Chesapeake Bay Program
A Watershed Partnership

DRAFT PHASE 7 DEVELOPMENT & REVIEW SCHEDULE

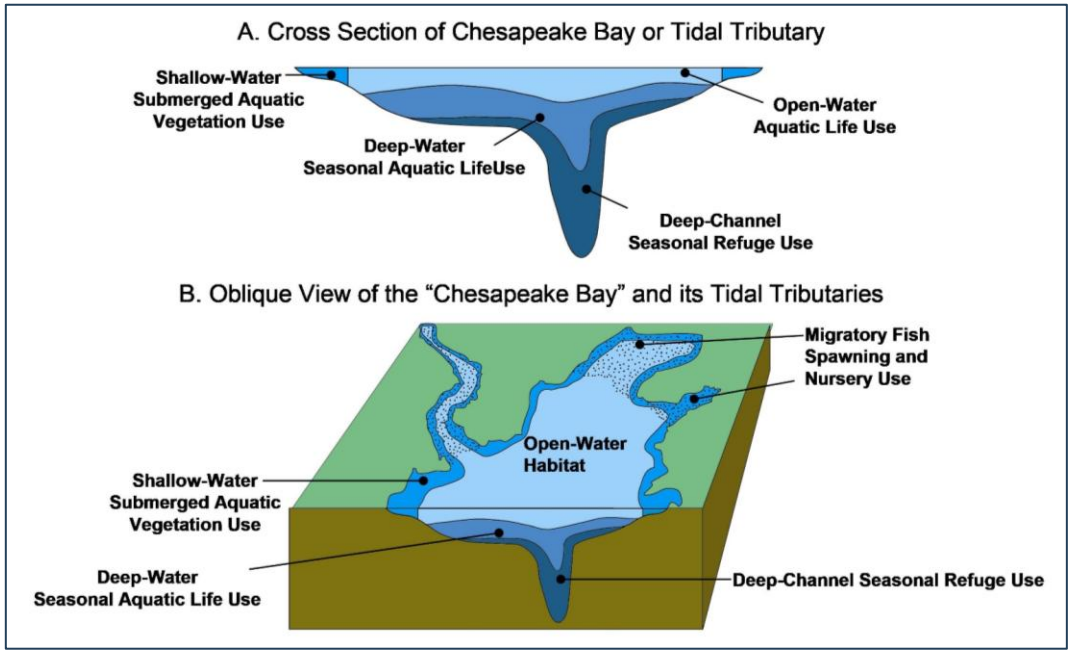
PRINCIPALS' STAFF COMMITTEE MEETING

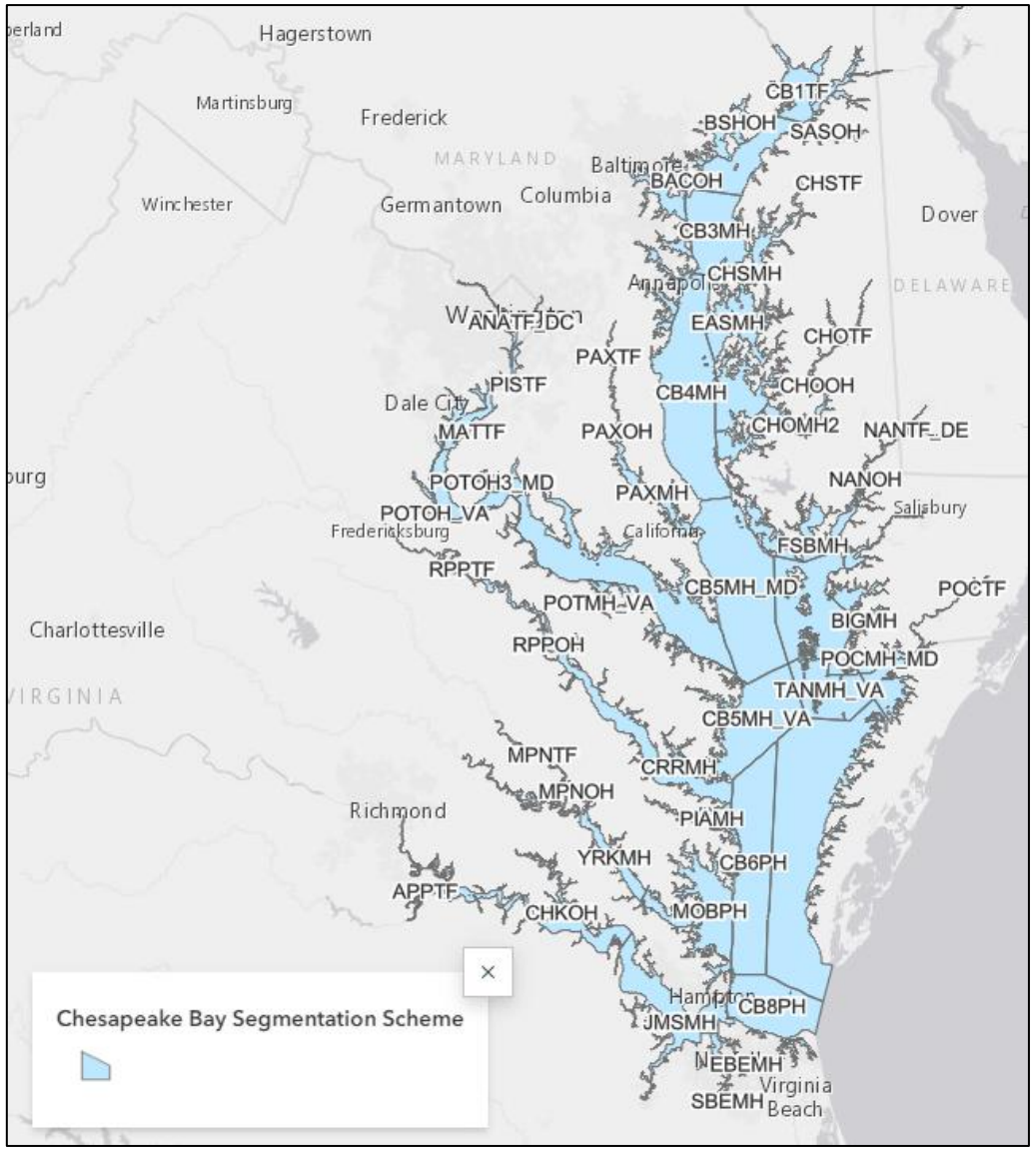
APRIL 7, 2026

LEE MCDONNELL, EPA CBPO

Restoring Chesapeake Bay Water Quality & Living Resources

Goal: Meet Water Quality Standards in 92 segments of the tidal Chesapeake Bay





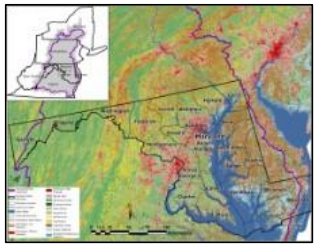
The CBP Model Suite – How the CBP Makes a Plan

Models are used to:

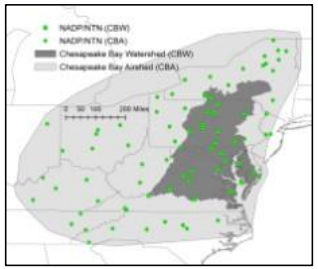
- Estimate levels of nutrients and sediment that reach the bay under different land management scenarios
- Set targets for nutrient and sediment reductions
- Plan for practices that will allow us to reach goals (Watershed Implementation Plans)
- Track progress towards restoration goals

Data and Model Inputs

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



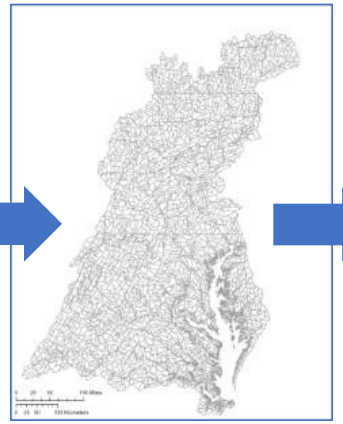
Land Use Change Model



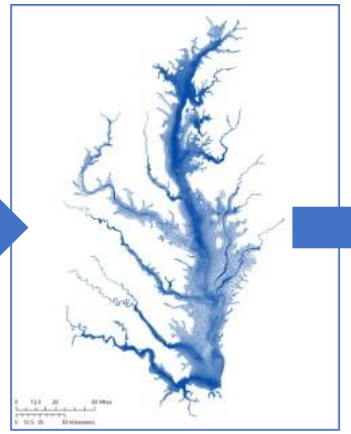
Airshed Model

Precipitation Data
Meteorological Data
Elevation Data
Soil Data

Phase 7 Watershed Model/CAST



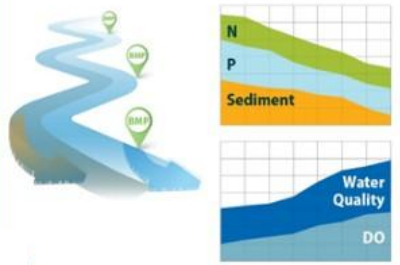
Estuary Model



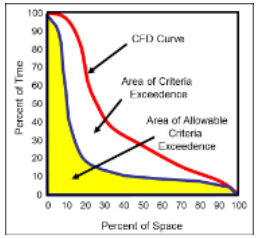
Model Outputs

Prediction of Impacts

BMP Implementation Results



Criteria Assessment Procedures



Nutrient and sediment targets for CBP state and Federal partnership

Effects

Targets

CBP MODEL AND PLANNING TIMELINE

Through 2030 continue to accelerate completion of all interim water quality planning targets (Target #1)

RENPS Target #2

Now - 2026

"Ramp up"
- Model Creation
- Initial reviews of data

2027

STAC and partnership reviews of model

2026-2027: Model Development and Review

2028

Set new planning targets based on phase 7 model

2029

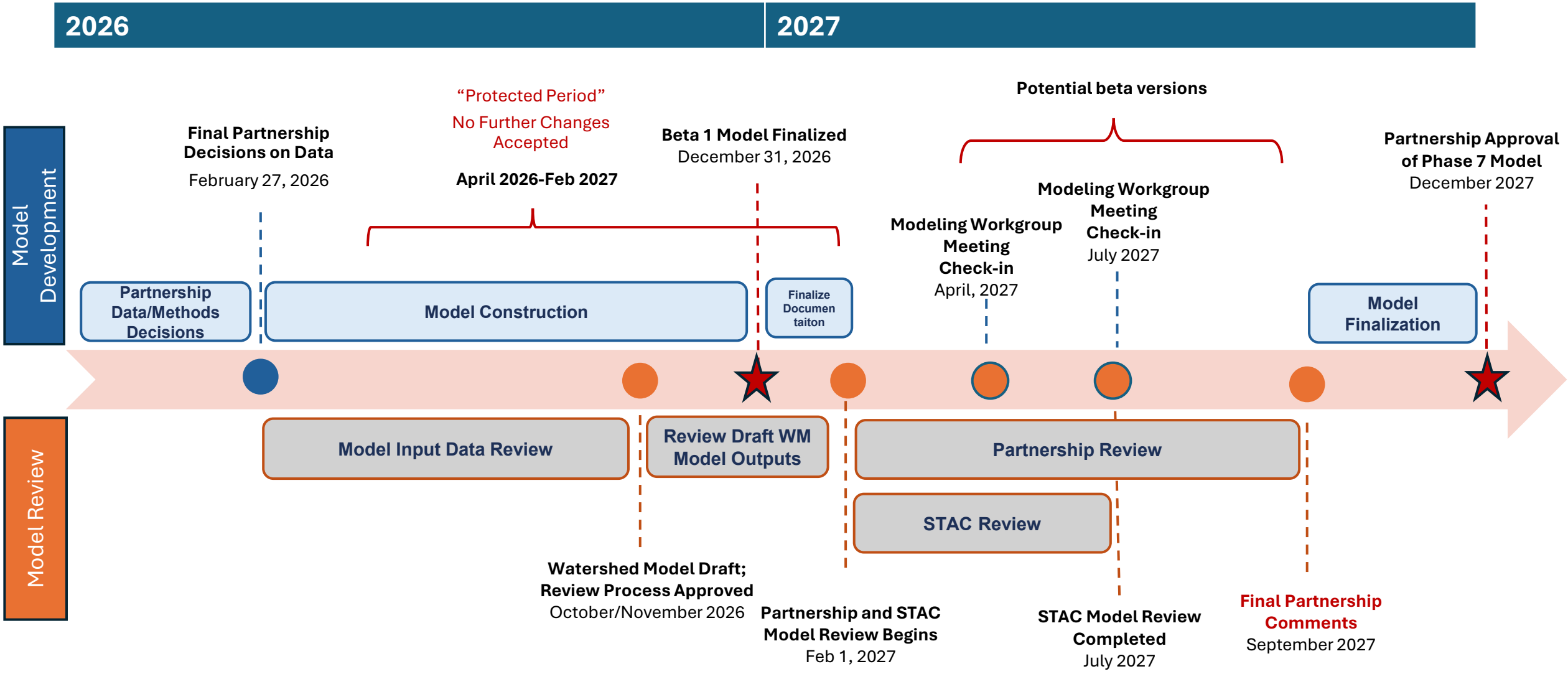
Finish targets and begin WIP planning

2030

Finish new or amended WIPs

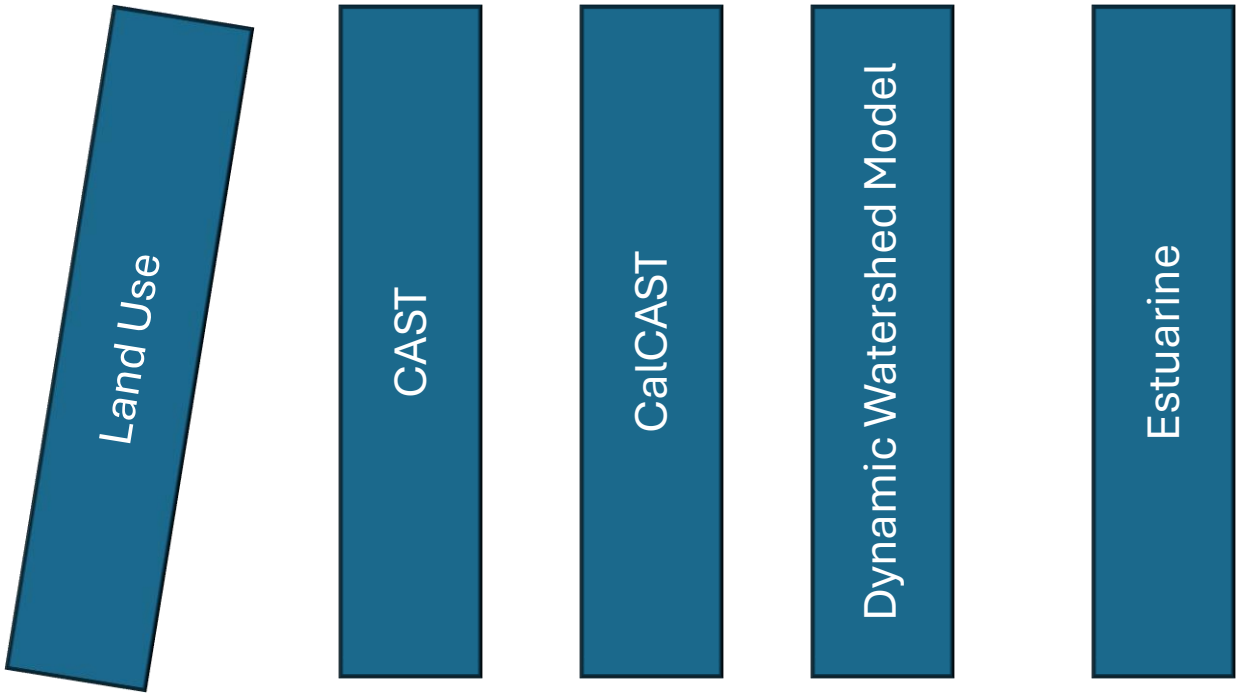
2028-2030: Planning Targets and WIP Development

PHASE 7 DEVELOPMENT & REVIEW SCHEDULE



2027 MODEL REVIEW

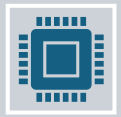
The type, complexity and location (i.e., number of dependencies) of a revision affects the level of effort needed



PHASE 7 MODEL IMPROVEMENTS

Enhanced Data Resolution and Simulation

The Phase 7 Model uses higher resolution PRISM precipitation data and finer land segmentation, improving the simulation of flows, nutrients, and sediment across the watershed.



Advanced Calibration and Assessment

Incorporation of a Generalized Stream Network (GSN) and extended simulation period (1984-2024) allows for more comprehensive calibration, utilizing a greater number of observations and improving load assessments.

Improved Input and Environmental Conditions

The model features updated estimates for fertilizers, manures, atmospheric deposition, and future climate conditions, enhancing predictions of land to water loads and environmental impacts.

Refined Land Use and Management

Higher resolution land use data and better representation of land use changes from 1985 to the present improve the accuracy of growth assessments and management strategies.

Integration of BMPs and Scenario Handling

New agricultural and stormwater Best Management Practices (BMPs) are incorporated, with improved scenario handling through efficient data linkage, optimizing nutrient and sediment reductions at lower costs.

QUESTIONS?

Lee McDonnell

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Chesapeake Bay Program
Science. Restoration. Partnership.

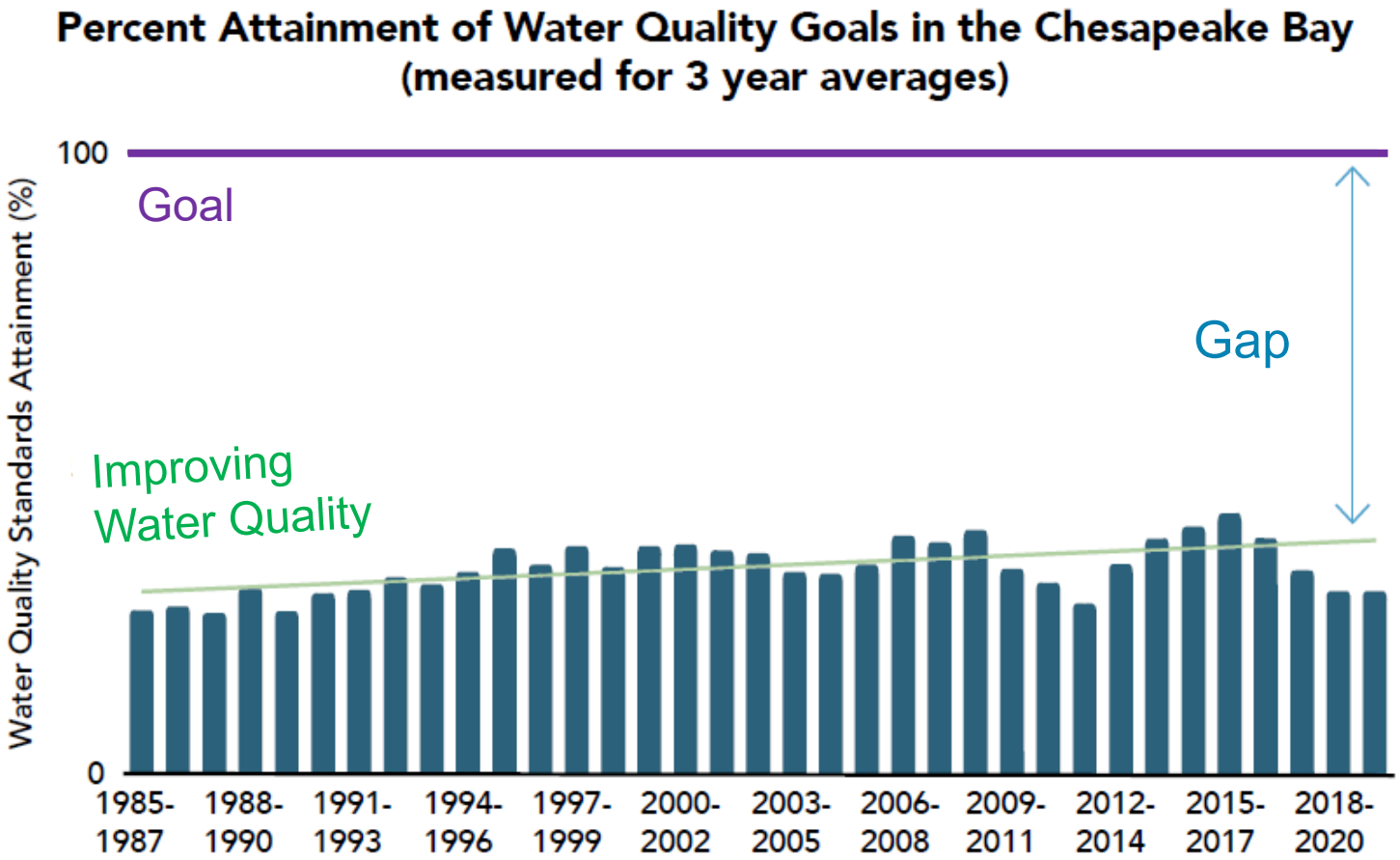
Foundations for Tiered Implementation

April 7, 2026

Bruce Voght, NOAA

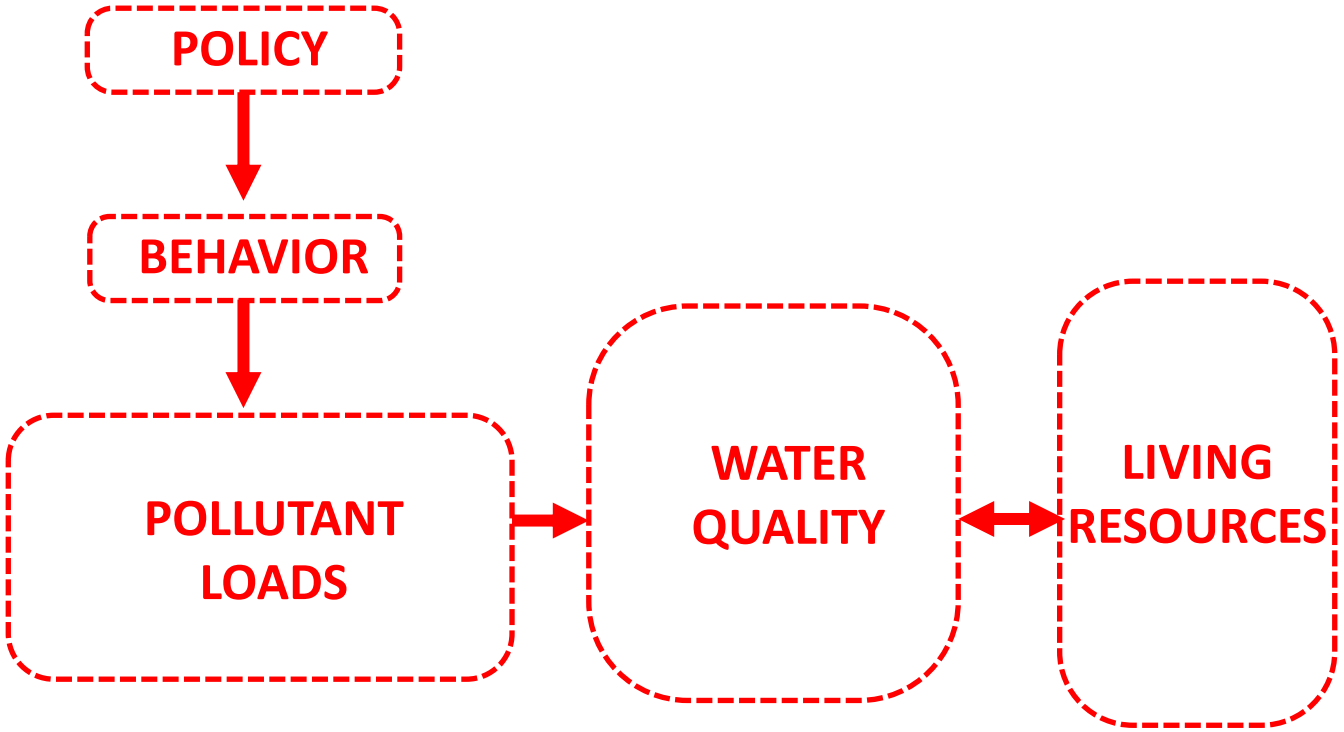
Motivation: The CESR Report

- 40+ years of Chesapeake Bay restoration
- Improvements have been made, plus value in holding the line
- Why is there a gap & how do we close it?
- What might we do differently going forward?



CESR: Comprehensive Evaluation of System Response

CESR Approach



- Systemic evaluation of what has occurred
- Policy relevant framing
- 50+ volunteer scientists
- Literature synthesis & supplemental empirical work

CESR Findings: Living Resources

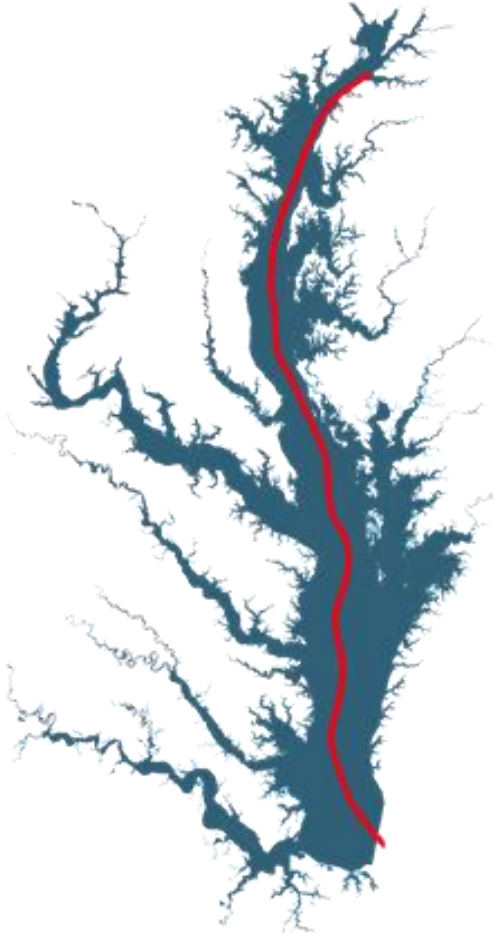
-Maryland Sea Grant

"Significant enhancement of living resources can be achieved through additional management actions without complete achievement of water quality standards across all habitats"

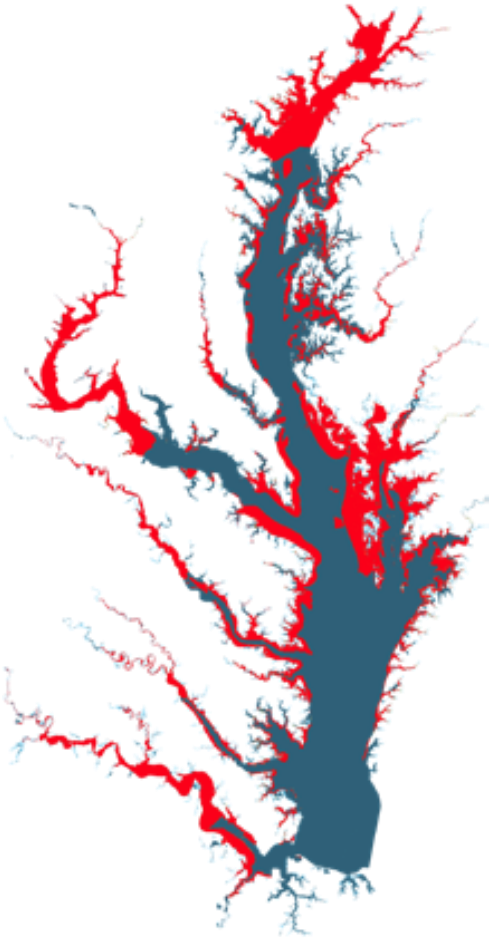
-CESR (p. viii)

Accelerating living resource response on our way to meeting overall goal

Deep water DO is most challenging water quality goal



But most impactful living resource habitats are elsewhere



K. Stephenson et al., AGU, 2024

Accelerating living resource response on our way to meeting overall goal

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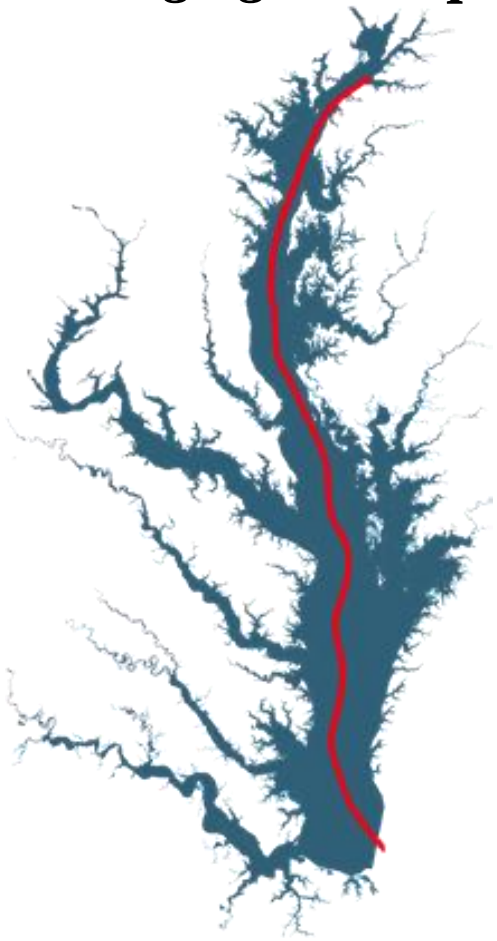

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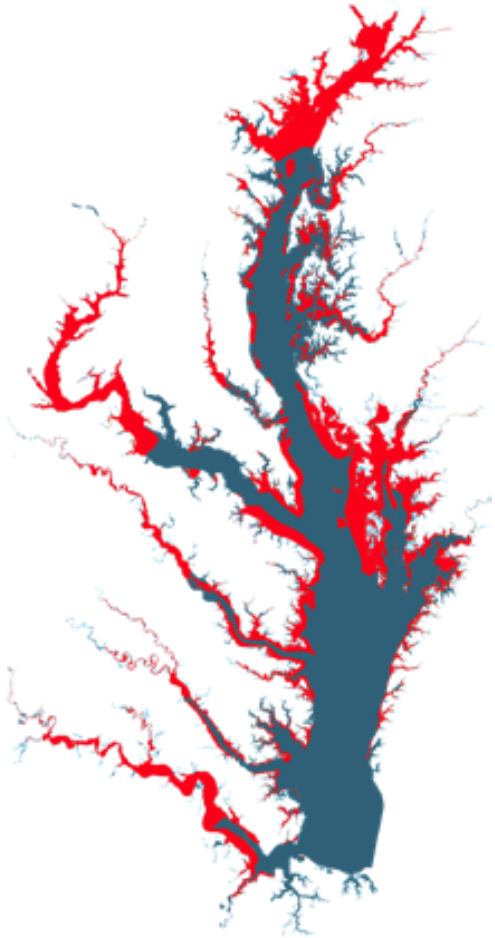
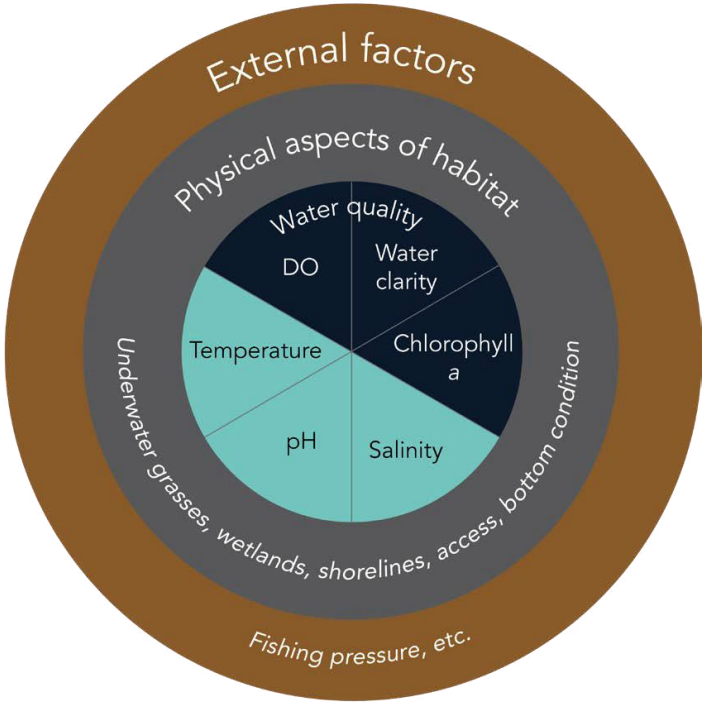


Living resource habitat factors that matter



K. Stephenson et al., AGU, 2024

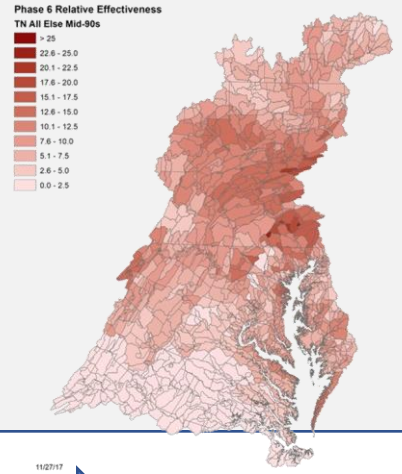
Guidelines for Planning Targets with the Default Approach

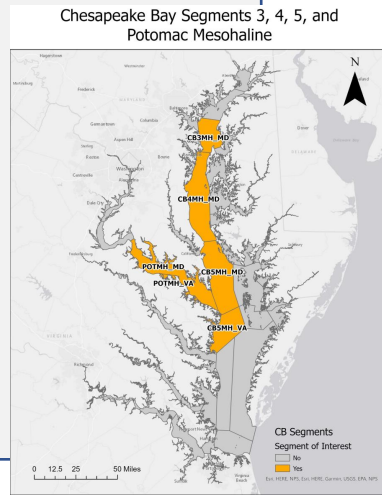
Everything
Everywhere
Everyone

Increasing relationship between
Relative Effectiveness and Effort

Effort

Effectiveness defined as the
deep channel and deep water



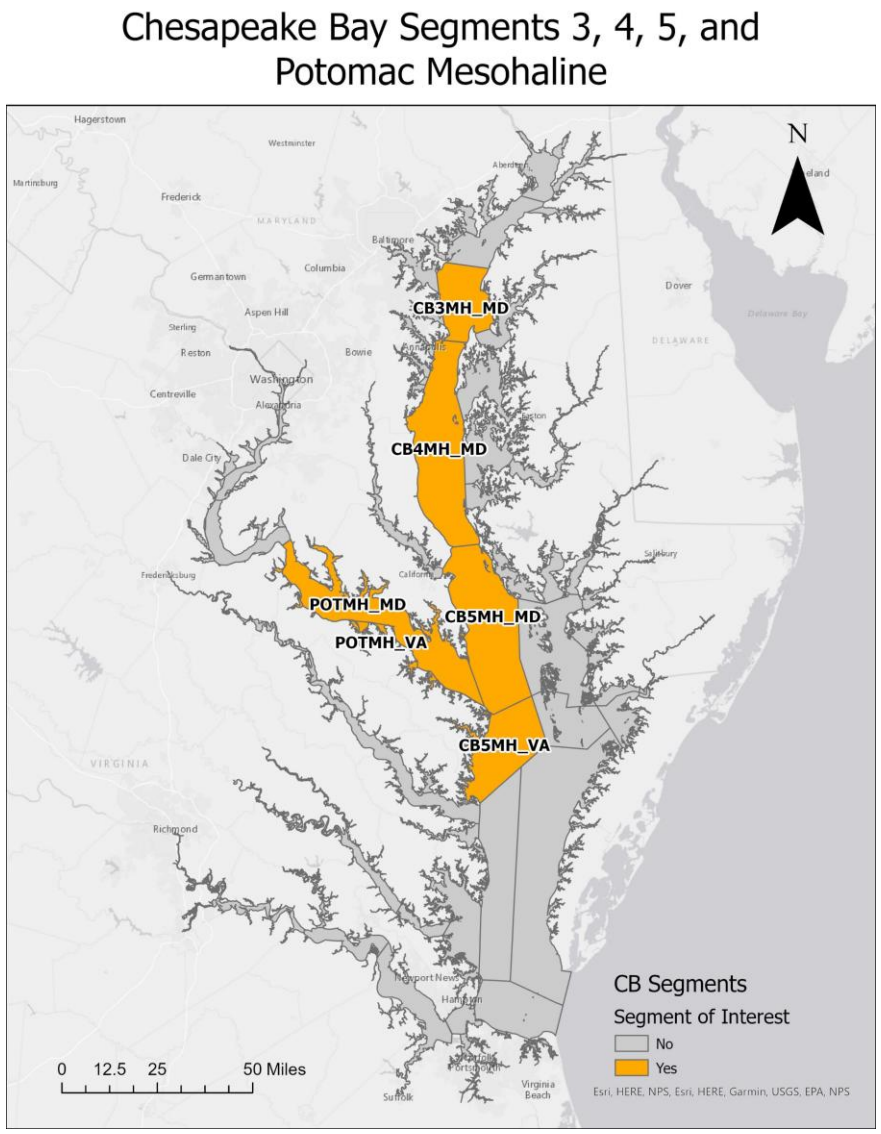


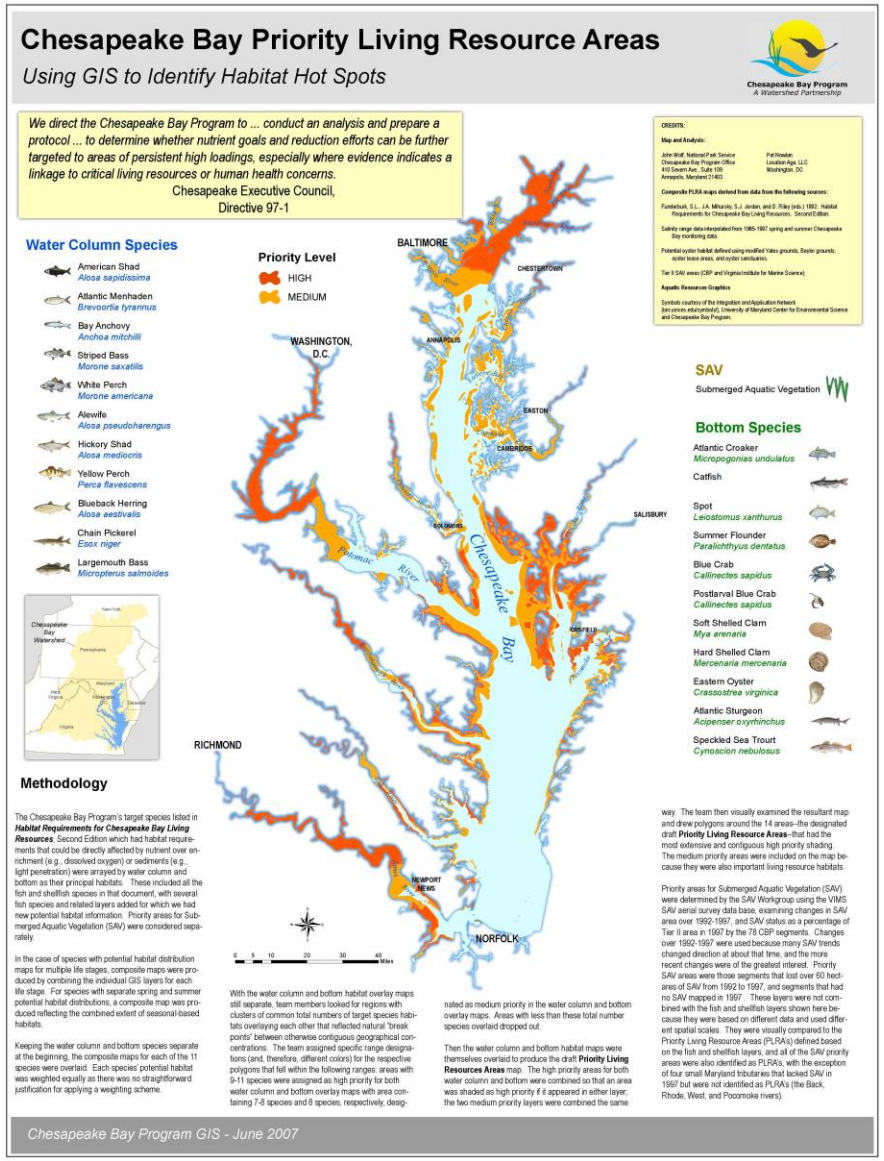
No BMPs

Effectiveness

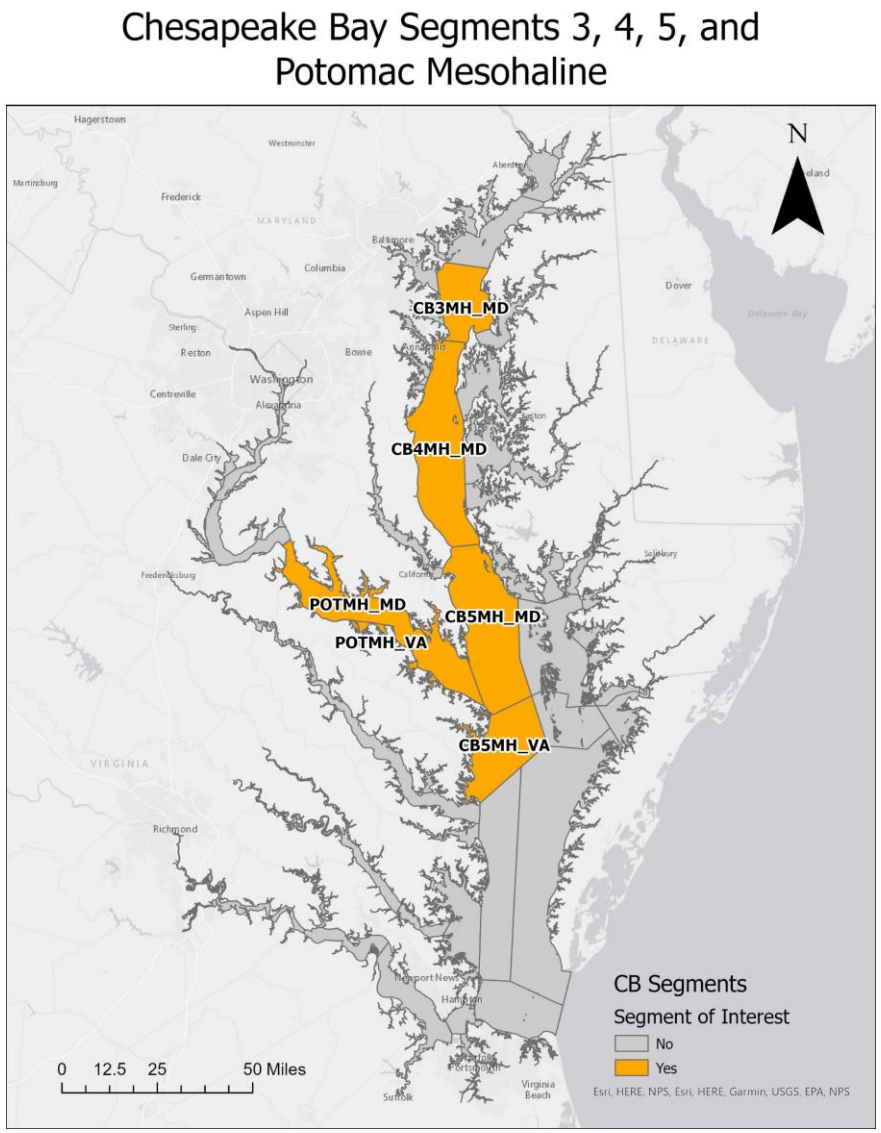
11/27/17

…but the middle of the bay is not the most important habitat

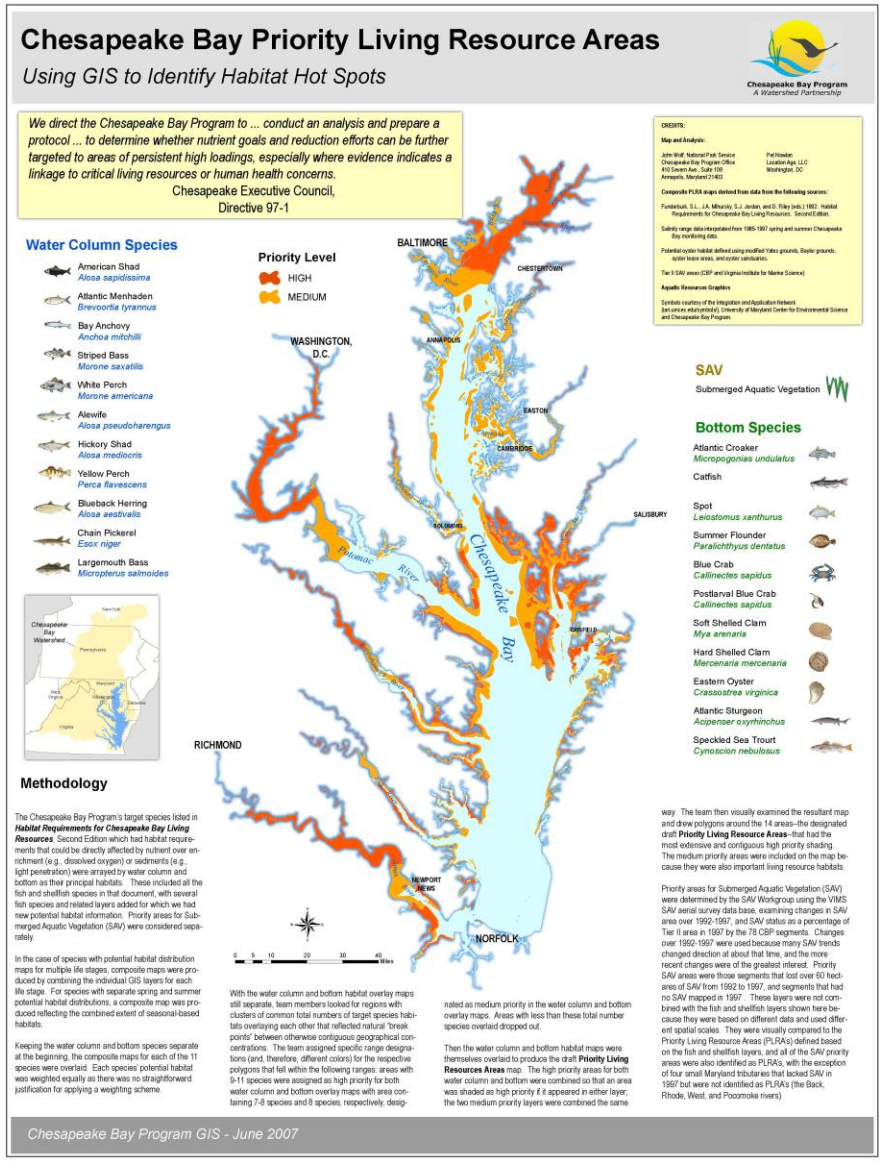




Keep the process of distributing planning targets…



…but do the things first that affect living resources



Potential Overall Plan

Build 4D Interpolator, Main Bay Model, Multiple Tributary Model, Habitat Suitability Model

Overall Goal

Keep default approach as it is and complete the planning target analysis based on Deep Water/Deep Channel

Tipping Points

Evaluate habitat suitability for the best place to make a positive impact based on improving DO

Develop visualization tools that aid Watershed Implementation Plan developers in evaluating options considering the tipping points

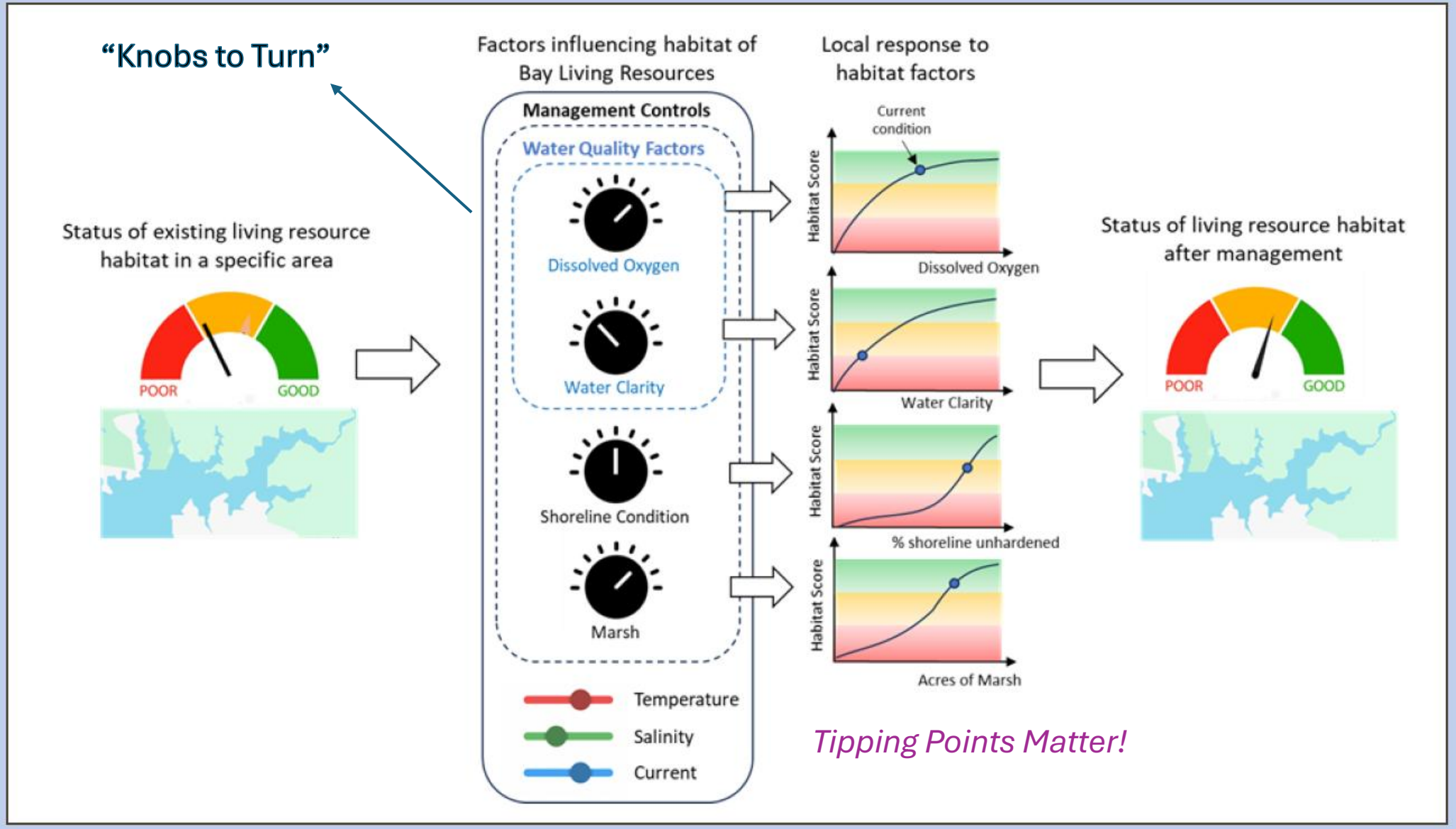
Consider prioritization of work toward based on moving the needle in those tipping point areas, while pursuing the overall goal

Ensure that these actions do not cause unintended consequences with regard to Deep Channel resuspension of nutrients

So, How Do Living Resources Fit Into This Partnership Process?

Photo by Charlie Nick/Chesapeake Bay Program

Assessing local water quality, stressor, and habitat conditions

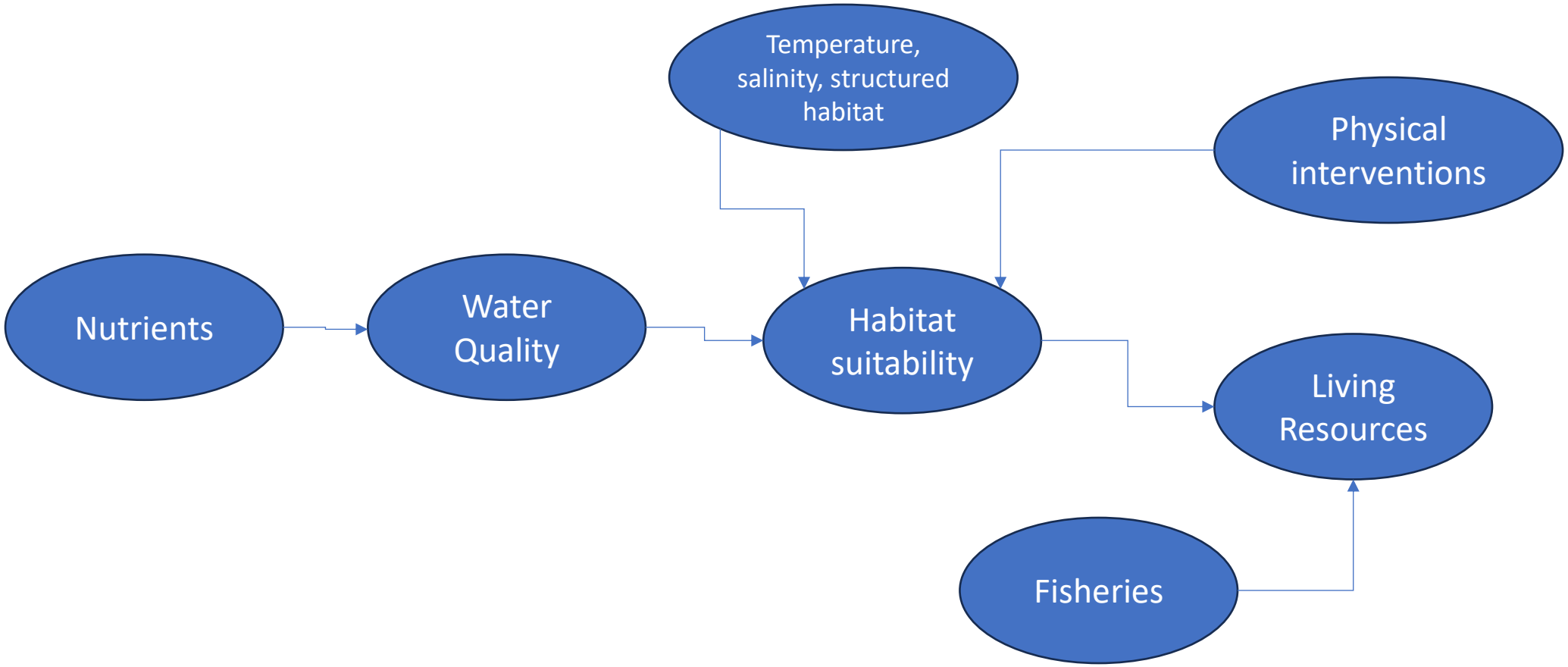


Tipping Points Matter!

Tiered Implementation: From Concept to Application

1. Conduct habitat suitability analysis
2. Assess living resource habitat improvement potential of various segment/habitat combinations (dials) (local conditions to response to stressors reductions)
3. Identify relative contribution of upstream and estuarine N, P and sediment on segment-habitat nutrient levels
4. Set interim N, P, and S targets based on 1-3 (policy decision).
5. A future WIP planning process that includes consideration of other factors that impact living resource habitat and that includes incentives to adapt to observable outcomes (stressor-response)

Habitat Suitability = F(Water Quality, Temp; Salinity; Structured Habitat; Physical Interventions)



Big Picture View: Chesapeake Bay Habitat Suitability Analysis

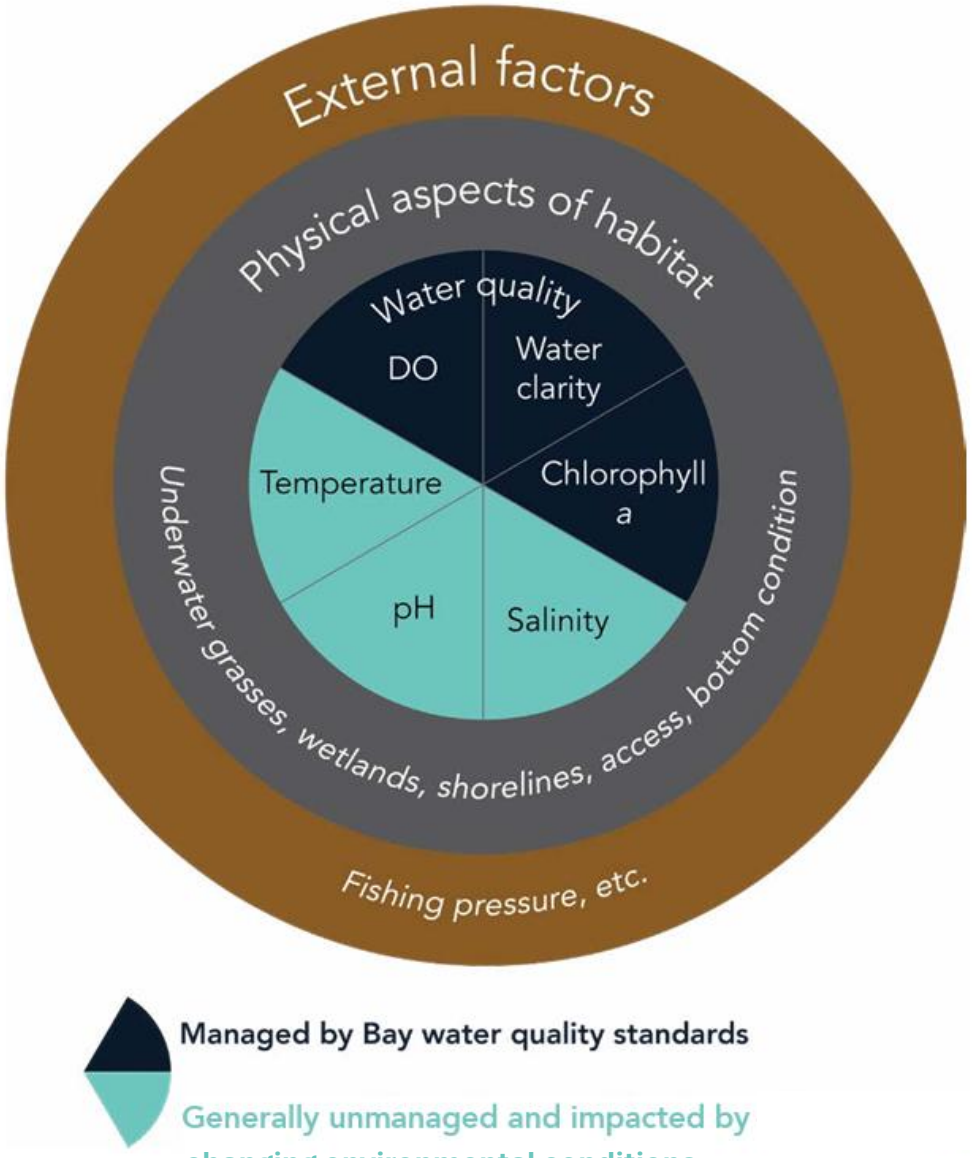
- Task meant to drive a result, not just to improve understanding
- Tie to management priority, tie to water quality and improve living resource outcomes
- Outcomes need to have the most potential for CBP partnership implementation and be feasible

- Analysis is a step to:
  1. Implement recommendations of the CESR report
  2. Identify target areas for tiered implementation/targeting
  3. First step to implementing the Fish Habitat Outcome under the revised Bay Agreement
  4. Lead to prioritization and where to invest resources
  5. Identify where landscape work impacts water quality, fish habitat, and other outcomes

Opportunity to Link

1. Water quality management decisions

2. Potential improvements in tidal living resource responses



Data Sets

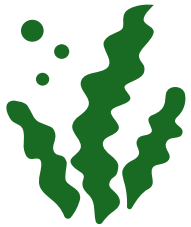
Fish Data

Juvenile Striped Bass

Bay Anchovy

Croaker

- *Note these three species provide excellent ecological coverage of the Bay*



Habitat Data

Substrate

Tidal Wetlands

SAV

Bathymetry

Oysters

Shoreline

Others

Water Quality Data

Initially from Fish Data

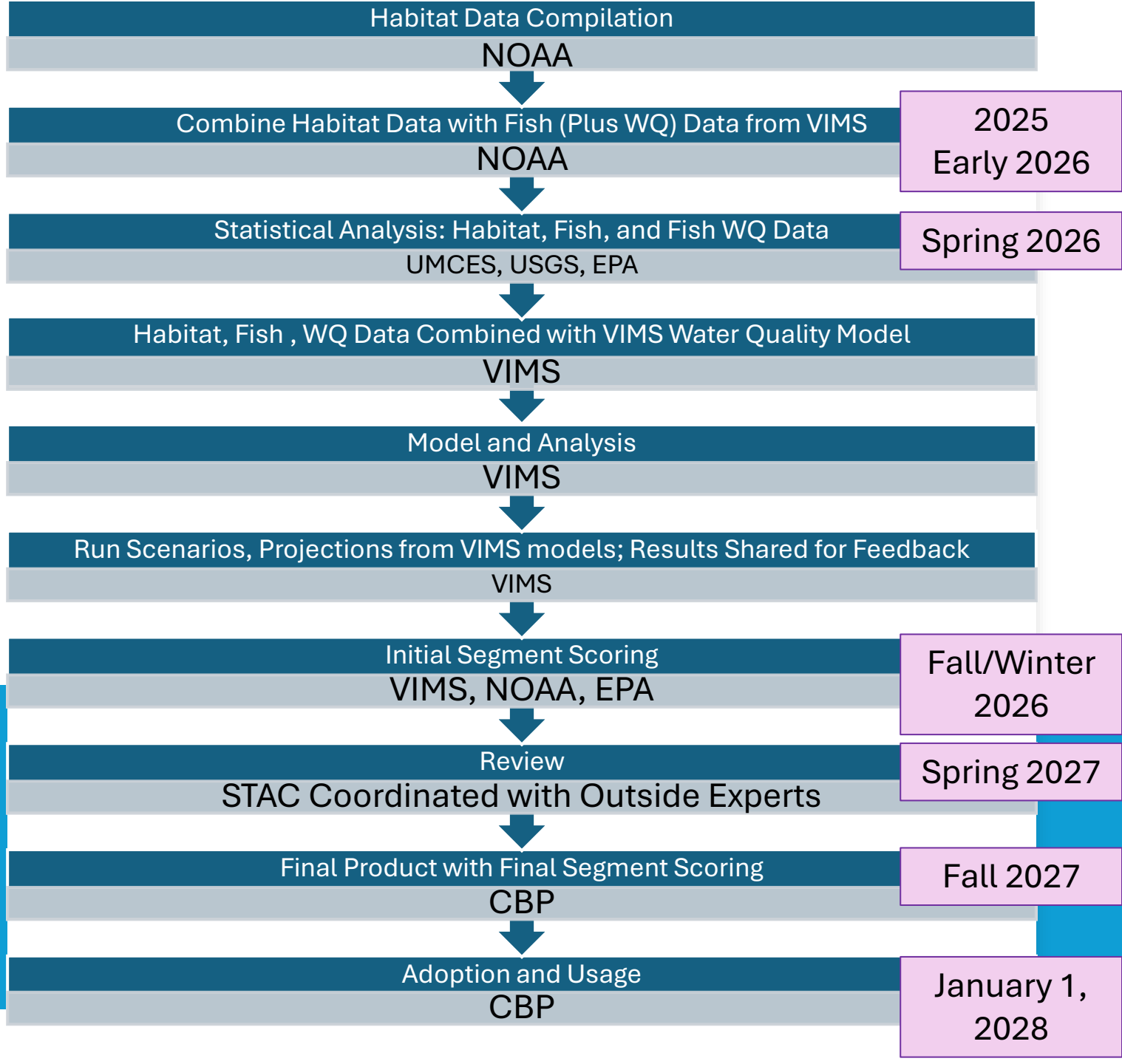
Then, VIMS model

(Later, Phase 7)

Workflow

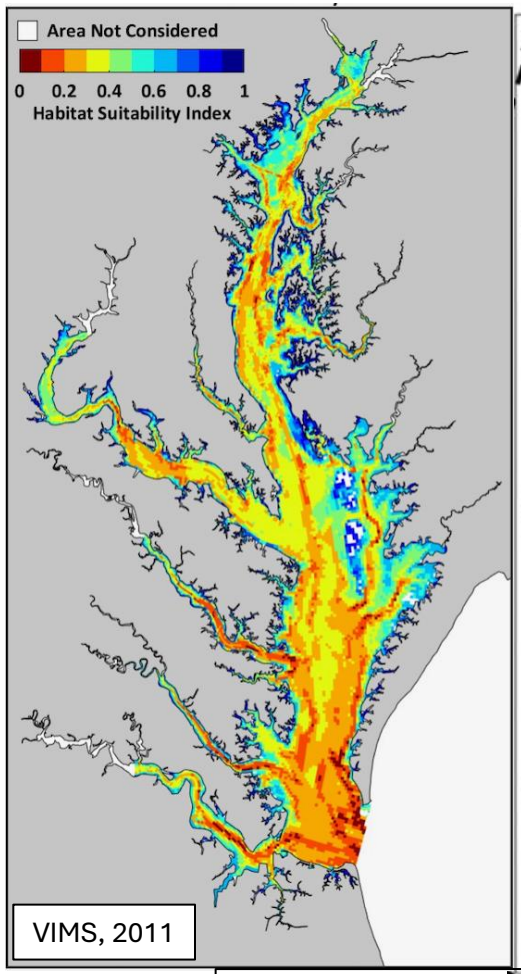
Strategic collaboration between NOAA, EPA, new Thriving Fisheries, Habitat and Wildlife Goal, WQ practitioners

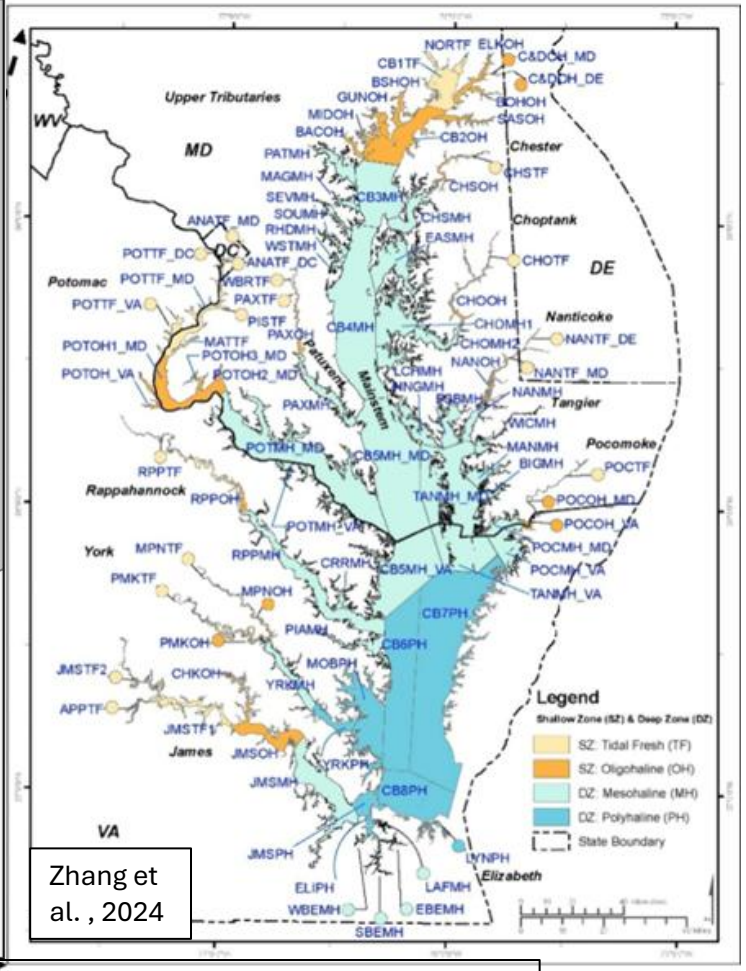
Example of project with STAC members collaborating with NOAA, EPA, VIMS, CBP



How is this going to work?

- Quantify relationships build habitat suitability index (example on left) for 92 management segments (map on right)
- Recognize we don't have fish data everywhere
- Relationships evoked where data are absent to quantify a score

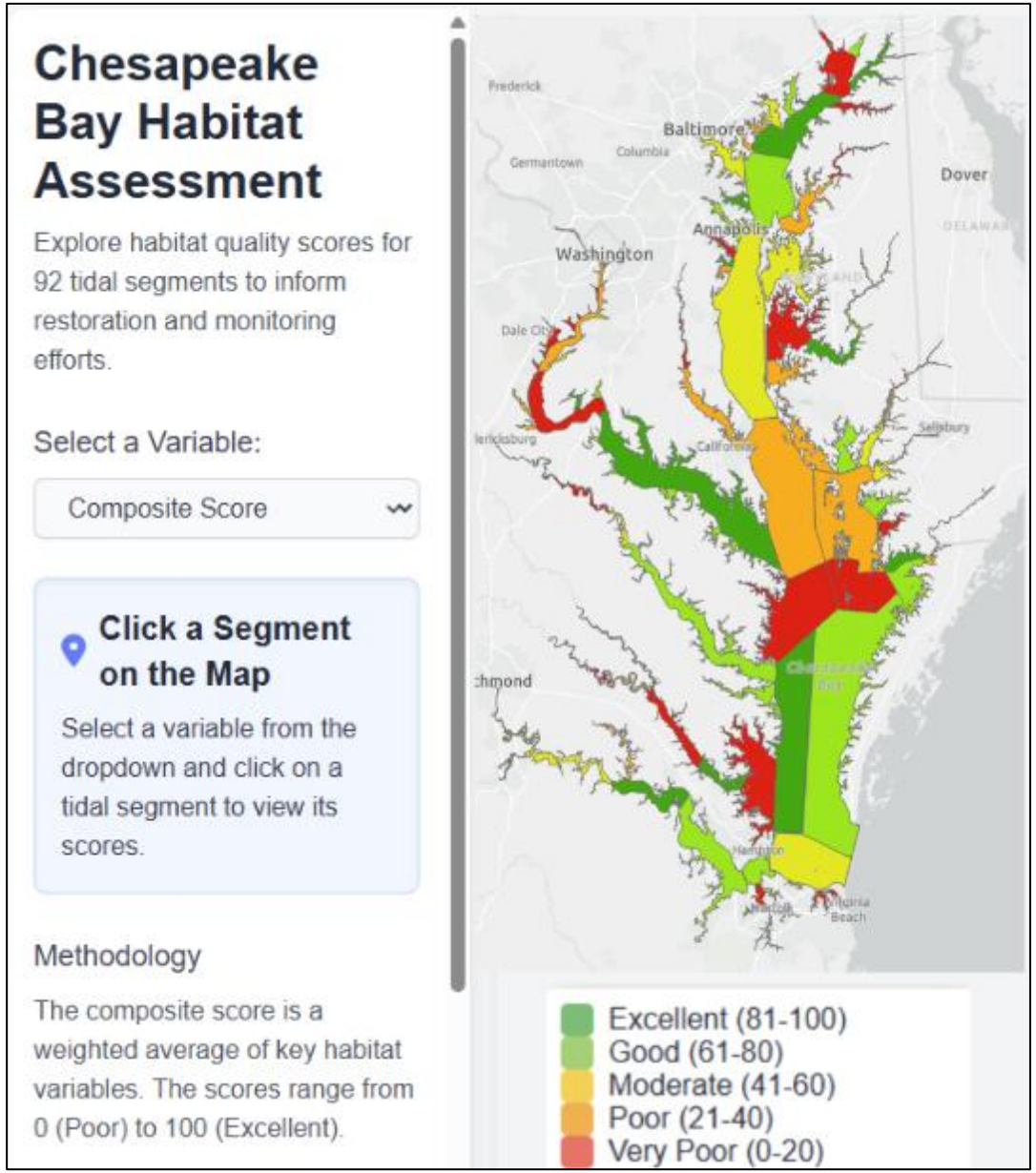




HSI based on fish, habitat, water quality data at the 92-segment scale

End Products

- Visualization of habitat assessment for each of the 92 segments
  - Potential future GIS support ask for visualization and hosting on C4 network
- Inform targeting needs to
  - *Implement tiered implementation*
  - Prioritize areas for habitat restoration
- Repeated at future intervals with updated data



**Note, this graphic shows an example of what a visualization might look like and includes made-up data for the mockup.*


(Will Parson/Chesapeake Bay Program with aerial support by Southwings)

Thank You!

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