Using CAST to Develop Implementation Plans that Meet Loading Targets in the Chesapeake Bay Watershed

Webcast sponsored by EPA's Watershed Academy

Thursday, November 09, 2017
1:00pm – 3:00pm Eastern

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Chesapeake Bay Program Office
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Annapolis, Maryland

and

Olivia Devereux, Environmental Scientist
Devereux Environmental Consulting

Webcast Logistics

- **To Ask a Question** – Type your question in the "Questions" tool box on the right side of your screen and click "Send."
- **To report any technical issues** (such as audio problems) – Type your issue in the "Questions" tool box on the right side of your screen and click "Send" and we will respond by posting an answer in the "Questions" box.

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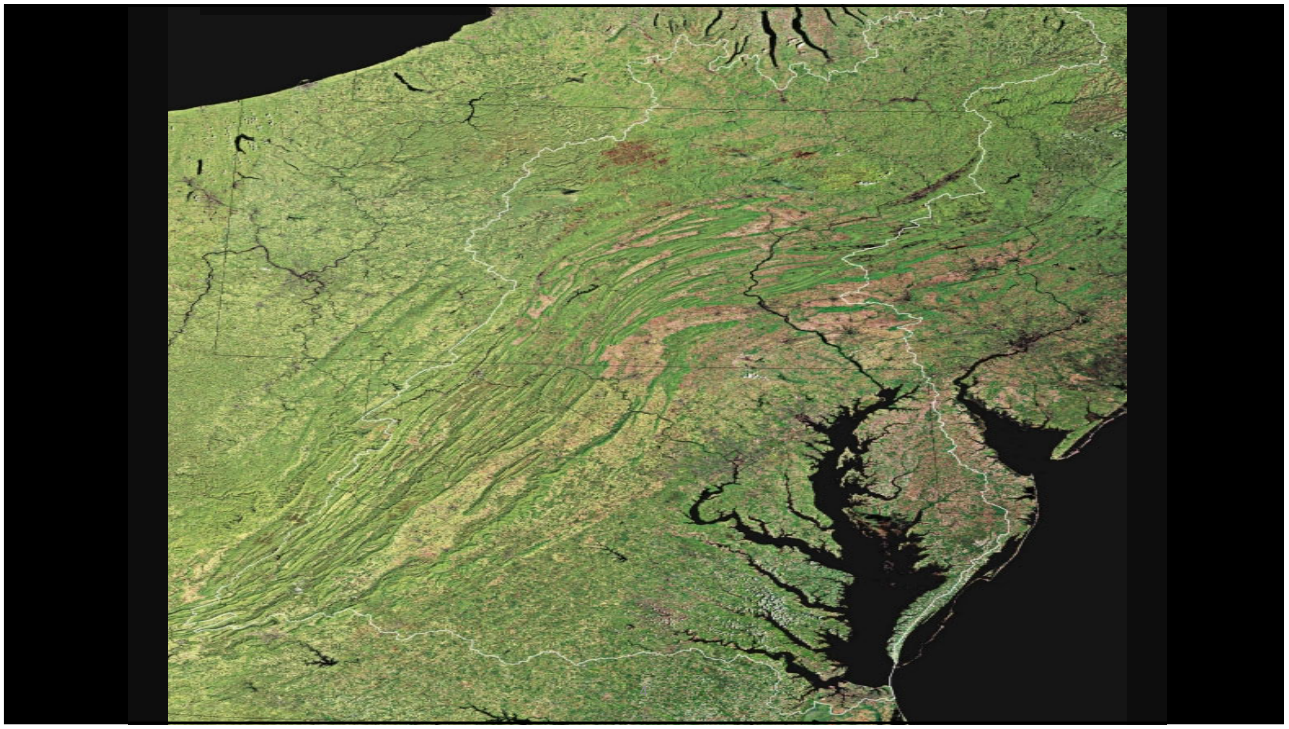
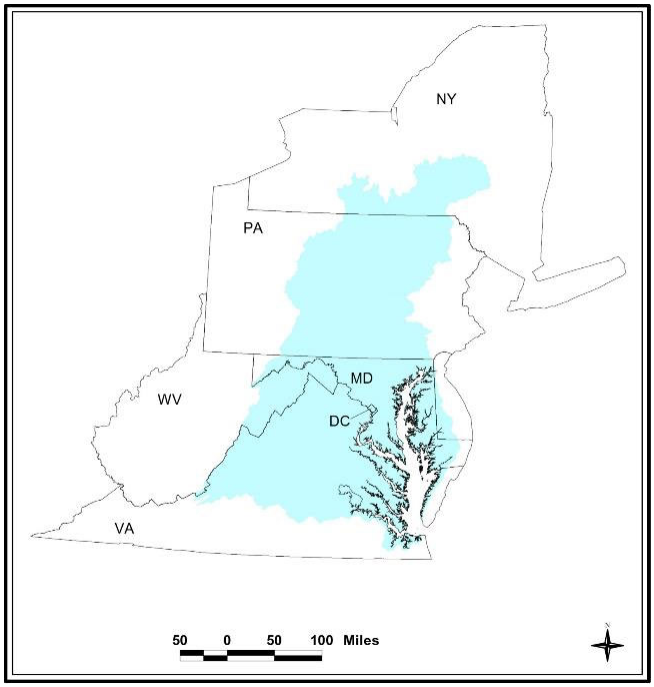
Speakers

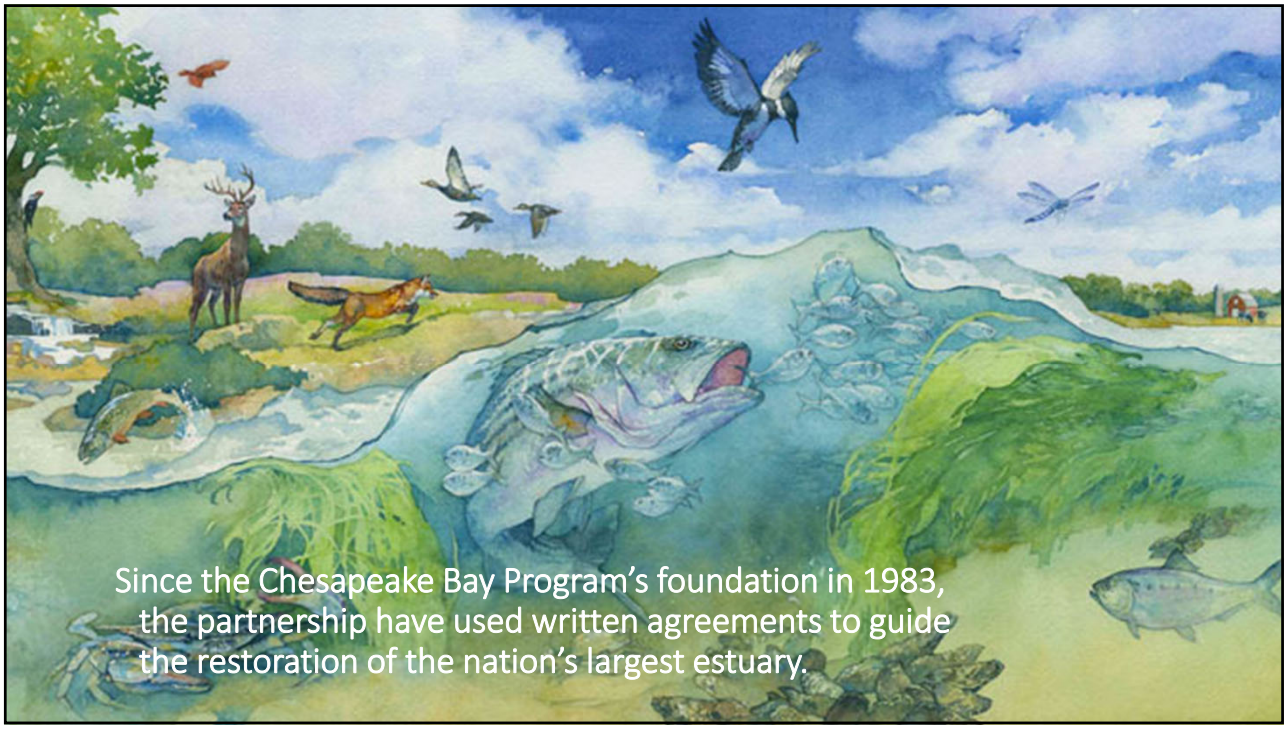
- **Rich Batiuk**, Associate Director for Science, Analysis and Implementation Chesapeake Bay Program Office, U.S. Environmental Protection Agency, Annapolis, Maryland
- **Olivia Devereux**, Environmental Scientist, Devereux Environmental Consulting



Chesapeake Bay Statistics

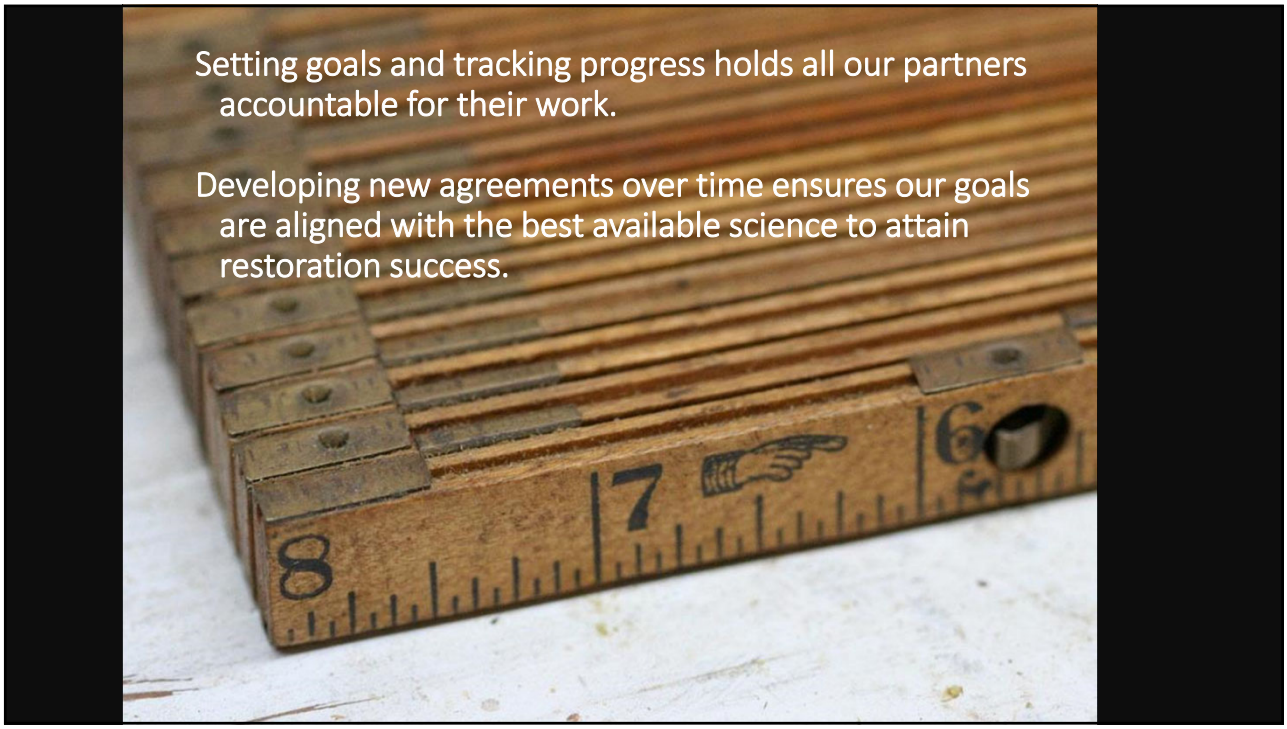
- Six states and DC
- 64,000 sq. mile watershed
- 719,000 sq. mile airshed
- 18 million people and growing
- 78,000 family farms
- 470 significant and 3,000+ nonsignificant dischargers
- Over 10,000 miles of shoreline
- 21 feet average depth
- 15:1 ratio of watershed to tidal surface waters

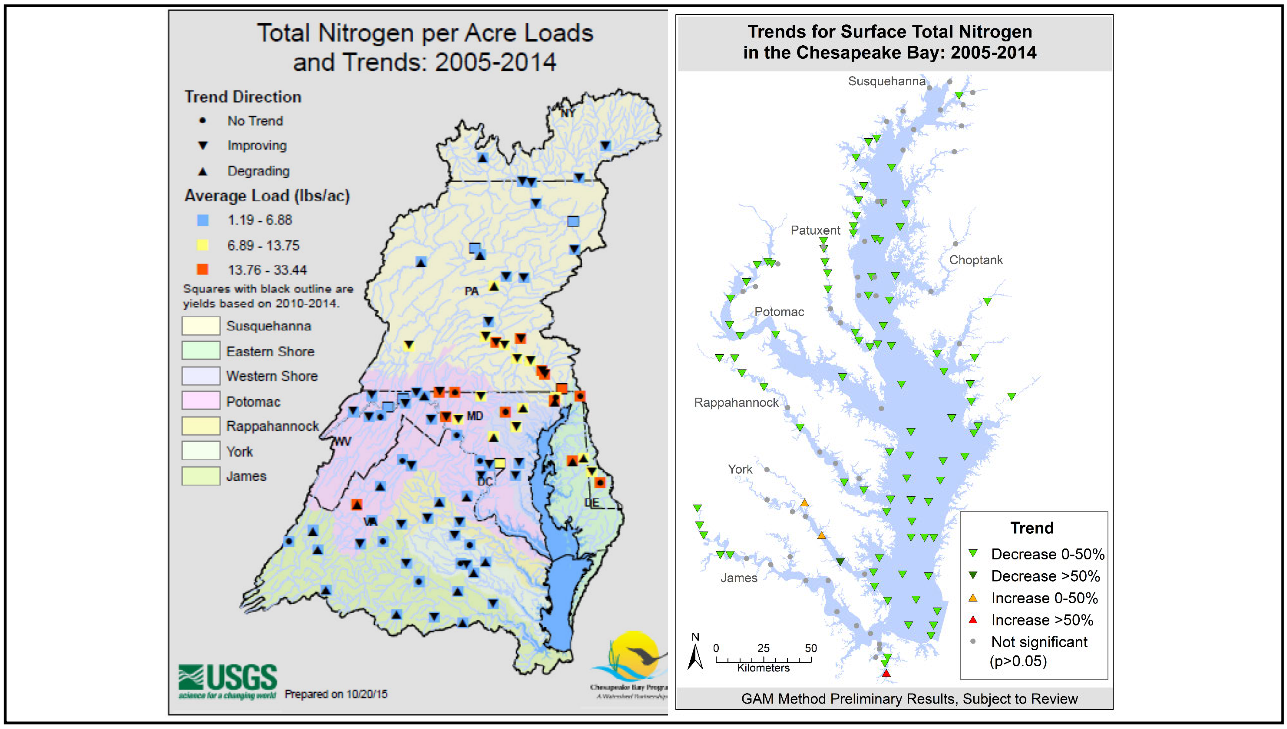




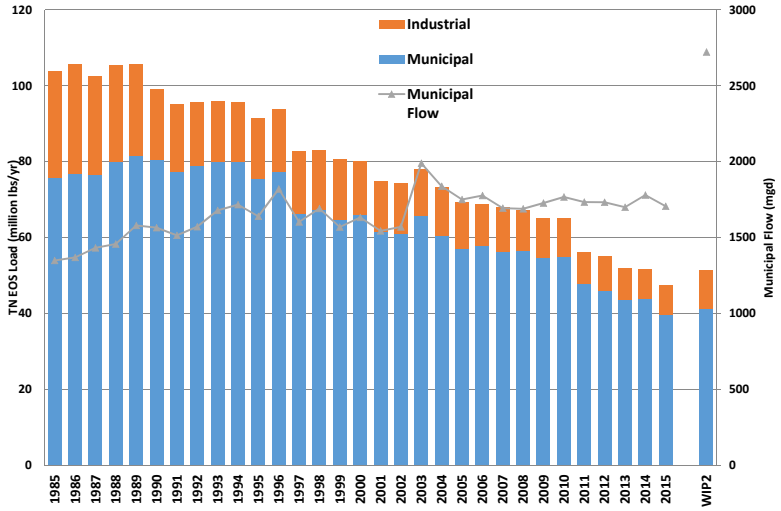
The Chesapeake Bay Restoration: A 50-Year History with a Challenging Future

- 1960s-70s Visible decline in Bay resources
- 1967 Chesapeake Bay Foundation established
- 1976-1982 EPA conducts 5-year Bay study
- 1980 Chesapeake Bay Commission established
- 1983 **First Bay Agreement** – Chesapeake Bay Program created
- 1987 **Second Bay Agreement** – WQ Goals: 40% Reduction
- 1992 Amendments to Agreement – Tributary Strategies
- 2000 **Third Bay Agreement** – Precursor to Chesapeake Bay TMDL
- 2008 Acknowledged Bay impairments will not be addressed by 2010
- 2010 Chesapeake Bay TMDL established
- 2014 **Fourth Bay Agreement** – focused on Bay and watershed restoration
- 2017 Interim target of 60% of Bay TMDL loads achieved
- 2025 100% of practices implemented to achieve TMDL allocations

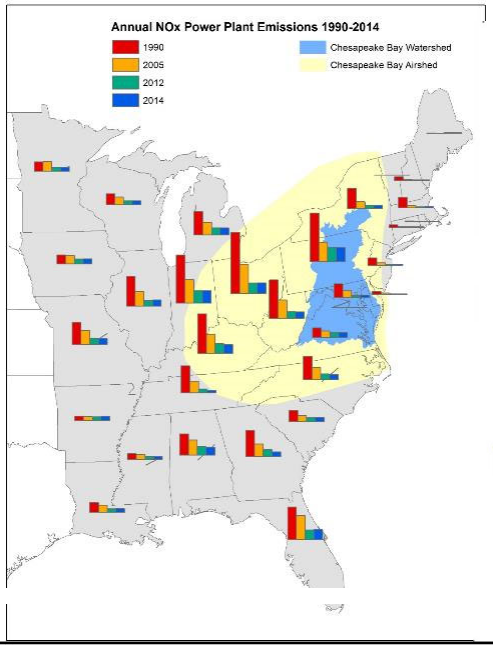

Setting goals and tracking progress holds all our partners accountable for their work.
Developing new agreements over time ensures our goals are aligned with the best available science to attain restoration success.

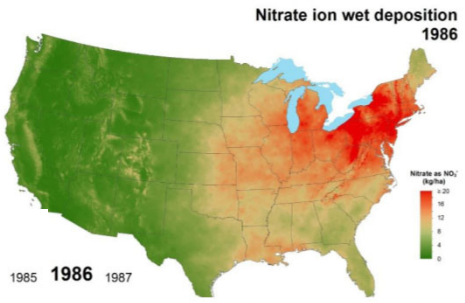

Total Nitrogen per Acre Loads and Trends: 2005-2014
Trend Direction
No Trend
Improving
Degrading
Average Load (lbs/ac)
1.19 - 6.88
6.89 - 13.75
13.76 - 33.44
Squares with black outline are yields based on 2010-2014.
Susquehanna
Eastern Shore
Western Shore
Potomac
Rappahannock
York
James
NY
PA
MD
WV
DC
DE
VA
USGS
Prepared on 10/20/15
Trends for Surface Total Nitrogen in the Chesapeake Bay: 2005-2014
Susquehanna
Patuxent
Choptank
Potomac
Rappahannock
York
James
N
0 25 50
Kilometers
Trend
Decrease 0-50%
Decrease >50%
Increase 0-50%
Increase >50%
Not significant (p>0.05)
GAM Method Preliminary Results, Subject to Review

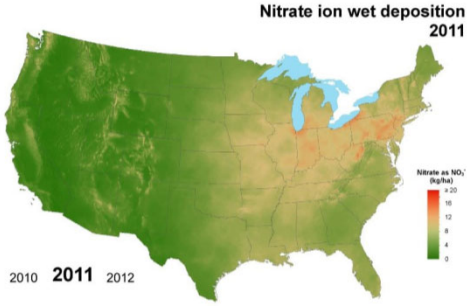
Chesapeake Bay Watershed Municipal and Industrial Wastewater Treatment Facilities Achieved their 2025 Goal a Decade Early!



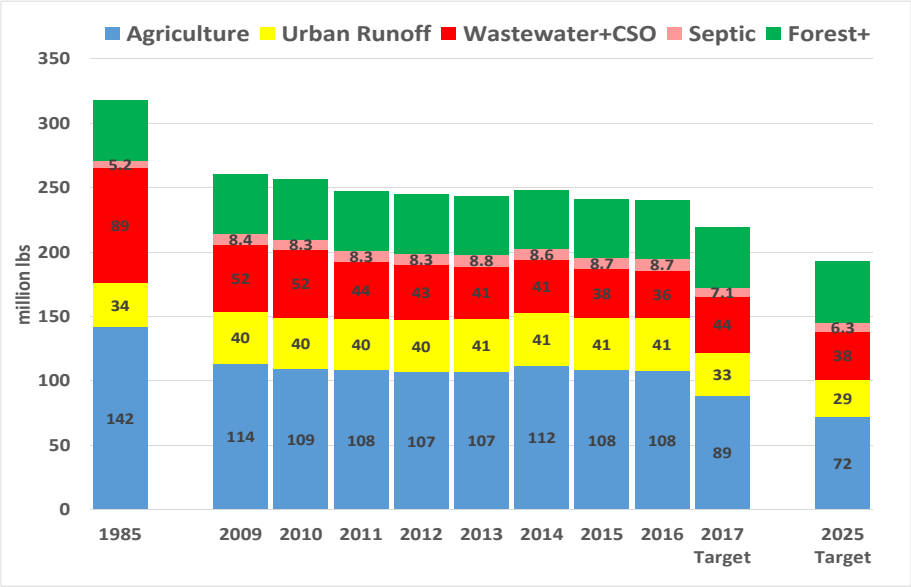
Clean Act Air Implementation by the States has Resulted in a 35 Million Pound Reduction of Nitrogen Loads to Chesapeake Bay from 1985 to 2015



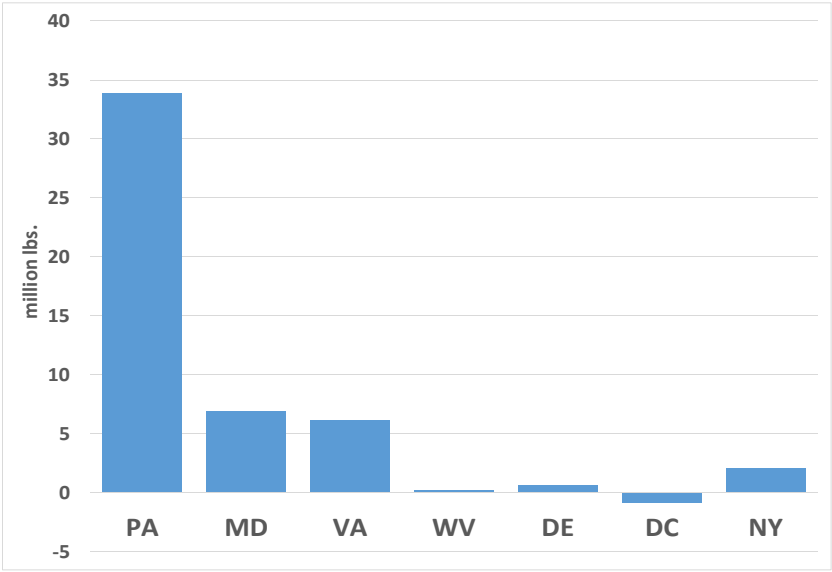




Chesapeake Bay Watershed
Nitrogen Loads and Goals: 1985-2025

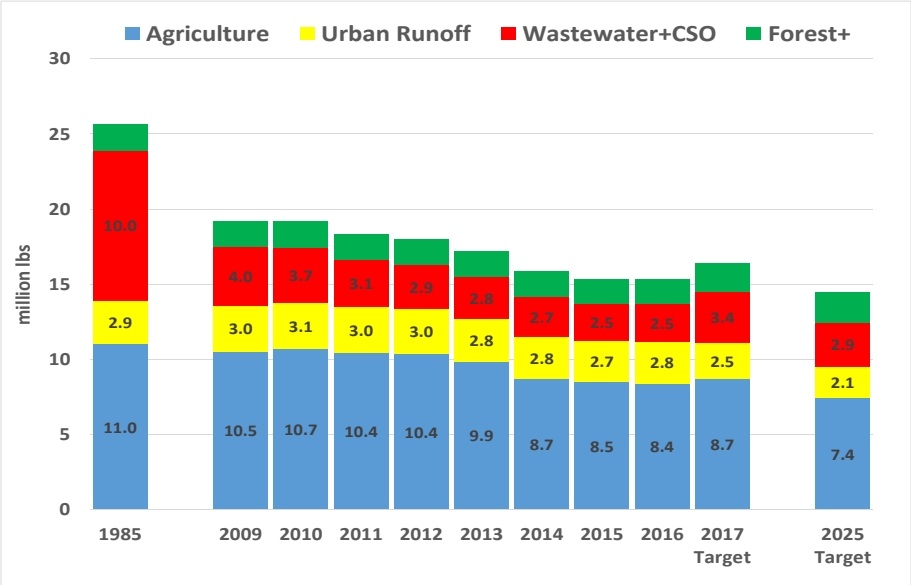


Nitrogen Load to be Reduced by 2025*

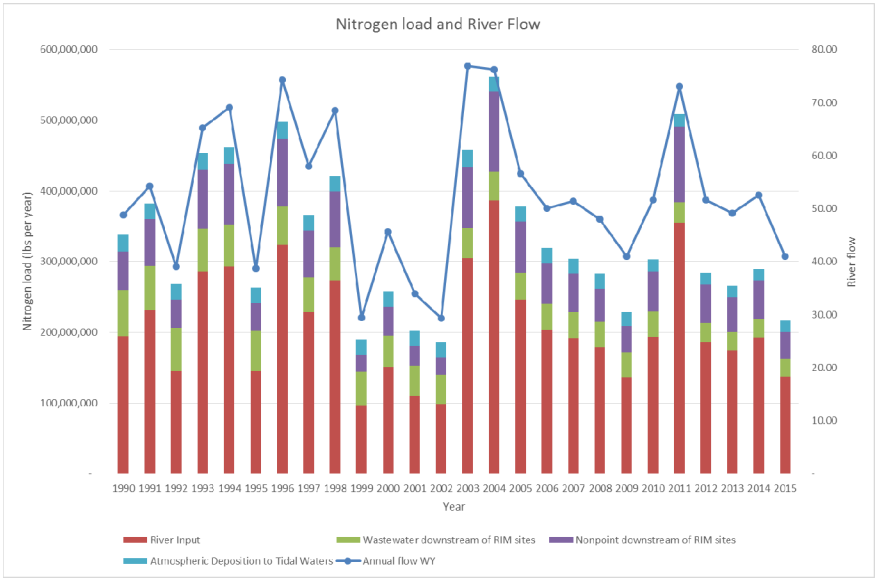


*Based on Jurisdictions' Phase II WIPs and Phase 5.3.2 Watershed Model

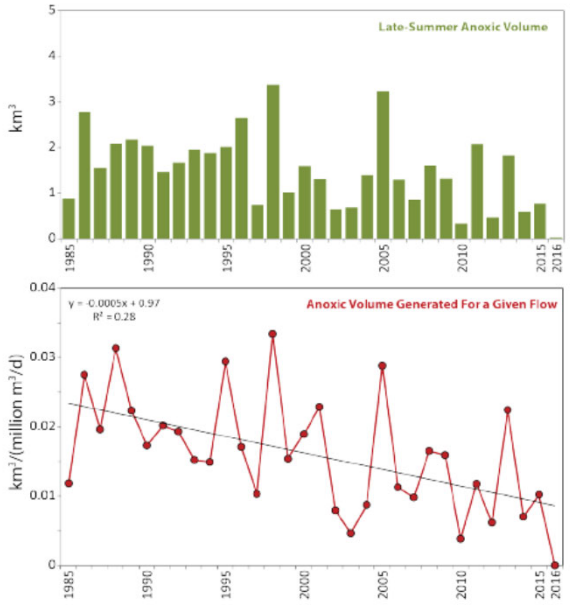
Chesapeake Bay Watershed
Phosphorus Loads and Goals: 1985-2025



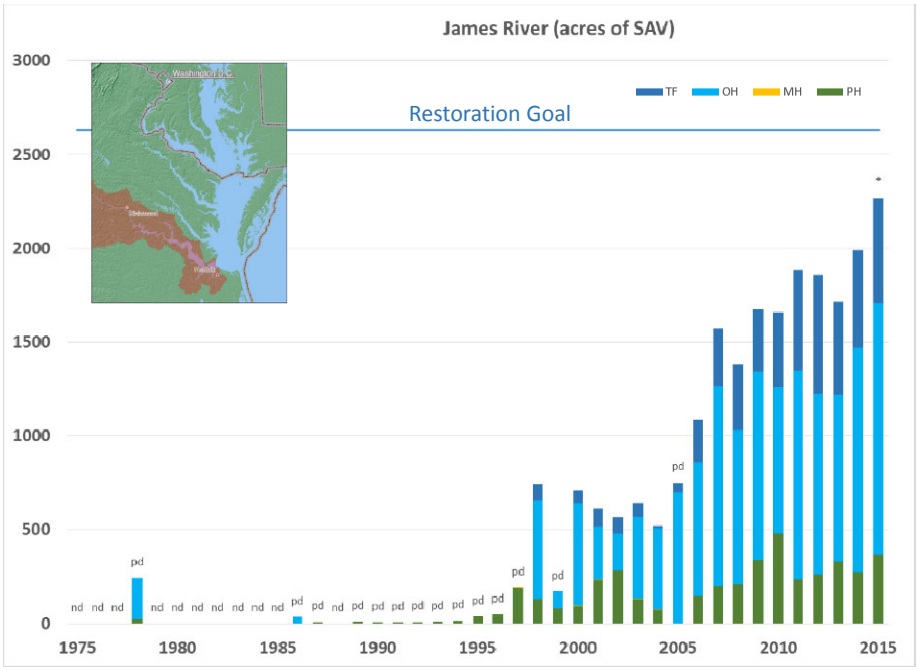
Over the Past Decade, There are Now Lower Nutrient Loads During Higher River Flows



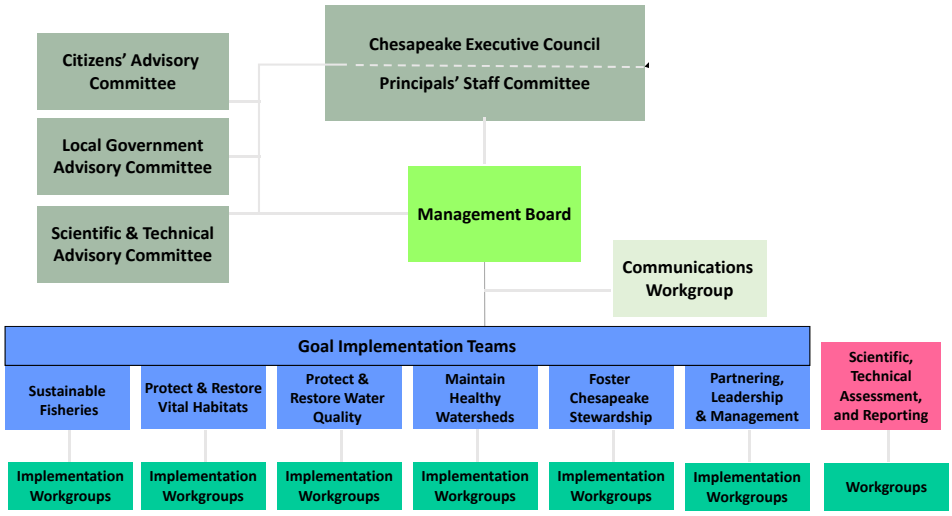
The Chesapeake Bay's Summertime Dead Zone is Decreasing in Size!



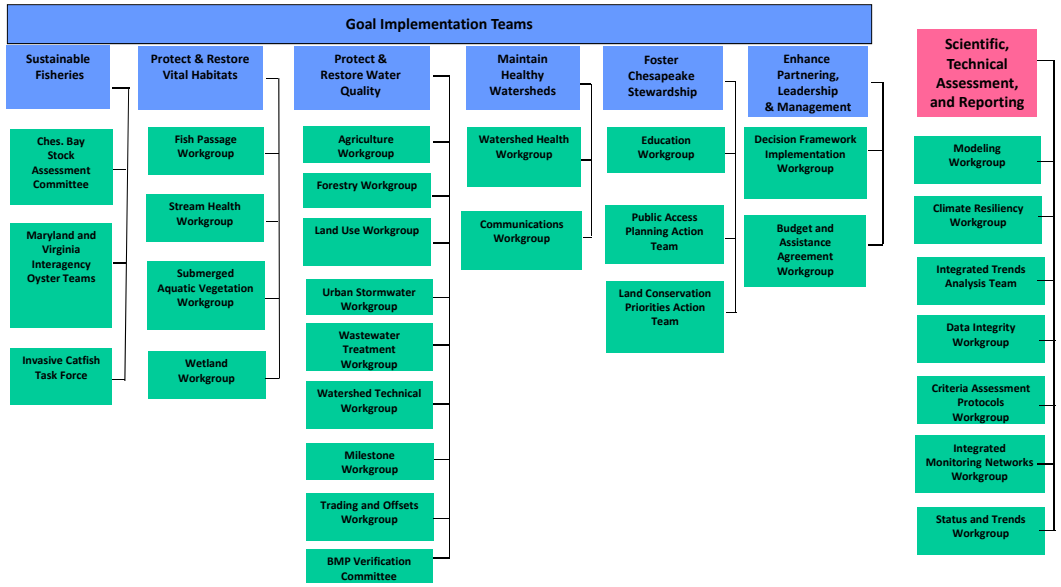
Source: Testa, 2017 unpublished



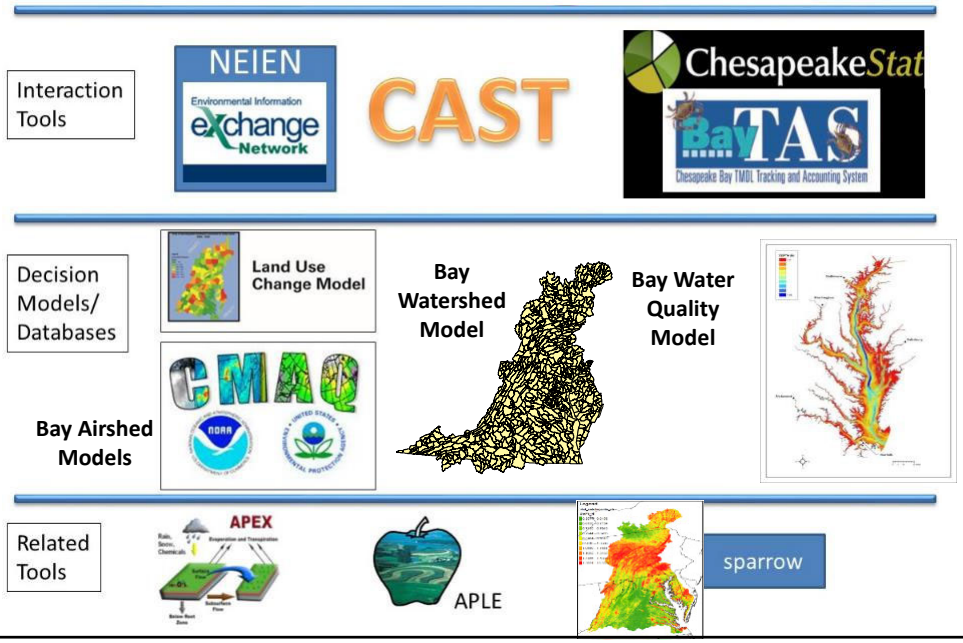
Chesapeake Bay Program Management Structure



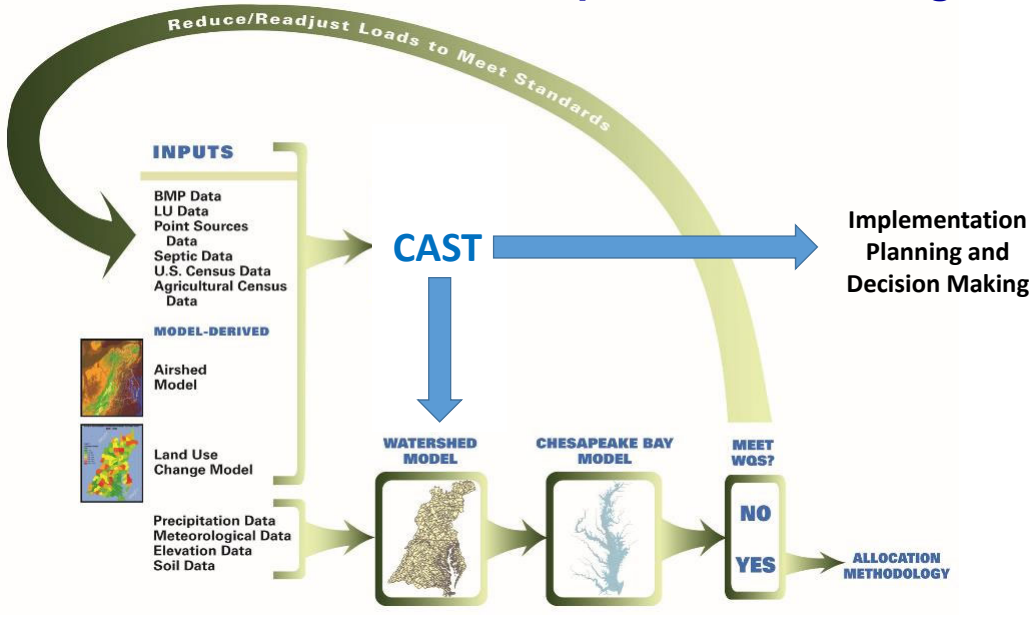
CBP Goal Implementation Teams' Workgroup Structure



Partnership's Decision Support Tools



Role of Models in Partnership Decision-Making



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Challenges of Modeling Watersheds

- Always improve
- Keep it simple

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Challenges of Modeling Watersheds

for Management

- Always improve … and never change
- Keep it simple … and include everything

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Challenges of Modeling Watersheds

for Scientists

- **Always improve** …and use my scientific research
- **Keep it simple**…and use multiple models

Phase 6 Model Structure

Average Load + Δ Inputs * Sensitivity

*

Land Use Acres

*

BMPs

*

Land to Water

*

Stream Delivery

*

River Delivery

Direct Loads

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Keep It Simple

Average Load + ΔInputs * Sensitivity

*

Land Use Acres

*

BMPs

*

Land to Water

*

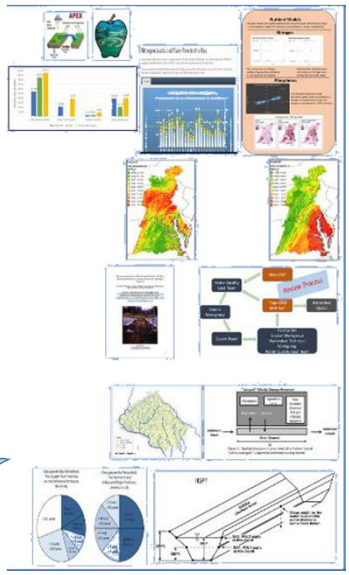
Stream Delivery

*

River Delivery

Direct Loads

Include Everything



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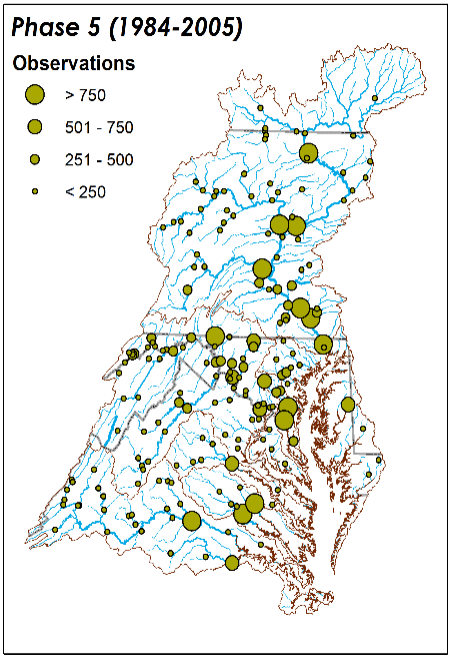
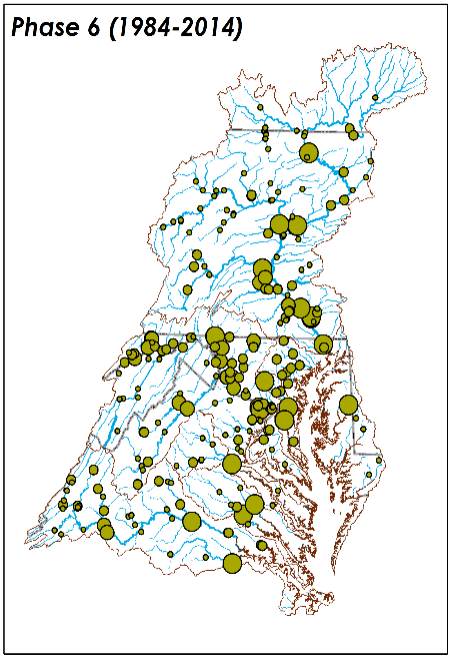
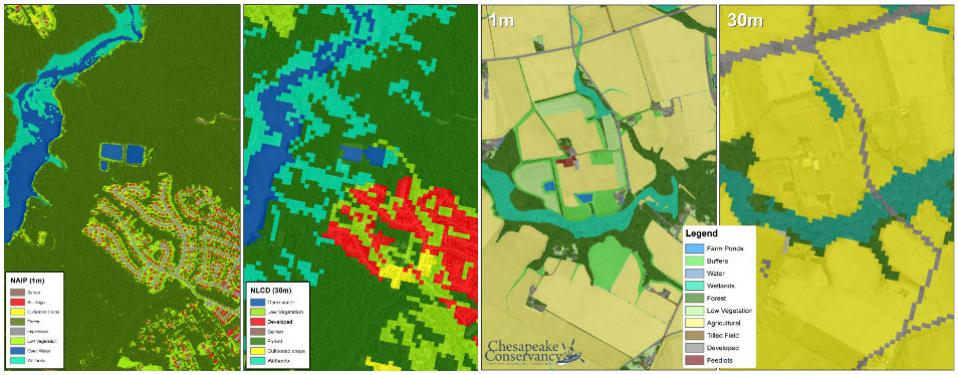




Phase 6 watershed model is calibrated to 215 phosphorus water quality monitoring sites

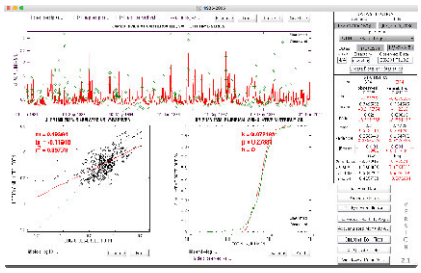
Chesapeake Bay Watershed High Resolution Land Cover Data

Phase 6 1 meter	Phase 5 30 meter	Phase 6 1 meter	Phase 5 30 meter

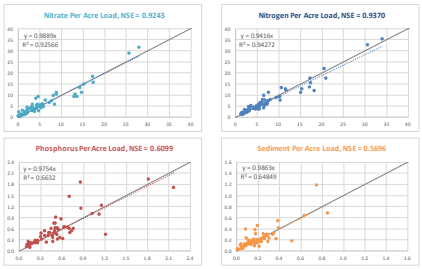


Urban/Suburban Settings **Rural Settings**

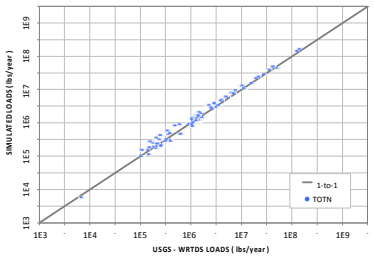
Evaluating Model Calibration Using Monitoring Data



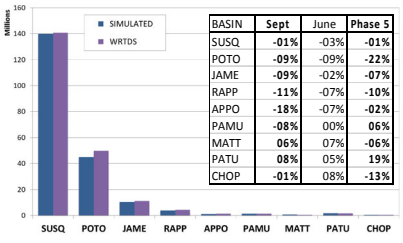
[1] Model calibration is made to improve agreement with monitoring data



[2] Simulated vs. WRTDS Per Acre Load and the Geographic Efficiencies



[3] Simulated vs. WRTDS loads

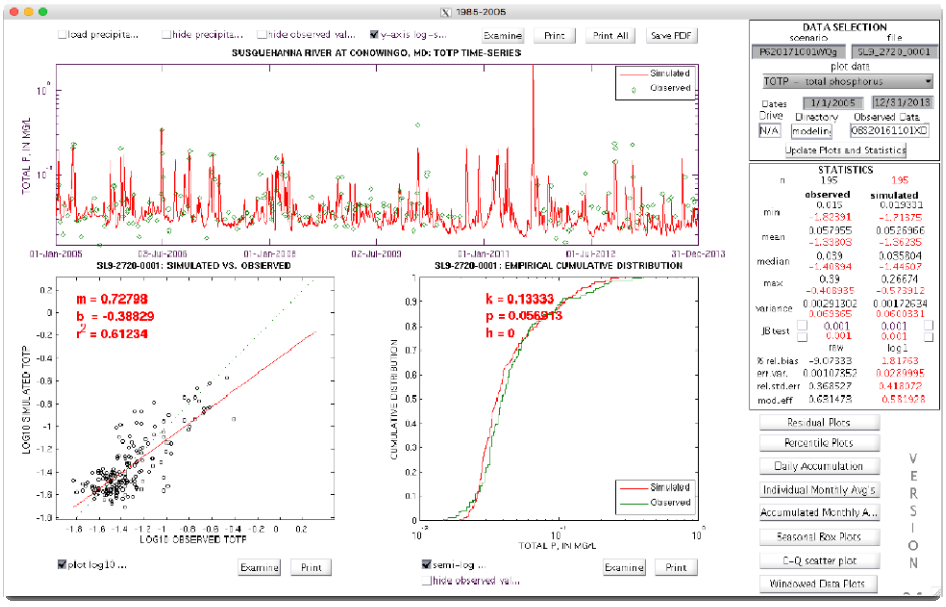


BASIN	Sept	June	Phase 5
SUSQ	-01%	-03%	-01%
POTO	-09%	-09%	-22%
JAME	-09%	-02%	-07%
RAPP	-11%	-07%	-10%
APPO	-18%	-07%	-02%
PAMU	-08%	00%	06%
MATT	06%	07%	-06%
PATU	08%	05%	19%
CHOP	-01%	08%	-13%

[4] Agreement between the simulated and WRTDS loads at the RIM sites

SUSQUEHANNA RIVER

PHOSPHORUS



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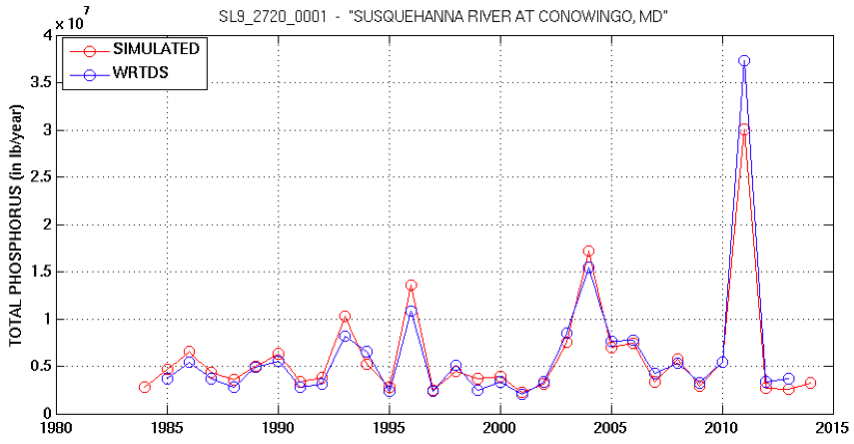
SUSQUEHANNA RIVER

PHOSPHORUS



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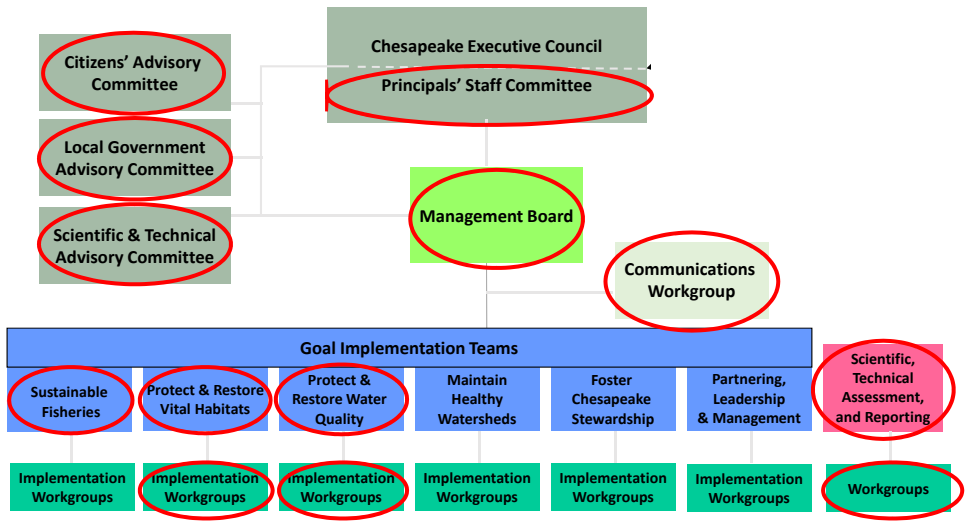
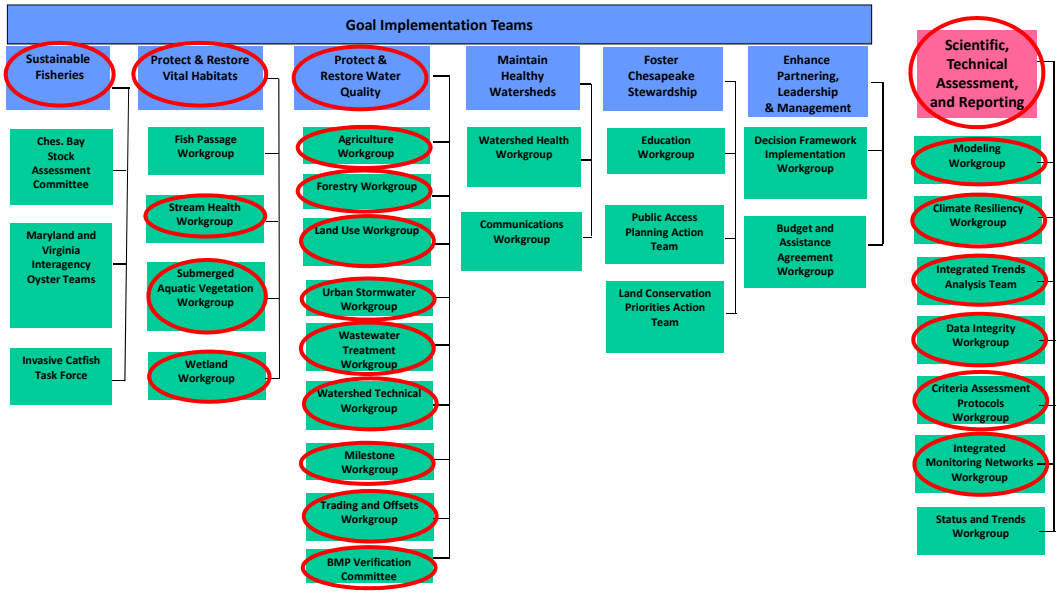
Partnership Models

- 5 years in development, calibration, review and approval
- Series of workshops used to seek and incorporate feedback and direction from a wide array of partners
- 26 different BMP expert panels
- Entire year of partners' review of four beta versions
- Extensive independent scientific peer reviews of each model and decision support tool
- Fatal flaw reviews by partners and stakeholders and collaborative decision making on resolutions
- Senior policy makers final sign-off for management applications

Chesapeake Bay Program Management Structure



CBP Goal Implementation Teams' Workgroup Structure



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Questions?

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Next Watershed Academy Webcast

Check back with us at www.epa.gov/watershedacademy for more details!

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Participation Certificate

https://epa.gov/sites/production/files/2017-11/documents/watershed_acad_webcast_certificate_110917_508.pdf

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Questions?

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Thank You!

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