



**Department of the Environment**

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# Maryland Coastal Bays: TMDL Development Update

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**Maryland Department of the Environment**

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# Presentation Outline

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- Brief Introduction
- Modeling Approach
- Water Quality Standards and TMDL Modeling Endpoints
- Status, Schedule and Timeline of TMDL Development
- Q/A





# Impairments Under Investigation

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- 1996: All Coastal Bays listed as impaired by nutrients.
- Some areas have nutrient TMDLs in place (Newport Bay and areas of Isle of Wight Bay).
- Areas needing TMDLs include:
  - Assawoman Bay (02130102)
    - Greys Creek
    - Open water
  - Isle of Wight Bay (02130103)
    - Manklin Creek
    - Open water
  - Sinepuxent Bay (02130104)
  - Newport Bay (02130105)
    - Marshall Creek
  - Chincoteague Bay (02130106)





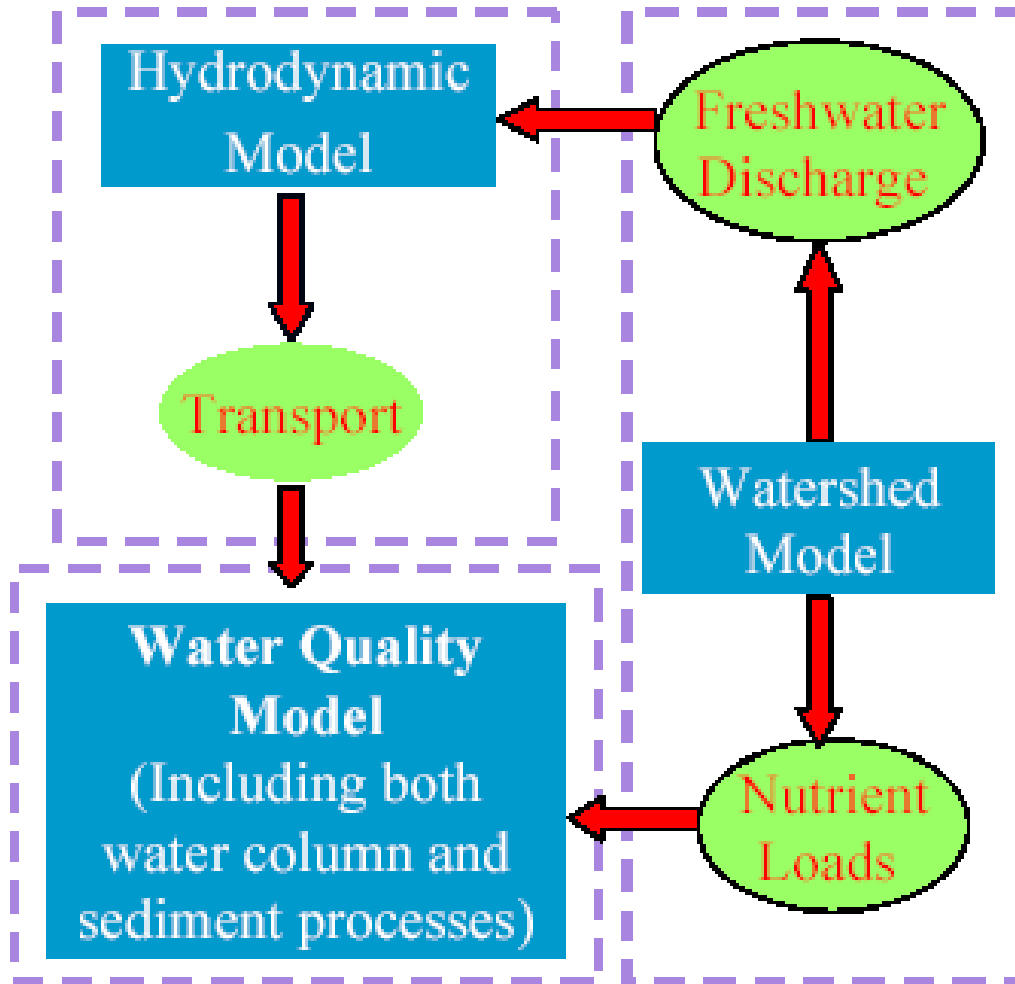
# MDE's Modeling Approach

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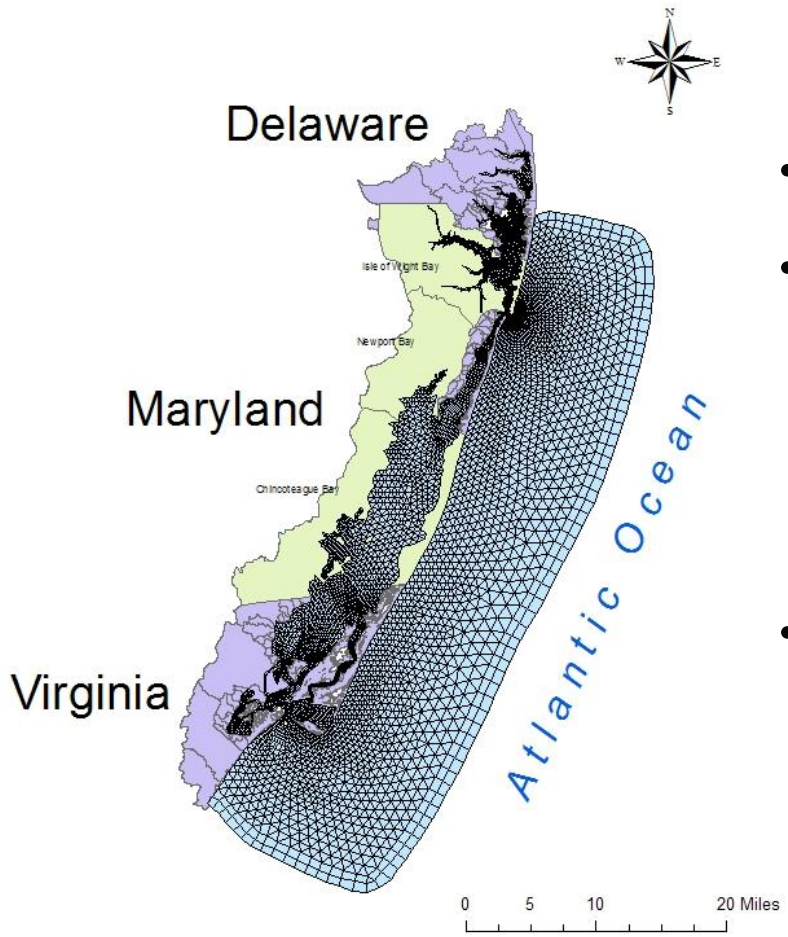
- MDE is currently developing a linked modeling system to address Coastal Bays impairments.
  - Watershed Model (HSPF)
    - University of Maryland
  - Hydrodynamic Model/Water Quality Model (UnTRIM/CE-QUAL-ICM)
    - Virginia Institute of Marine Science
      - Includes sediment process component



# Schematic of the Modeling Framework for TMDL Development

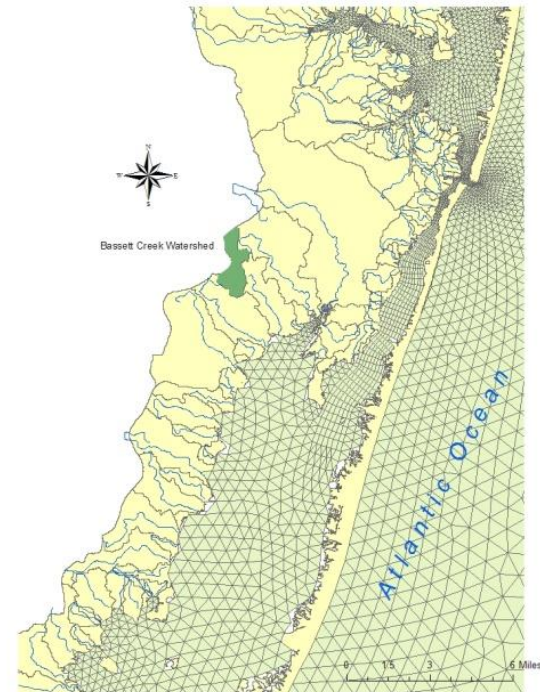
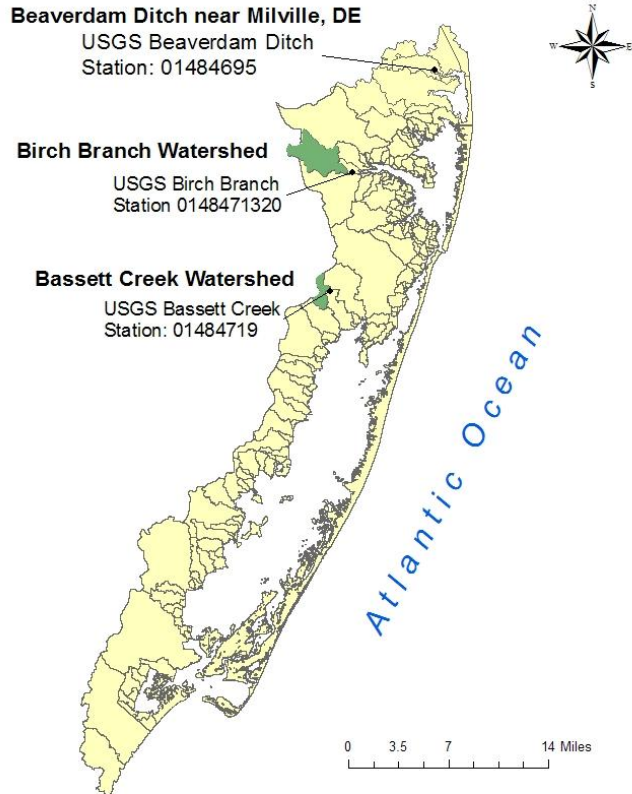


# Watershed Segmentation Procedure



- Delaware Inland Bays model
- MD-8 digit watersheds (Includes State boundary)
  - Delineation to USGS calibration stations
  - Automated based on DEMs
- Delineated to match hydrodynamic model grid

# Watershed Model Segmentation



- Delaware (Inland Bays model)
  - Delaware Department of Planning Land Use Database.
- Maryland
  - Worcester County Land Use database (2009)
  - CBPO land use classification for agricultural categories
- Virginia
  - National Land Cover Data (USGS, 1999)
    - CBPO land use classification for agricultural categories





# TMDL/Modeling Endpoints

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- Must be protective of Designated Uses per Code of Maryland Regulations
  - Seek to protect SAV grow zones



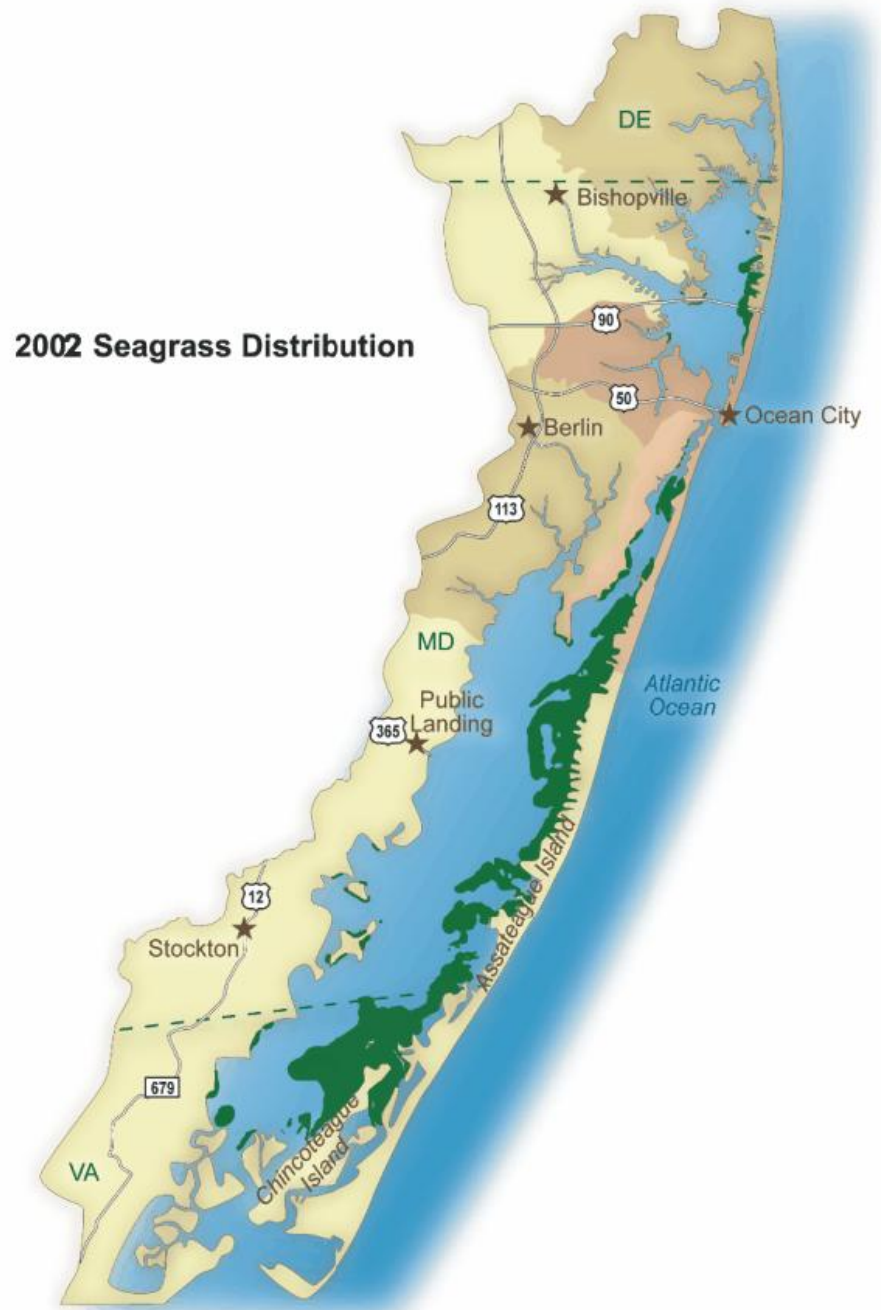
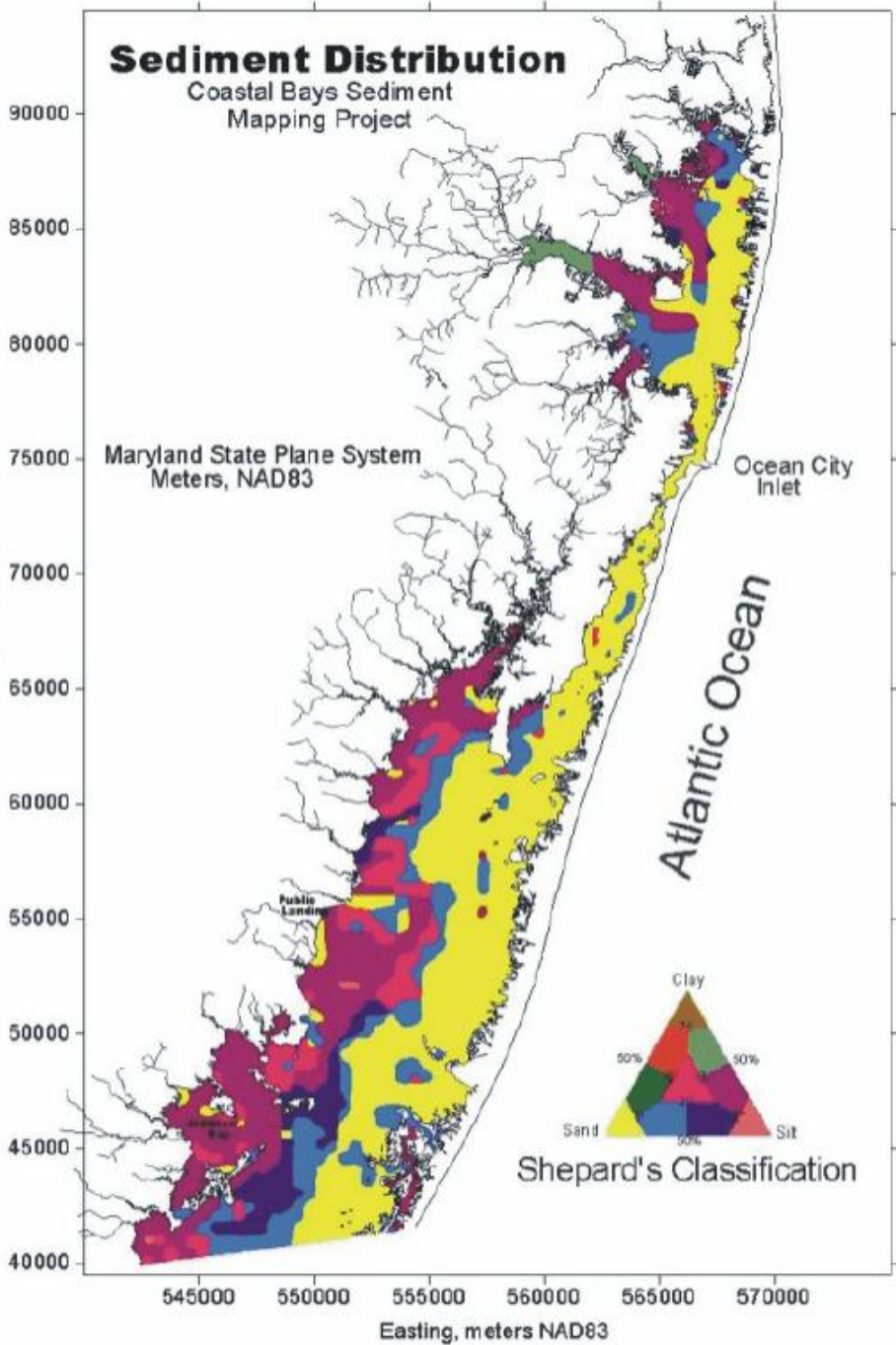
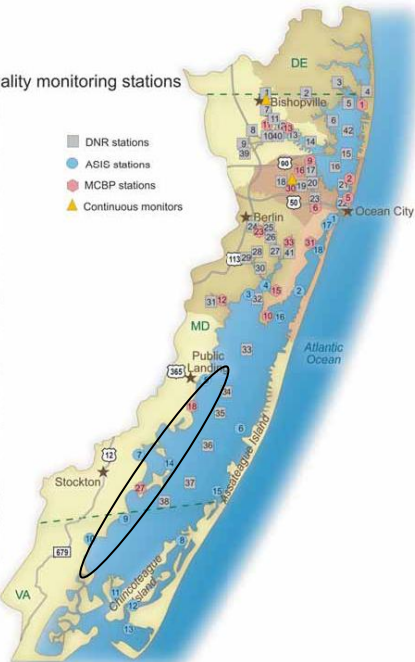


Figure 5-1: Total seagrass coverage in the Coastal Bays derived from 2002 Virginia

Water quality monitoring stations

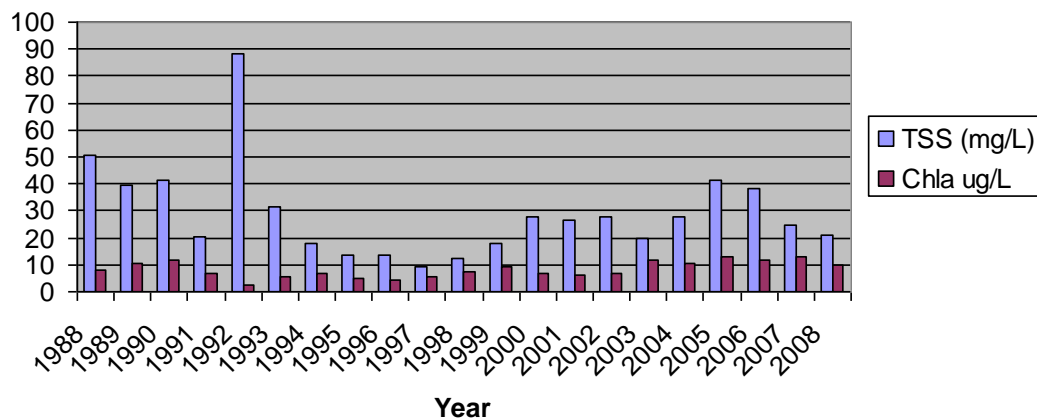
- DNR stations
- 1. BSH0030
- 2. GET0005
- 3. XDN7545
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- 6. XDN5724
- 7. XDM4486
- 8. BIH0009
- 9. BNT0012
- 10. TUV0034
- 11. BSH0008
- 12. XDN4797
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- 16. XDN2340
- 17. MKL0010
- 18. TUV0034
- 19. TUV0019
- 20. TUV0011
- 21. XDN2438
- 22. XDN0146
- 23. HEC0012
- 24. KIT0015
- 25. BOB0001
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- 27. TRC0043
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- 29. BMC0011
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- 31. MSL0011
- 32. XCM4878
- 33. XCM1562
- 34. XCM0159
- 35. XBM8149
- 36. XBM5932
- 37. XBM3418
- 38. XBM1301
- 39. XME0011
- 40. SPR0002
- 41. AYRO017
- 42. XDN4851

- DNR stations
- ASIS stations
- MCBP stations
- ▲ Continuous monitors



Mean Chla= 8.3µg/L Mean TSS=25.2mg/L

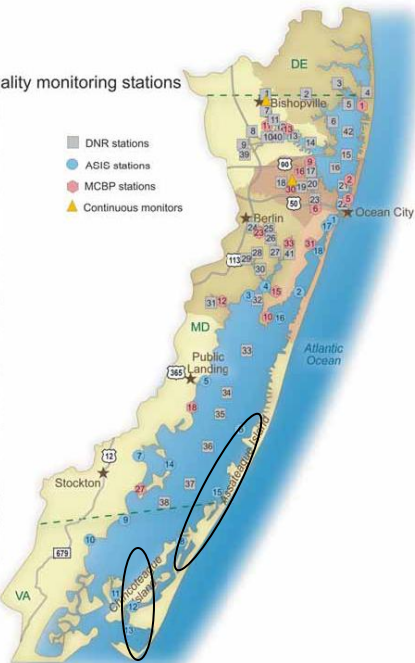
### Chincoteague Bay-West Part (A5,7,9,10,14) grow season (apr-oct) average



Water quality monitoring stations

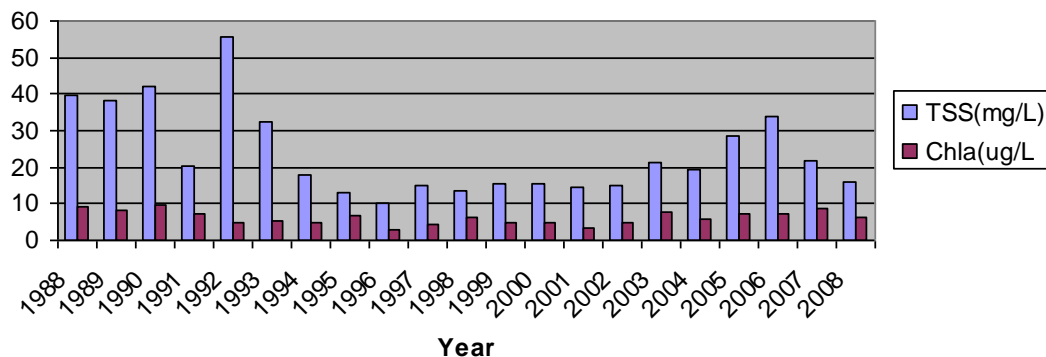
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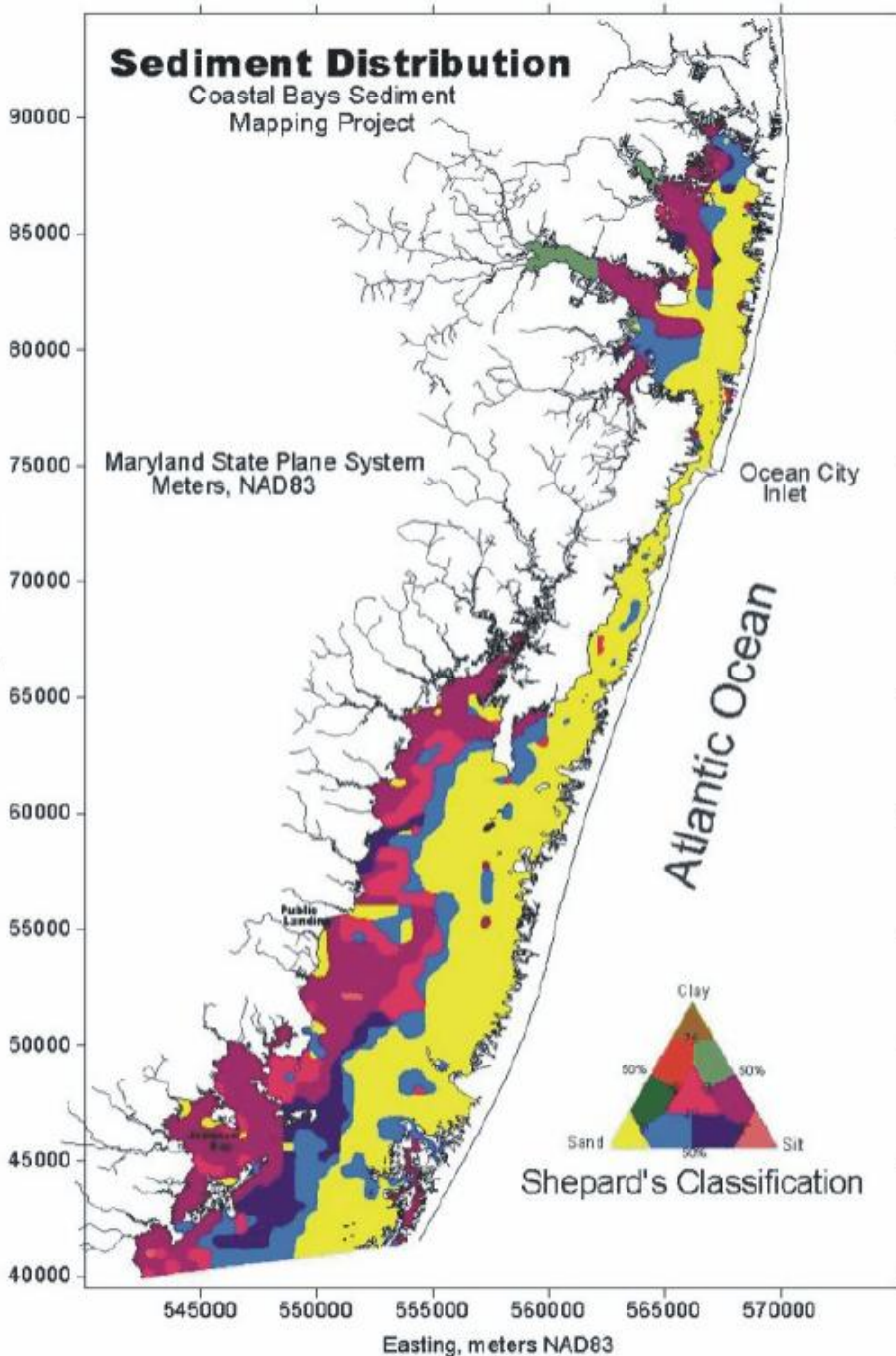
Mean Chla= 5.9µg/L Mean TSS=20.8mg/L

### Chincoteague Bay-East Part-major SAV area(A6,8,11-13,15) grow season(apr-oct) average



# Sediment

- Re-suspension is wind driven
- Composition varies spatially
- TSS is a significant factor in water clarity





# Current designated uses and criteria

- Designated Uses in Coastal Bays are:
  - Water Contact Recreation (Use I)
  - Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting (Use II)
- Dissolved Oxygen Criteria (Numeric)
  - MD: 5 mg/l DO at any time
  - VA: 5mg/L min/ 6mg/L daily average DO
  - DE: 5mg/L daily average DO
- Narrative Nutrient Criteria for Chlorophyll *a* in MD
  - Not to exceed levels that result in ecologically undesirable consequences



# Prior and Existing Efforts:

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- Maryland TMDLs:
  - 50-100 $\mu$ g/L – Estuarine systems (based on Thomann and Mueller, 1987)
  - 10 $\mu$ g/L mean; 30 $\mu$ g/L 90<sup>th</sup> percentile –Reservoirs and Lakes (drinking water supply)
- DE Inland Bays TMDLs: 20 $\mu$ g/L
- NC TMDLs: 40 $\mu$ g/L
- Chesapeake Bay SAV goals: 15 $\mu$ g/L
  - Also MD-Coastal Bays Program SAV habitat goals



# Options Examined

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- Option 1: Use 50 $\mu$ g/L (as used in previous TMDLs)
- Option 2: Develop regional chlorophyll *a* targets using an optical model
- Option 3: Use values from other systems or literature
- Option 4: Use 15 $\mu$ g/L in SAV grow zones

# Recommended Endpoint(s):

- **Combined Approach:**
  - 15µg/L in SAV grow zones
  - 50µg/L in non – SAV grow zones
- Defensible
- Practical
  - Compatible with sampling
  - Recognizes variability throughout the Coastal Bays system
- Protective of SAV
- Protective against DO/Nuisance Issues



# TMDL Development Status and Timelines



# TMDL Development Schedule and Status

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- Watershed model development and calibration virtually complete; technology transfer to MDE underway.
- January – March:
  - Calibration of Water Quality Model (VIMS)
  - Scenario Runs Setup (MDE)
  - Post Processing Setup (MDE)
- March:
  - Technical Workgroup Meeting; comprehensive update
- March – April:
  - VIMS TMDL Scenario Development





# TMDL Development Schedule (cont'd)

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- June:
  - MDE Internal Review
- July:
  - Interagency Review
    - Opportunity for STAC and others to review
- August:
  - Public Comment Period
- September 30: Submittal to U.S. EPA

# Questions?



# Contact Information

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