Climate allocation methods

CRWG 4/20/2020

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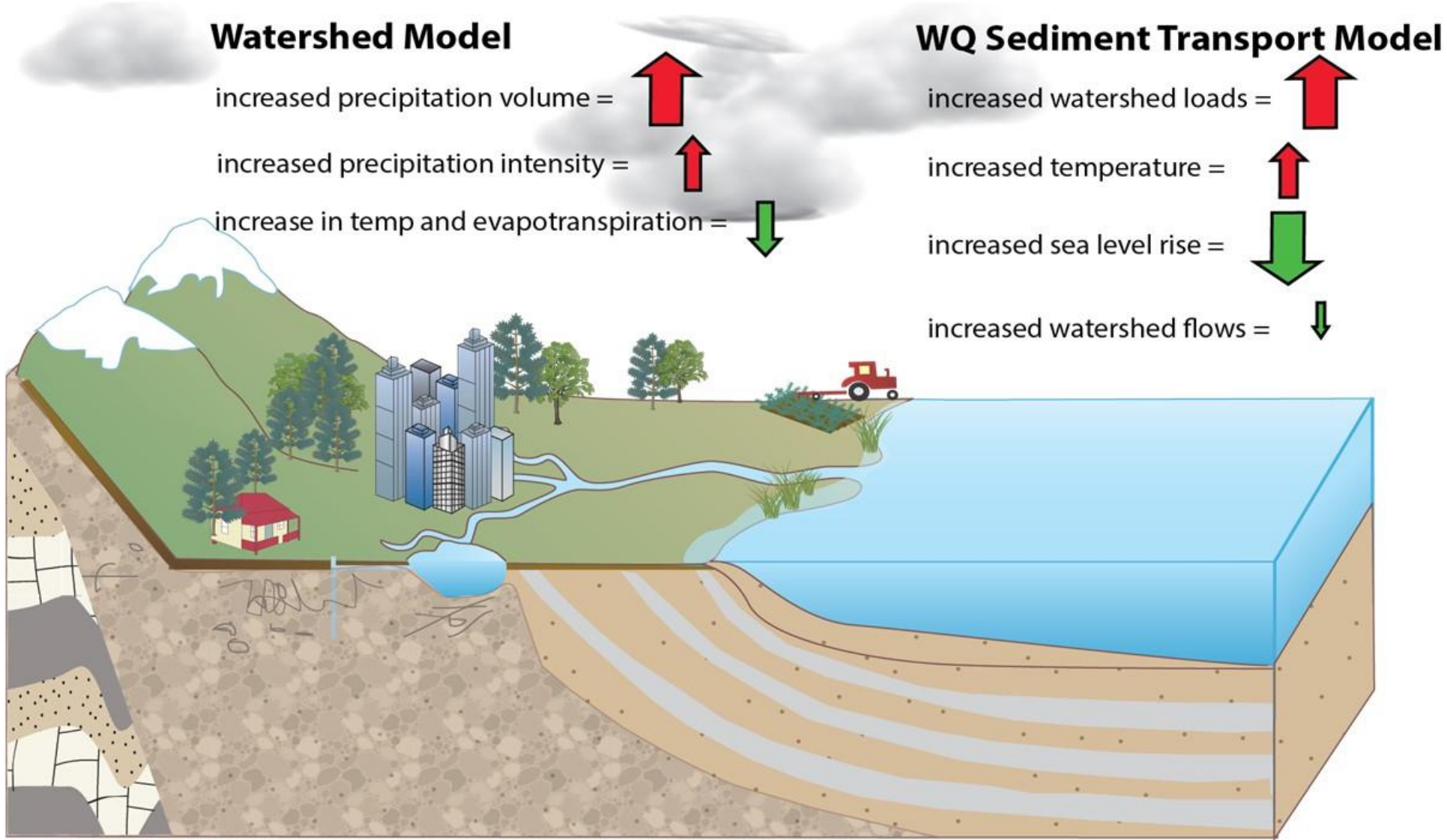
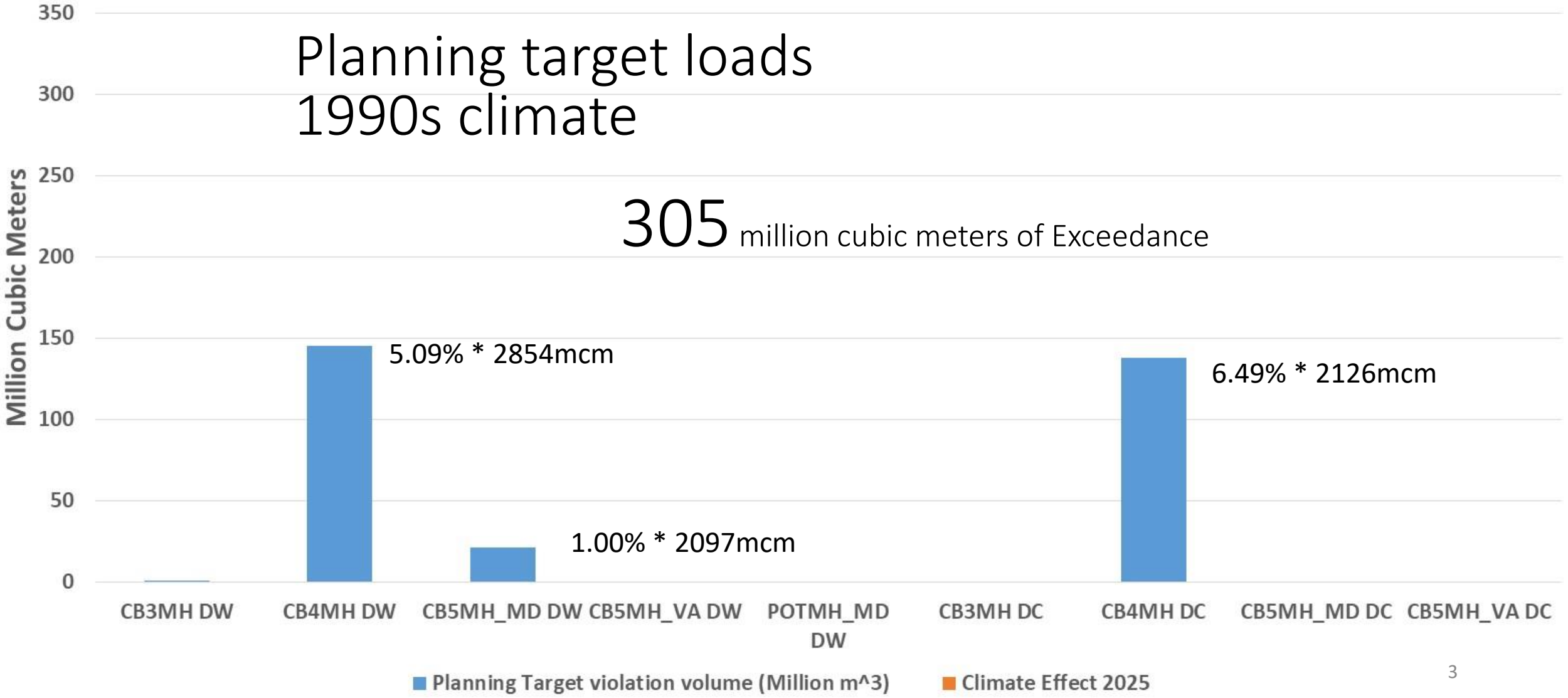
Components of Climate Change – Effect on Tidal Dissolved Oxygen



Climate Change Effect on Main Bay DWDC



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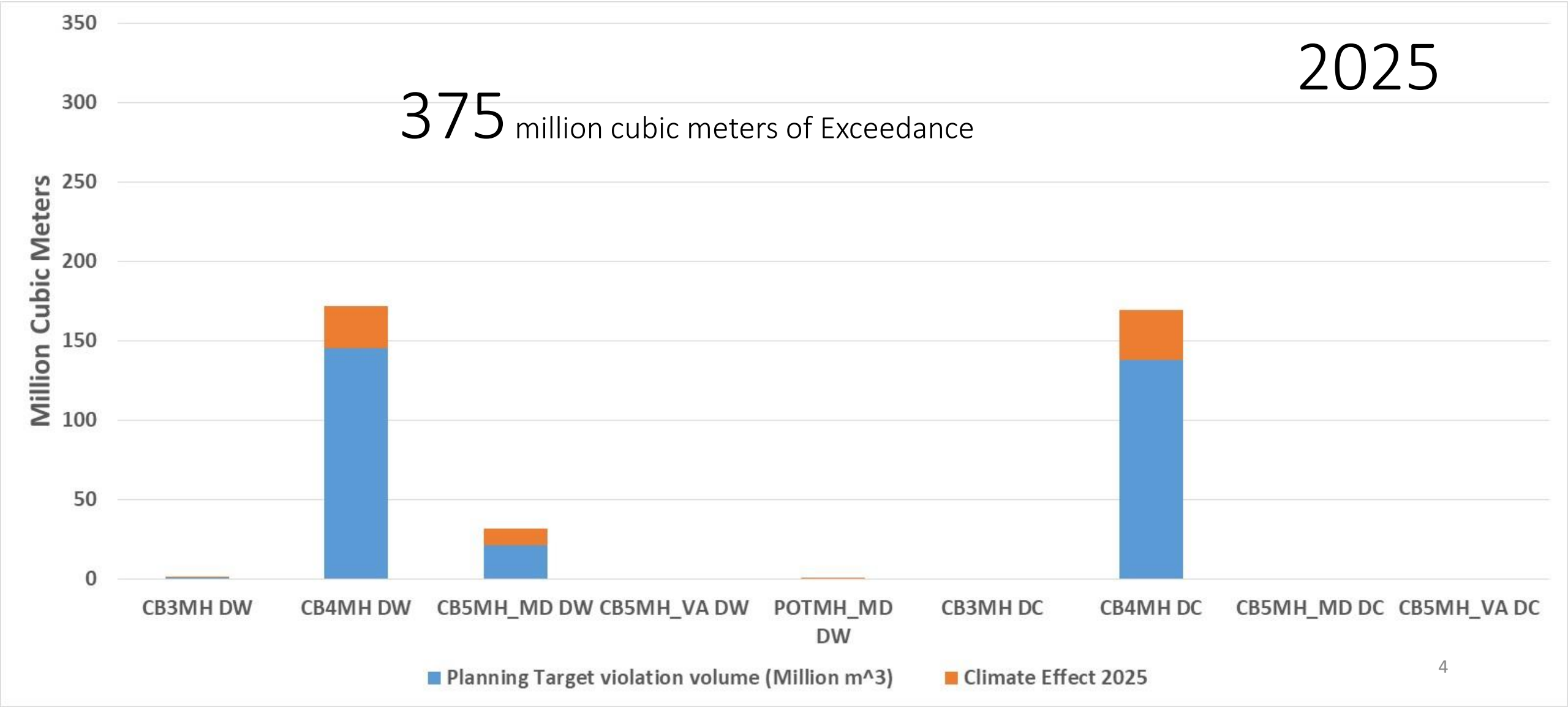


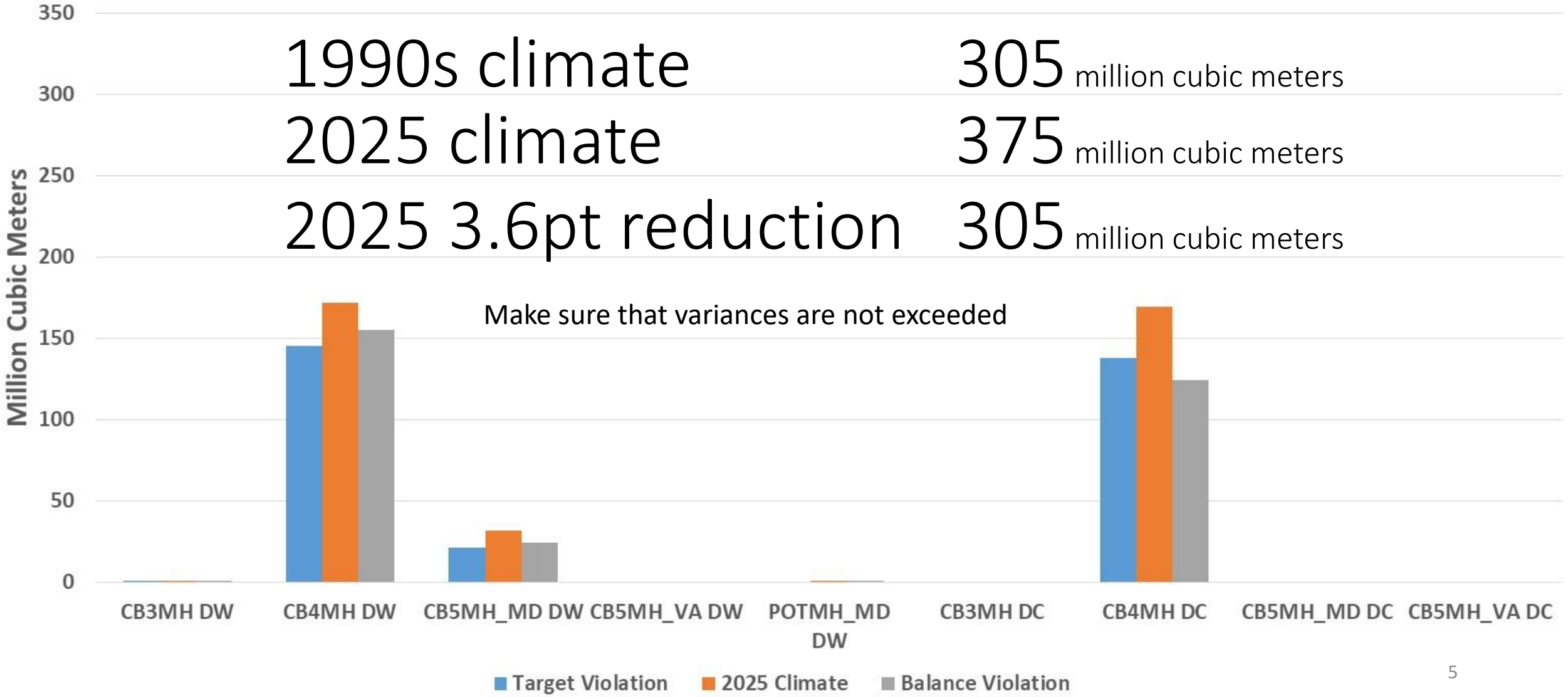
Climate Change Effect on Main Bay DWDC

1990s climate 305 million cubic meters

2025 climate 375 million cubic meters

2025 3.6pt reduction 305 million cubic meters

Make sure that variances are not exceeded



WQGIT Climate Allocation Decisions

- WWTP responsibility
  - Only non-WWTP sources
  - Include WWTP
- Watershed loads first
  - Take out jurisdiction loads first
  - Do not consider jurisdiction loads
- Year
  - 2025
  - 2035
- Open Water
  - How do deal with open water violations in the lower Bay

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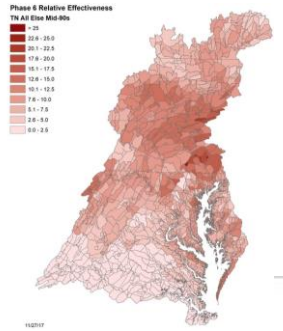
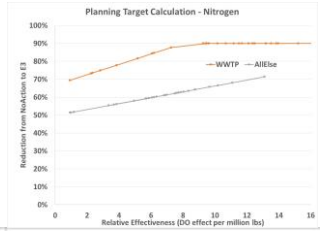
Watershed Loads First





- Ran WQSTM run to show reduced non-attainment for jurisdiction reductions equal to the climate load increase
- Allocated remaining effect

	Climate Increase		Allocated Additional Reduction		Total Reduction
DC	0.00		0.00		0.00
DE	0.00		0.01		0.01
MD	0.11		0.09		0.20
NY	0.04	+	0.01	=	0.06
PA	0.09		0.12		0.21
VA	0.34		0.16		0.49
WV	0.01		0.01		0.02
Total	0.60		0.40		1.00

2025, phosphorus, OWDWDC, non-WWTP example

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Year Decision

- What change to account for –
  - 1995-2025
  - 1995-2035
- When the reductions would need to be accomplished
  - 2025
  - 2035
  - Some other date

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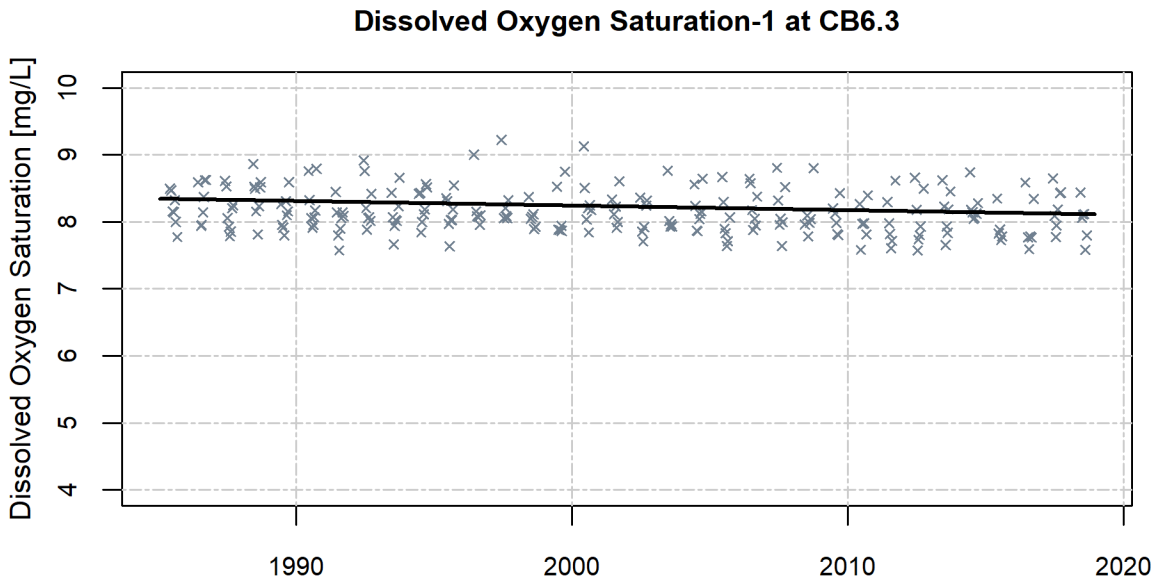
Open water is important!

- The OW criteria are based on living resource needs for striped bass and other important species
- There is a huge amount of open water (2/3 of the Bay)
- It’s the part of the bay that humans interact with

Open water is likely affected by climate change

- Climate change is decreasing the saturation concentration of oxygen
- Open water is more often saturated or super saturated so it will be decreased by a lowering of the saturation level
- Deep water and Deep Channel rarely approach saturation, so lowering of the saturation concentration may have less of an effect



https://www.chesapeakebay.net/content/publications/cbp_13218.pdf

Why are CB6 and CB7 acting so differently?

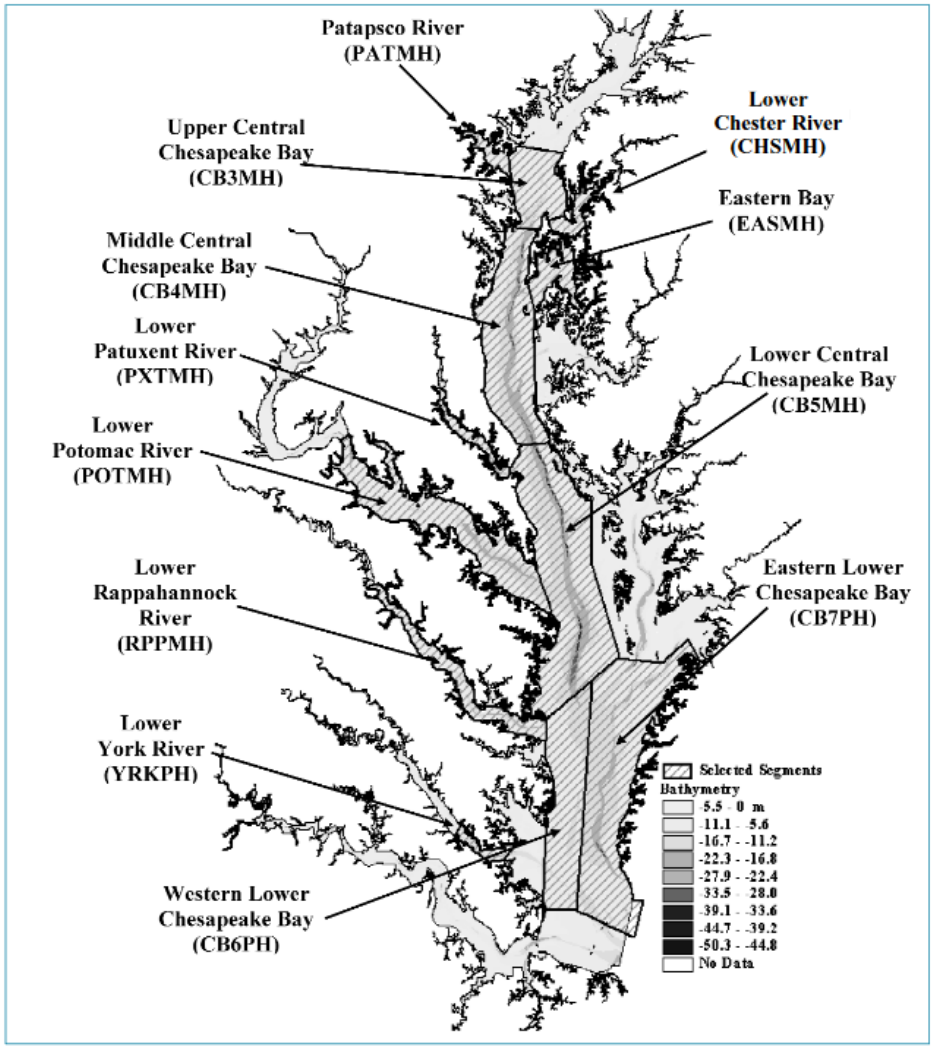


Figure IV-19. Chesapeake Bay Program segments identified as having chronic low dissolved oxygen

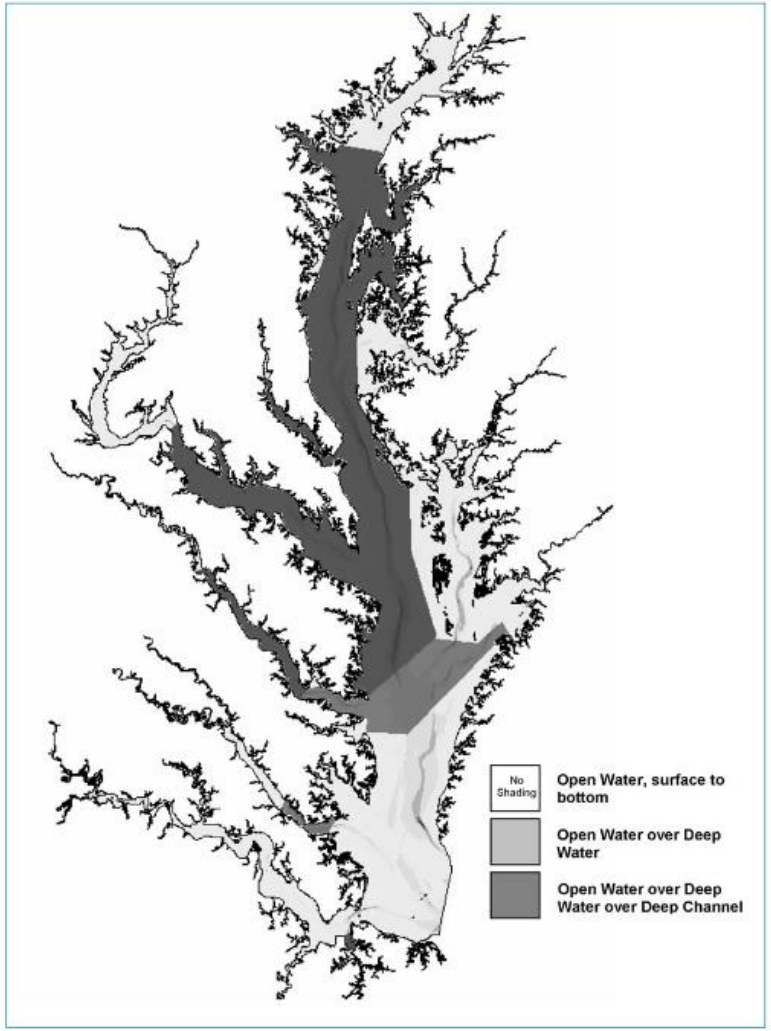


Figure IV-23. Map showing the dissolved oxygen designated uses of the Chesapeake Bay and its tidal tributaries.

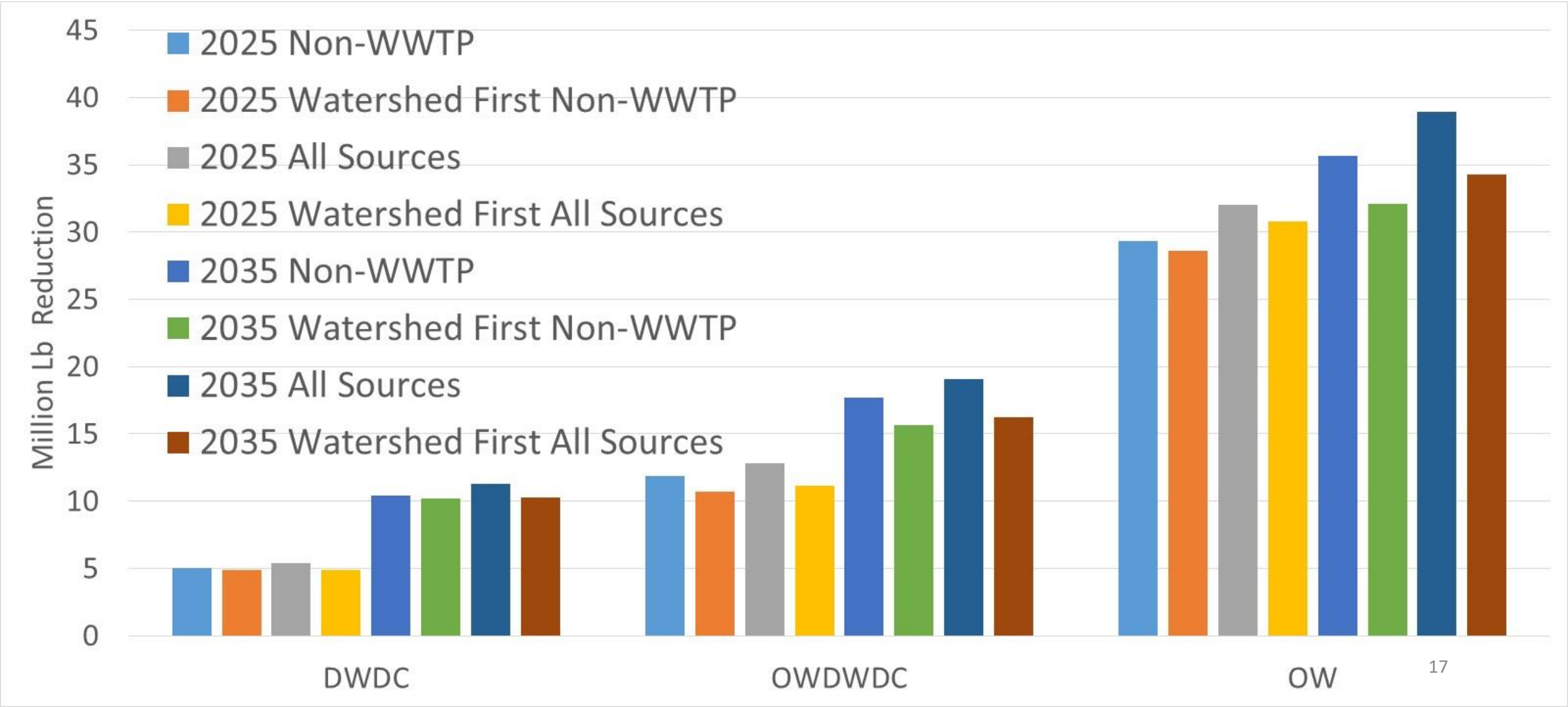
- 2003 Technical Support Document

"The delineation of the boundary was determined by examining maps of contemporary dissolved oxygen concentration distributions and the anecdotal historical dissolved oxygen concentration data record."

Open Water Thoughts

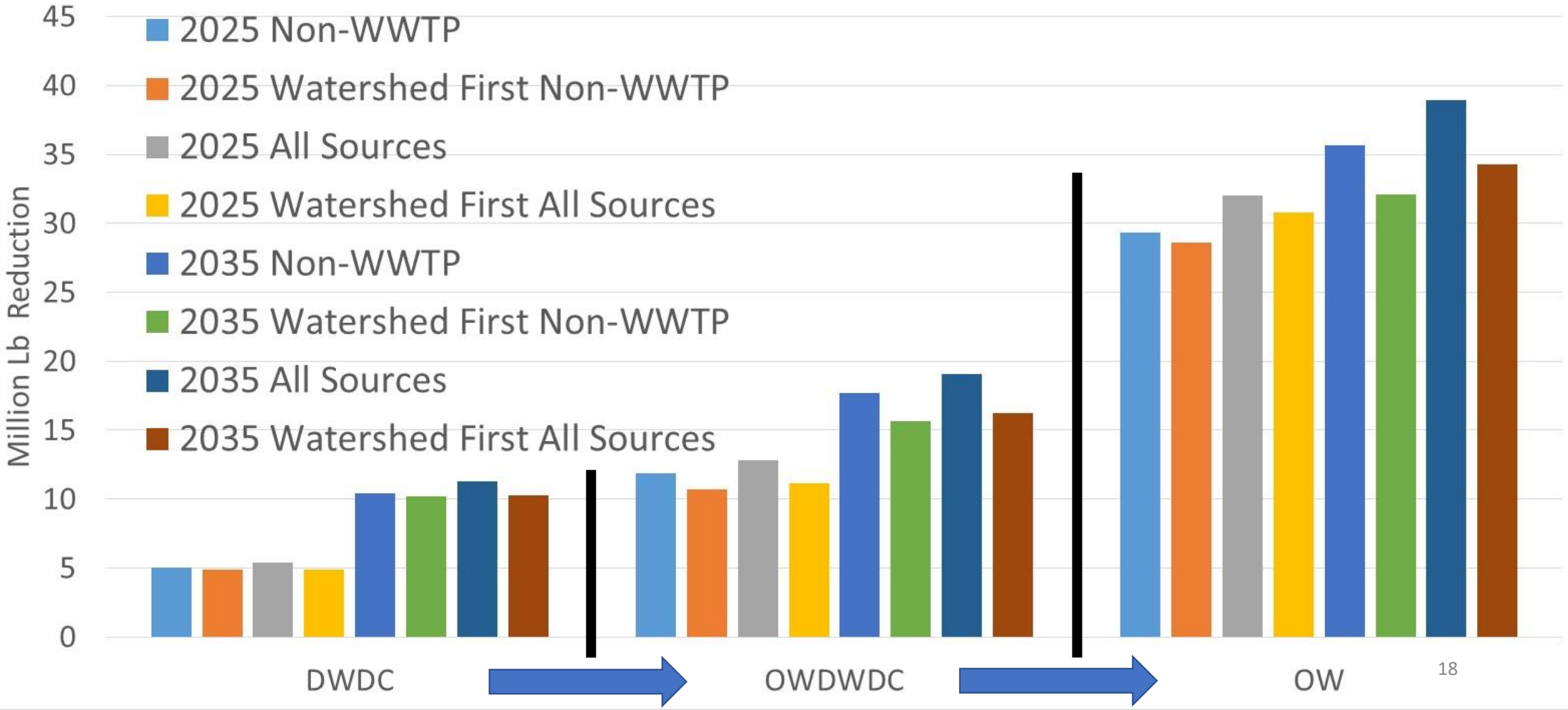
- Open water is an important use for living resources
- Open water may be more affected by temperature due to concentrations closer to saturation
- The Modeling Workgroup did not advocate for the WQGIT to drive allocations with CB6 and CB7 open water
  - Relatively insensitive to load reductions
  - No other Mainstem Open Water violations through 2055
    - Other large rivers mostly have no violations through 2055
  - Strong dependence on the appropriate delineation between ‘Open Water over Deep Water’ and ‘Open Water to the bottom’

Nitrogen Total Reductions



Nitrogen Total Reductions

- **Open Water is a big lift**
- 2035 increases effort substantially
- Including WWTP increases necessary reductions
- Watershed loads first are a little lower for N



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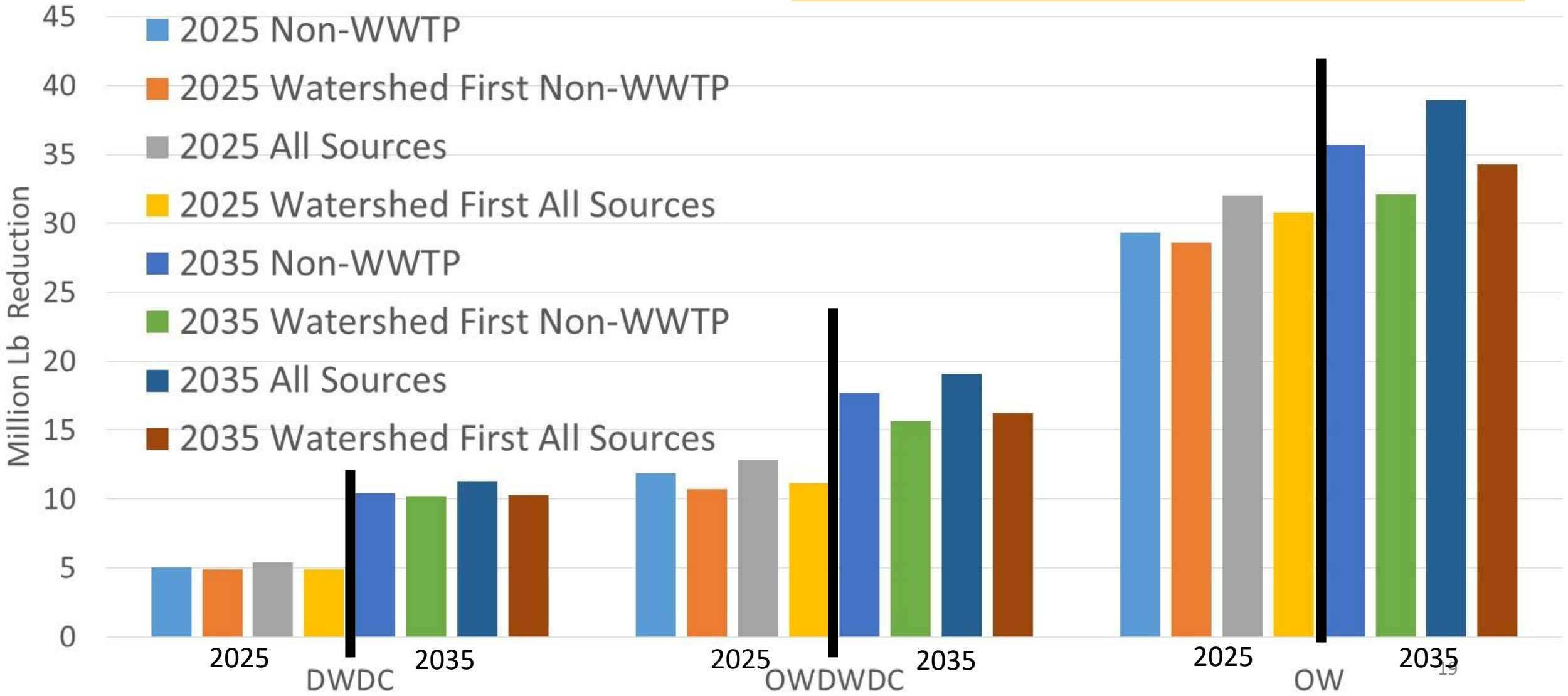

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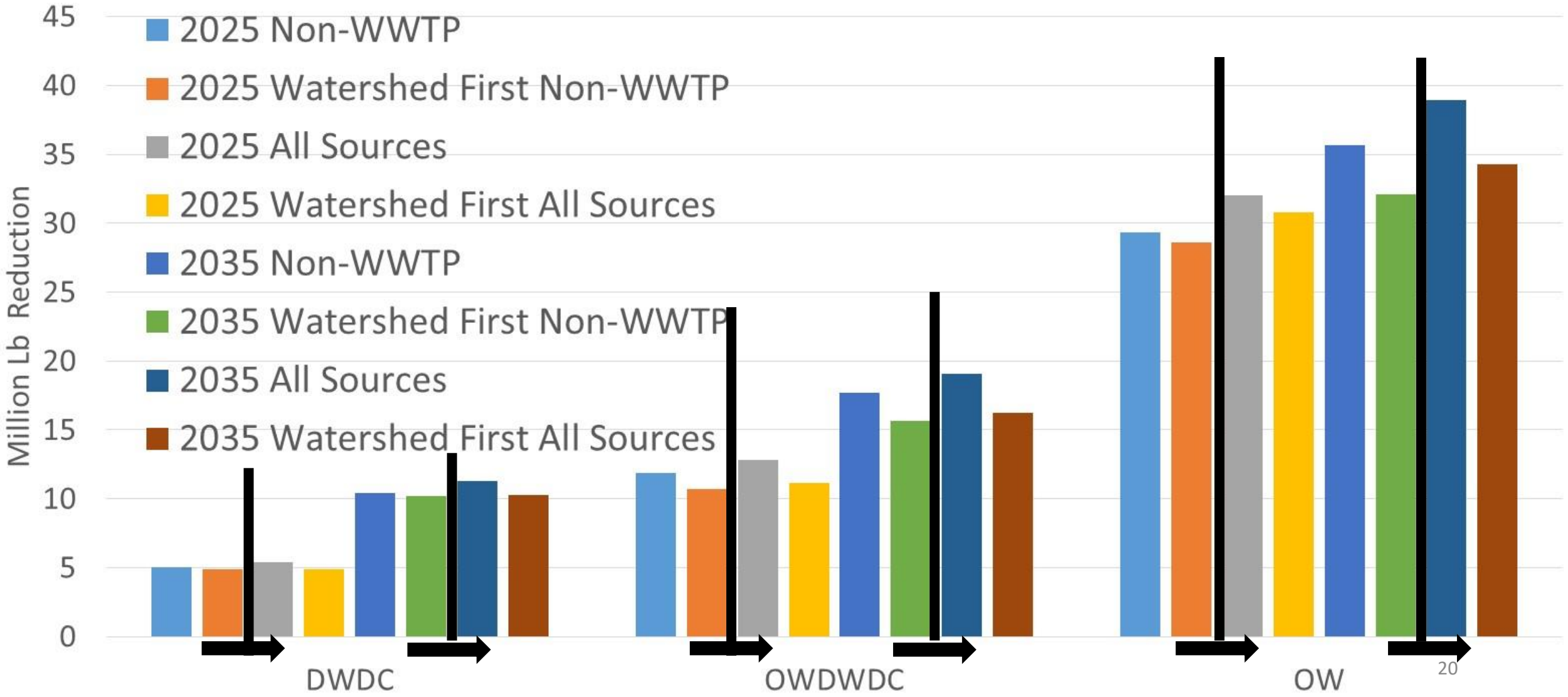

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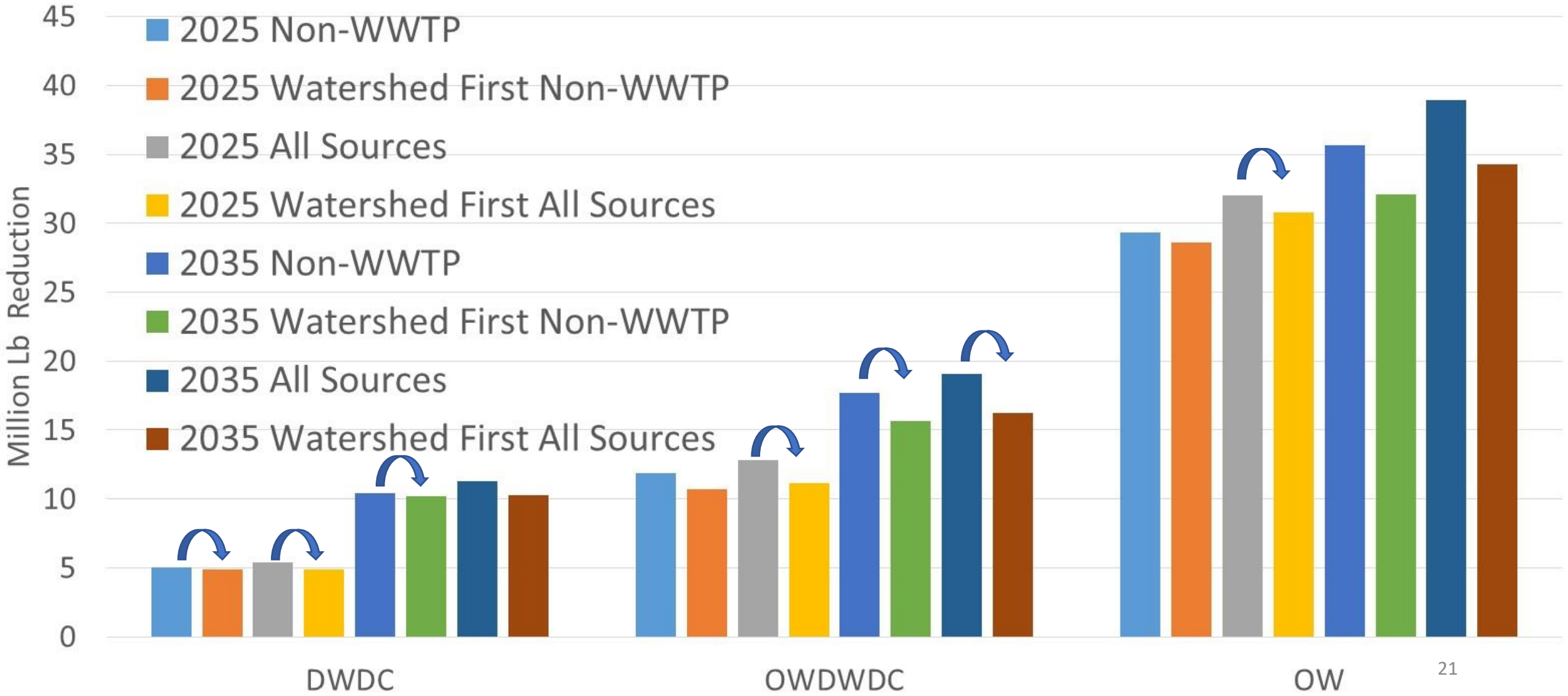

Phosphorus Total Reduc

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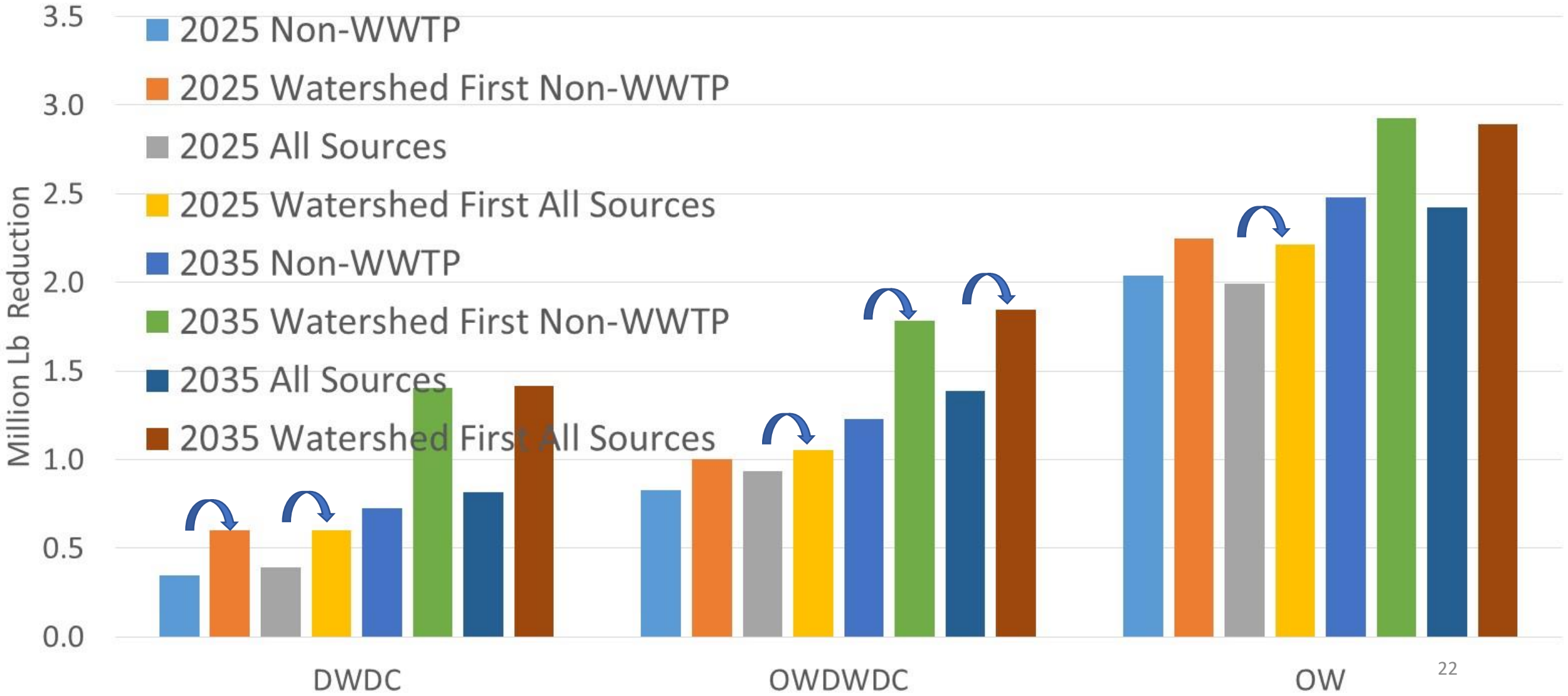
- Including WWTP increases necessary reductions
- **Watershed loads first is a larger reduction for P**



Summary

- Climate change effects on dissolved oxygen criteria attainment were assessed in the CBP model
- Additional load reductions to account for climate change calculated

- WQGIT to consider climate allocation options
  - Include CB6 and CB7 Open Water?
  - Include responsibility for WWTP loads?
  - Reduce watershed loads first and allocate the rest?
  - 2025 or 2035?