Chesapeake Bay Program
Science. Restoration. Partnership.

Foundations for Tiered Implementation

January 26, 2026

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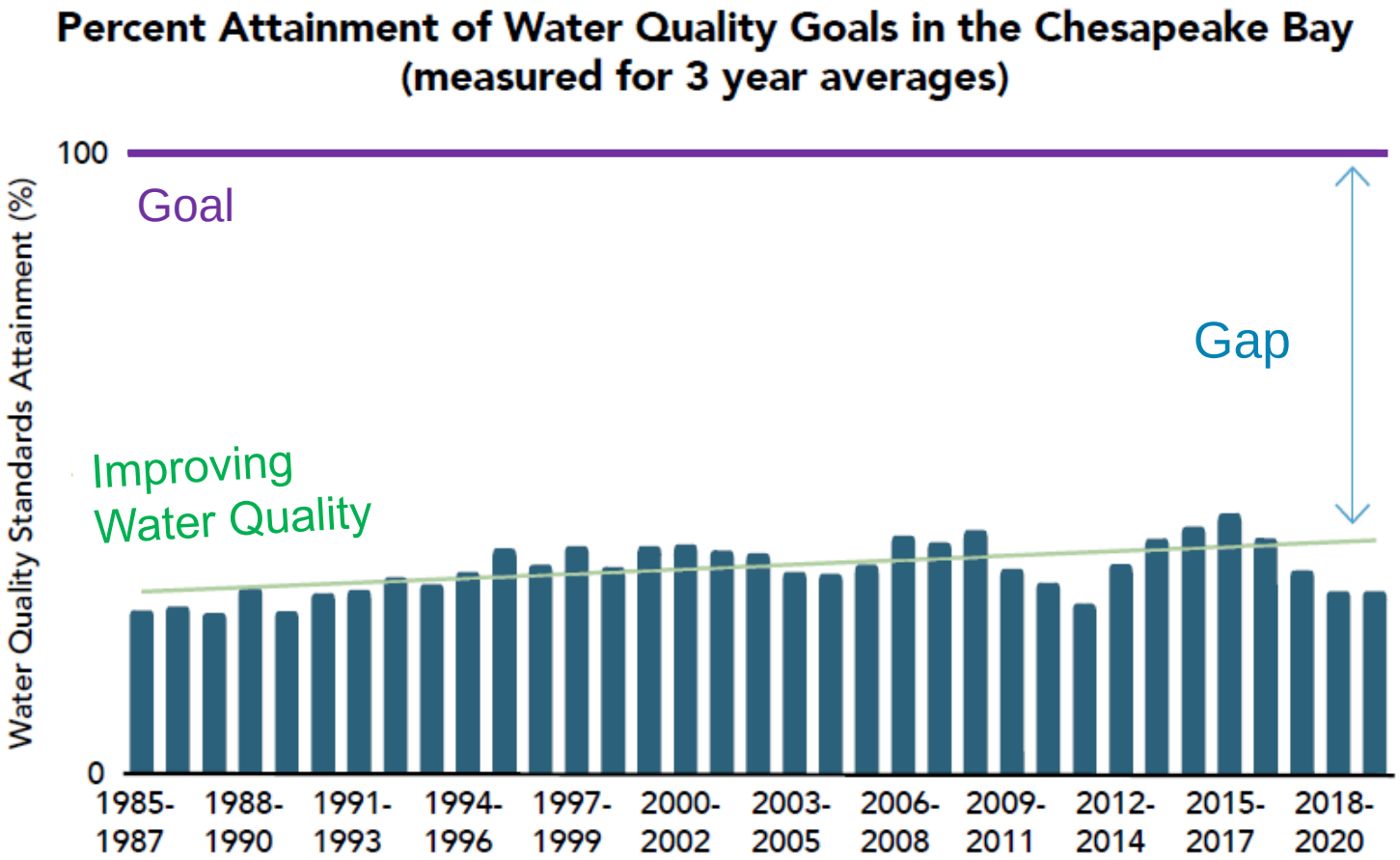
Bruce Vogt, NOAA

WQGIT

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

Chesapeake Bay Water Quality Goals

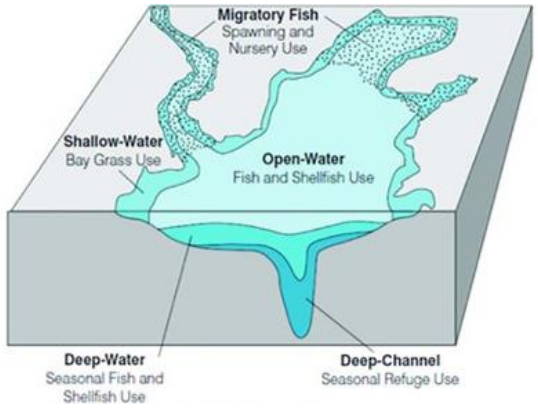
Water Quality Goal → **Measurement of the Goal** → **Achieving the Goal**

Protect aquatic living resources

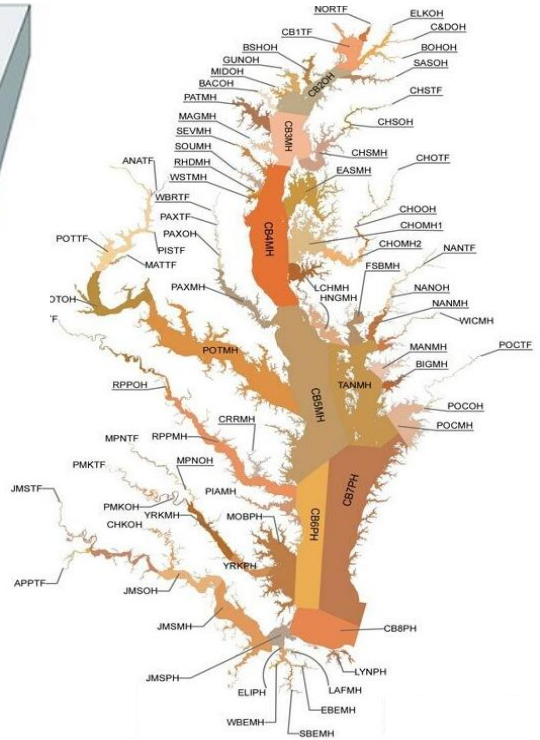
Numeric Criteria

Dissolved Oxygen
Water Clarity/SAV
Chlorophyll a

Across 5 habitats



in 92 Segments



TMDL

N, P, sediment targets to meet goal

↑

Pollutant Control Programs

↑

Accountability

K. Stephenson et al., AGU, 2024

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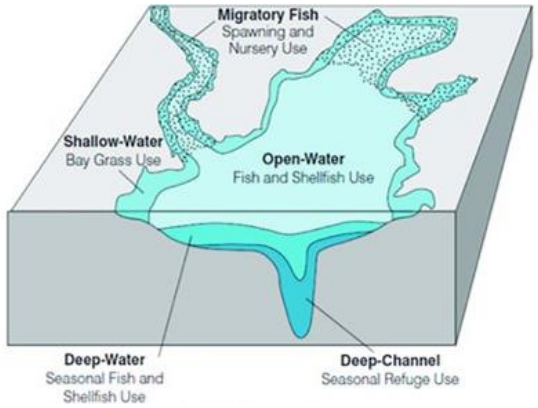
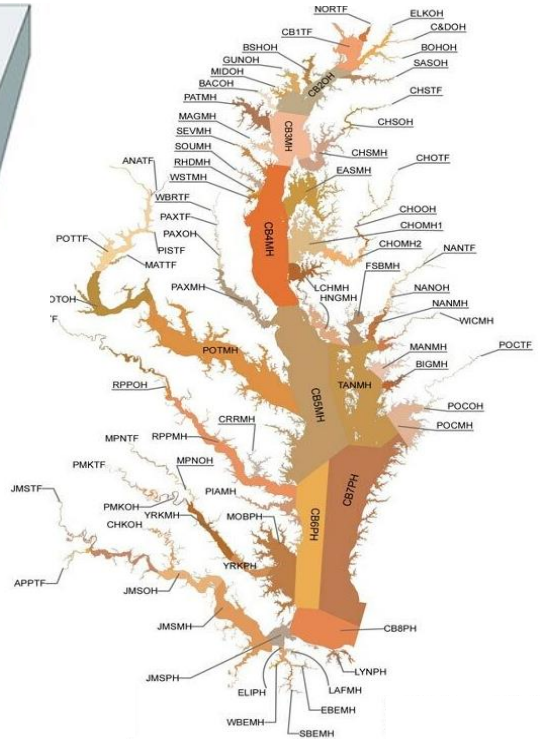


in 92 Segments



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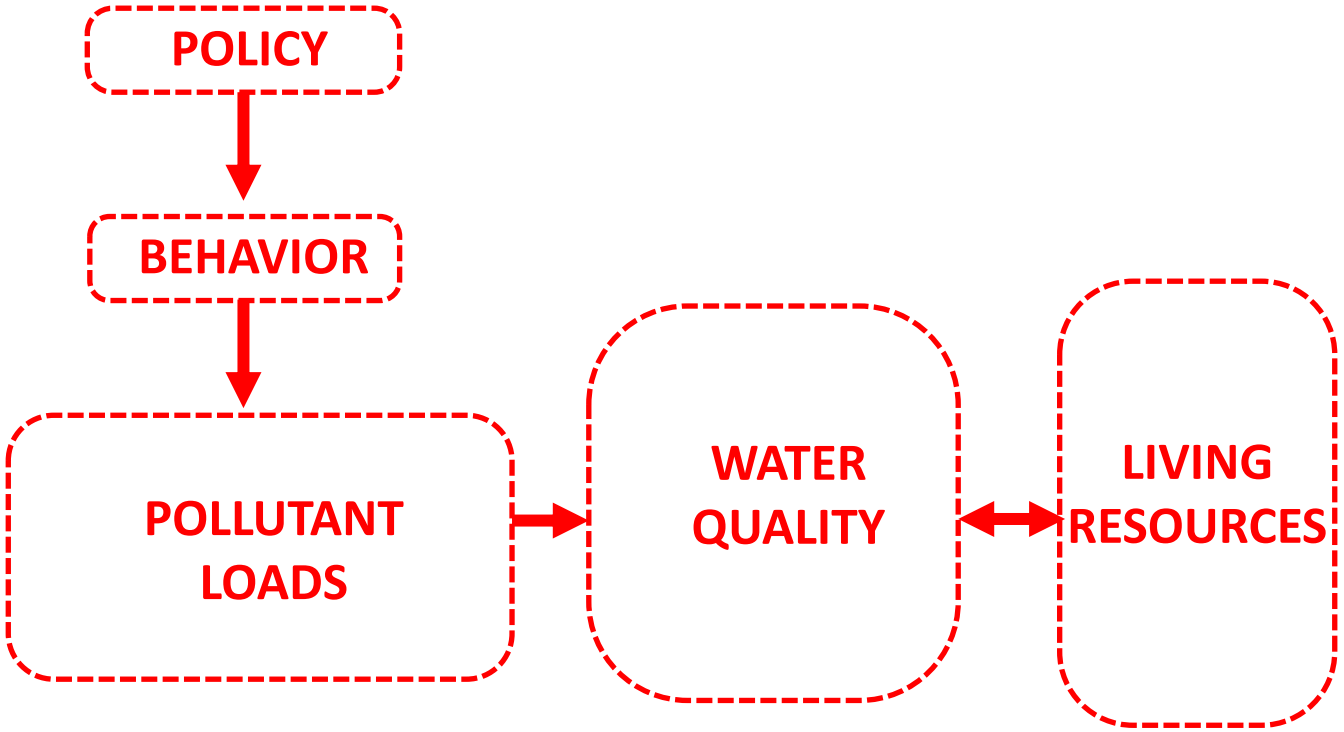
CESR Approach



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

CESR Findings: Living Resources

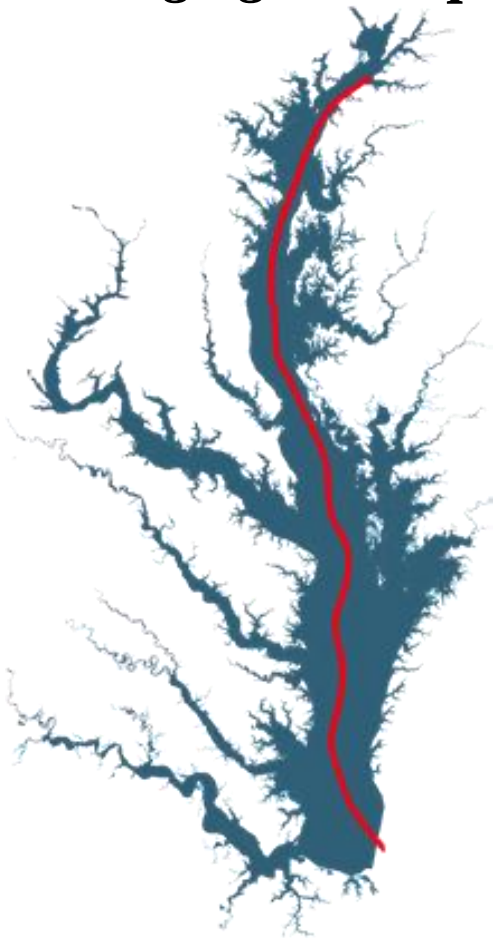
-Maryland Sea Grant

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

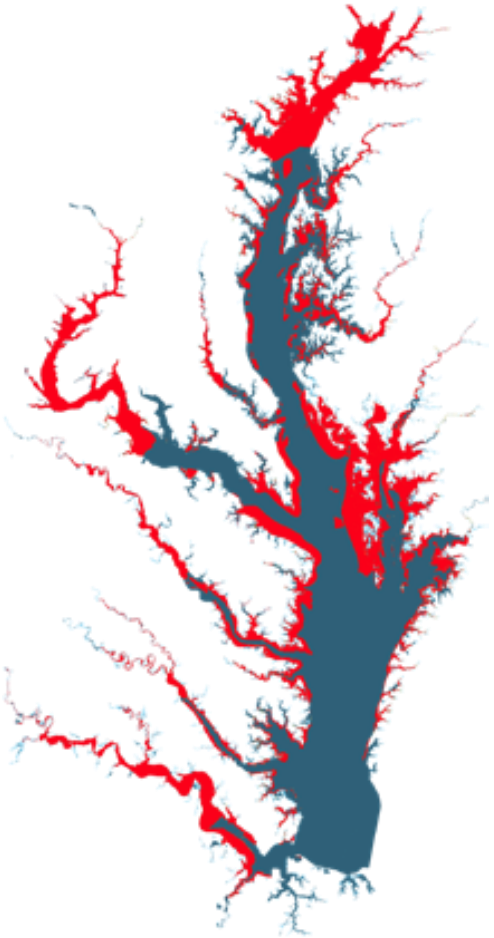
-CESR (p. viii)

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

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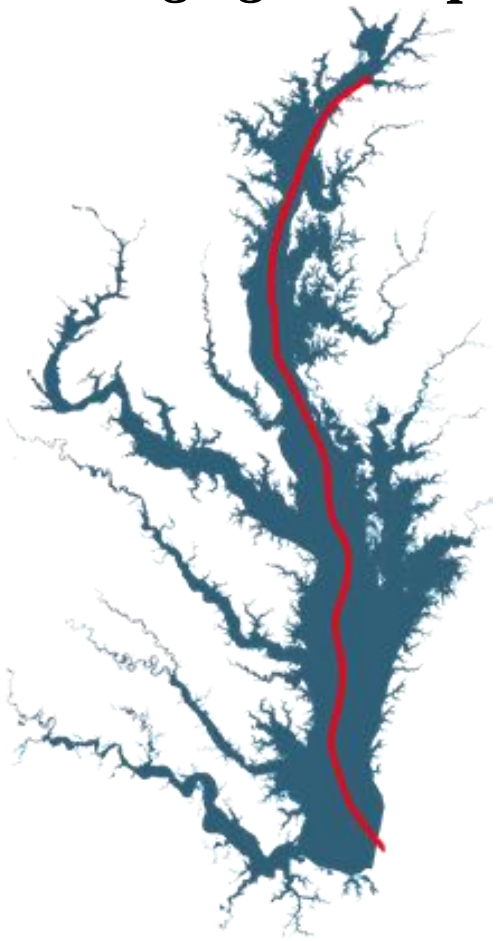

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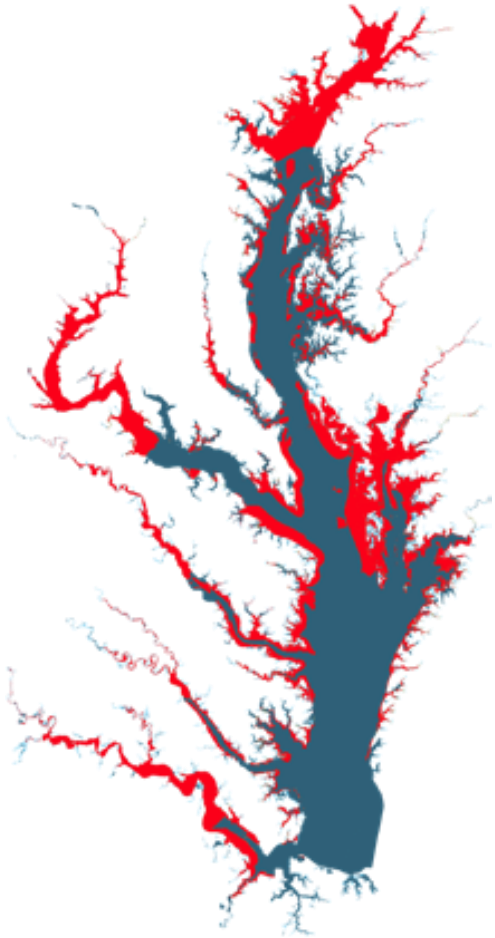
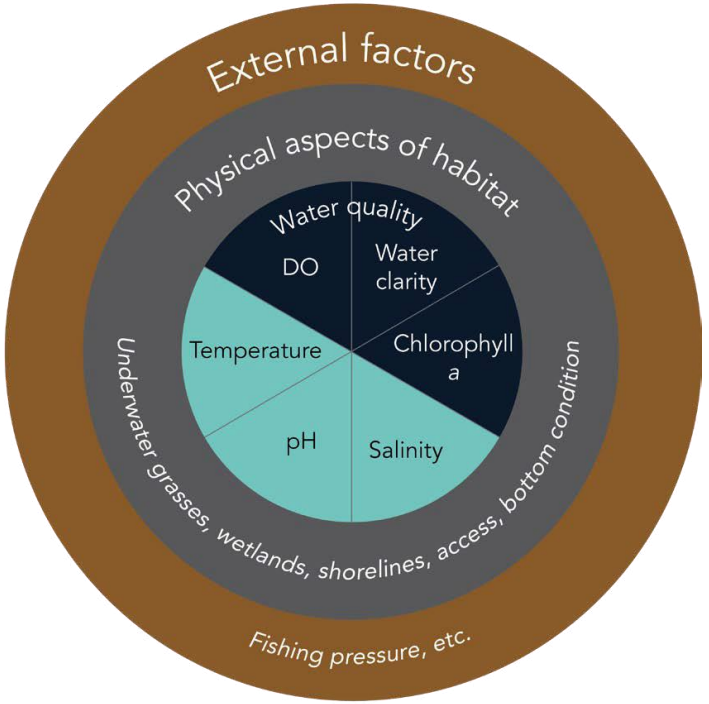


Living resource habitat factors that matter



K. Stephenson et al., AGU, 2024

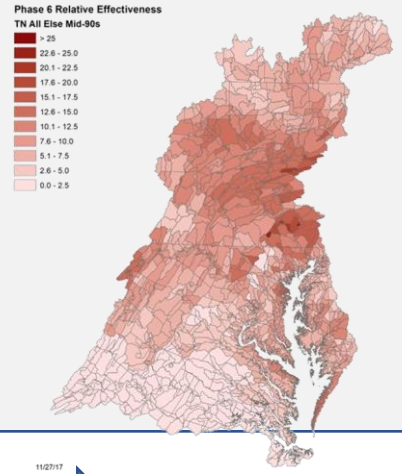
Guidelines for Planning Targets with the Default Approach

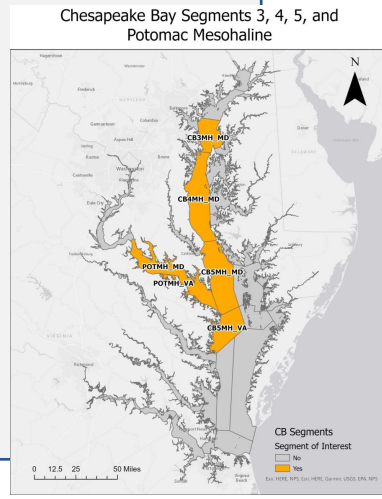
Everything
Everywhere
Everyone

Increasing relationship between
Relative Effectiveness and Effort

Effort

Effectiveness defined as the
deep channel and deep water

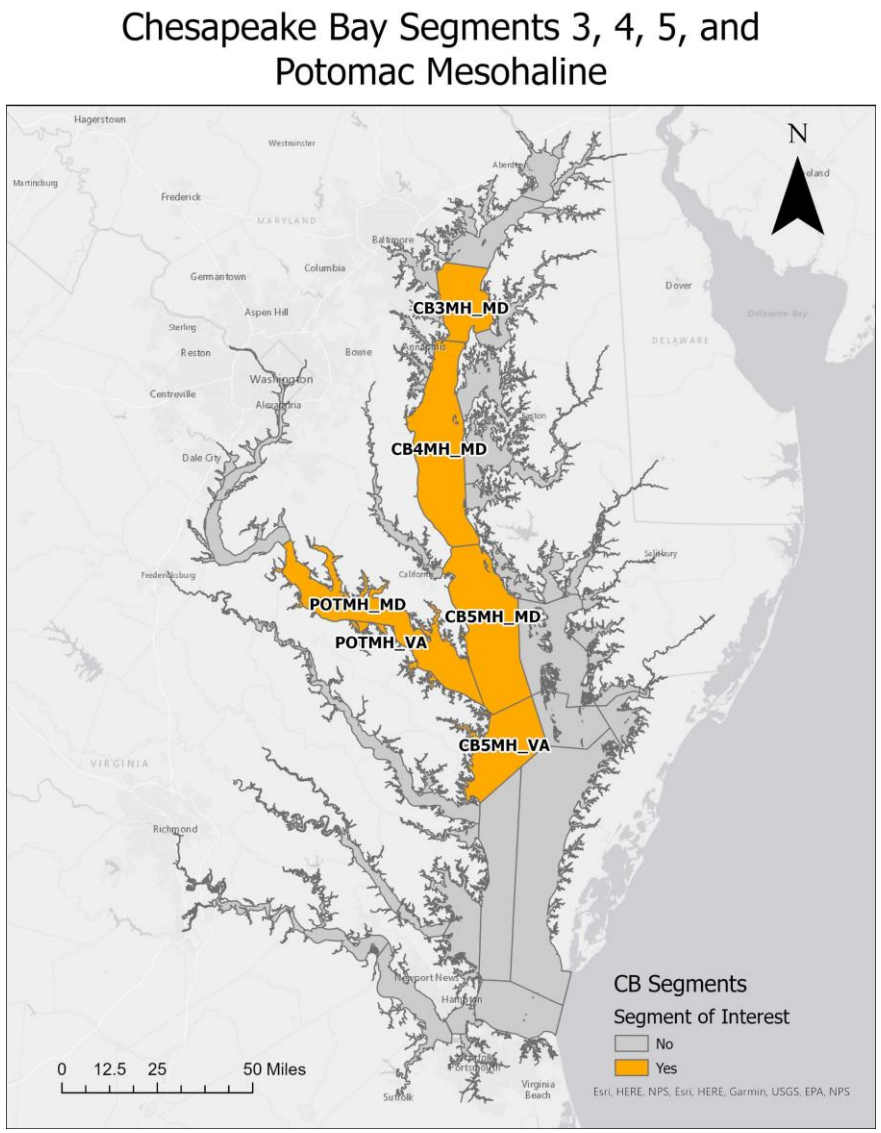


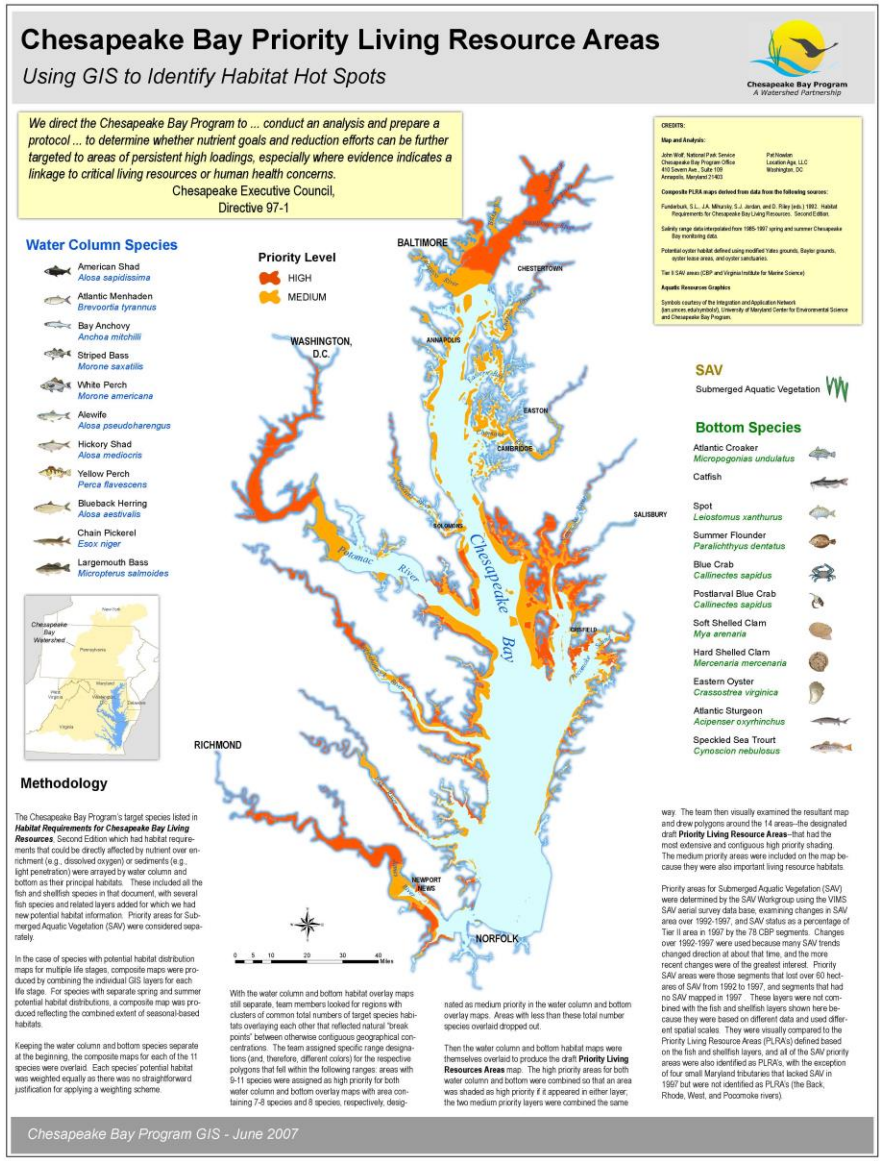


No BMPs

Effectiveness

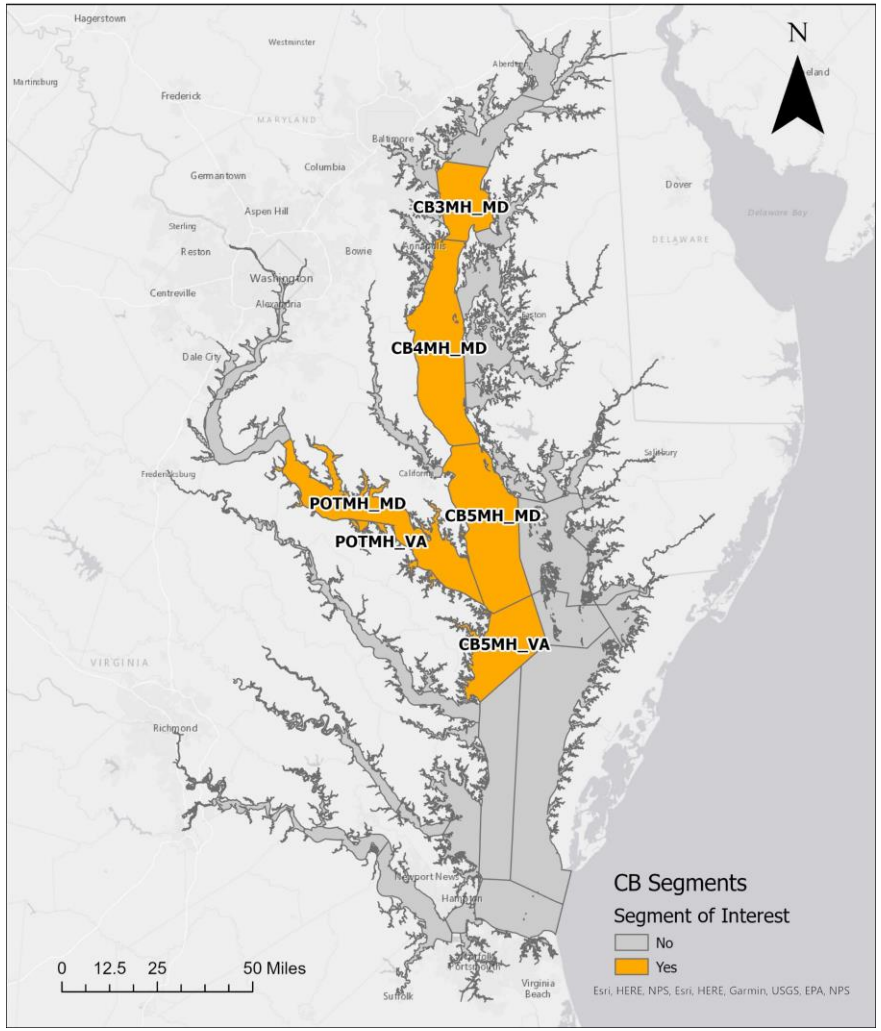
…but the middle of the bay is not the most important habitat



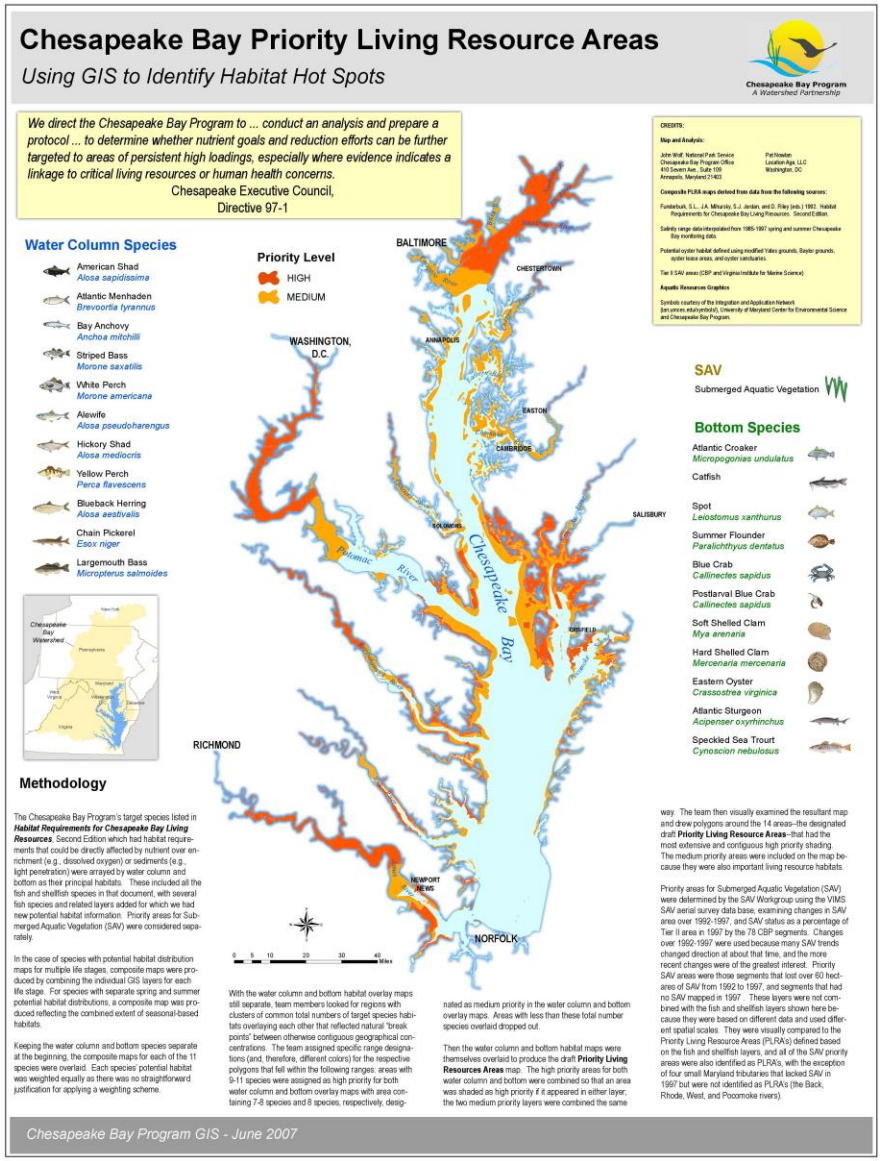


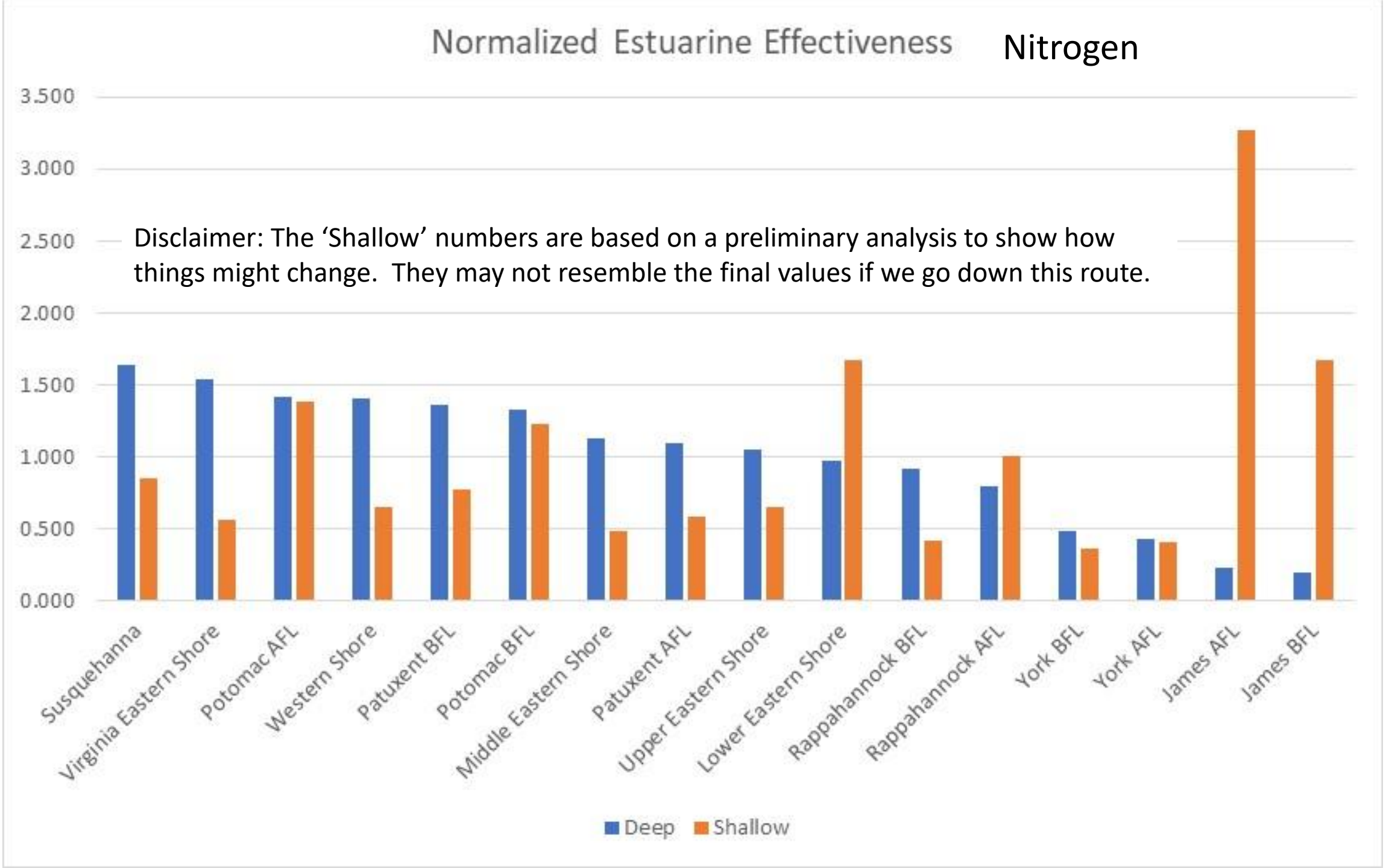
Keep the process of distributing planning targets…

Chesapeake Bay Segments 3, 4, 5, and Potomac Mesohaline

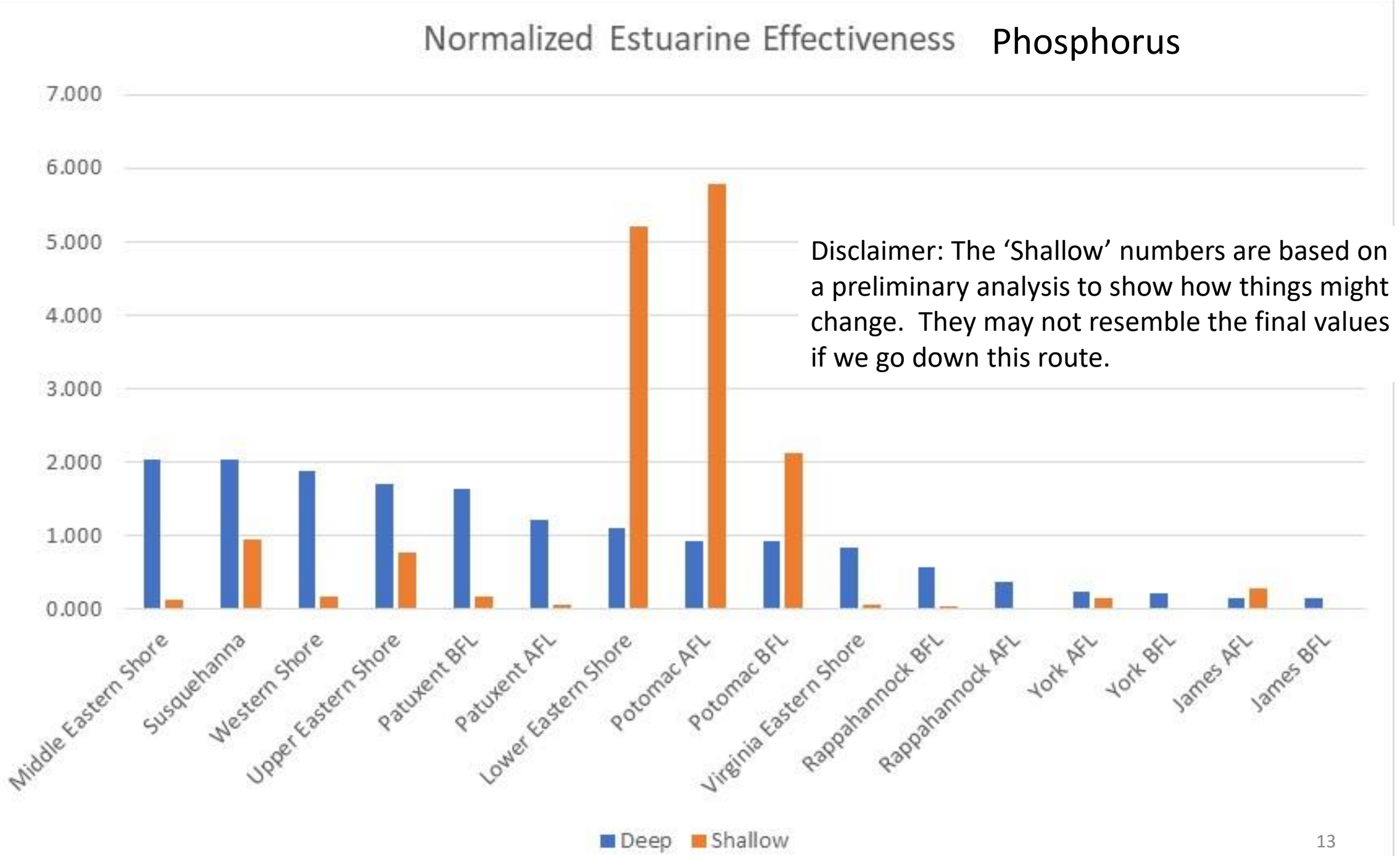


…but do the things first that affect living resources




Normalized Estuarine Effectiveness
Nitrogen
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Disclaimer: The 'Shallow' numbers are based on a preliminary analysis to show how things might change. They may not resemble the final values if we go down this route.
Susquehanna
Virginia Eastern Shore
Potomac AFL
Western Shore
Patuxent BFL
Potomac BFL
Middle Eastern Shore
Patuxent AFL
Upper Eastern Shore
Lower Eastern Shore
Rappahannock BFL
Rappahannock AFL
York BFL
York AFL
James AFL
James BFL
Deep
Shallow

Phosphorus



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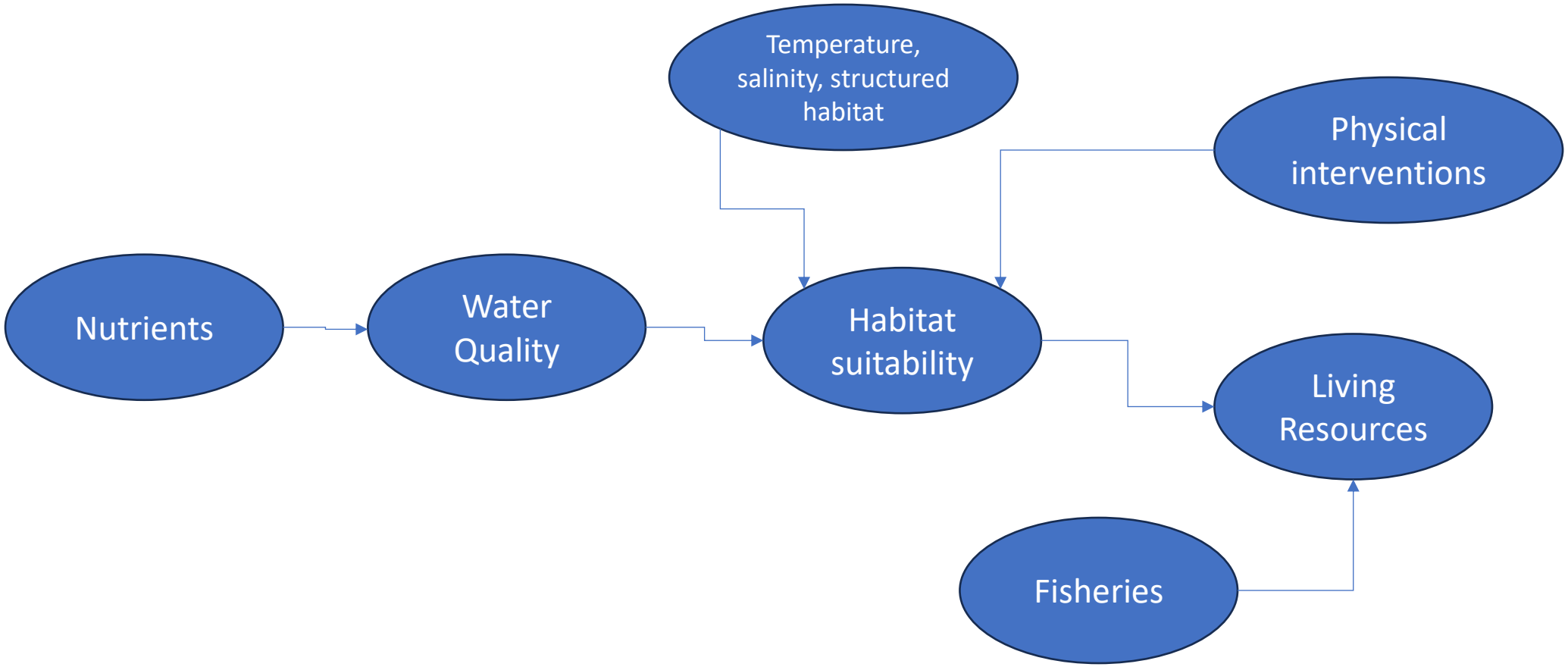
Habitat Suitability = F(Water Quality, Temp; Salinity; Structured Habitat; Physical Interventions)



Potential Overall plan

- Build 4D, MBM, MTM, Habitat suitability models

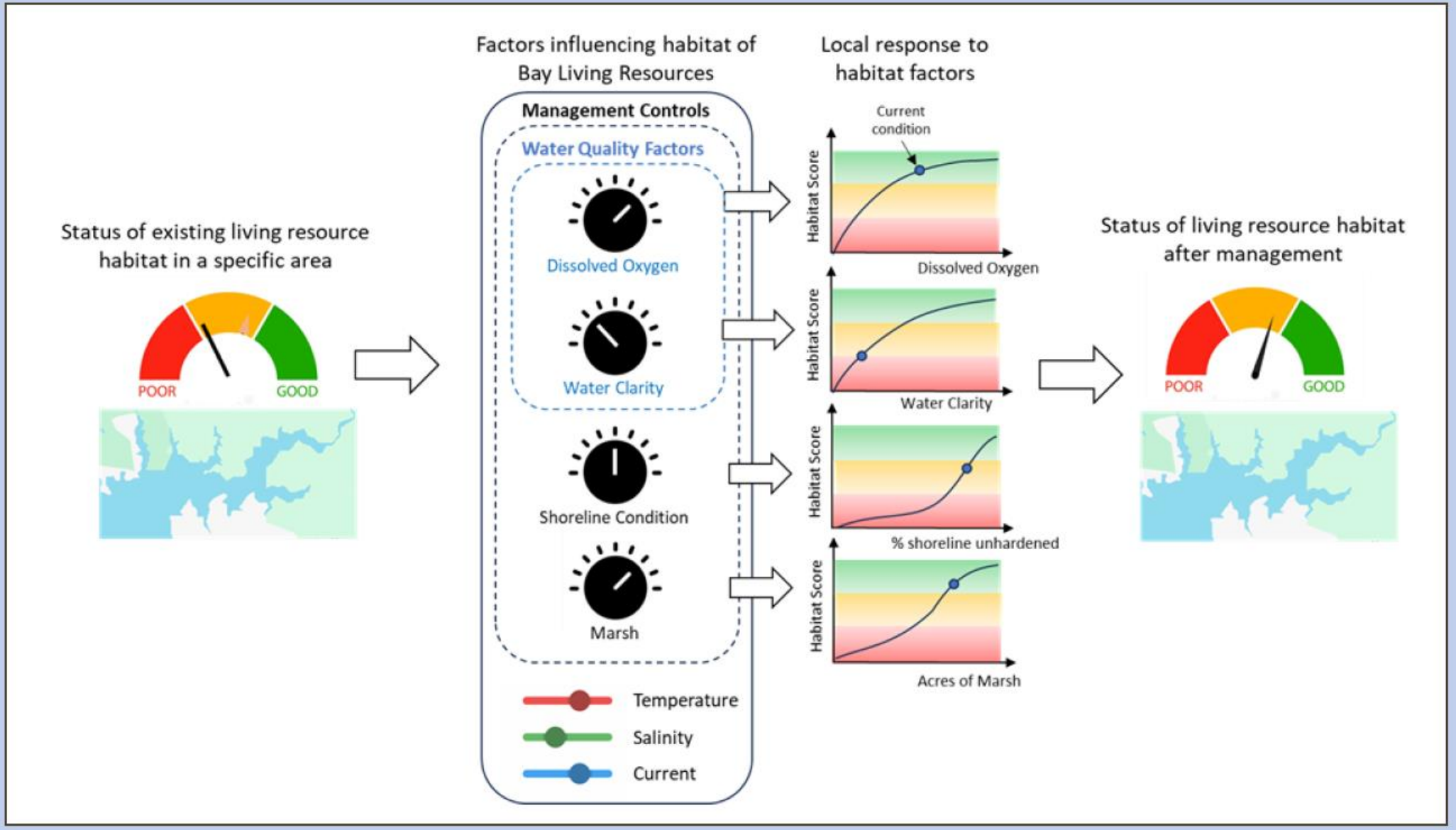
- Keep default approach as it is but prioritize in time based on LR needs (do an allocation-like exercise but use LR-relevant metrics)
  - Take care of the biggest differences first

- Develop tools that allow an organization to lookup from their Cbseg to see the best say to improve the LR
  - Numerical version of the conceptual model on the previous slide

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



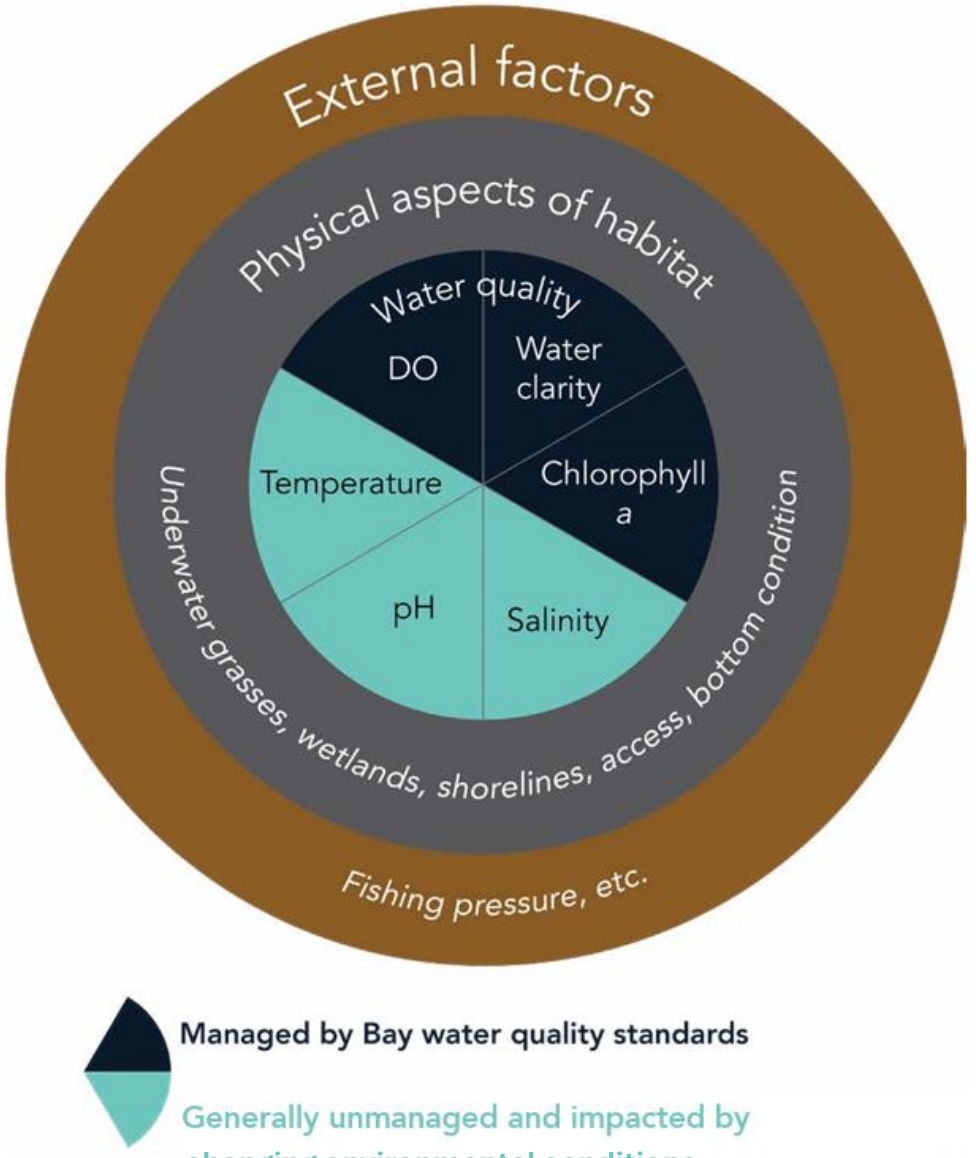
From Concept to Implementation

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)

Opportunity to Link

1. Water quality management decisions

2. Potential improvements in tidal living resource responses



Big Picture View & Motivation

- Priority Living Resource Habitat Area Identification
  - Task meant to drive a result, not just to improve understanding
  - Tie to management priority, tie to water quality and improve living resource outcomes

- Fast track to complete a habitat suitability index (HSI) for the 92 tidal segments of the Chesapeake Bay
  - This project is a priority of the CBP

- 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

Remember:

Outcomes need to have the most potential for CBP partnership implementation *and be feasible*

Ability to meet management objectives, resources required, data availability, achievable within timeline, reproducible to track changes over time, includes factors CBP can control

Objective

Determine the approach to target and track linked responses of living resources, structural habitat, and water quality while considering known constraints, including ability of approach to meet objectives at zero cost, and generate a workplan, including a timeline and who is contributing to this effort.

Project Support

Chespaeake Bay Program
- Members on the Project Oversight Committee

Scientific and Technical Advisory Committee (STAC)
- Members on the Project Analysis and Implementation Team and Prjoect Oversight Committee
- Members coordinate external review

Virginia Institute of Marine Science (VIMS)
- Project Analysis and Implementation Team
- Disseration Committee will review Colin's work

Chesapeake Research Consortium (CRC)
- Coordinate the merit review
- Help with communications
- Coordinate the hybrid meeting of the do-ers (October or November 2025)
- Technical editing of merit review
- Potential infographics support via Greenfin

Chesapeake Bay Program Data Center
- As needed consult

Chesapeake Bay Program Geospatial Analysis Team (GSAT)
- Public facing viewer/tool
- Potential Plan B doers

Chesapeake Bay Program Communications Team
- Develop communication pieces, webinars

- Additional analysis support from NOAA NCCOS and Chesapeake Bay Trust Chesapeake Conservation and Climate Corps

Additional Thoughts On This Work

CBP

Tiered Implementation talks starting across the partnership

Also, other uses of this information

- Collaboration and cooperation across goals and outcomes
- Ties outcomes together in one dataset

Keeping this team up to date as we go

First time NOAA and Fish GIT have direct connection to EPA WQ folks

Meets multiple needs

Novel effort for the CBP

- Builds off the CESR idea

Example of project with STAC members very collaborative with NOAA, EPA, VIMS, CBP

Only example or example in recent memory of this type of collaboration

Room for future collaborations with these groups?

Future

At some point, codify where this work lives under new structure/governance

Fold linked living resources and water quality into new way we work

Fish habitat team is a prime place to do this

Briefing/conversation/starting point for STAR

Work is starting point for other assessment

Data Sets

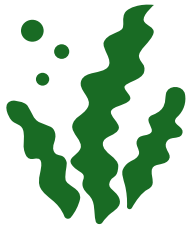
Fish Data

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

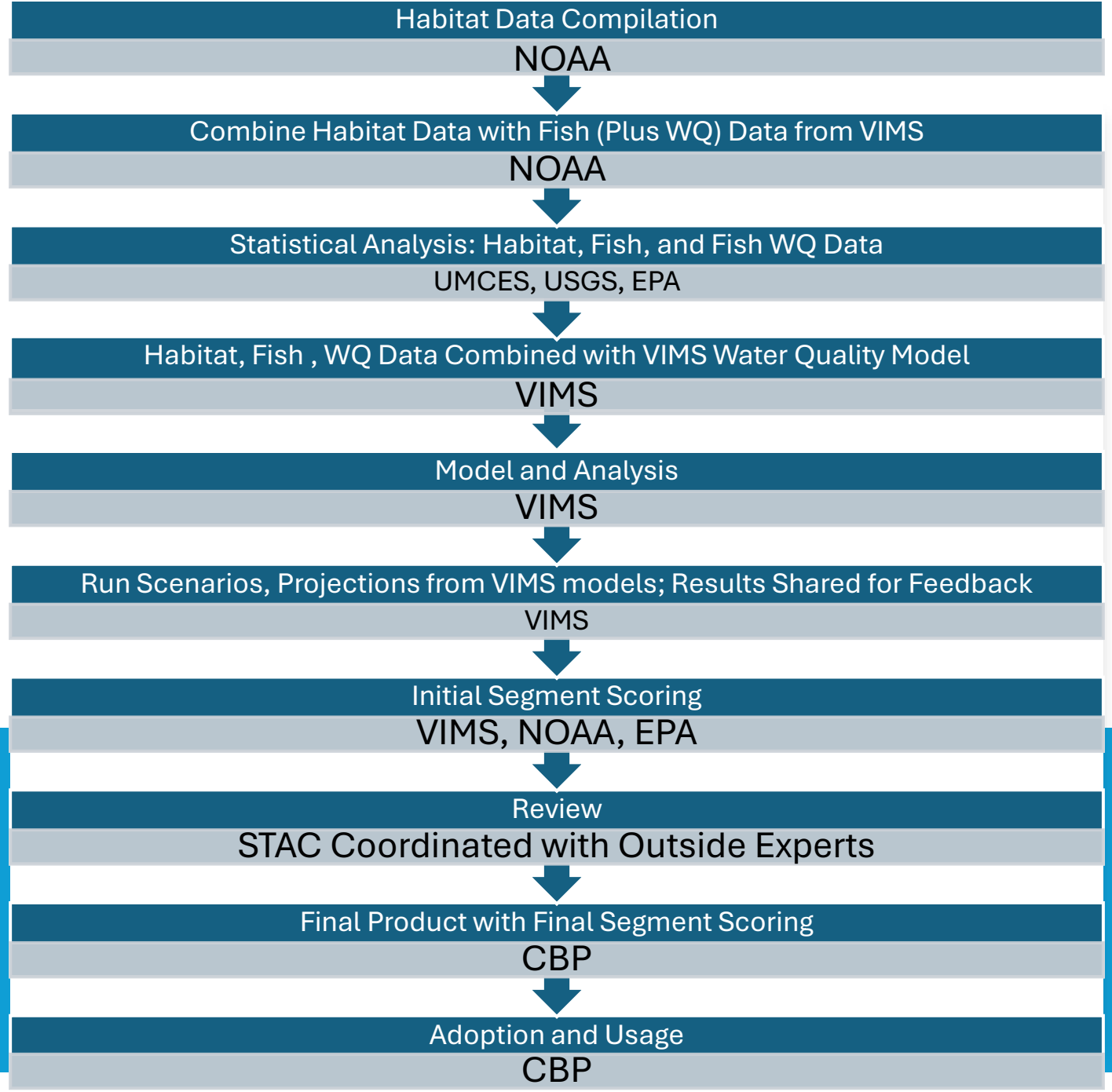
Water Quality Data

Initially from Fish Data

Then, VIMS model

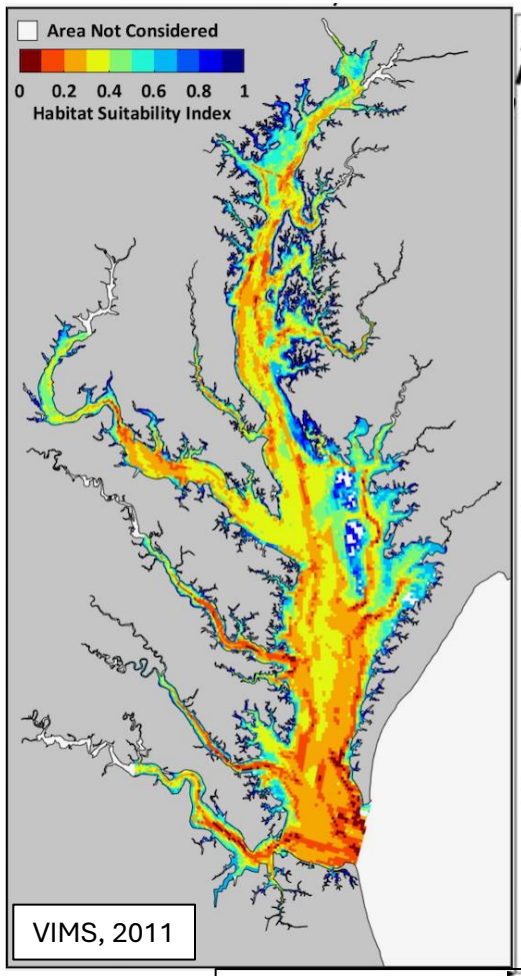
(Later, Phase 7)

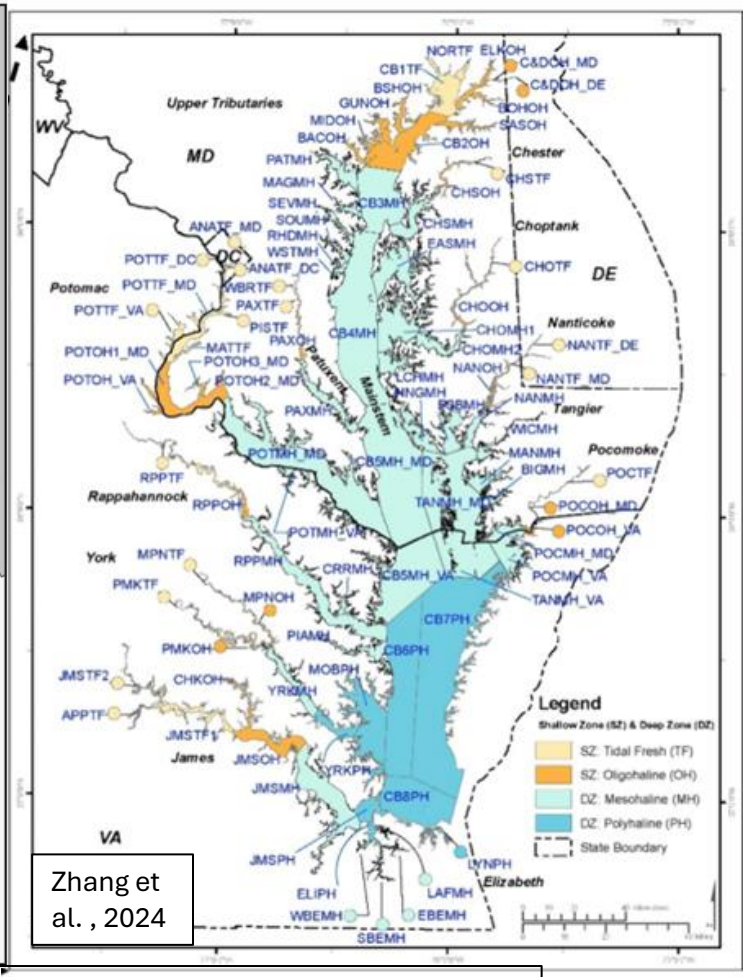
Workflow


Habitat Data Compilation
NOAA
Combine Habitat Data with Fish (Plus WQ) Data from VIMS
NOAA
Statistical Analysis: Habitat, Fish, and Fish WQ Data
UMCES, USGS, EPA
Habitat, Fish , WQ Data Combined with VIMS Water Quality Model
VIMS
Model and Analysis
VIMS
Run Scenarios, Projections from VIMS models; Results Shared for Feedback
VIMS
Initial Segment Scoring
VIMS, NOAA, EPA
Review
STAC Coordinated with Outside Experts
Final Product with Final Segment Scoring
CBP
Adoption and Usage
CBP

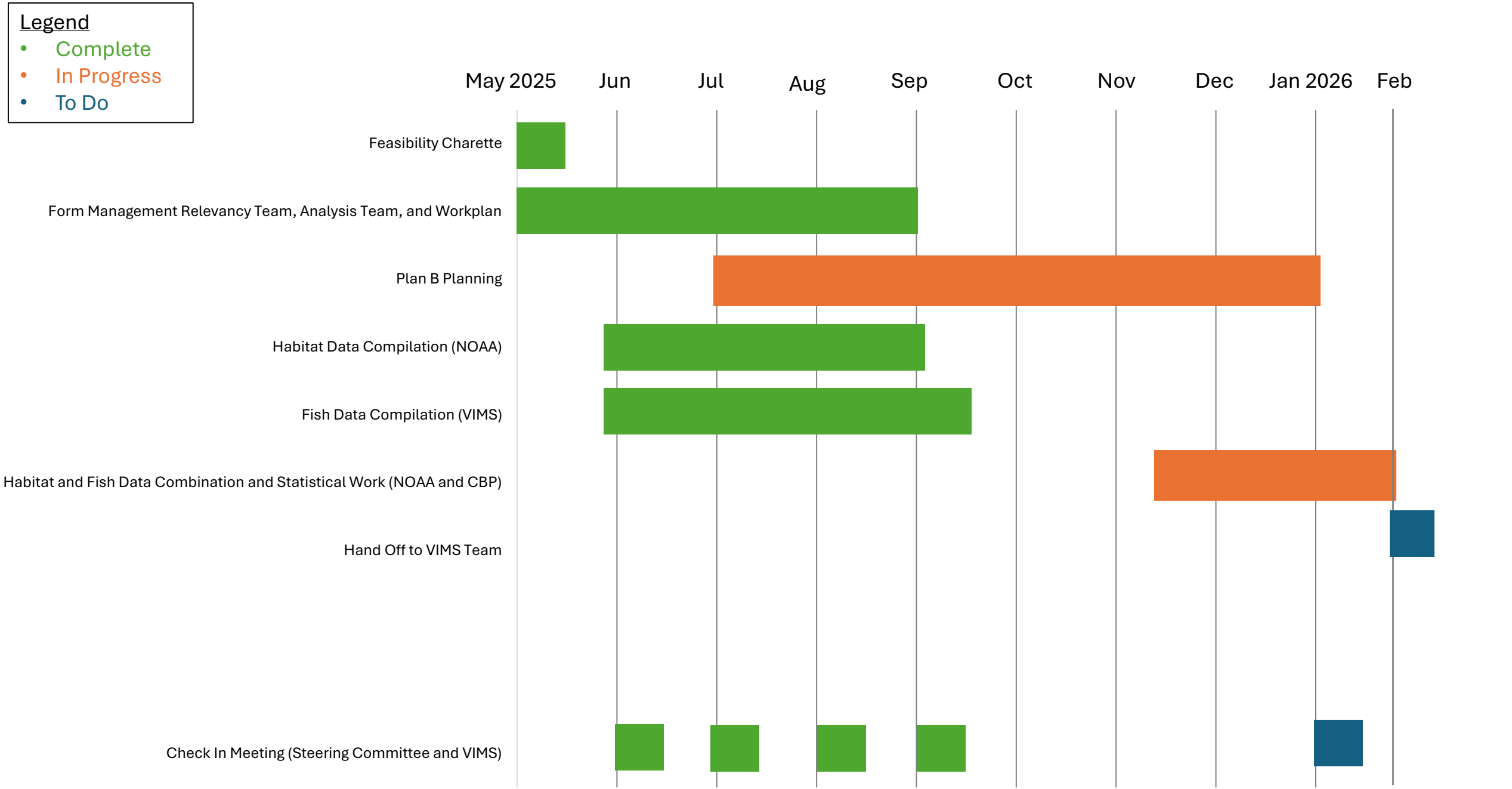
How is this going to work?

- Looking for relationships for habitat and fish data to build habitat suitability index (HSI, example on the left) for all 92 segments (map on the right)
- Recognize we don't have fish data everywhere
- Relationships evoked where data are absent, we will have the score

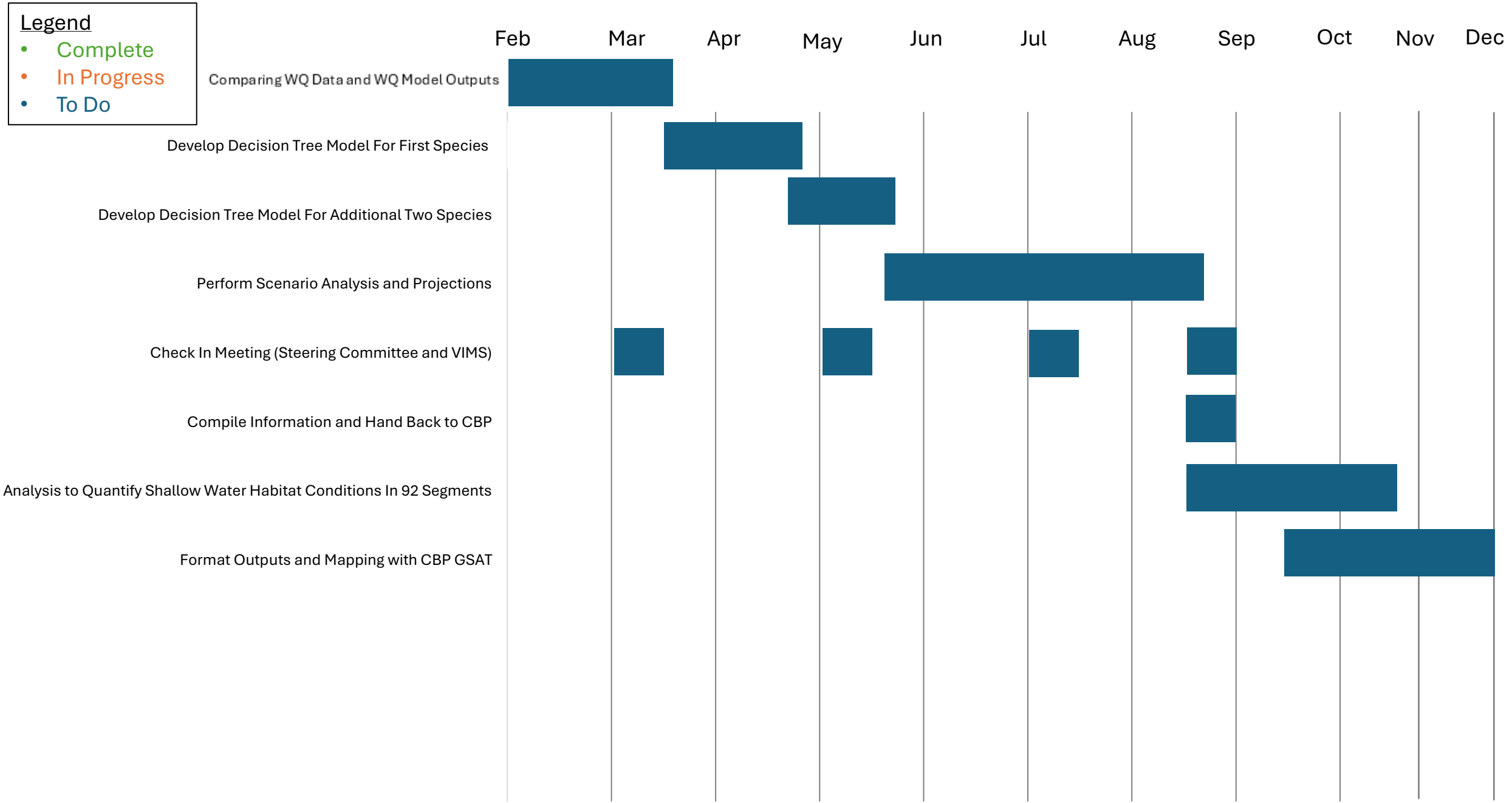




HSI based on fish, habitat, water quality data at the 92-segment scale

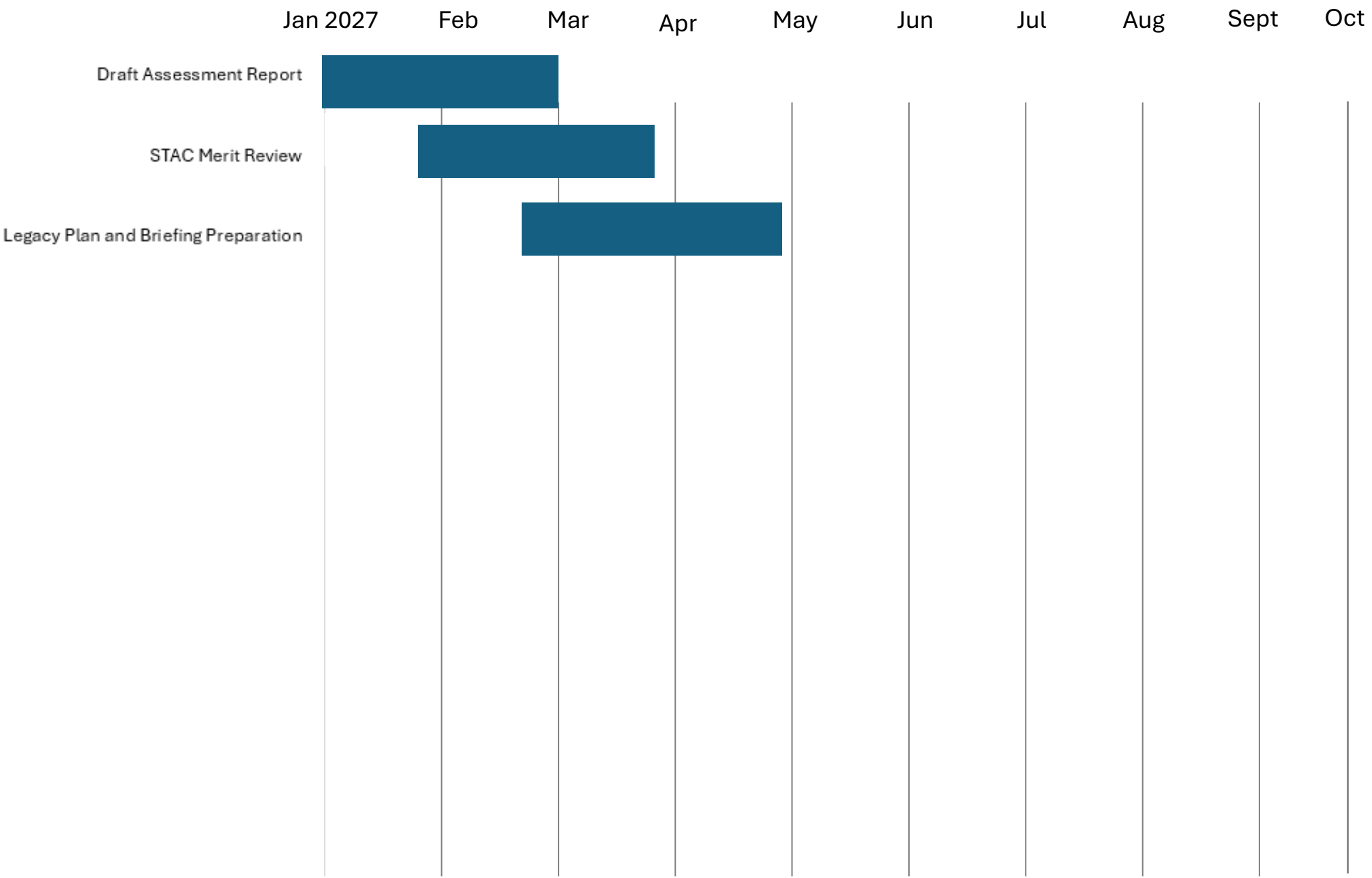


Updated in January 2026



Updated in January 2026

Legend
- Complete
- In Progress
- To Do



Updated in January 2026

Parallel Path

We are hopeful that this approach to score 92 tidal segments will work

- Uncertainty with it working with the fish data, as there will be many places with zeros/no data/no fish information

However, we must meet our objective

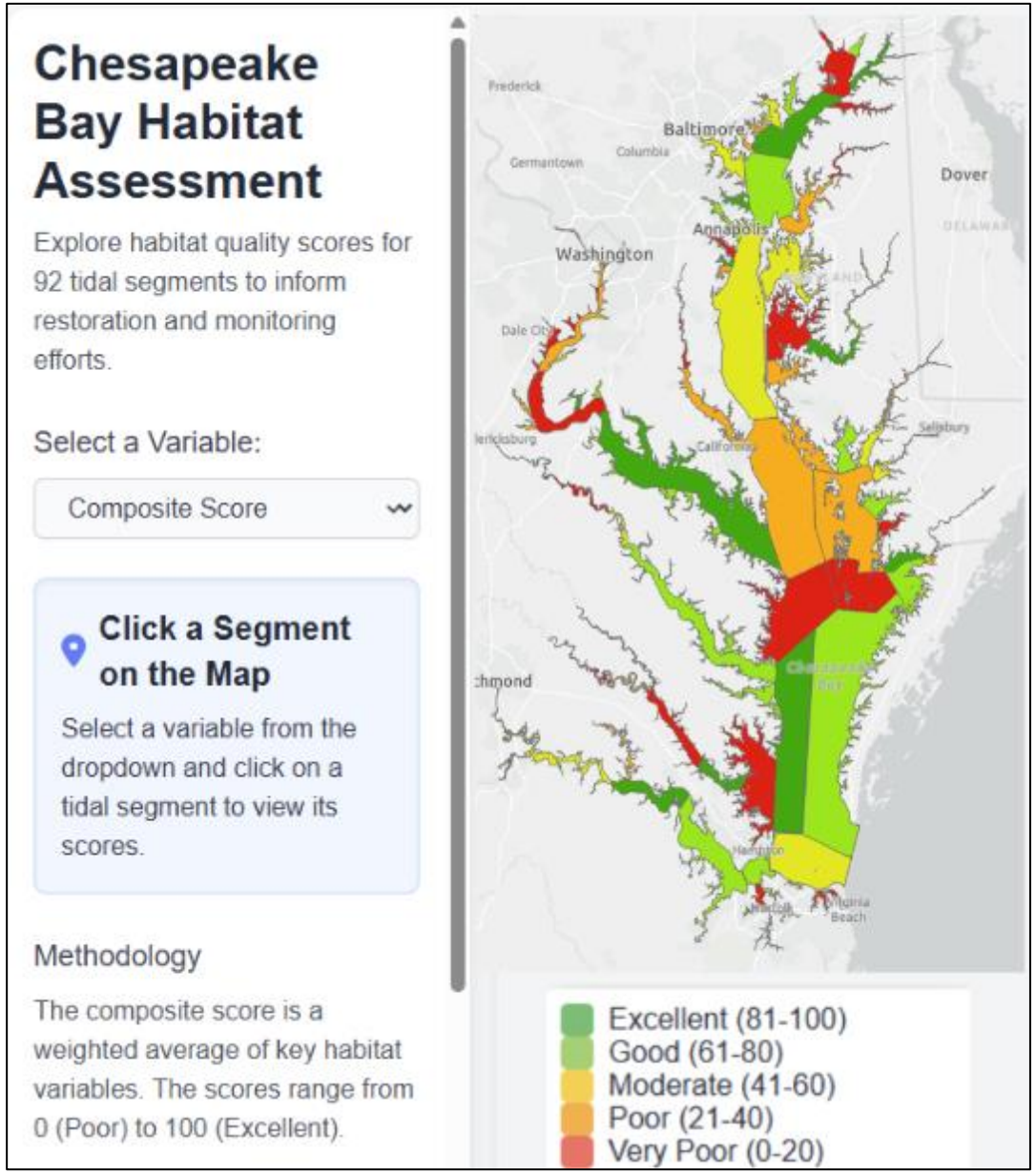
- Objective: places to focus on for tiered targeting

Plan for Parallel Path

- Segment scoring based on habitat requirements, underscored by NOAA datasets
- Derived from geospatial habitat requirements and water quality data
- Composite score based on criteria weighting
- Provides a common, transparent, and scientifically-backed framework that allows all partners to work from a shared understanding of the Bay's healh

Potential End Product

- 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 targeting*
  - 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!

Dr. Kaylyn S. Gootman
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