Chesapeake Bay Program
A Watershed Partnership

CHESAPEAKE BAY PROGRAM PHASE 7 SUITE OF MODELING TOOLS

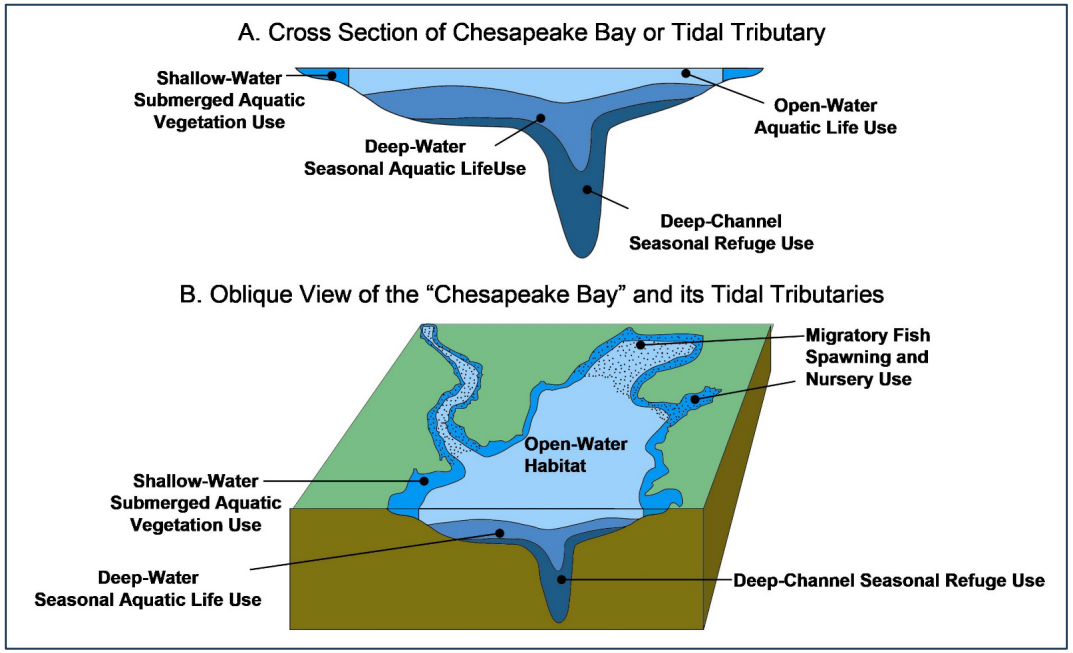
CHESAPEAKE BAY COMMISSION MEETING

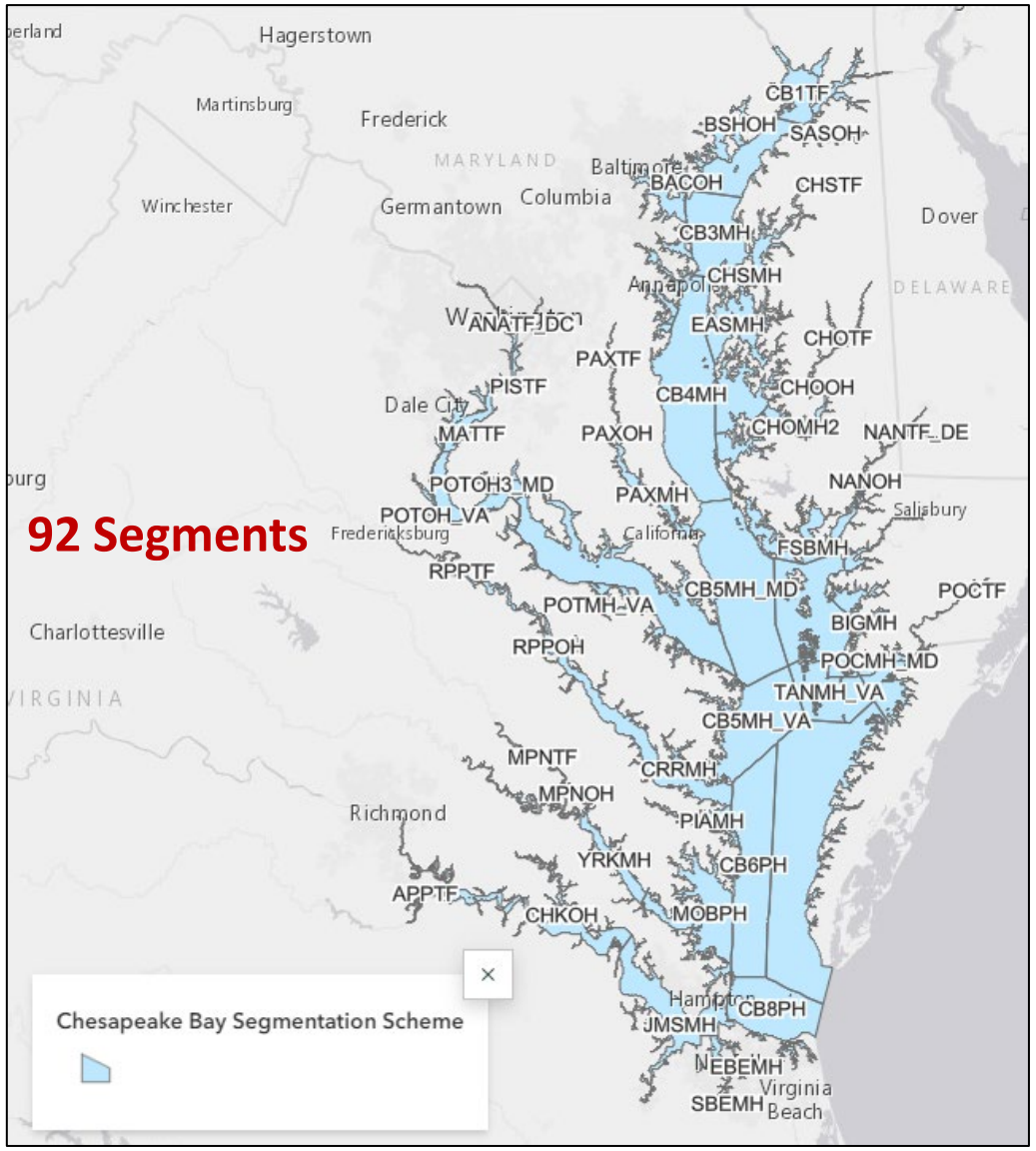
MAY 8, 2026

BO WILLIAMS, EPA CBPO

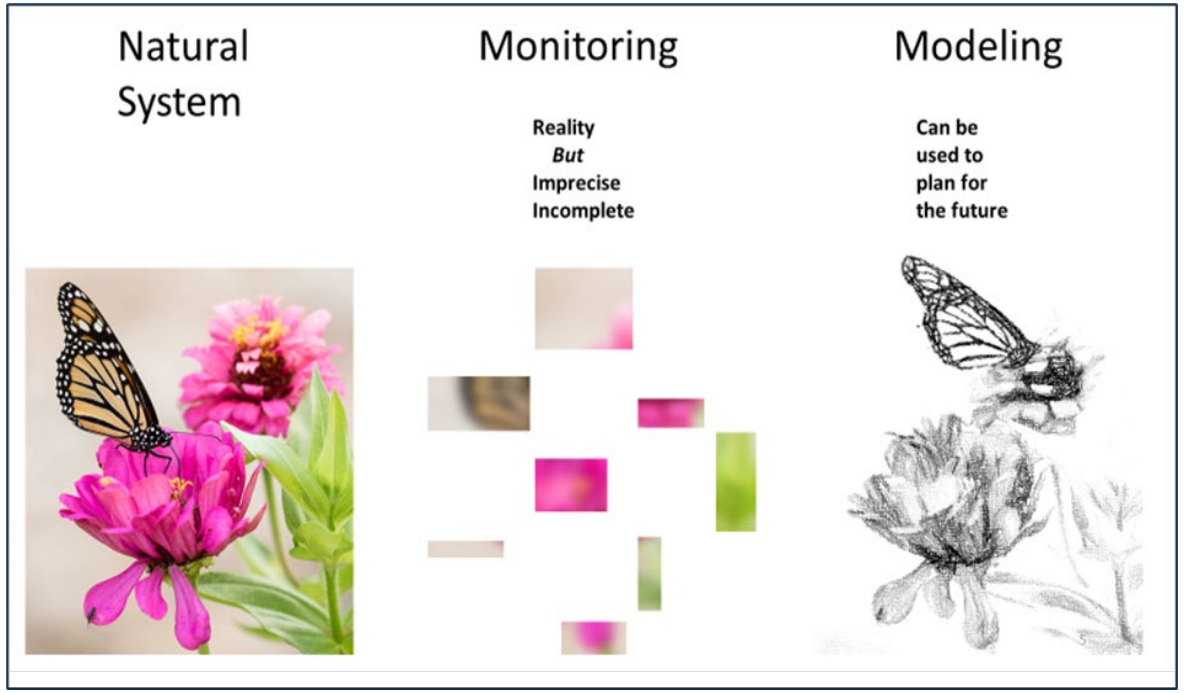
Restoring Chesapeake Bay Water Quality & Living Resources

Goal: Meet Water Quality Standards in 92 segments of the tidal Chesapeake Bay to protect & restore aquatic resources





Modeling & Monitoring the Chesapeake



A comprehensive view of the Chesapeake ecosystem

Monitoring

- Monitoring tells us how the Bay is doing--direct measurements of water quality.
- Long term trends in loads and yields
- Calibrate or “truth check” modeling tools

Modeling

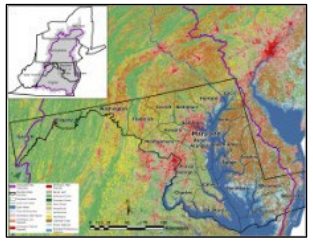
- Replicates conditions of watershed
- Models tell us the WHY
- Predicts impacts of future conditions and management practices---links actions to expected outcomes
- Provides common currency for comparisons

The Chesapeake Bay Program (CBP) Model Suite – What goes into the Model

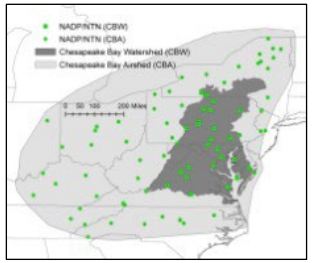
A suite of models

Data and Model Inputs

BMP Data
Land Use Data
Point Sources Data
Septic Data
U.S. Census Data
Agricultural Data



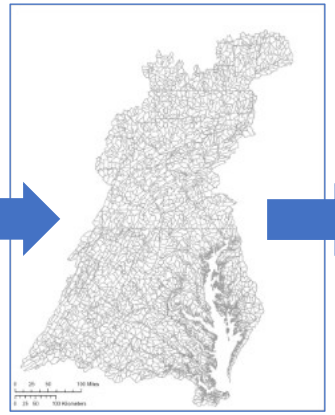
Land Use Change Model



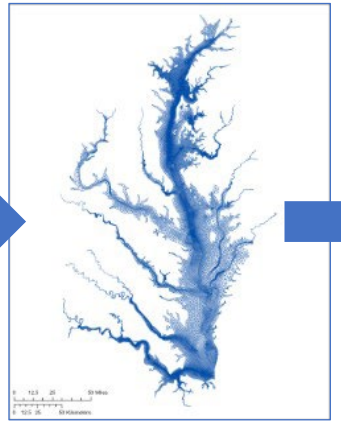
Airshed Model

Precipitation Data
Meteorological Data
Elevation Data
Soil Data

Phase 7 Watershed Model/CAST



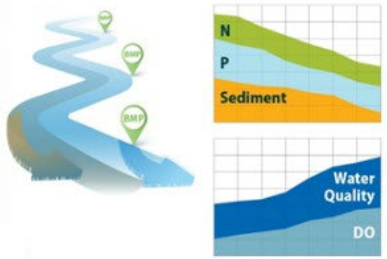
Estuary Model



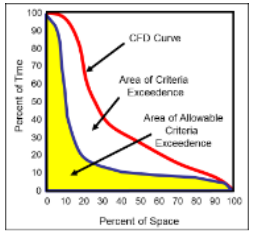
Model Outputs

Prediction of Impacts

BMP Implementation Results



Criteria Assessment Procedures



Nutrient and sediment targets for CBP state and Federal partnership

Effects

Targets

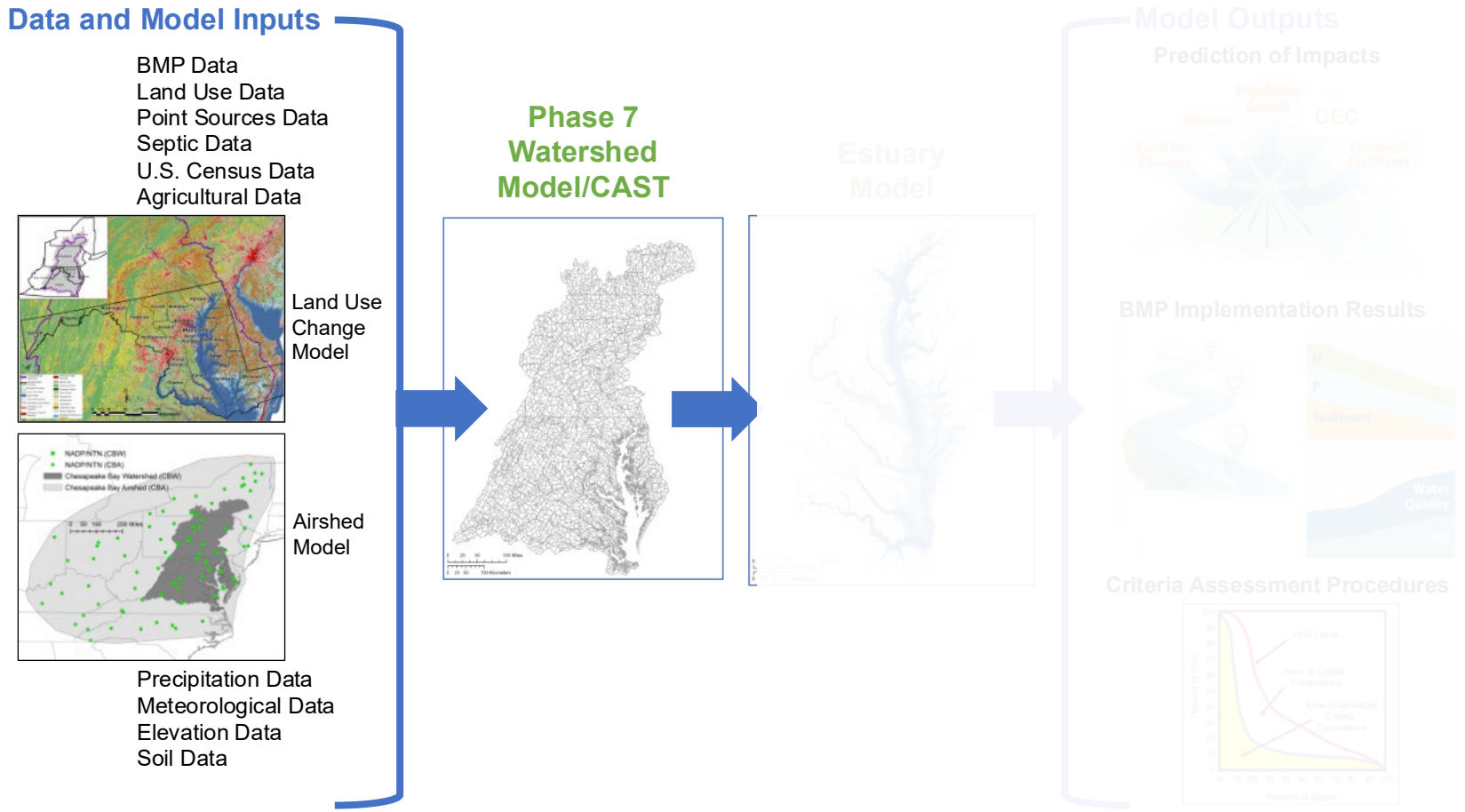
*BMP=Best Management Practice

The CBP Model Suite – What goes into the Model

The modeling suite is used to answer these questions:

CAST/Watershed Model:

- How are land use & environmental conditions changing over time?
- What are the sources of nitrogen, phosphorus, and sediment (NPS)?
- How much NPS reaches the Bay?



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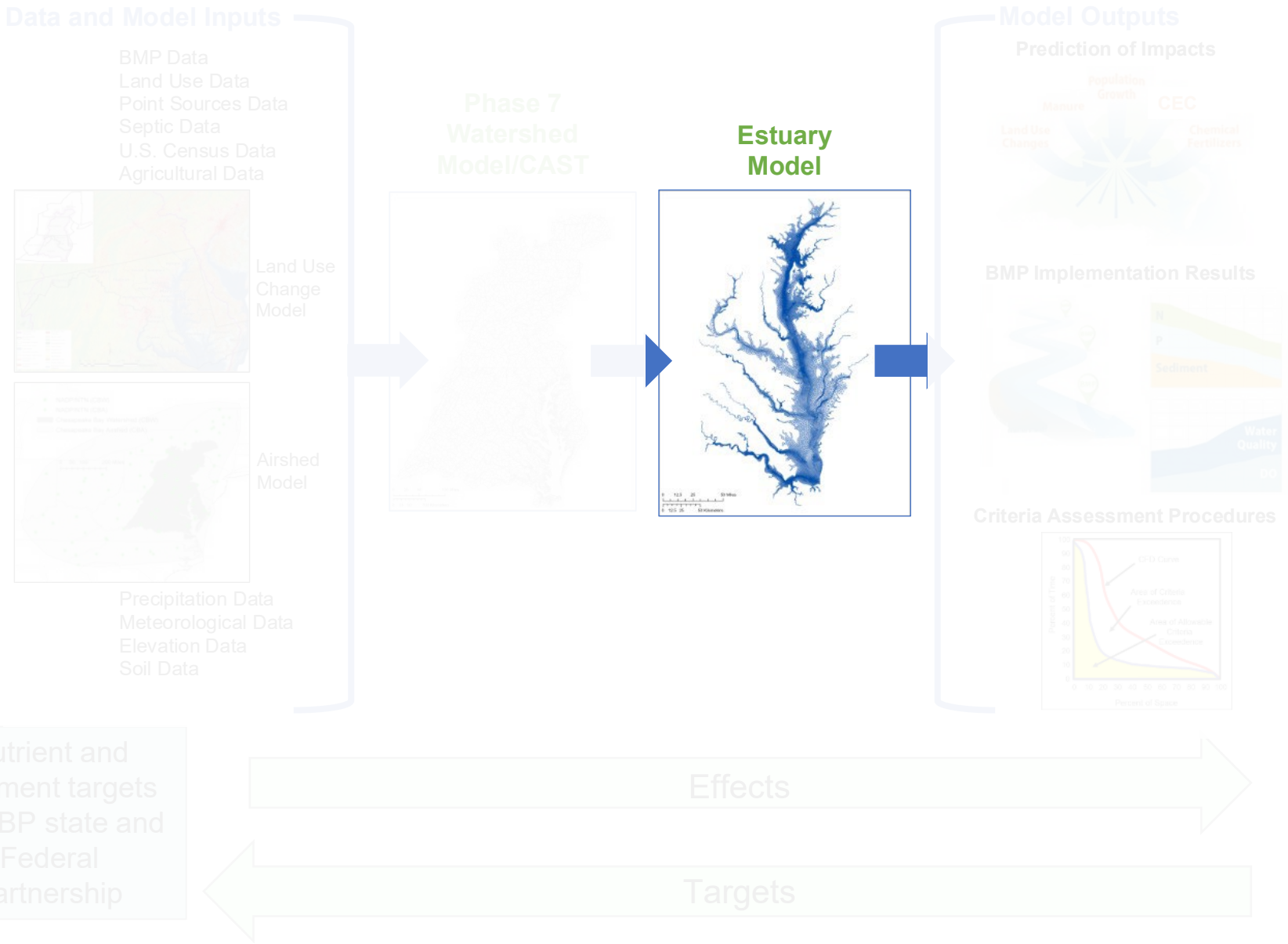
Estuary model

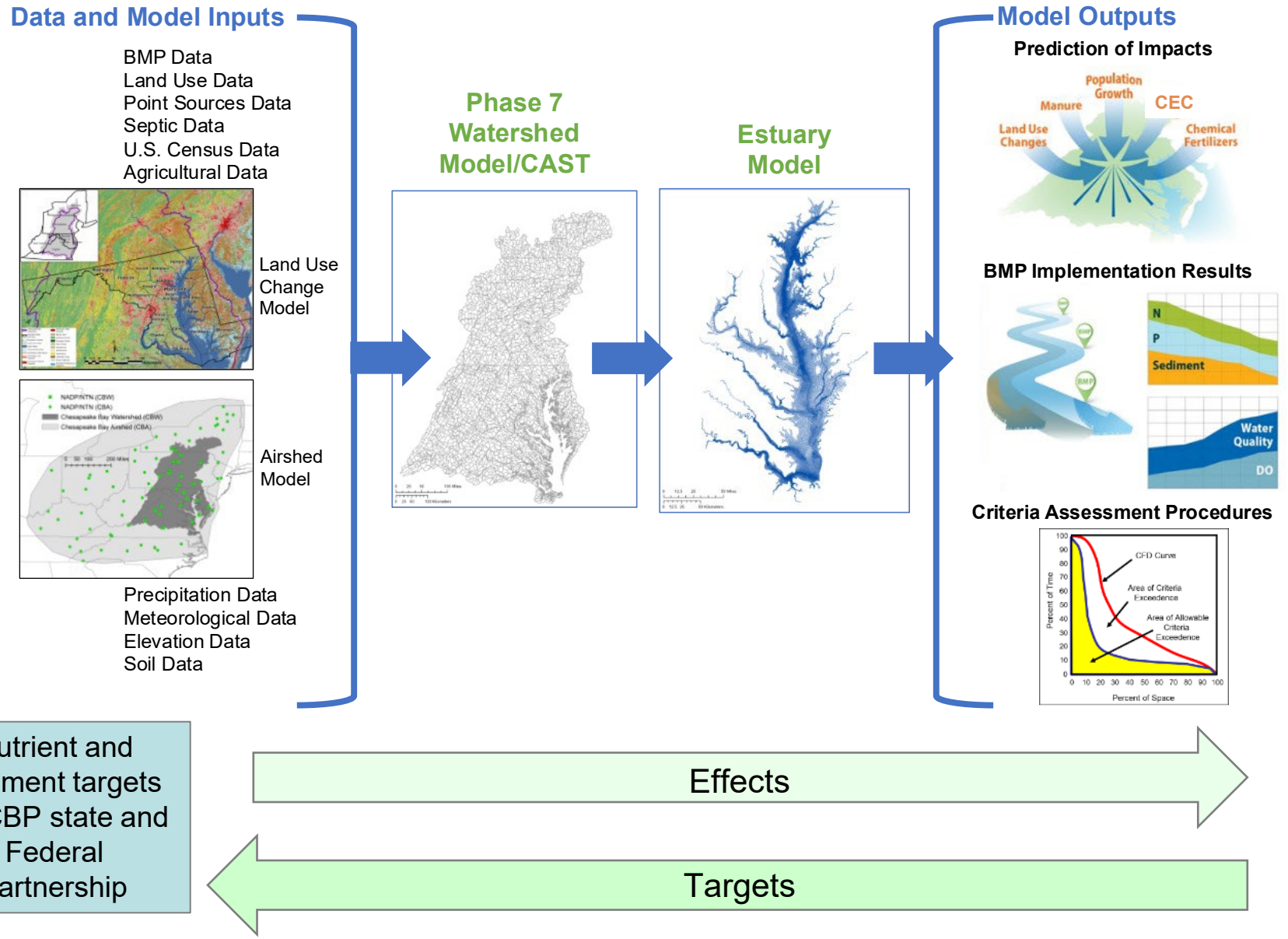
- How does oxygen in the Bay respond to different levels of NPS?



The CBP Model Suite – How CBP Makes a Plan

CBP uses the model suite to:

- Estimate levels of nutrients and sediment that reach the bay under different land management scenarios
- Set targets for nutrient and sediment reductions for jurisdictions
- Plan for practices that will allow us to reach goals (Watershed Implementation Plans)
- Track progress towards restoration goals



The CBP Model Suite—Why we update the model

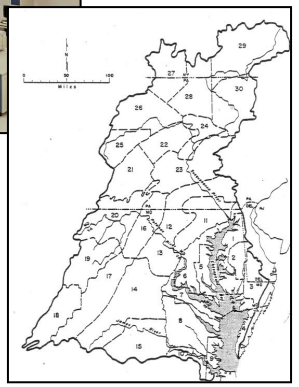
The models are built by the partnership

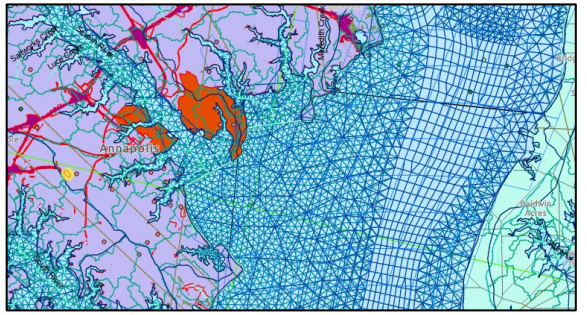
- Expression of the CBP partnership's knowledge about the Chesapeake system.

Updates ensure confidence and credibility

- New model every ~ 10 years
- Smaller updates within (2-4 years)
- Incorporation of new data, scientific advances, and partner feedback… *more confidence, more credibility*

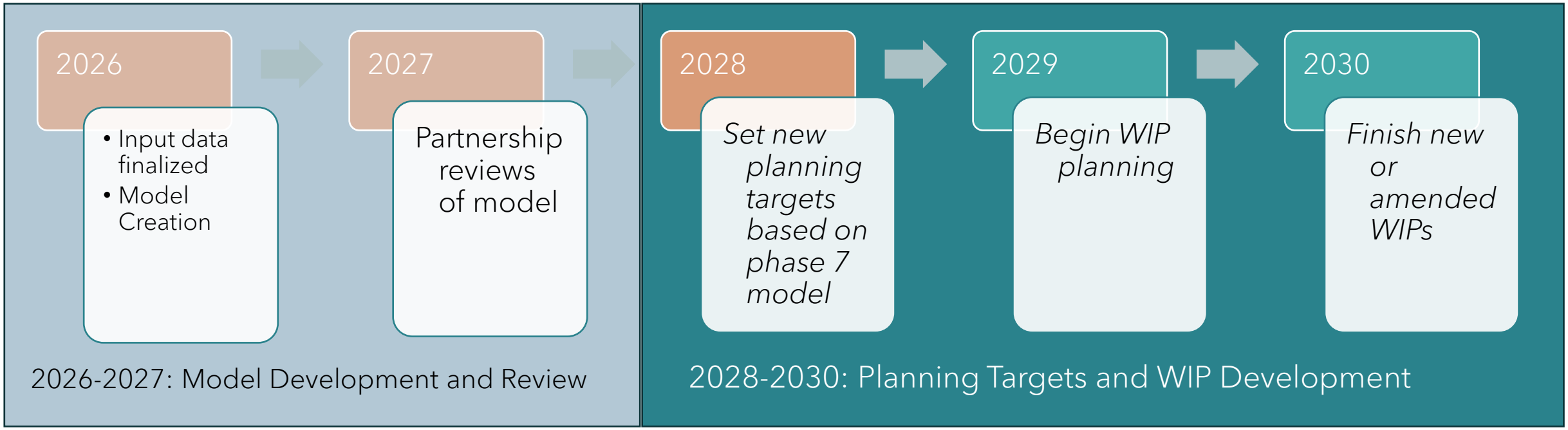
Time	Name	Scenarios
Mid 1980s	NA	0
Early 1990s	Phase 2	<10
Late 1990s	Phase 4.1	37
Early 2000s	Phase 4.3	400+
2009 – 2010	Phase 5.3.0	300+
2011 – 2017	Phase 5.3.2	1000 or so
2017	Phase 6	1000s per year
2028 – 2040	Phase 7	Many more…





CBP MODEL AND PLANNING TIMELINE

Through 2030 continue to accelerate completion of all interim water quality planning targets



PHASE 7: IMPLICATIONS AND OPPORTUNITIES

- Sharper, more credible planning targets
- Better targeting of conservation and restoration programs investments
- Improved tracking, crediting, and accountability
- Improved ability to measure progress towards meeting water quality standards across multiple habitats
- Expanding use of water quality monitoring in measuring progress

QUESTIONS?

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