PLANNING TARGETS & TIERED IMPLEMENTATION

CLEAN WATER GOAL TEAM IN-PERSON MEETING

JUNE 22, 2026

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Reducing Excess Nitrogen, Phosphorus & Sediment (RENPS)

Target #2

Implement and maintain practices and controls to reduce nitrogen, phosphorus and sediment. These reductions are necessary to achieve the applicable water quality standards, as described in the Bay TMDL. Those water quality standards support living resources and protect human health, as required by the Clean Water Act.

- Through 2030, signatories will continue to accelerate completion of all interim water quality planning targets through implementation of Chesapeake Bay Watershed Implementation Plans, two-year milestone commitments and other innovative strategies to achieve and maintain reduced levels of nitrogen, phosphorus and sediment.

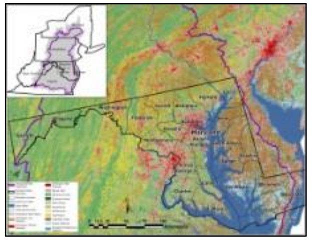
- By December 31, 2030, revise the planning targets approved by the Principals’ Staff Committee for nitrogen, phosphorus and sediment, incorporating the latest watershed modeling, monitoring data and research findings, and develop new or amended Watershed Implementation Plans to meet the updated targets by 2040.

- Demonstrate net reductions in nitrogen, phosphorus and sediment through multiple lines of evidence, including modeling and monitoring data.

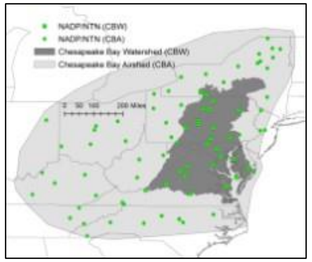
The Chesapeake Bay Program (CBP) Model Suite – How CBP Makes a Plan

Data and Model Inputs

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



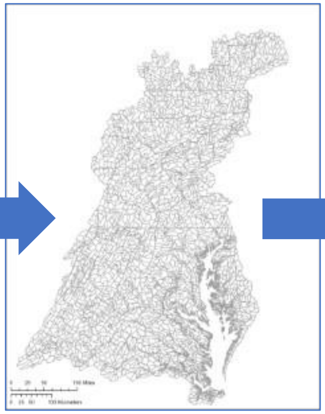
Land Use Change Model



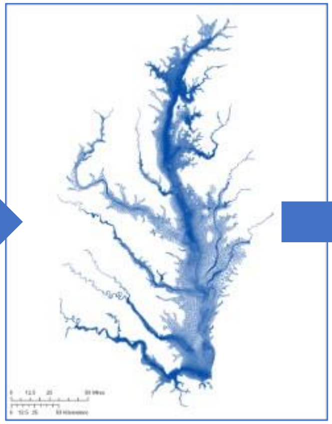
Airshed Model

Precipitation Data
Meteorological Data
Elevation Data
Soil Data

Phase 7 Watershed Model/CAST



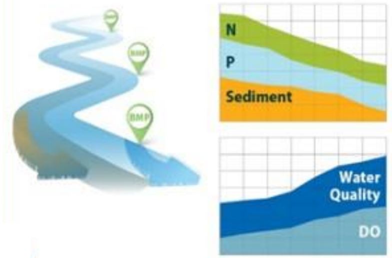
Estuary Model



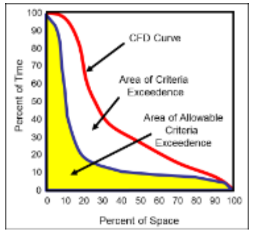
Model Outputs

Prediction of Impacts

BMP Implementation Results



Criteria Assessment Procedures



Nutrient and sediment targets for CBP state and Federal partnership

Effects →

← Targets

WE HAVE MADE PROGRESS

Pollutant	Total Simulated Load - 2009 (million lbs/year)	Total Simulated Load - 2024 (million lbs/year)	Interim Target (with CEC)	Completion of Interim Target
Nitrogen	297.13	251.64	219.55	59%
Phosphorus	16.75	13.09	12.78	92%
Sediment	18,830	17,390	18,587	>100%

Pollutant	Agriculture Sector Contributions to Load Reduction Since 2009 (million lbs/year)	Developed Sector Contributions to Load Reduction Since 2009 (million lbs/year)
Nitrogen	5.66	-1.0M
Phosphorus	0.66	0.33
Sediment	631.77	20

Where reductions were achieved and where they are planned

2009-2024 N reductions by sector

- Wastewater: 81%, 28.9M lbs/y, **1.927 lbs/y**
- Developed: 0%, -**1.0M lbs/y,**
- Agriculture: 16%, 5.66M lbs/y, **400k lbs/y**
- Natural: 3%, **1.0M lbs/y**

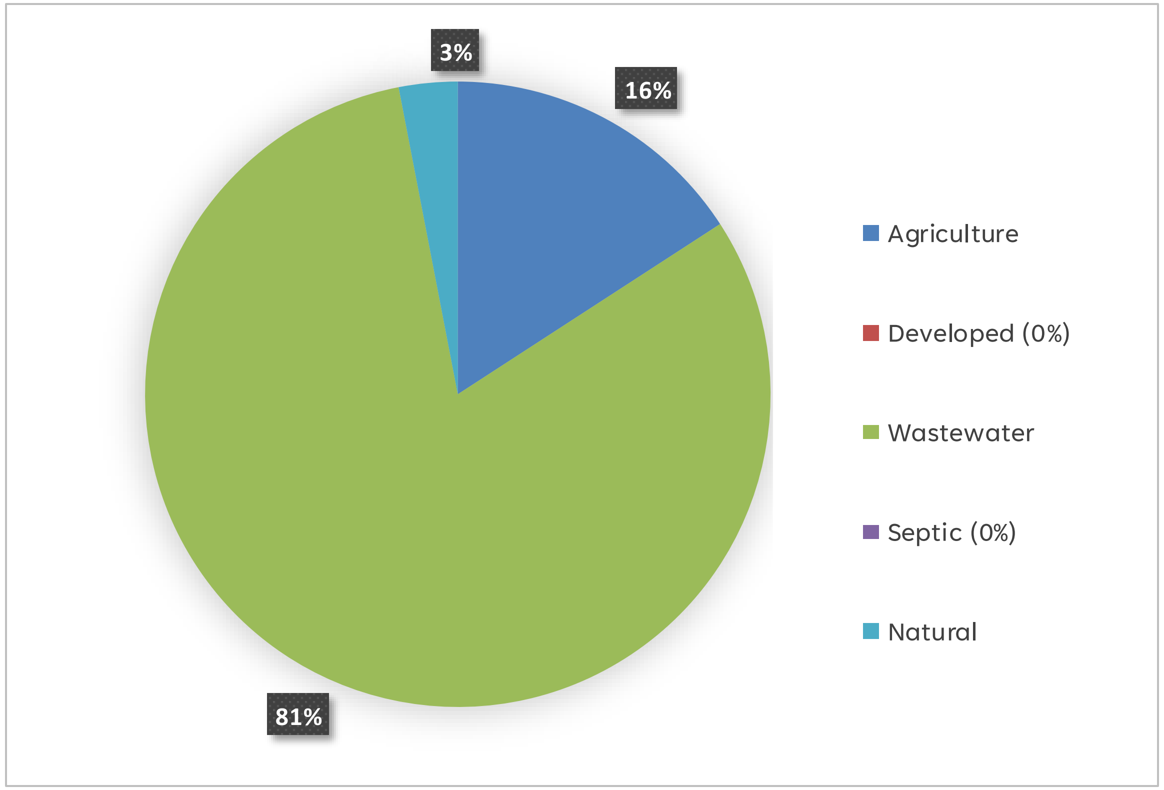
From 2023-2024

- 76% of reductions from Agriculture
- 11% from Developed

Where are future reductions planned (WIP3)?

- 89.1% from Agriculture
- 5.4% from Developed

2009-2024 Sources of Nitrogen Reduction to the Bay

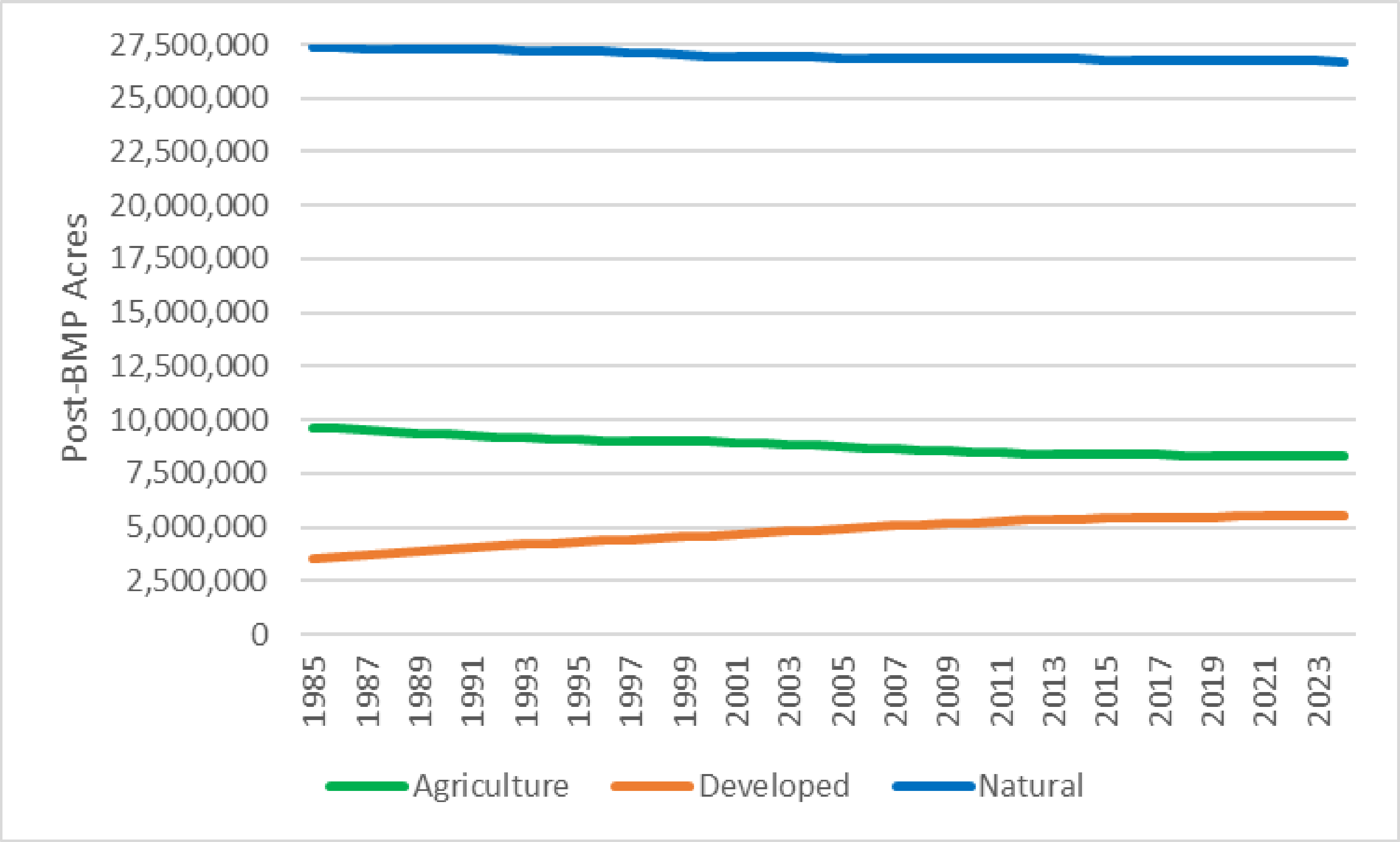


Where should the focus be in the future to achieve reductions?

Watershed Land Use is Changing

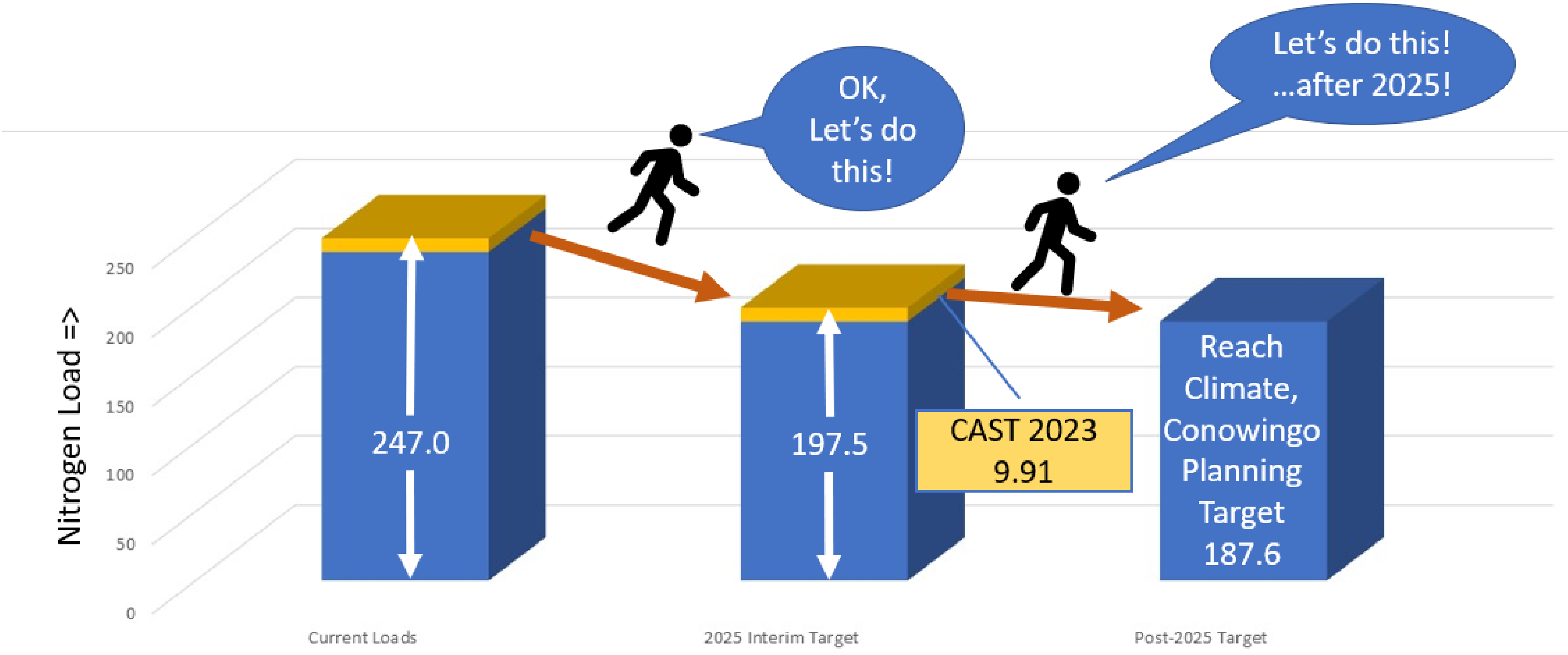
Watershed-Wide Sector Change (1985-2024)

- CAST Phase 6 Land Use
- Developed Sector grows ~2M acres, and Agriculture+Natural goes down ~2M acres.
- The decrease of Agriculture to Natural is at a 2:1 ratio is more affected by this shift.



What remains from targets w/ CEC, UALs, & Conowingo?

Unaccounted Loads Were Not Included, But They Are Back In Consideration



2009 load: **297.11**

2024 Progress: **251.64**

Target w/ UAL, Conowingo, CEC: **187.6**

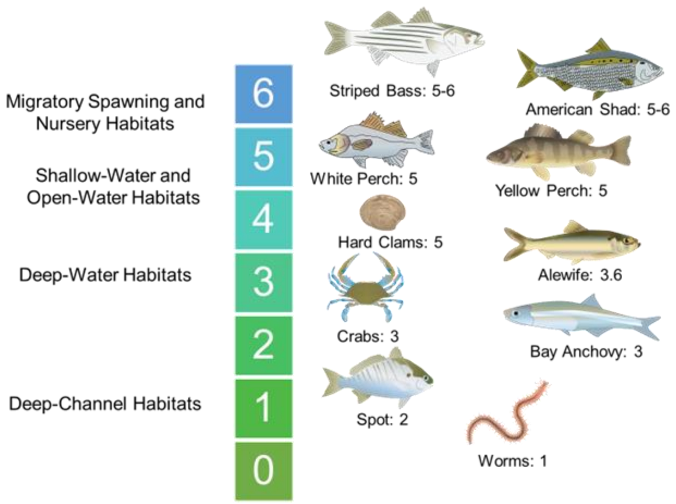
Total N reduced = 42.47

Still needed = 64.04

RESTORING THE CHESAPEAKE BAY

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

Protect Aquatic Living Resources



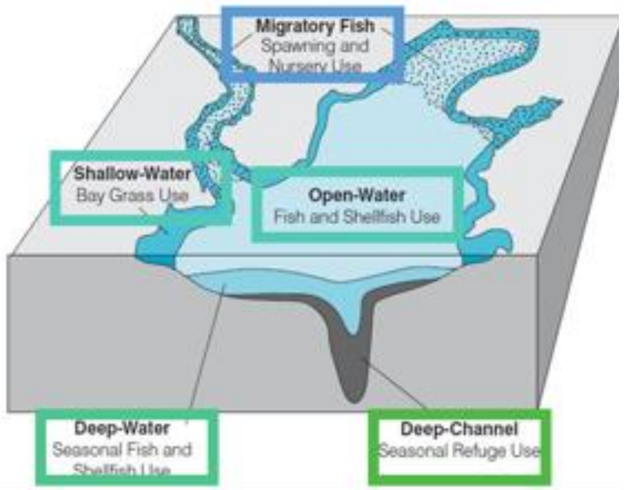
Dissolved oxygen (mg liter^{-1}) concentrations required by different species and communities.

**Goal is based on how much oxygen the deeper, harder-to-reach parts of the Bay need. If those deep areas get enough oxygen, then the shallower areas will also have met their targets*

Numeric Criteria

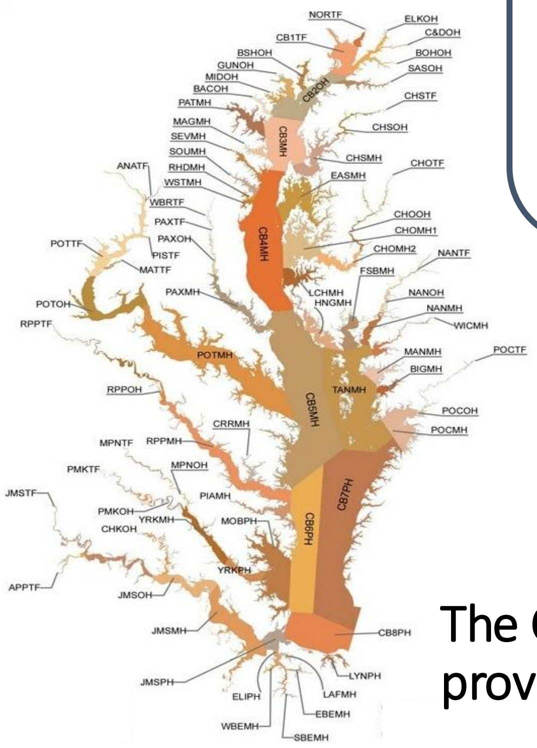
Dissolved Oxygen
Water Clarity/SAV
Chlorophyll a

Across 5 habitats



Five Chesapeake Bay tidal water designated use zones.

in 92 Segments



TMDL

N, P, sediment targets to meet goal

↑

Pollutant Control Programs

↑

Accountability

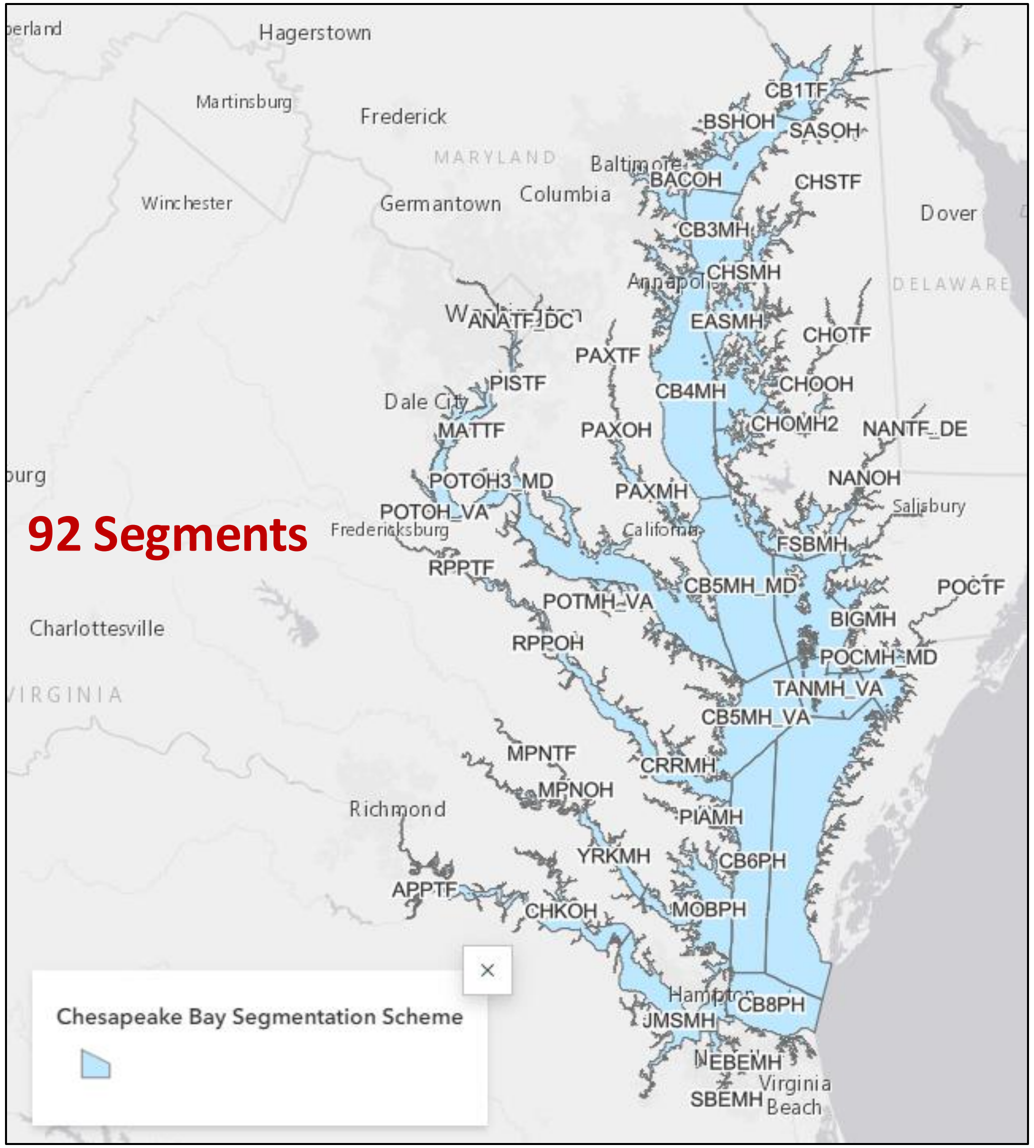
The Chesapeake Bay TMDL still provides the backbone

Chesapeake Bay Water Quality Goals

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

Determining implementation planning targets (to meet this goal):

- 2010-2025: Default/Phase 3 Method, All controls and practices in place by 2025 to meet WQS.
- 2025-2040: RENPs--How will we adapt planning targets to meet this ultimate goal of meeting water quality standards.
    - How can we accelerate progress?
    - What would a 2040 tiered target look like?
    - If 2040 is an interim target, by which date would we expect all practices in place?

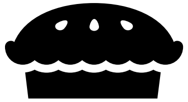


Default Method: Setting Planning Targets

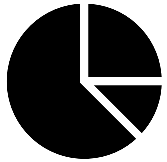
Planning Targets Determine the Size and Distribution of Needed Load Reductions

<u>Two essential steps</u>:

1. Determine what reductions in TN, TP, and TSS are needed to meet Water Quality Standards



2. Inform the distribution of these reductions based on suite of watershed and estuarine models (which are informed by monitoring information)



PLANNING TARGET PRINCIPLES (PHASE 3)

1. Distributed loads must result in achievement of the jurisdictions' Bay water quality standards.

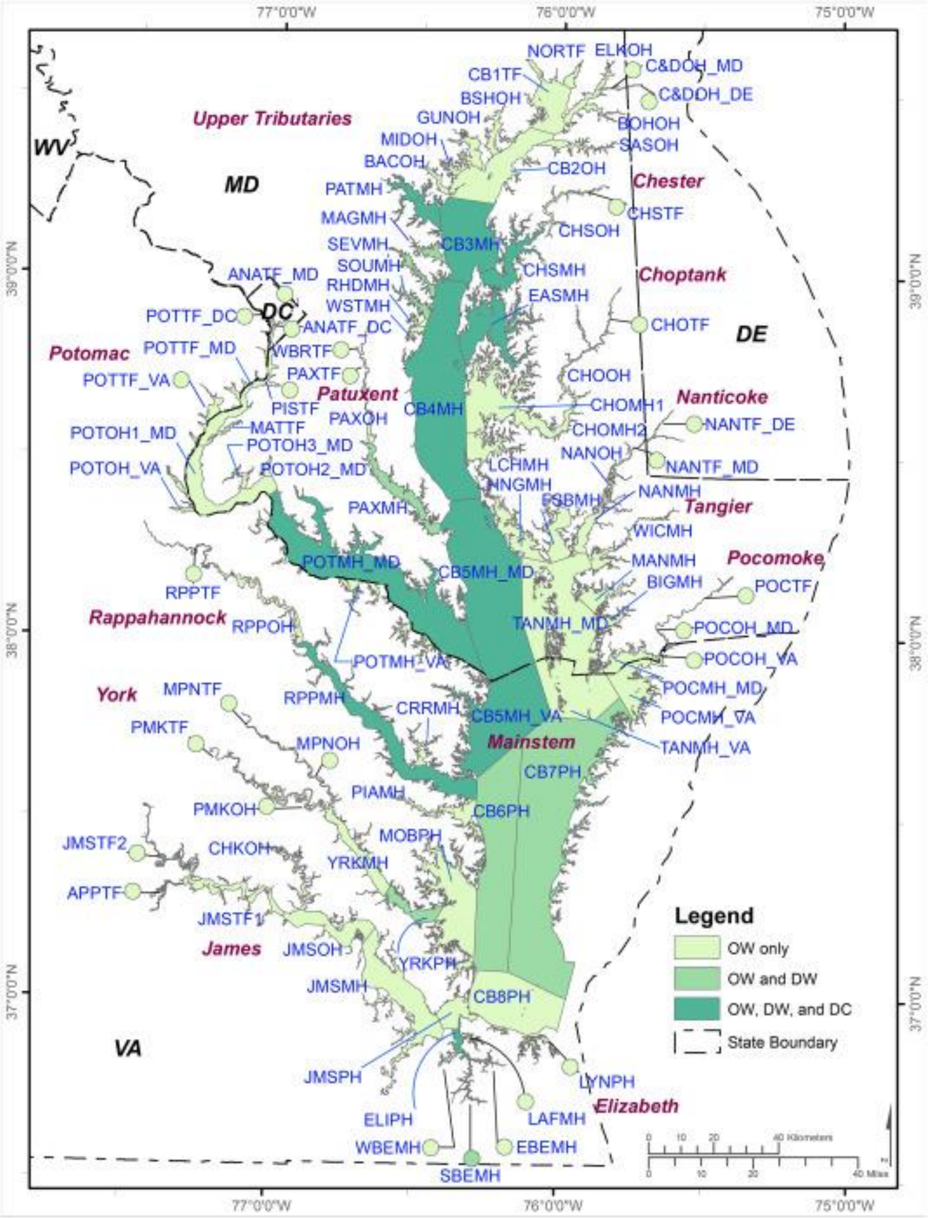
2. State-river basins that contribute the most to Bay water quality problems must do the most to resolve those problems.
    a) More effective basins do more

3. All tracked and reported reductions in loads are credited toward achieving assigned targets

(DM) Setting Planning Targets: Determining WQ Goals

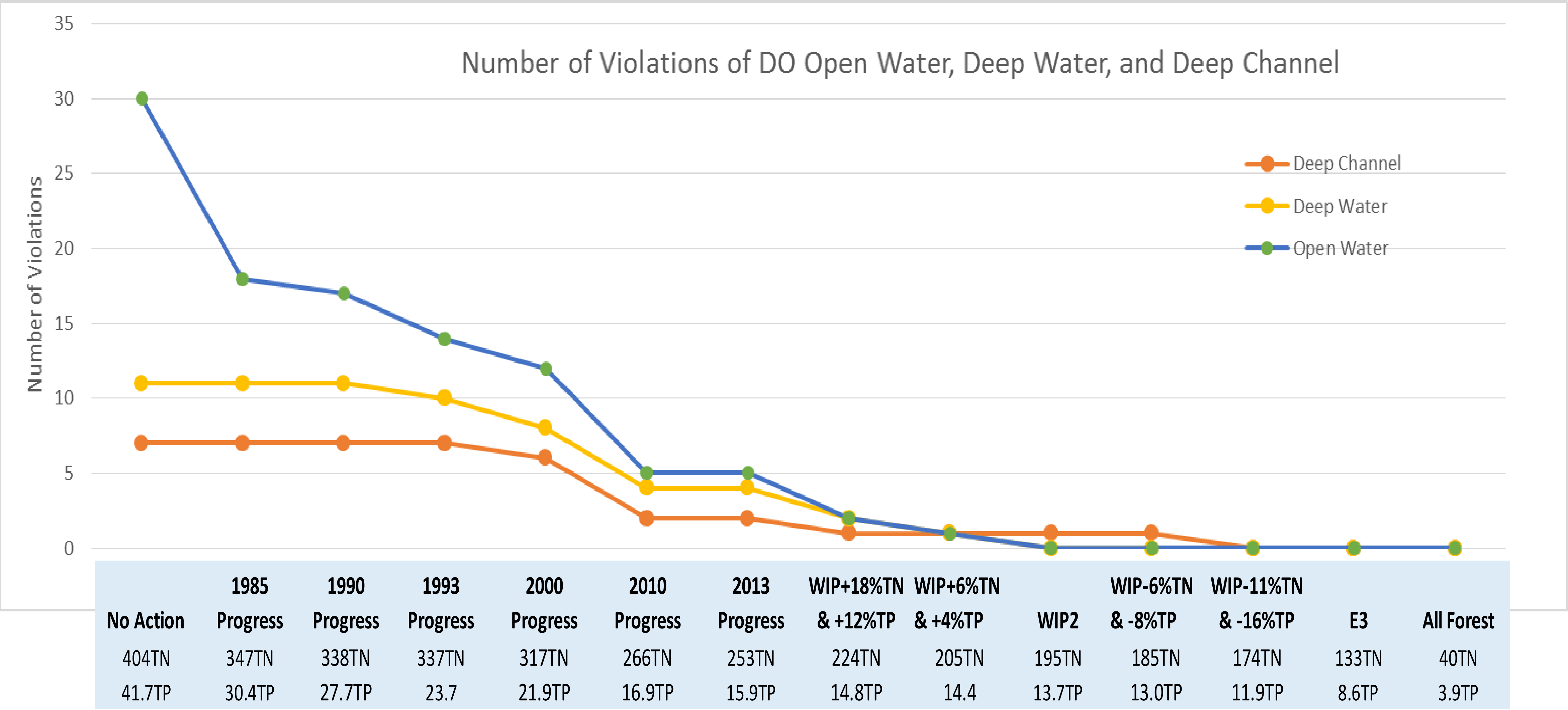
Critical values for Dissolved Oxygen (DO), Chlorophyll-a, and Water Clarity vary by

- Designated Use
- Season
- Duration (e.g., 30-day mean)



(DM) Setting Planning Targets: Determining WQ Goals

Assimilative Capacity was Explored by Comparing Scenarios



(DM) Setting Planning Targets: Determining WQ Goals

Segments Attaining Oxygen Standards: Open-Water Use

Segments NOT in Attainment

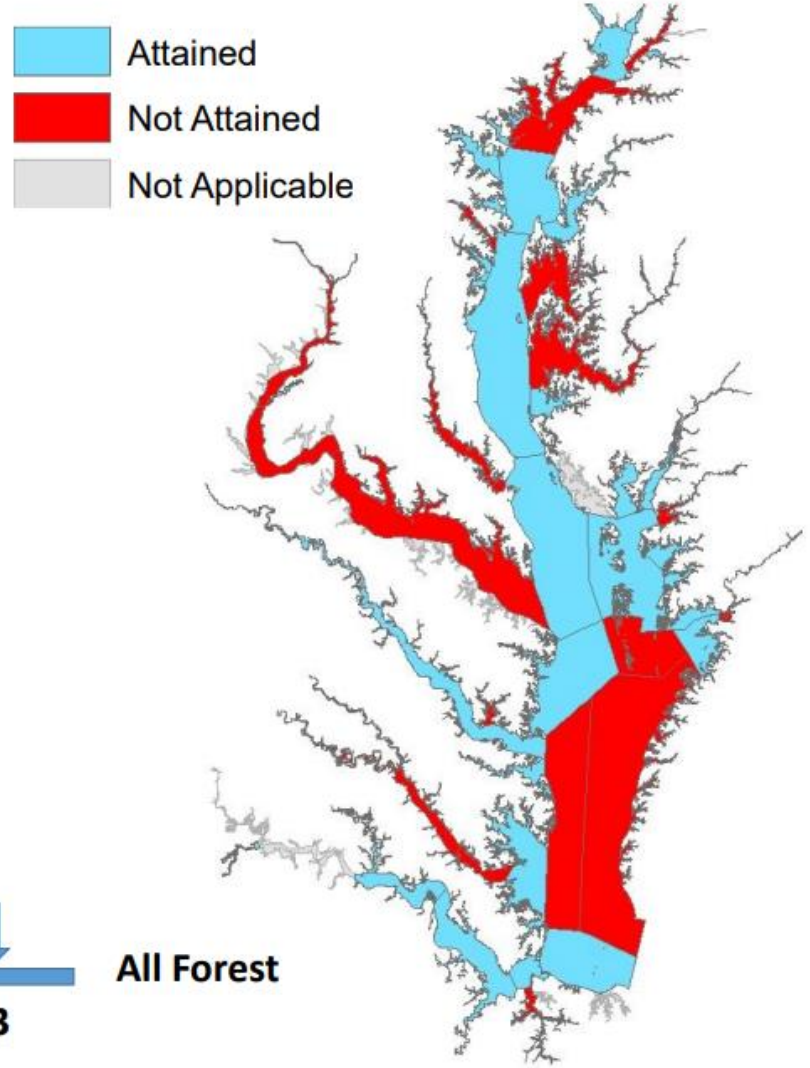
- CB2OH
- CB6PH
- CB7PH
- BSHOH
- SEVMH
- PAXOH
- PAXMH
- POTTF_DC
- POTTF_MD
- ANATF_DC
- ANATF_MD
- PISTF
- POTOH1_MD
- POTOMH_MD
- PMKOH
- YRKMH
- YRKPH
- ELIPH
- C&Dcanal
- ELKOH
- SASOH
- EASMH
- CHOTF
- CHOOH
- CHOMH2
- CHOMH1
- POCTF
- POCOH_MD
- POCOH_VA
- TANMH_VA

404 TN 41.7 TP

No Action

E3

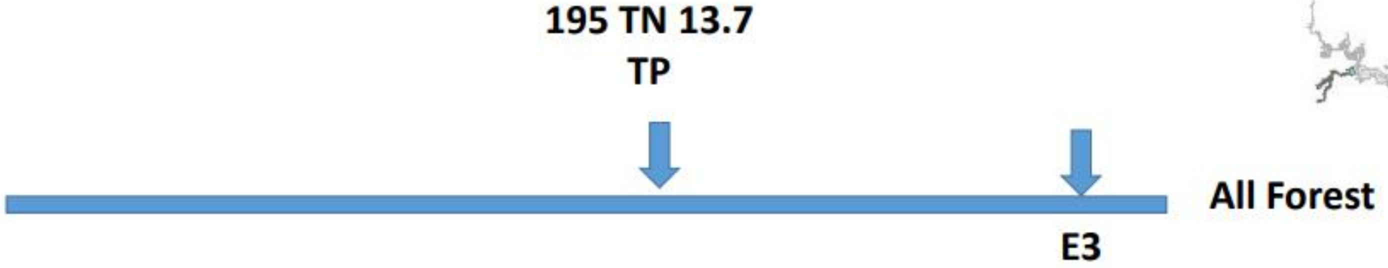
All Forest

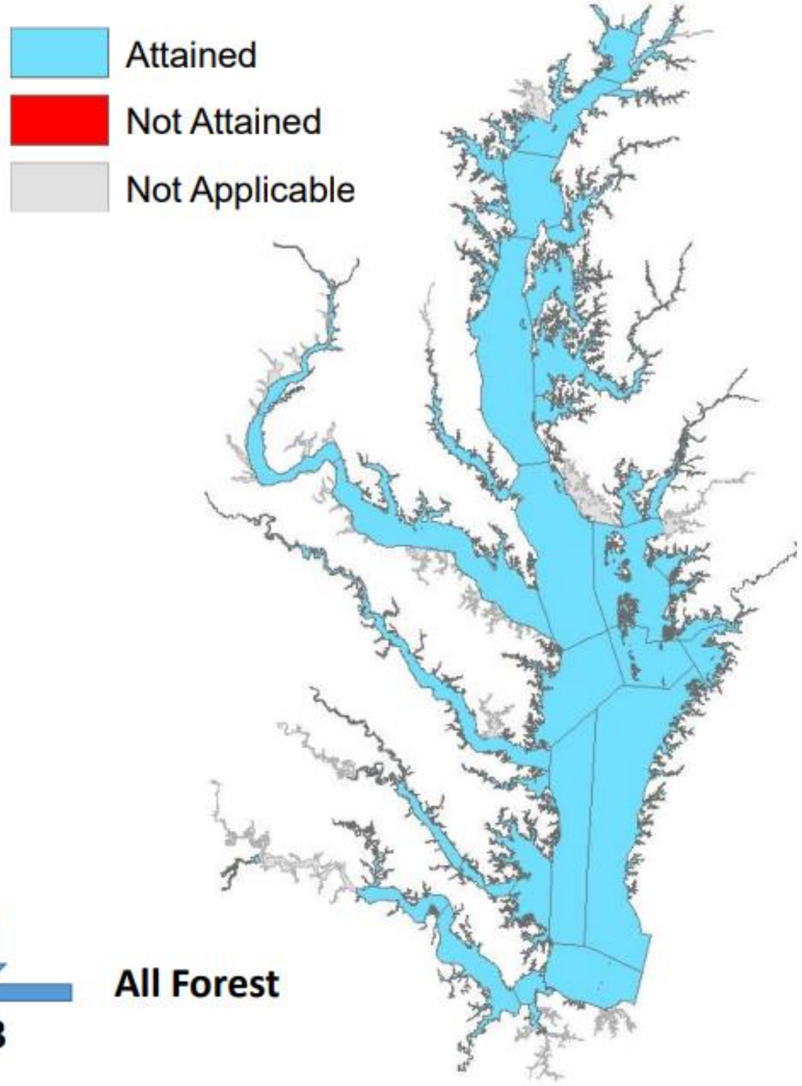


(DM) Setting Planning Targets: Determining WQ Goals

Segments Attaining Oxygen Standards: Open-Water Use

Segments NOT in Attainment



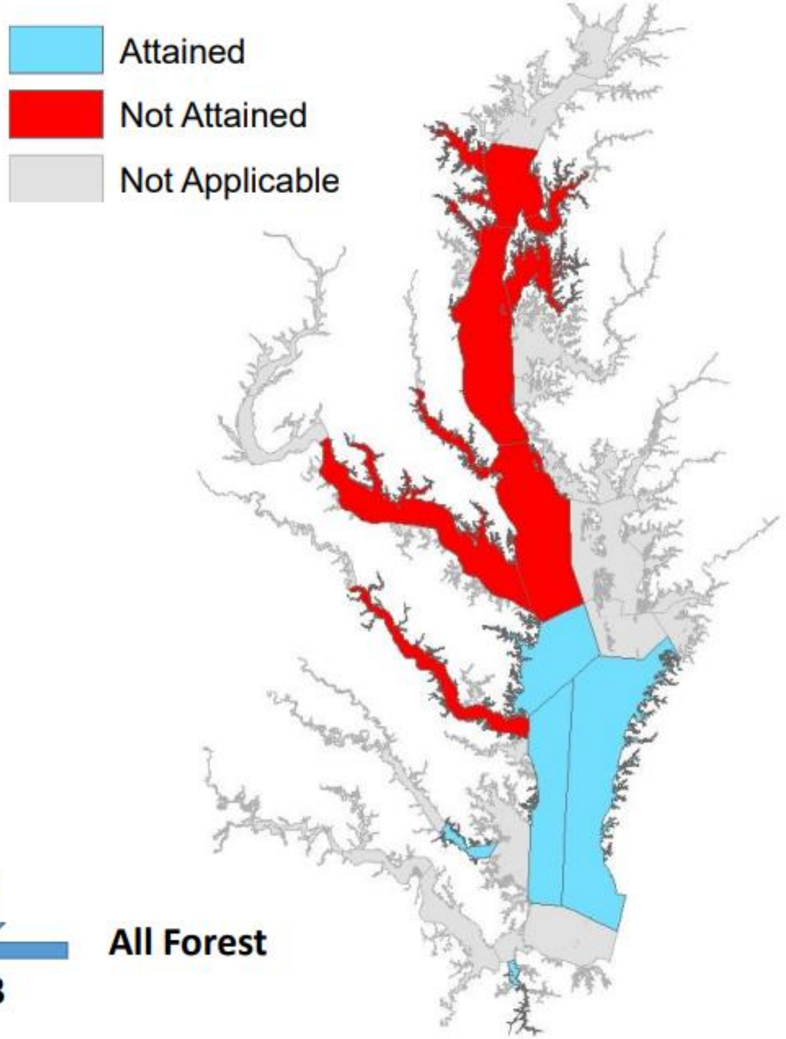


(DM) Setting Planning Targets: Determining WQ Goals

Segments Attaining Oxygen Standards: Deep-Water Use

Segments NOT in Attainment

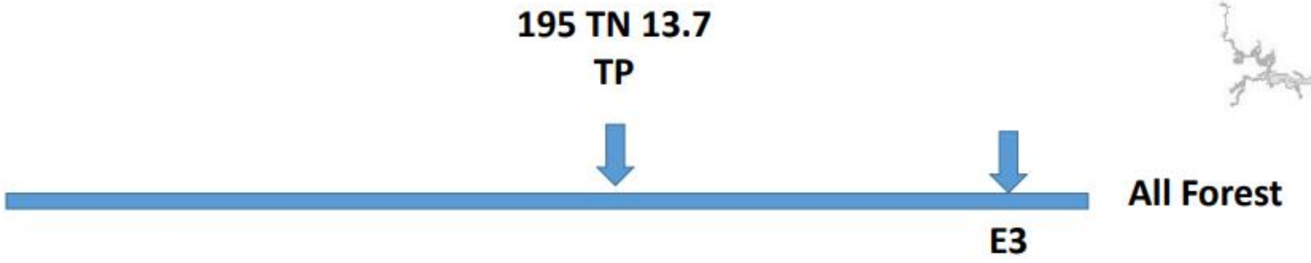
- CB3MH
- CB4MH
- CB5MH_MD
- PATMH
- MAGMH
- SEVMH
- PAXMH
- POTMH
- RPPMH
- CHSMH
- EASMH

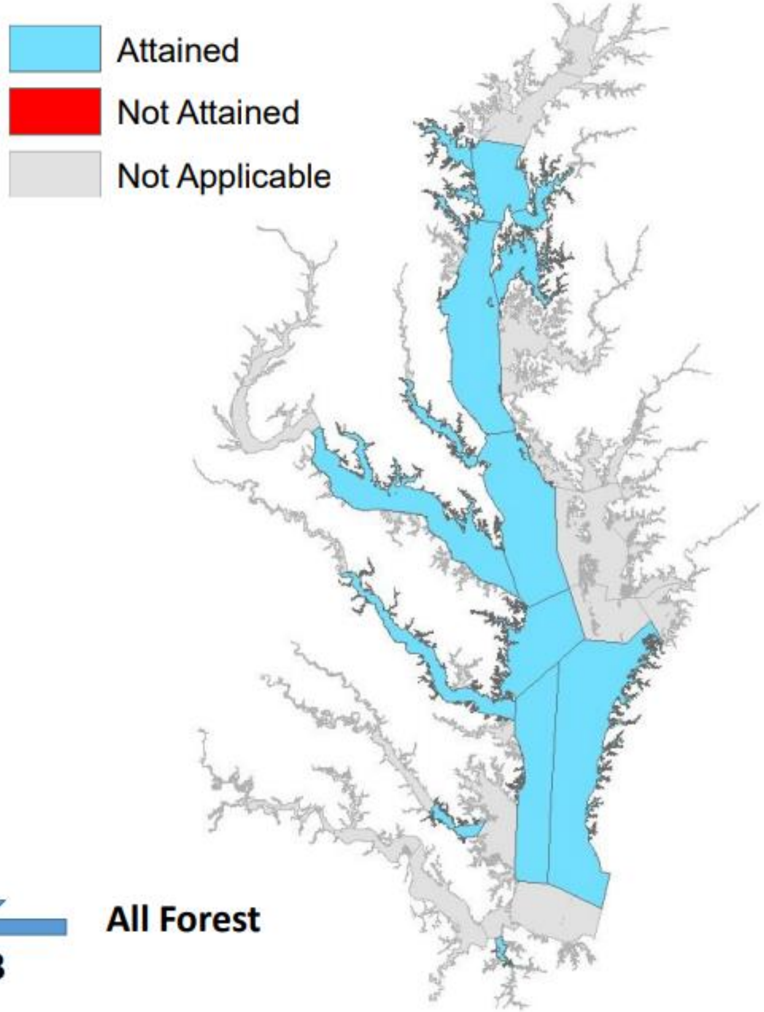


(DM) Setting Planning Targets: Determining WQ Goals

Segments Attaining Oxygen Standards: Deep-Water Use

Segments NOT in Attainment



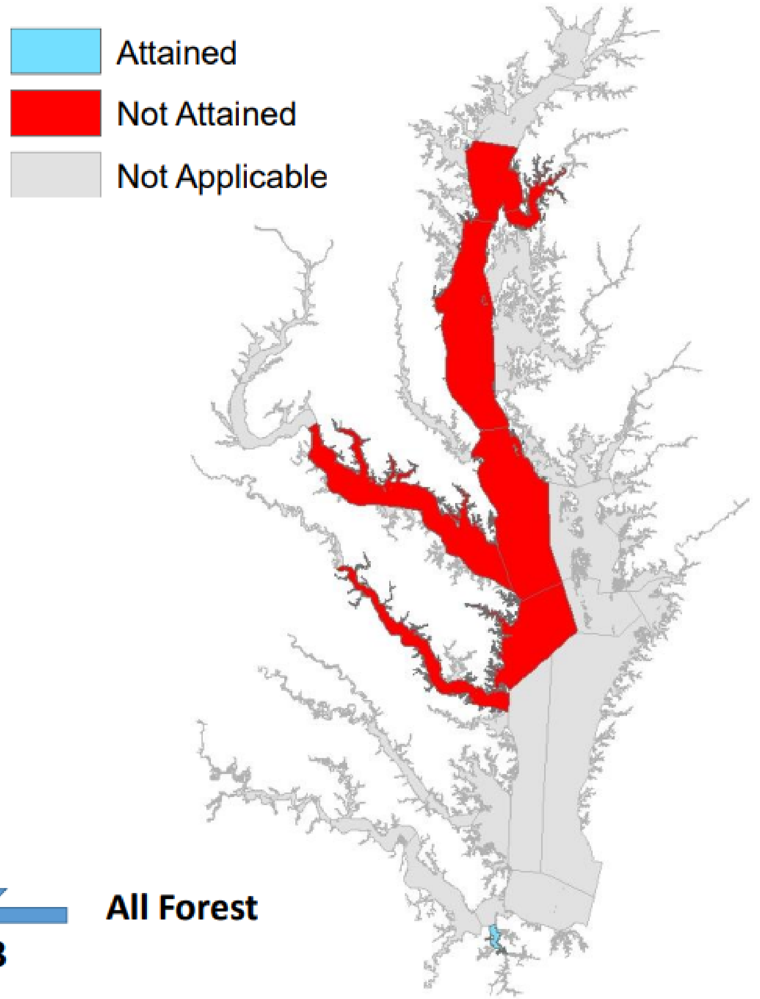


(DM) Setting Planning Targets: Determining WQ Goals

Segments Attaining Oxygen Standards: Deep-Channel Use

Segments NOT in Attainment

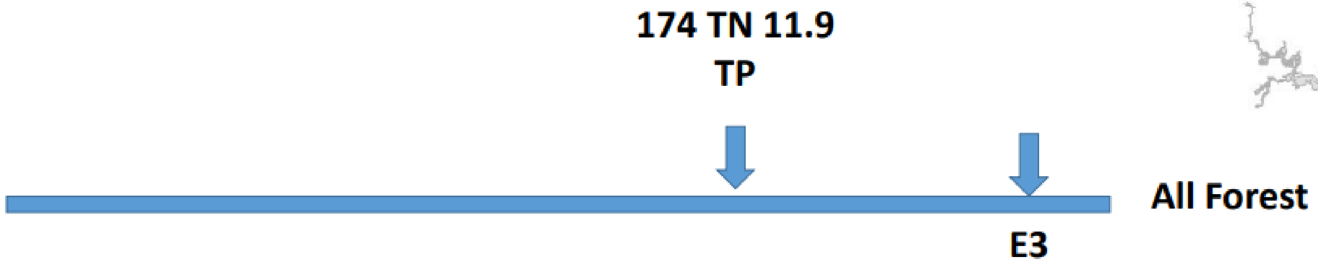
- CB3MH
- CB4MH
- CB5MH_MD
- CB5MH_VA
- PATMH
- POTMH
- RPPMH
- CHSMH

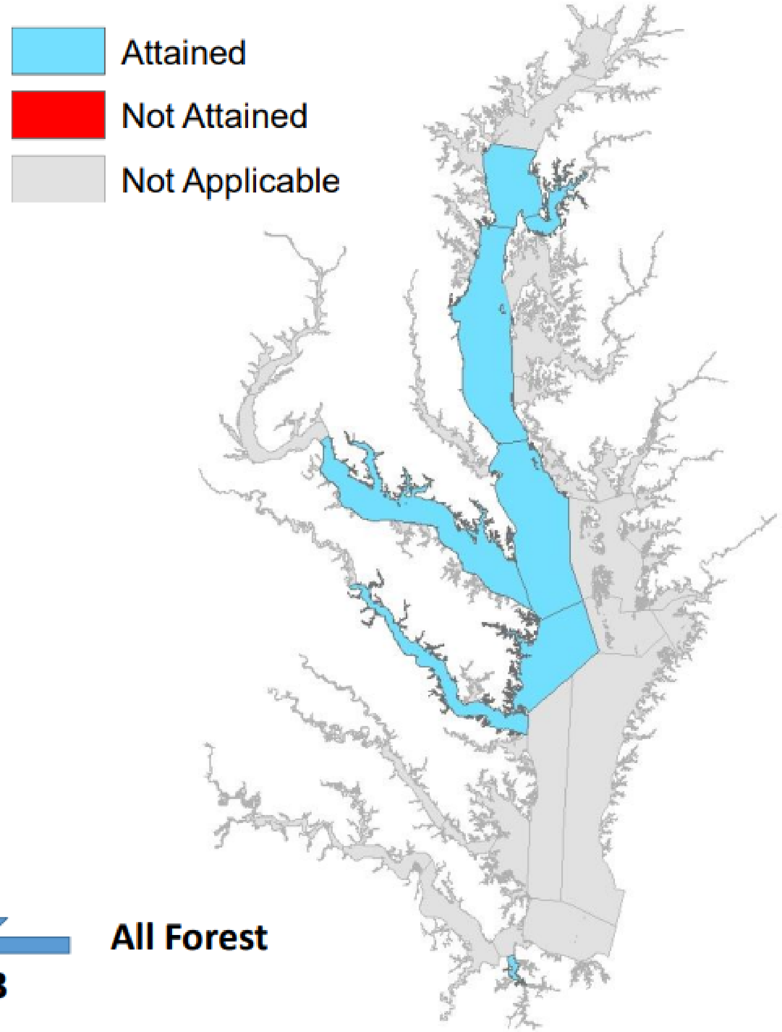


(DM) Setting Planning Targets: Determining WQ Goals

Segments Attaining Oxygen Standards: Deep-Channel Use

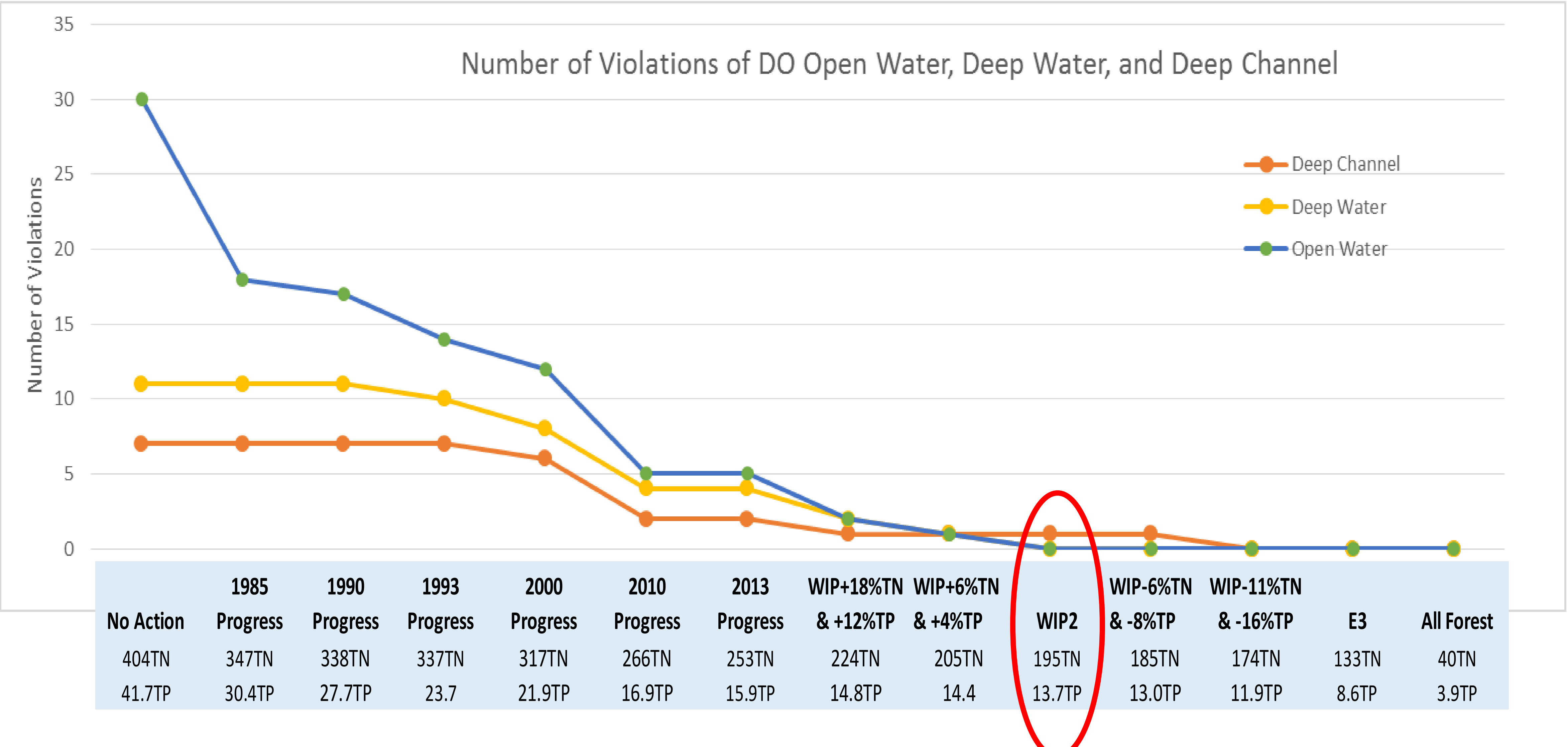
Segments NOT in Attainment





Setting Planning Targets: Determining WQ Goals

Assimilative Capacity set where WQS are met.



Criteria evaluations help identify where we’re close and where there is opportunity

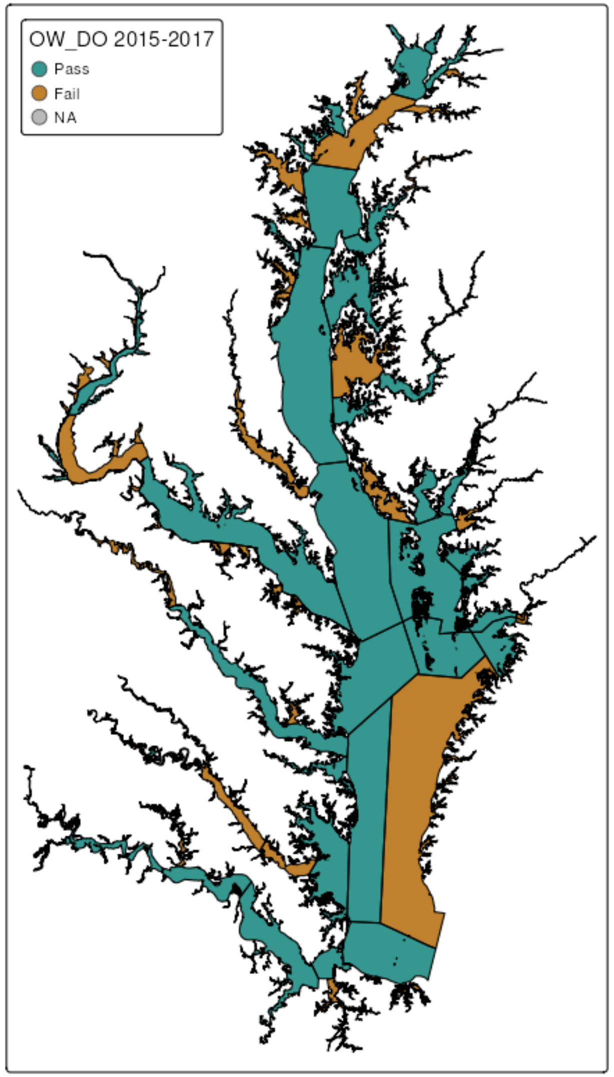
Open Water, Dissolved Oxygen, 2015-2017

Definitions

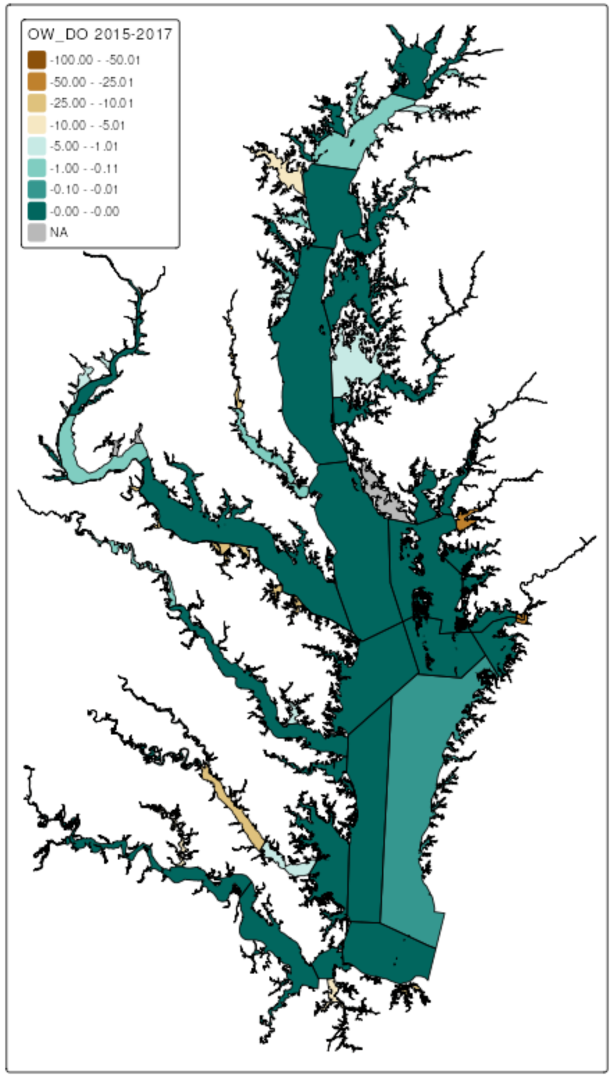
- Attainment
    - Water quality is evaluated using three parameters: dissolved oxygen, water clarity or underwater grass abundance, and chlorophyll-a (a measure of algae growth) to estimate attainment as pass/fail

- Attainment Deficit
    - How close or far a segment is from attainment
    - 0% = full attainment
    - -100% = full non-attainment

Attainment

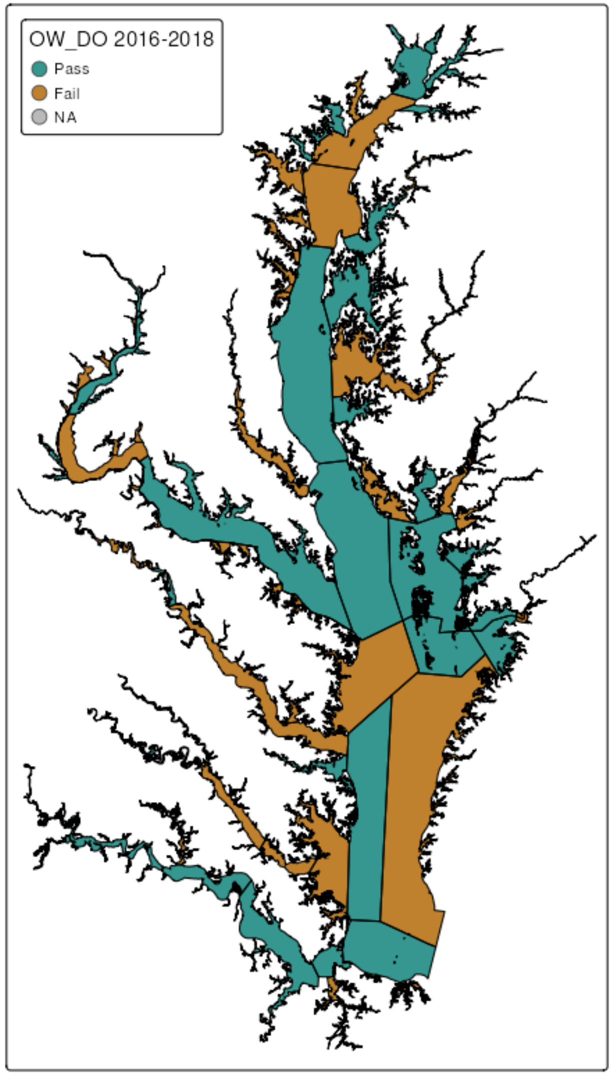


Attainment Deficit

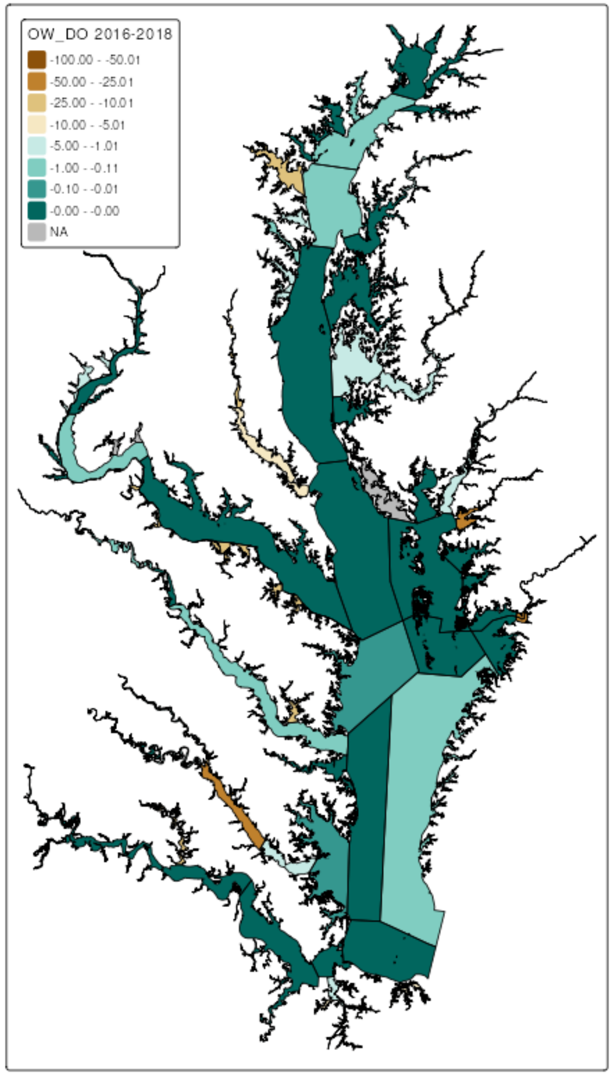


Open Water, Dissolved Oxygen, 2016-2018

Attainment

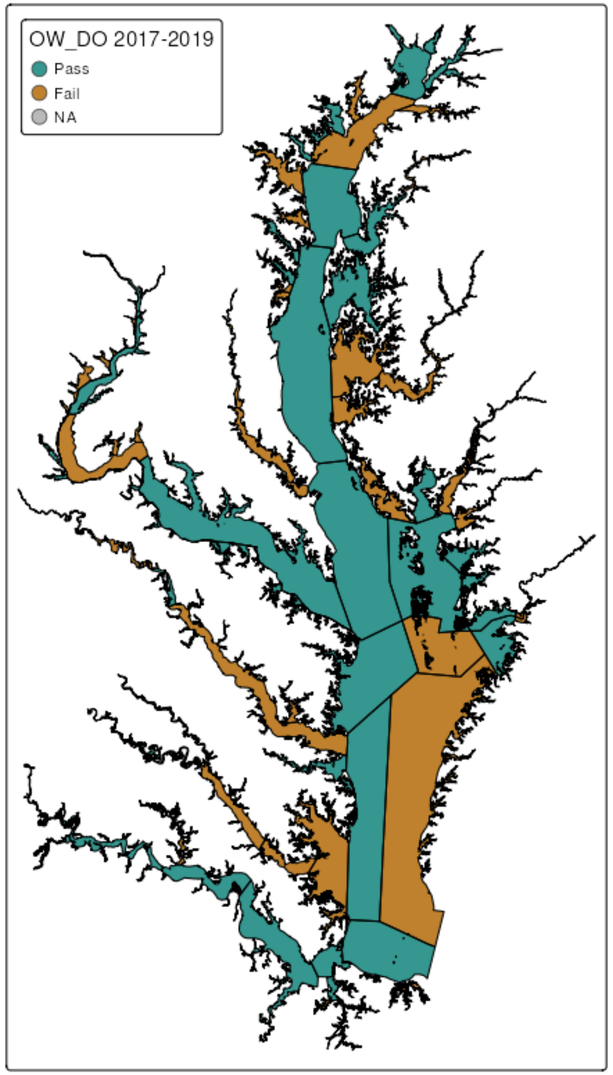


Attainment Deficit

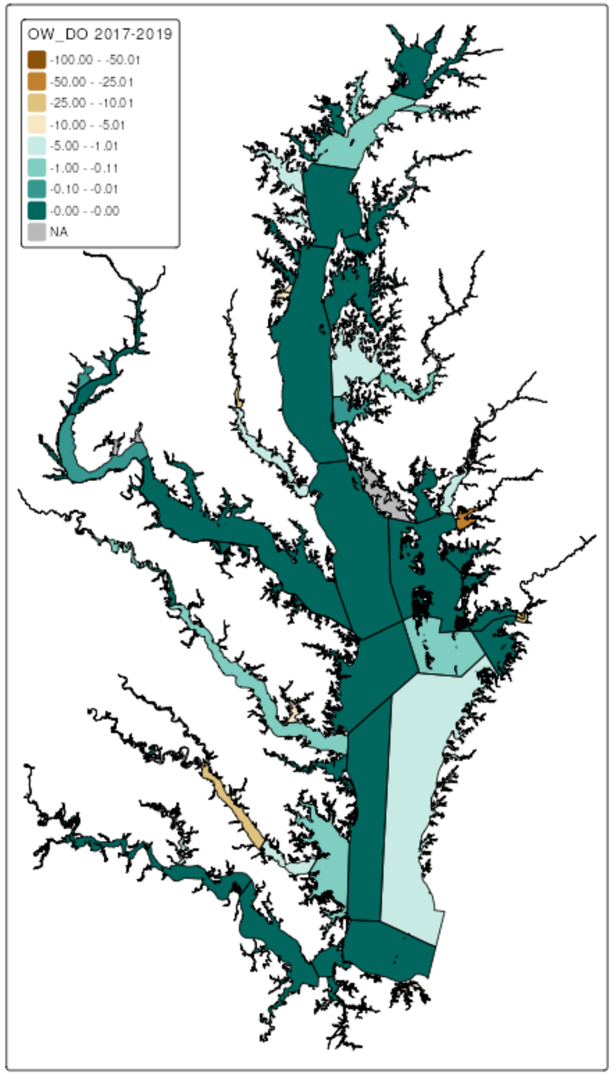


Open Water, Dissolved Oxygen, 2017-2019

Attainment

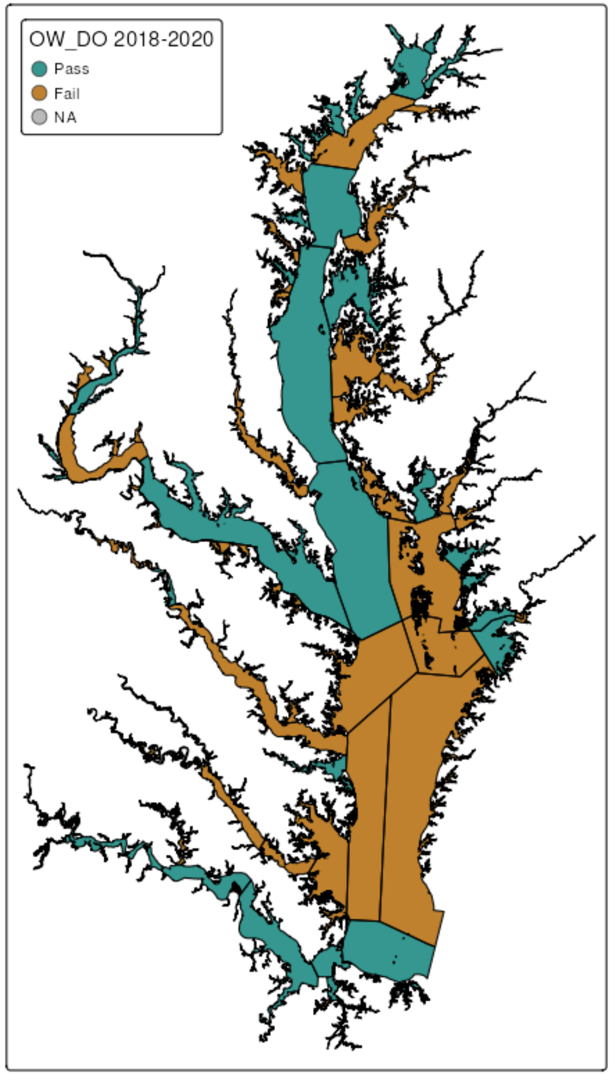


Attainment Deficit

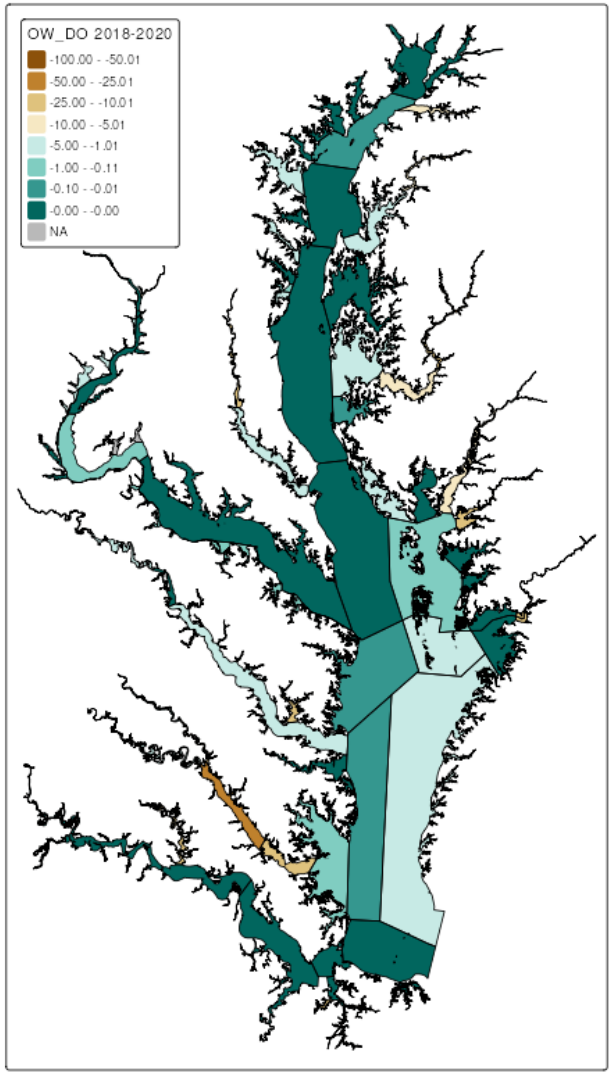


Open Water, Dissolved Oxygen, 2018-2020

Attainment

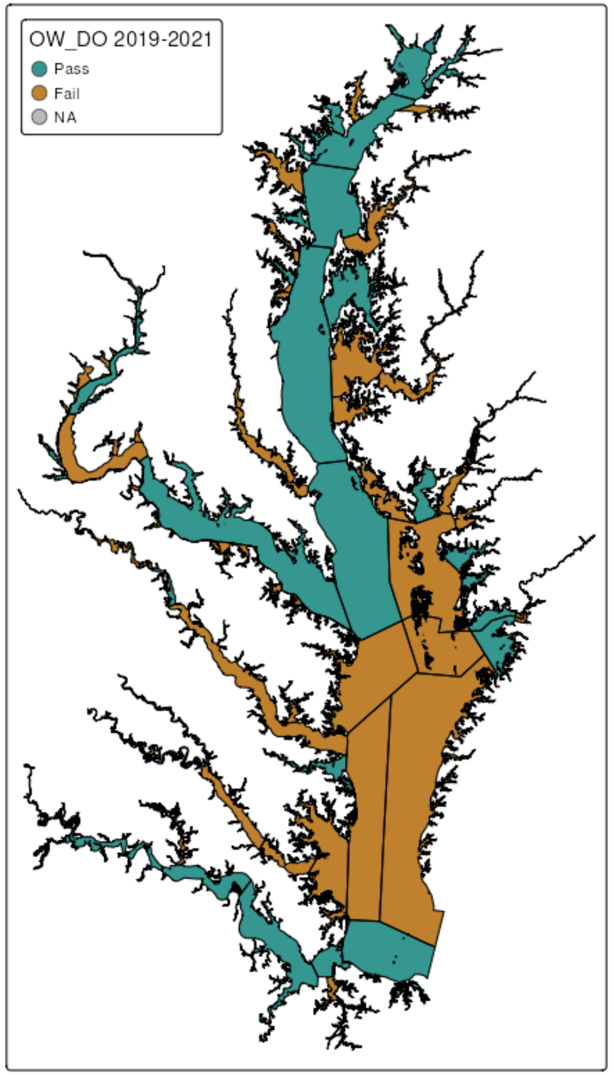


Attainment Deficit

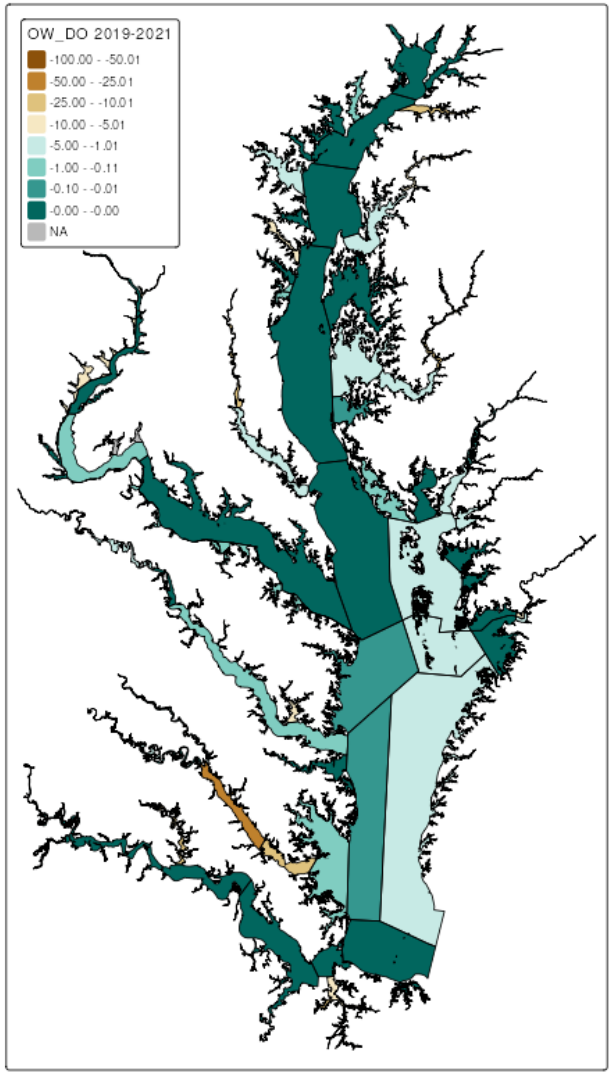


Open Water, Dissolved Oxygen, 2019-2021

Attainment

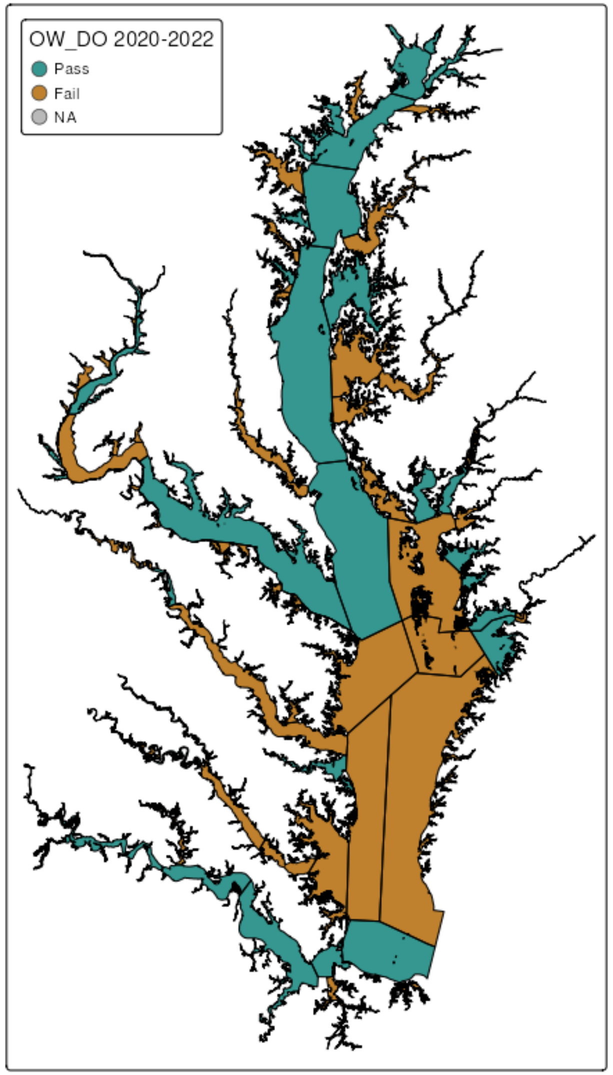


Attainment Deficit

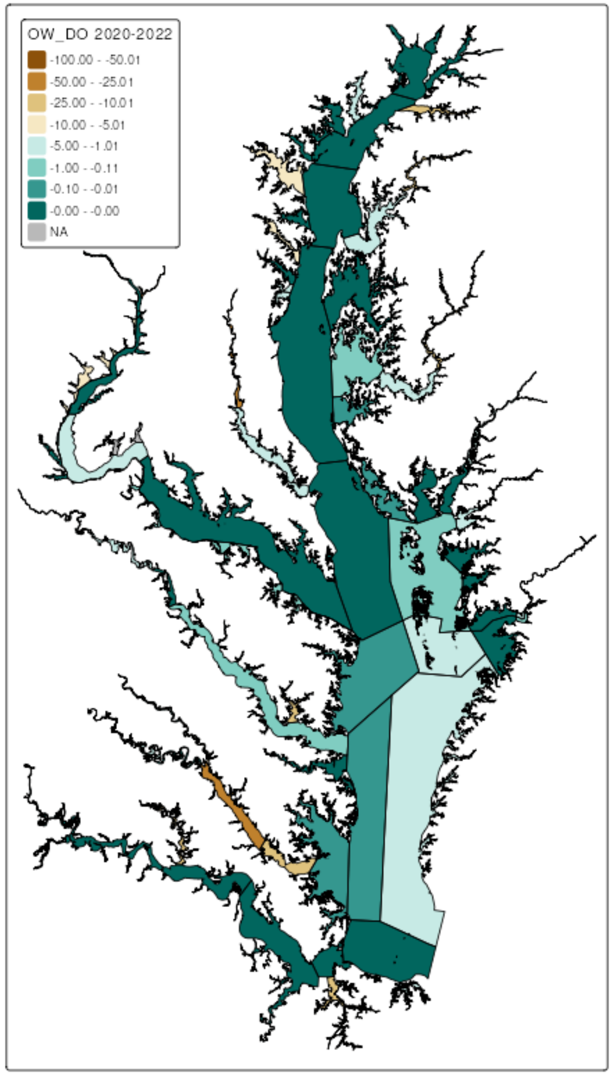


Open Water, Dissolved Oxygen, 2020-2022

Attainment

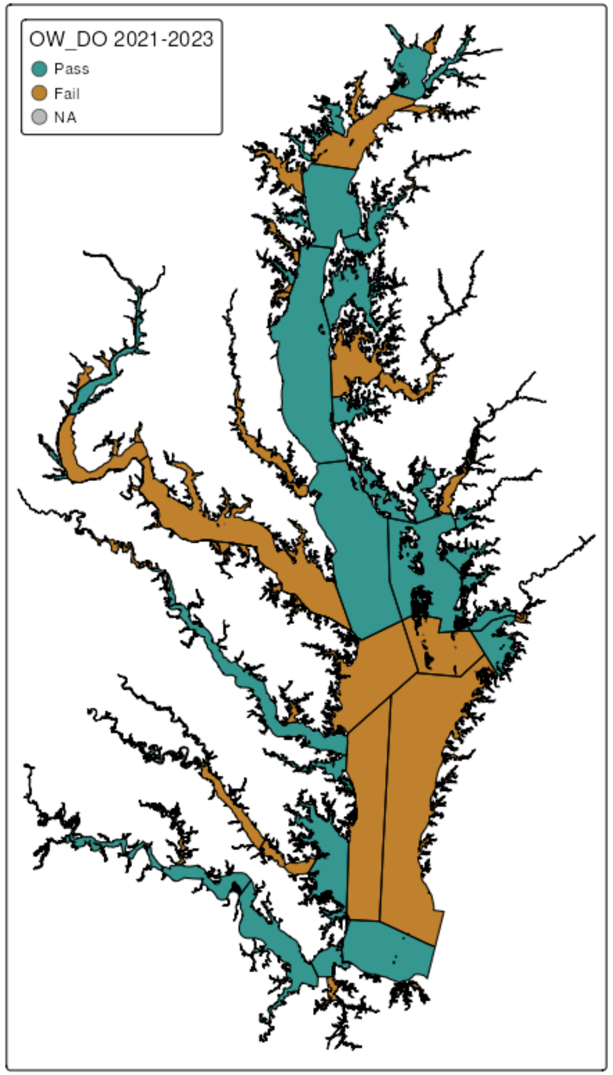


Attainment Deficit

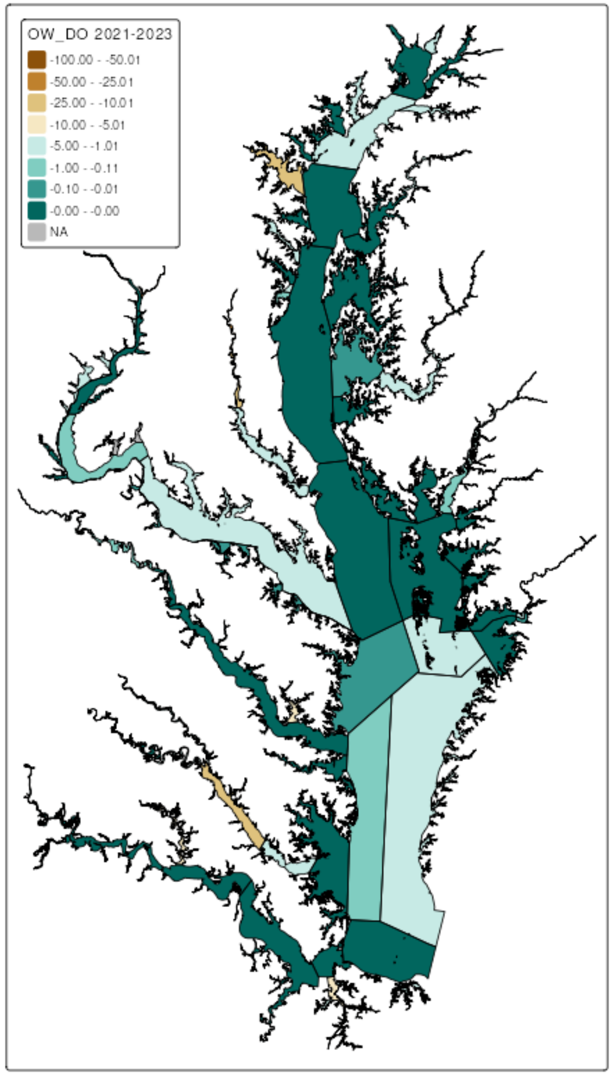


Open Water, Dissolved Oxygen, 2021-2023

Attainment



Attainment Deficit



Setting Planning Targets: Determining WQ Goals

DO criteria that can currently be evaluated with existing approaches and data

How will ability to evaluate DO attainment for all habitats, seasons, and durations affect WQ Goals and strategies?

*Note a 30-day mean 6 mg/L MSN value is evaluated for purpose of the WQ indicator.

Table 1. Chesapeake Bay dissolved oxygen criteria.

Designated Use	Criteria Concentration/Duration	Protection Provided	Temporal Application
Migratory fish spawning and nursery use	7-day mean ≥ 6 mg liter^{-1} (tidal habitats with 0-0.5 ppt salinity)	Survival/growth of larval/juvenile tidal-fresh resident fish; protective of threatened/endangered species.	February 1 - May 31
	Instantaneous minimum ≥ 5 mg liter^{-1}	Survival and growth of larval/juvenile migratory fish; protective of threatened/endangered species.	
	Open-water fish and shellfish designated use criteria apply		June 1 - January 31
Shallow-water bay grass use	Open-water fish and shellfish designated use criteria apply		Year-round
Open-water fish and shellfish use	30-day mean ≥ 5.5 mg liter^{-1} (tidal habitats with 0-0.5 ppt salinity)	Growth of tidal-fresh juvenile and adult fish; protective of threatened/endangered species.	Year-round
	30-day mean ≥ 5 mg liter^{-1} (tidal habitats with >0.5 ppt salinity)	Growth of larval, juvenile and adult fish and shellfish; protective of threatened/endangered species.	
	7-day mean ≥ 4 mg liter^{-1}	Survival of open-water fish larvae.	
	Instantaneous minimum ≥ 3.2 mg liter^{-1}	Survival of threatened/endangered sturgeon species.[1]	
Deep-water seasonal fish and shellfish use	30-day mean ≥ 3 mg liter^{-1}	Survival and recruitment of bay anchovy eggs and larvae.	June 1 - September 30
	1-day mean ≥ 2.3 mg liter^{-1}	Survival of open-water juvenile and adult fish.	
	Instantaneous minimum ≥ 1.7 mg liter^{-1}	Survival of bay anchovy eggs and larvae.	
	Open-water fish and shellfish designated-use criteria apply		October 1 - May 31
Deep-channel seasonal refuge use	Instantaneous minimum ≥ 1 mg liter^{-1}	Survival of bottom-dwelling worms and clams.	June 1 - September 30
	Open-water fish and shellfish designated use criteria apply		October 1 - May 31

[1] At temperatures considered stressful to shortnose sturgeon (>29°C), dissolved oxygen concentrations above an instantaneous minimum of 4.3 mg liter^{-1} will protect survival of this listed sturgeon species.

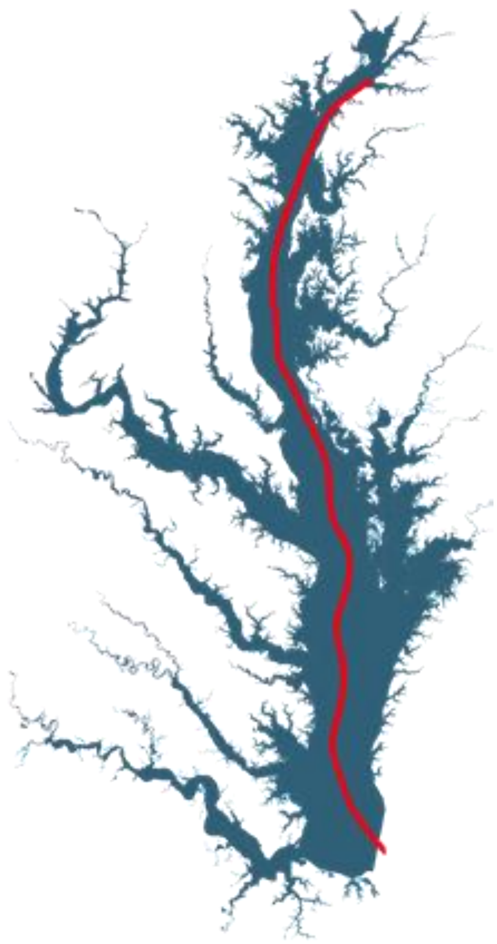
From EPA 2003 Ambient Water Quality Criteria

Tiered Implementation Approach

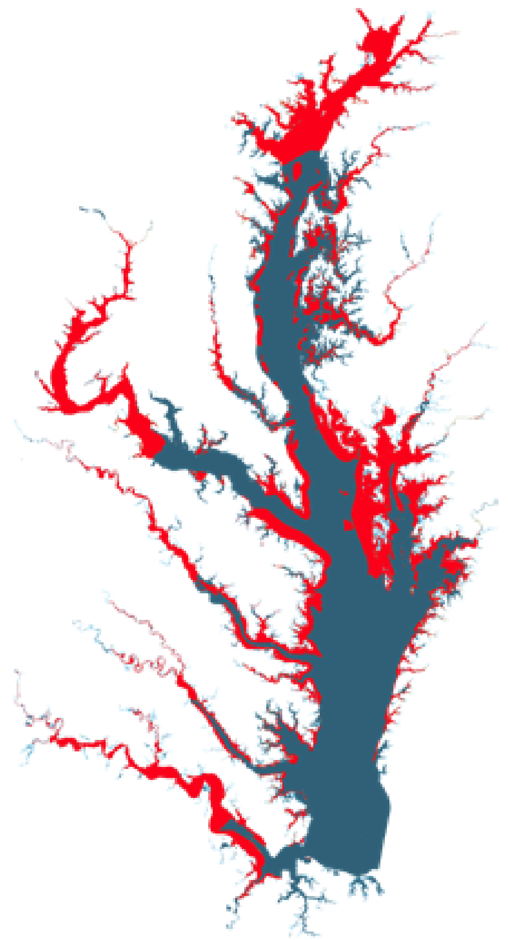
Key CESR Insights

- Some habitats respond faster to water quality improvements than others
- We can help fish and habitats even before all water goals are met
- Focus on areas where restoration gives the quickest benefits

Deep water DO is most challenging water quality goal



But most impactful living resource habitats are elsewhere



Tiered Implementation Approach

Comparison of tiered and conventional approaches to achieving water quality goals

Keep ultimate targets in place →

	Tiered Approach	Conventional Approach
What are planning priorities for nutrient reduction?	Local areas for living resource benefit	Deep channel dissolved oxygen in the mainstem of the Bay
What type of implementation?	Water quality + habitat restoration	Water quality
What is the implementation horizon?	10-15 yrs for interim goals	10-15 yrs for final TMDL target
How is implementation success evaluated?	Model response and monitoring at local scale	Model response
What are final TMDL nutrient and sediment targets?	Same	Same
What are TMDL permittee obligations?	Same	Same

From Tiered Implementation Prospectus

Tiered Implementation Approach

Components of a tiered approach to achieving water quality goals

Identify where water quality improvements (at segment level) have the most potential to improve living resource conditions

Ecological opportunity

Identify relative contribution of upstream and estuarine N, P and sediment on segment habitat nutrient levels.

Watershed vs Estuarine influence "Local control"

Determine sources of nutrient and sediment loads on localized water quality

Relative effectiveness

Tiered Implementation Approach

Living Resource Habitat Factors That Matter

Water Quality

Managed by Bay Water Quality Standards

- Dissolved Oxygen
- Water Clarity
- Chlorophyll-a

Generally Unmanaged and Impacted by Changing Environmental Conditions

- Temperature
- pH
- Salinity

Physical Habitat Aspects

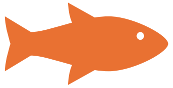
- Underwater Grasses
- Wetlands
- Shorelines
- Access
- Bottom Condition

External Factors

- Fishing Pressures
- Etc.

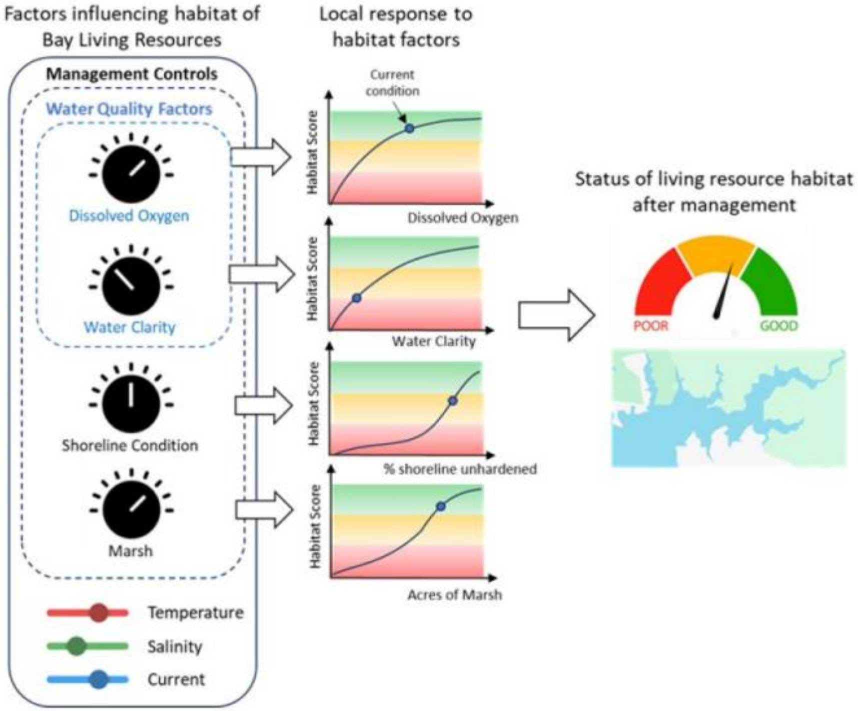
Tiered Implementation Approach

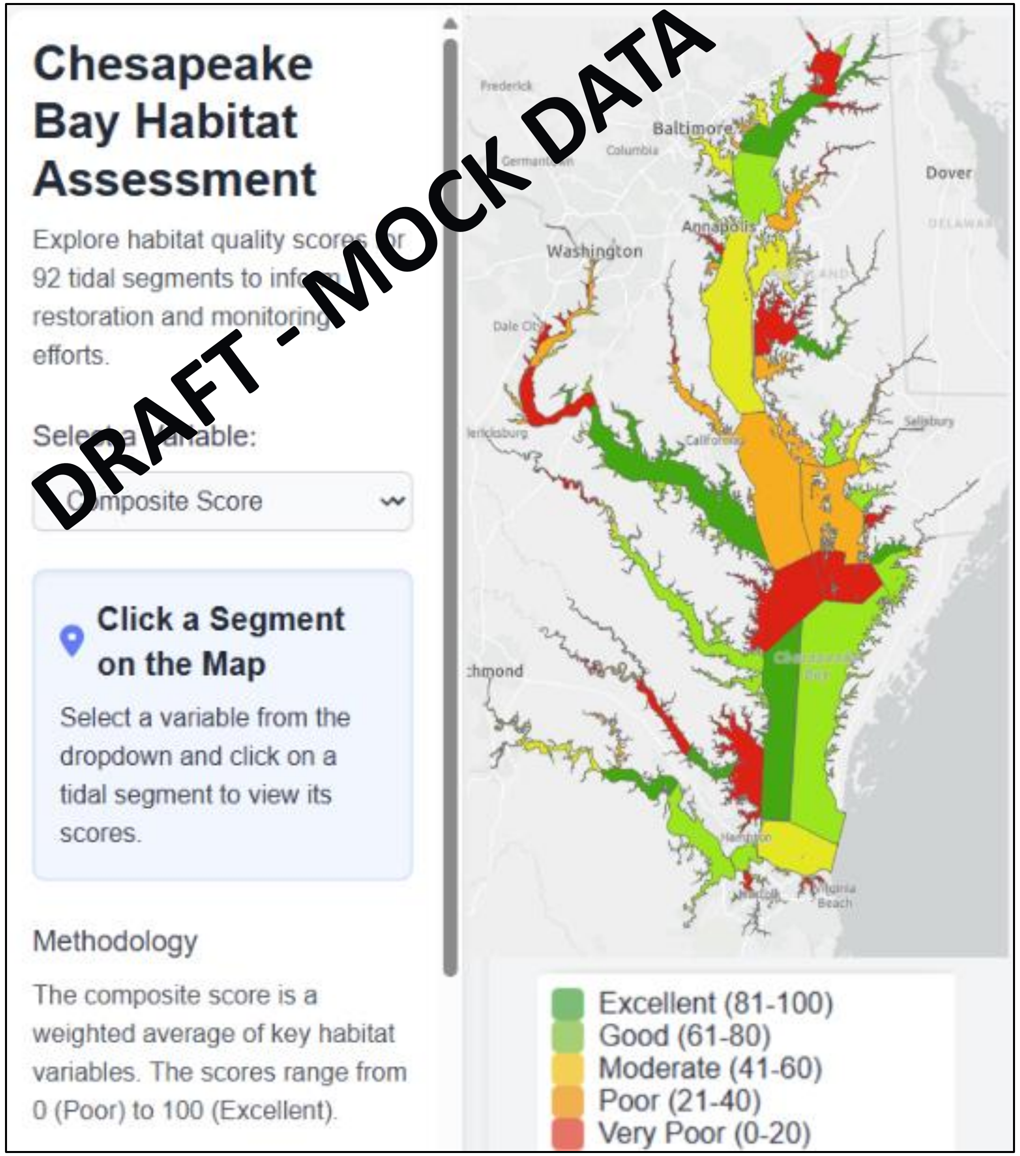
Ecological opportunity



Identify where water quality improvements (at segment level) have the most potential to improve living resource conditions.

Which areas are on the border of attainment?





Tiered Implementation Approach

Watershed vs estuarine influence

Identify relative contribution of upstream and estuarine N, P and sediment on segment habitat nutrient levels.

Darker blue= greater influence of upstream sources of nutrients on local water quality.

Lighter blue=less upstream influence and more regional (estuarine) influence

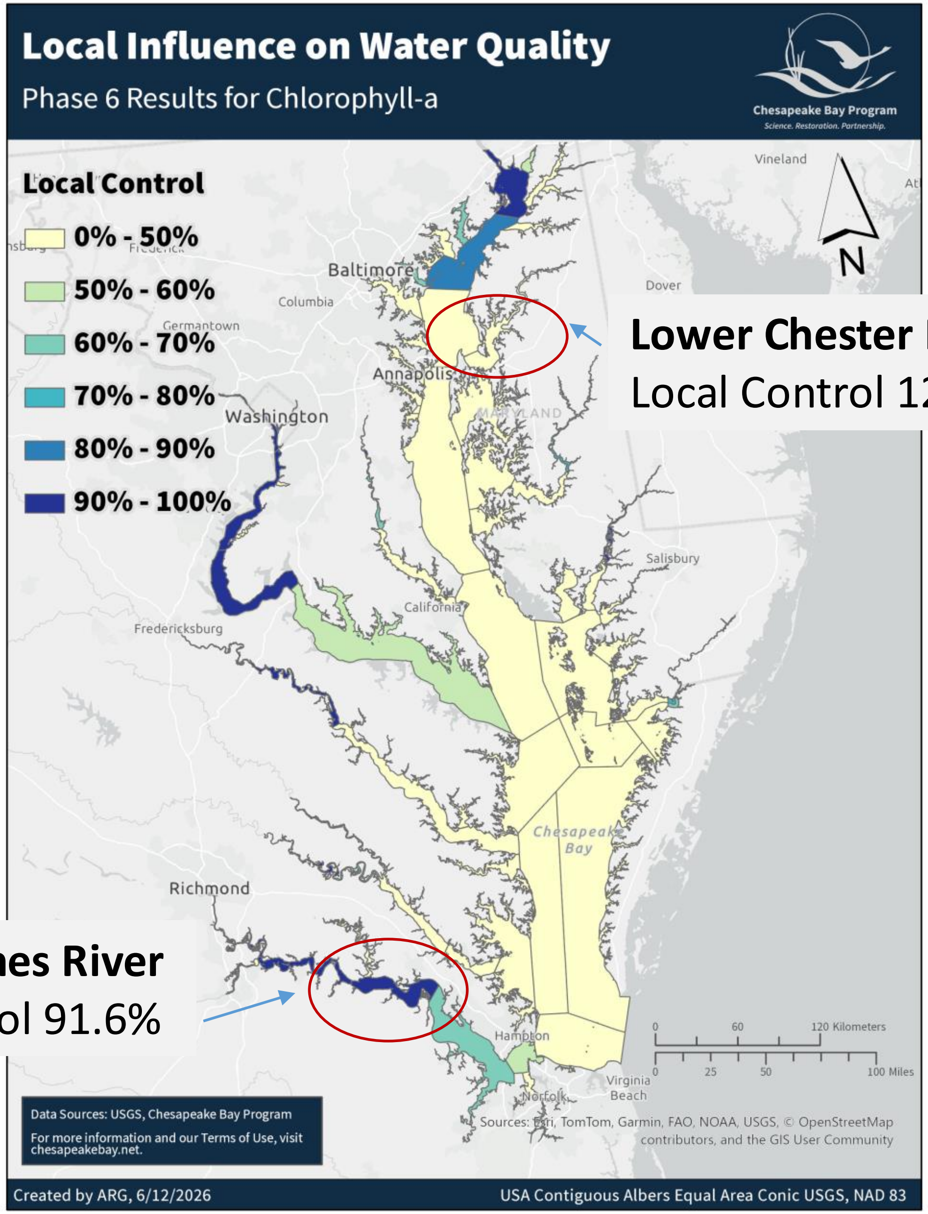
Tiered Implementation Approach

Watershed vs estuarine influence

Identify relative contribution of upstream and estuarine N, P on segment habitat nutrient levels.

How much of a segment's water quality condition is driven by upstream influences versus broader system influences?

- Local fraction of chlorophyll-a
- Geographic isolation runs to help determine relative estuarine influence



Lower Chester River
Local Control 12.8%

Middle James River
Local Control 91.6%

Tiered Implementation Approach

Watershed vs estuarine influence/Local control

Identify relative contribution of upstream and estuarine N, P and sediment on segment habitat nutrient levels.

Freshwater flow from tributaries affects the water quality of tidal segments

- Susquehanna and Potomac--most of the nutrient and sediment load to the Bay
- All tributaries affect Bay and local tidal area

Image Source: Jimmy Webber, USGS.
https://www.chesapeakebay.net/files/documents/RIM_Update_2024_Webber_2025.08.27.pdf

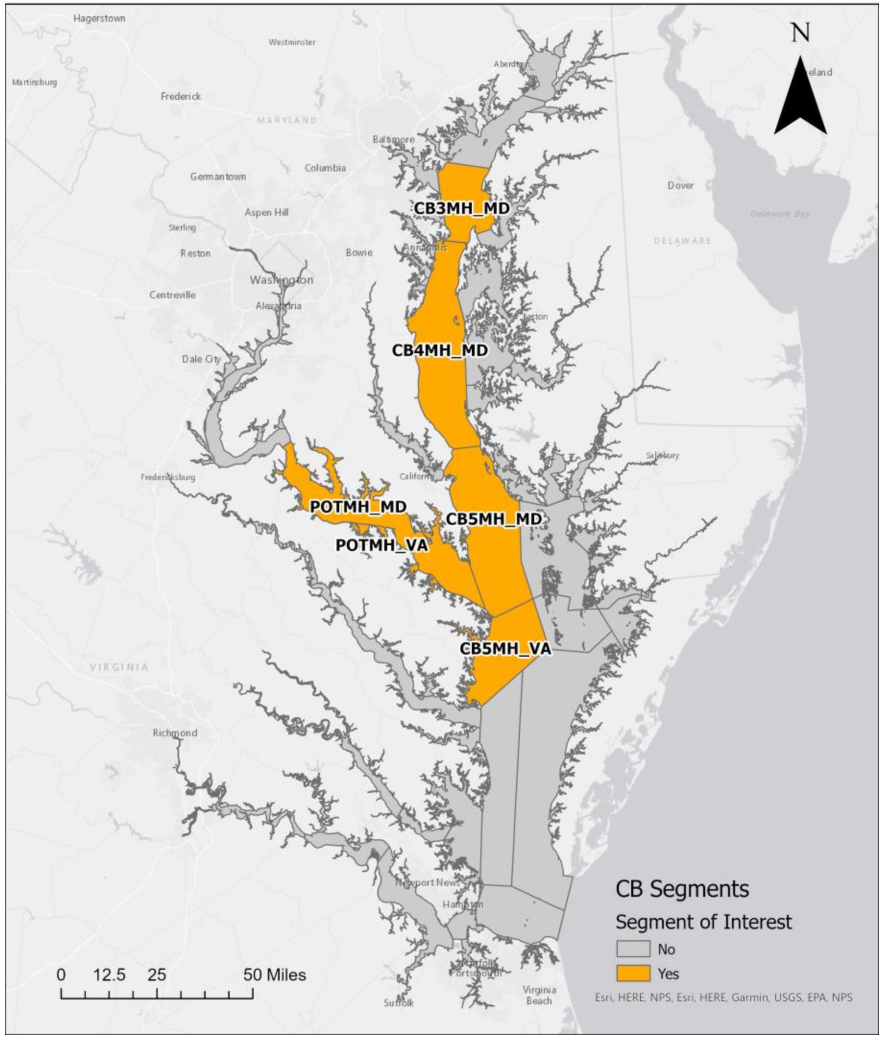
(DM) Setting Planning Targets: Distributing the Loads

More Effective Basins do More

Phase III WIPs relied on relative effectiveness of the state-basin for improving conditions during the summer for

- Deep Water (CB3MH, CB4MH, CB5MH, POTMH)
- Deep Channel (CB3MH, CB4MH, CB5MH)

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

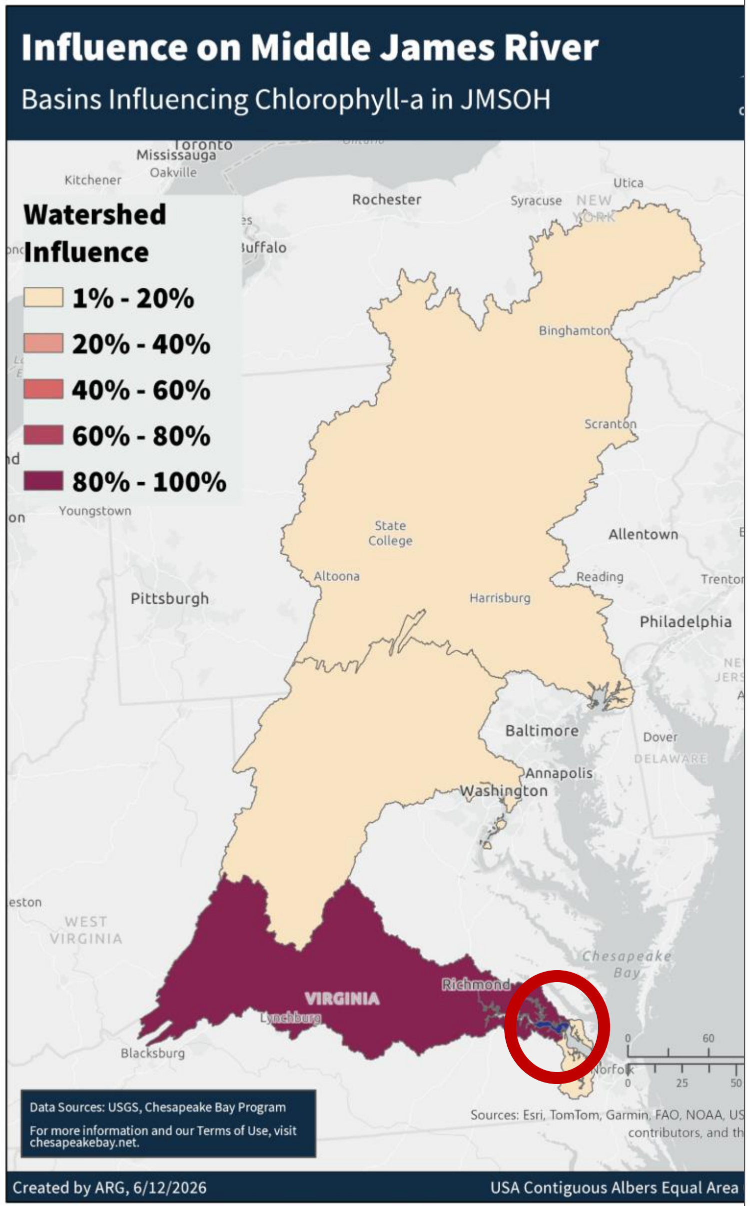


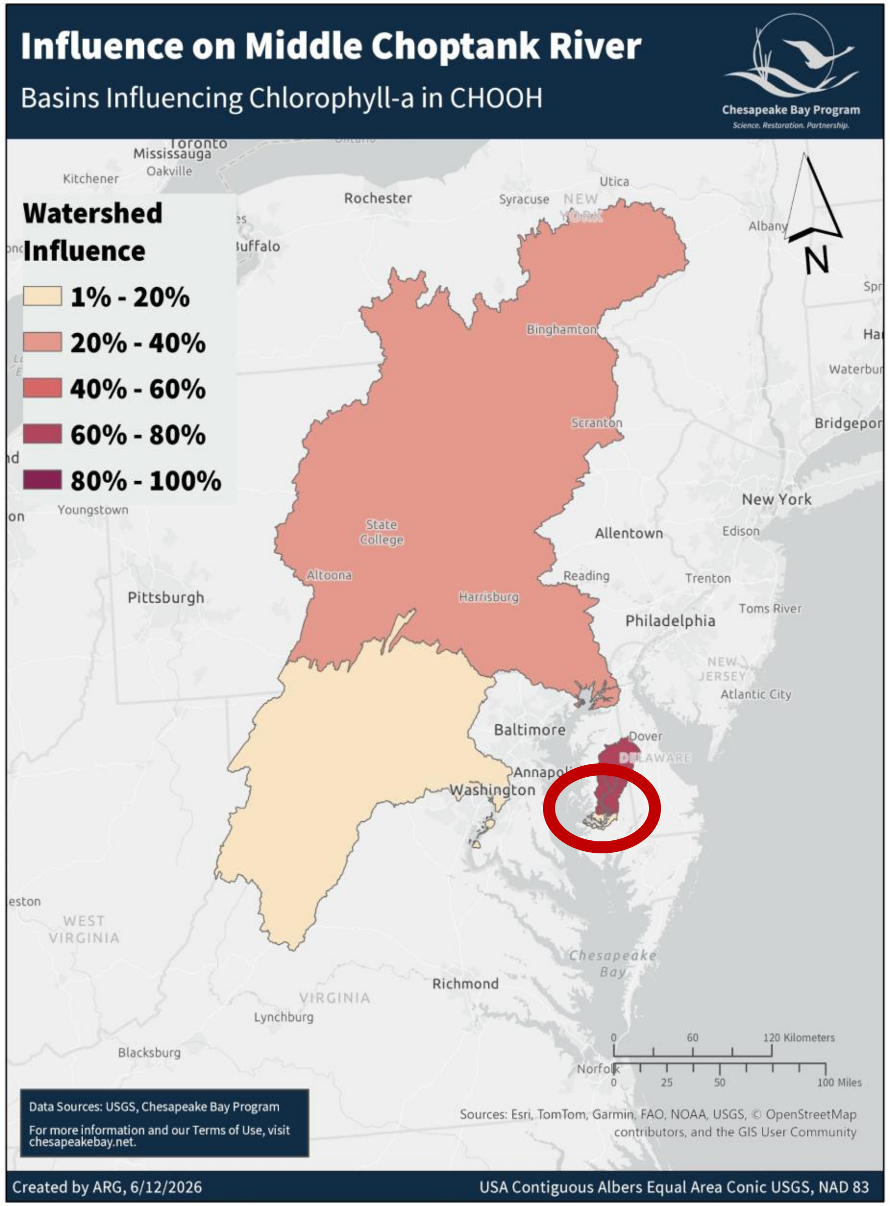
Setting Planning Targets: Tiered Approach

Determine sources of nutrient and sediment loads on localized water quality.

Which upstream places most influence water quality in a Bay segment?

- Geographic isolation runs



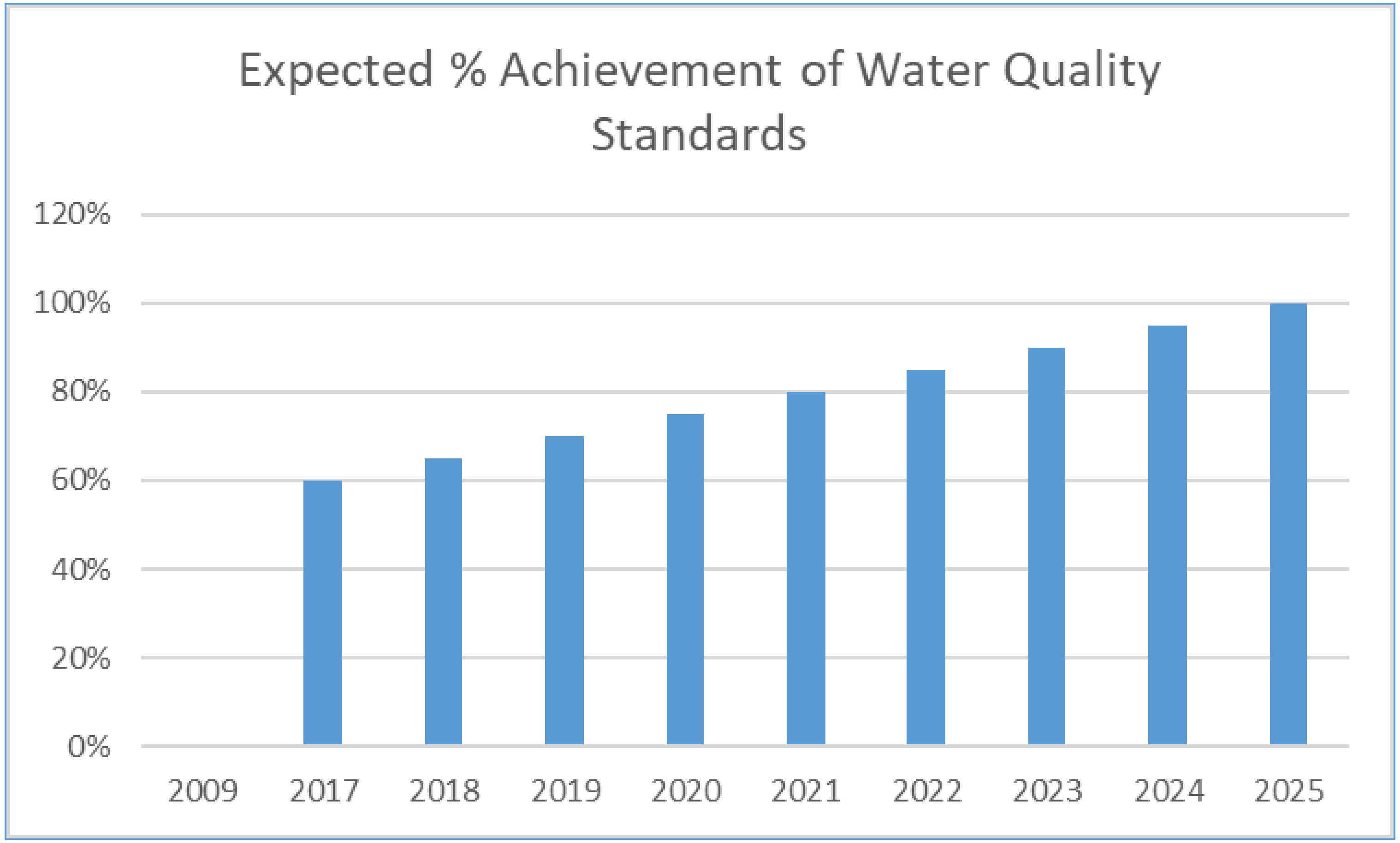


HOW WOULD A FOCUS ON HABITAT IMPROVEMENT AND THE INTRODUCTION OF INTERIM TARGETS AFFECT TRACKING AND REPORTING?

Measuring Progress

How we currently measure implementation progress (default method)

- 2009/2010 TMDL: no reduction presumed
- WIP 2017: Meet 60% of reduction target by 2017
- Straight line trajectory from 2017-2025
- Jurisdictions provided opportunity to define different trajectory.



Measuring Progress

Additional considerations for progress tracking

- What options are available for setting targets and measuring progress at various basin levels?
- How could Eutrophication Units be highlighted?
- How will monitoring data be used alongside modeled data?
- How would habitat improvements be tracked?

DISCUSSION QUESTIONS

- Where are you seeing opportunities to increase, concentrate, or accelerate implementation—either through traditional WIP approaches or through tiered implementation strategies, such as focusing on high-opportunity segments, living resource habitat benefits, or areas with high local control or effectiveness?
- What barriers, constraints, or needs could limit the ability to reach water quality standards?
- What additional information, tools, or analytical capabilities (e.g., BMP opportunity tools, segment-level ecological opportunity data) would most improve your ability to target implementation effectively?

DISCUSSION QUESTIONS

- What targets demonstrate accelerated implementation and closing the gap in meeting water quality standards?
- How should the partnership balance local priorities and habitat-focused gains with the need to maintain long-term alignment with the ultimate WQS-based load targets, particularly if adopting a tiered approach to planning targets?
- What benefits—and potential tradeoffs—do you see in setting 2040 as an interim, rather than ultimate, planning target?