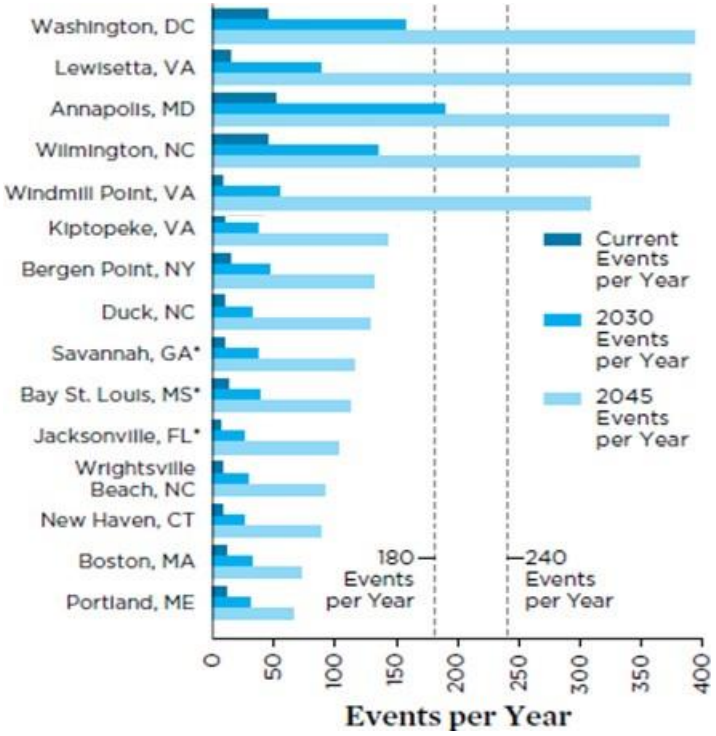
Tidal Shoreline Erosion

- Decision at the January 2023 MWG meeting to use the same total erosion as phase 6, but temporally disaggregate using new method

- Track down:
  - VIMS has been estimating sedimentation with the CCRM shoreline, which has been chosen for use as the CBP shoreline
  - Follow up to STAC review of boat wake loads and science (Bilkovic et al., 2017)

Tidal Flooding

- Margie Mulholland Measured the Muck
- Found that the nitrogen runoff from a single king tide was equal to the TMDL NPS load for the Lafayette River
- Noted that there would be an increasing trend over time
- Looking for good ideas on how to generalize.



Combined Sewer Overflows

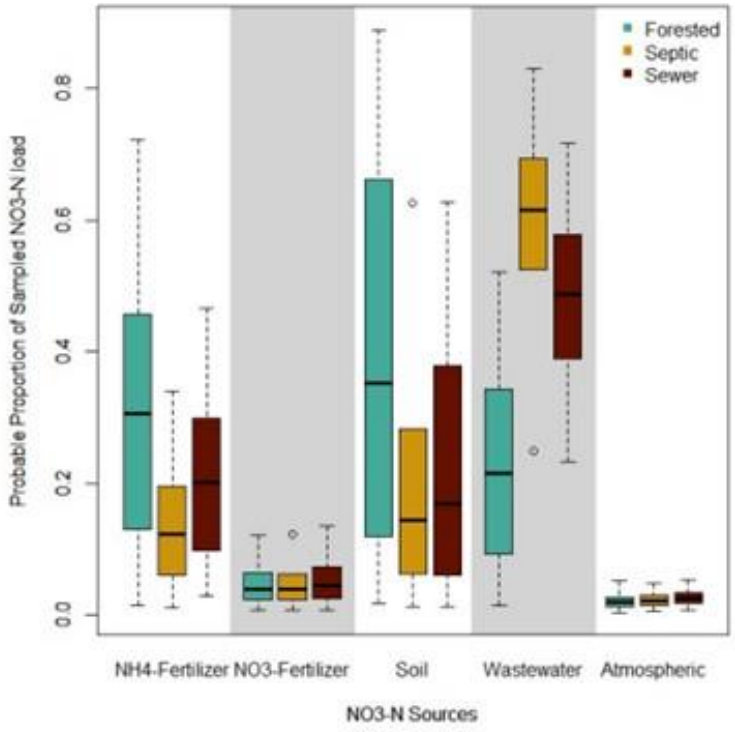
- 64 Combined Sewer Systems
- Phase 6
  - 4 had good data
  - 60 were modeled, but with some issues in the method
- Phase 7
  - More data may be available
  - Can update model
- Waiting for WWTWG to be reconstituted

Grey Infrastructure

- Unquantified portion of existing developed load
  - Non-sanitary
    - Laundry Washwater, Commercial Car Washing, Floor Drains, other
  - Sanitary
    - Direct Connections, Sewage Exfiltration and Dry Weather overflow
- Discussion at recent STAC local monitoring workshop
- Approved BMP, but never reported
- Incorporate into sensitivities?

Hampton Roads Regional Stormwater Monitoring

Aaron Porter
aporter@usgs.gov
U.S. Geological Survey, Virginia and West Virginia Water Science Center



Joseph Delesantro
Postdoctoral Scholar, Penn State University
jdelesantro@psu.edu

Jonathan M. Duncan, Diego Riveros-Iregui, Keridwen M. Whitmore, Joanna Blaszczak, Emily Bernhardt, Dean Urban, Lawrence E. Band

Documentation

- Record of approved model
- MWG approves some sections; WQGIT approves others
- Will discuss sections as they come available

- Section 1: Overview
  - 18-page summary
  - Draft available on Phase 7 website in .docx form
  - Accepting suggestions
  - Won’t be final until end of Phase 7 development

Documentation focus for 2023

- Section 1 overview
- Section 2 physical setting and segmentation
- Section 3 meteorological and stream data
- Section 9 land to water
- Section 10 direct loads
- Section 11 stream to bay
- Section 12 CalCAST
- Section 13 Dynamic Model