Conowingo Dam Impacts to the Chesapeake Bay

Chesapeake Bay Commission
Board Meeting
November 7, 2014

MARYLAND
Smart, Green & Growing

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Presentation Outline

- Susquehanna River Facts
- Conowingo Dam Relicensing Process
- Lower Susquehanna River Watershed Assessment Study
- Potential Impacts to the Bay TMDL

Susquehanna River As a % of Chesapeake Bay inputs

47% of freshwater

41% of nitrogen

25% of phosphorus

27% of sediment

What Does this mean to the Bay?

- 59% (more than half) of the nitrogen comes from outside the Susquehanna River Watershed
- 75% (3 quarters) of the phosphorus comes from outside the SR Watershed
- 73% (almost 3 quarters) of the sediment comes from outside the SR Watershed
- Jurisdictions outside the SR Watershed must continue to meet their nutrient and sediment reductions if we expect Bay and our tributaries to be restored

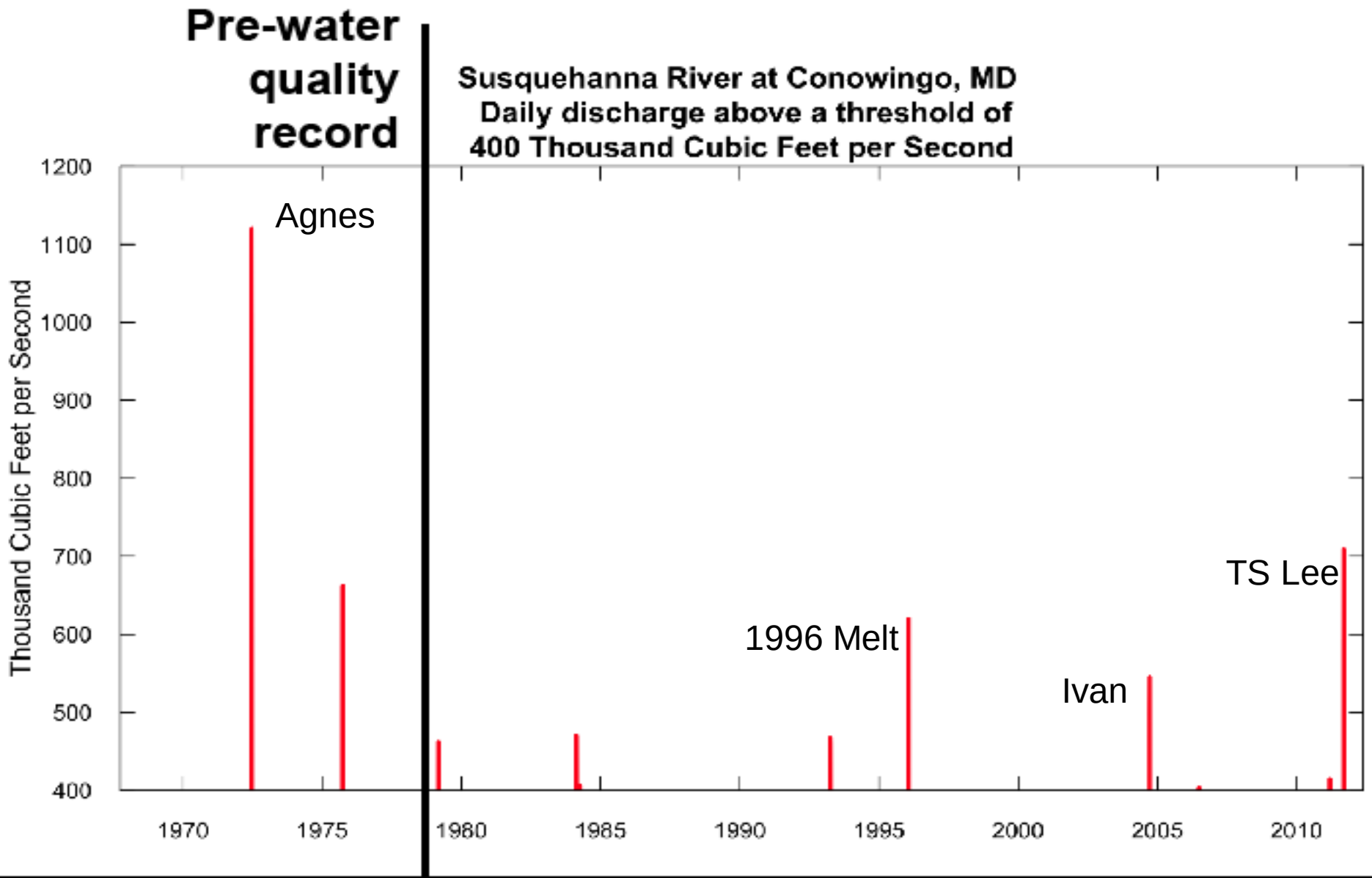
Susquehanna River Sediment

- 3 million tons/year loading with 2 million tons/year captured
- Conowingo Dam Traps about 2% N, 40% P and 50-70% of suspended sediments
- Ability to store sediment is near or at capacity - "dynamic equilibrium"
- Tropical Storm Lee (2011) scoured ≈ 4 million tons of sediment / added about 2 yrs sediment capacity at 728,000 cfs
- Hurricane Agnes (1972) – largest single event at 1,100,000 cfs

All Tributaries Contribute Sediment

- The Susquehanna is not the only river that delivers sediment to the Bay
- Large rain events contribute the majority of sediments and nutrients to the Bay whenever they occur
- The key to restoring the Bay and local watersheds is a comprehensive approach that includes completing the WIPs and addressing sediments behind Conowingo Dam

How unusual was the Tropical Storm Lee event?



FERC Relicensing Activities

2009
- Exelon Filed Pre-Application Document
  - Maryland participated in the development of all study plans
  - FERC approved a total of 32 studies
  - Exelon conducted studies between 2010 and 2012

2012
- Exelon Filed Final License Application (FLA): August 31, 2012

2013
- FERC - Ready for Environmental Assessment (REA): April 29, 2013

2014
- Maryland 401 WQC Application Submitted (1 year review period) State has to certify that the project will meet water quality standards – January 30, 2015 or deny the application
- FERC issues temporary license: September 1, 2014

Major Issues To Be Addressed Through Relicensing

- Proper Management of Sediment
- Improved Fish Passage
  - American Shad; Goal of 2M above York Haven
  - American Eel; Goal of 8.2M within 10 years
- Restore Freshwater Mussels
  - Water quality / filtration capabilities
- Enhance Flow Conditions
  - Improve downstream habitat
  - Reduce fish stranding
- Expand and Improve Recreational Opportunities
- BMP for Debris Management
- Land Preservation
- Protection of RTE Species

Lower Susquehanna River Watershed Assessment Study

- Watershed assessment (Authorized by Section 729 of Water Resources Development Act of 1986)
- Cost: $1.376 million
- Cost-sharing sponsor = Maryland Department of the Environment with contributions from MD DNR, Susquehanna River Basin Commission and The Nature Conservancy
- Cost sharing = 75% Federal, 25% non-Federal
- Agreement executed September 23, 2011
- Draft LSRWA Study report to be released for public comment on November 13, 2014

Goals and Objectives

1. Evaluate strategies to manage sediment and associated nutrient delivery to the Chesapeake Bay.
   - Strategies will incorporate input from Maryland, New York, and Pennsylvania Total Maximum Daily Load (TMDL) Watershed Implementation Plans.
   - Strategies will evaluate types of sediment delivered and associated effects on the Chesapeake Bay.

2. Determine the effects to the Chesapeake Bay during high flow events due to the loss of sediment and nutrient storage behind the hydroelectric dams on the Lower Susquehanna River.

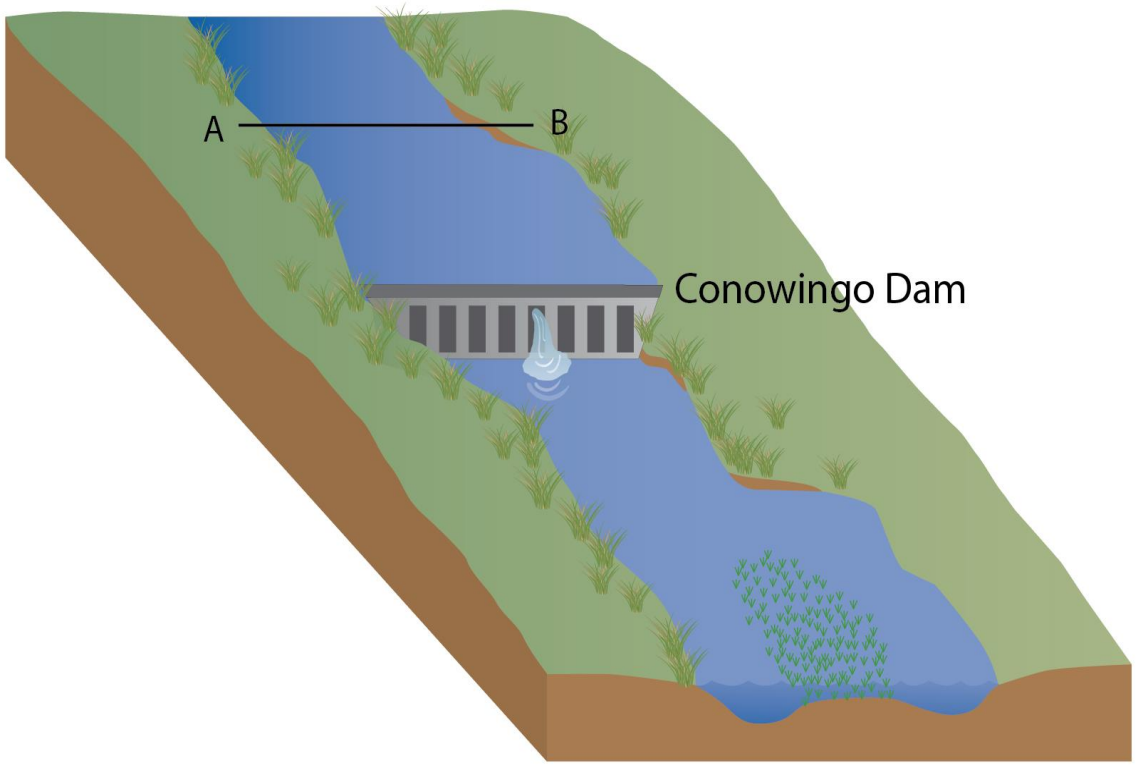
Sediment Management Options Being Investigated

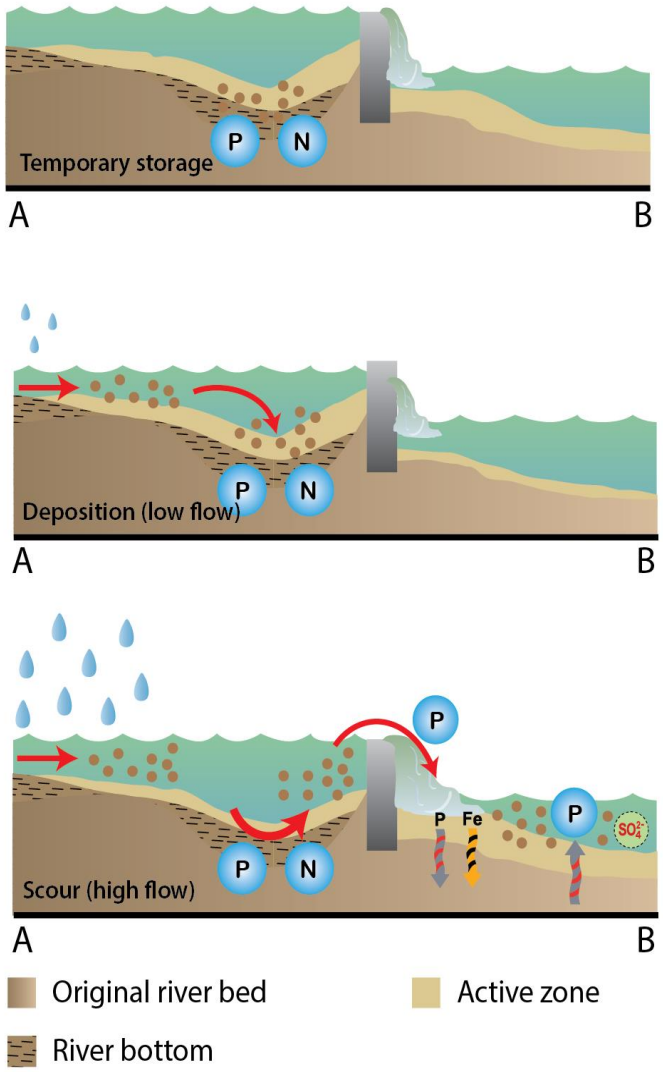
- ✓ Reducing sediment yield from the upstream watershed
  - ✓ Expansion of BMPs above and beyond current WIPs
- ✓ Minimize sediment deposition impacts – allow sediments to bypass the dam during times with least impacts to the Bay
  - ✓ Reservoir operations
  - ✓ Pipeline to downstream areas
- ✓ Increase or recover sediment-trapping volume
  - ✓ Dredging with innovative reuse of materials – e.g., construction aggregate, island restoration
  - ✓ Dredging with placement on land – e.g., quarries, agricultural lands, abandoned mines

Sediment Infilling behind Conowingo Dam

- Conowingo is at “Dynamic Equilibrium”
- During high flow events – scour will continue to occur
- During low flow events – sediment will be trapped behind the Dam
- Associated nutrients cause Bay water quality impairments

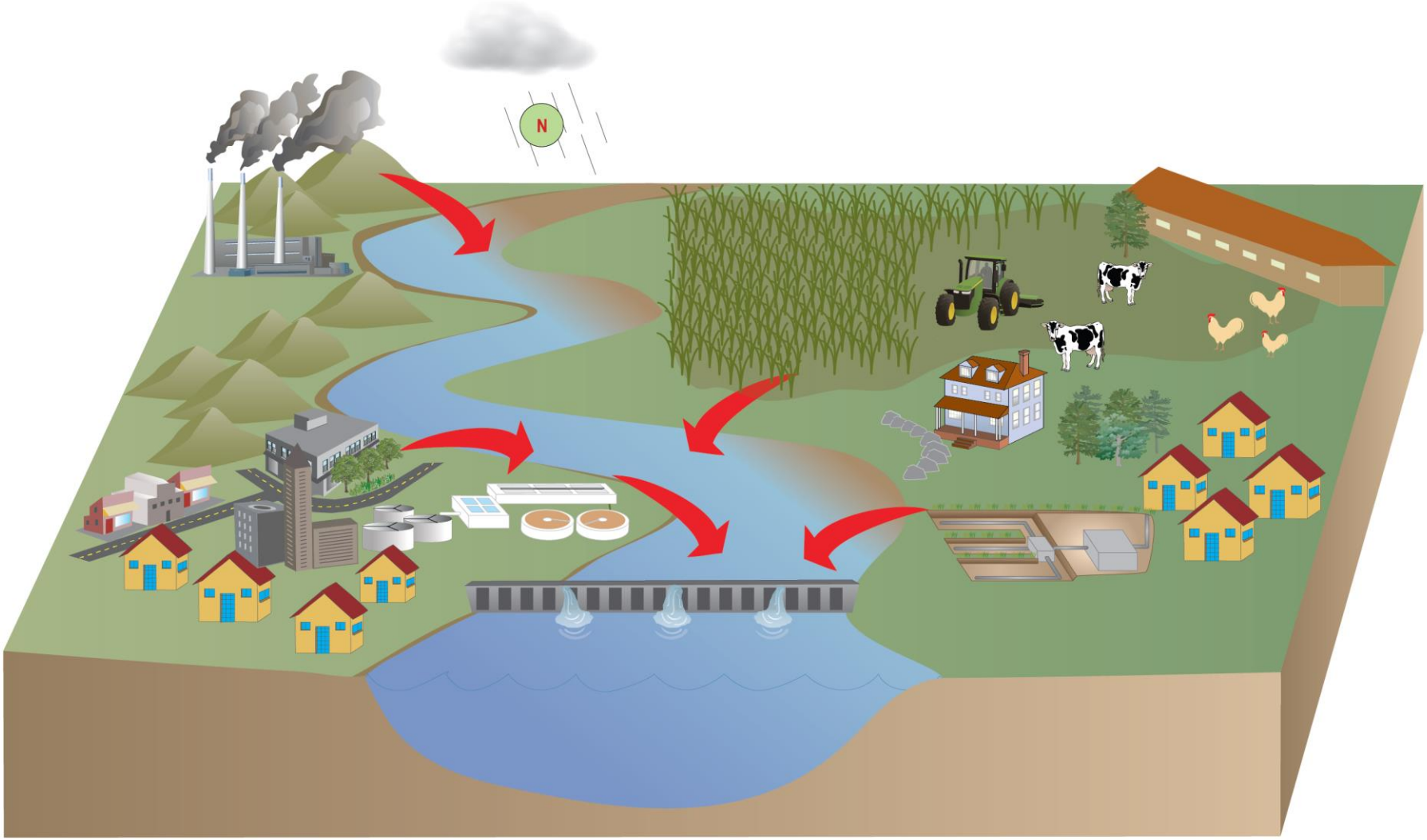
Conowingo Dam – Infill/Dynamic Equilibrium





Graphic courtesy of UMCES

Susquehanna Watershed Inputs to Conowingo Dam



Graphic courtesy of UMCES

Draft LSRWA Findings

- Conditions in the Lower Susquehanna reservoir system are different than previously understood
- The loss of long-term sediment trapping capacity is causing impacts to the health of the Bay ecosystem
- Sources upstream of Conowingo Dam deliver more sediment and nutrients, and therefore, have more impact on the Bay ecosystem, than do the scoured sediment and associated nutrients from behind Conowingo Dam
- Large-scale dredging, along with bypassing and operational changes, do not provide sufficient benefits to offset water quality impacts from the loss of long-term sediment trapping capacity.

Draft LSRWA Recommendations

- Before 2017, quantify the full impact on Bay aquatic resources and water quality from changed conditions in the lower Susquehanna River and reservoir system.

- EPA and State partners should integrate findings from the LSRWA into their ongoing analyses and development of the seven watershed jurisdictions' Phase III WIPs as part of Chesapeake Bay TMDL 2017 mid-point assessment.

- Develop and implement management options that offset impacts to the upper Chesapeake Bay ecosystem from increased nutrient and sediment loads.

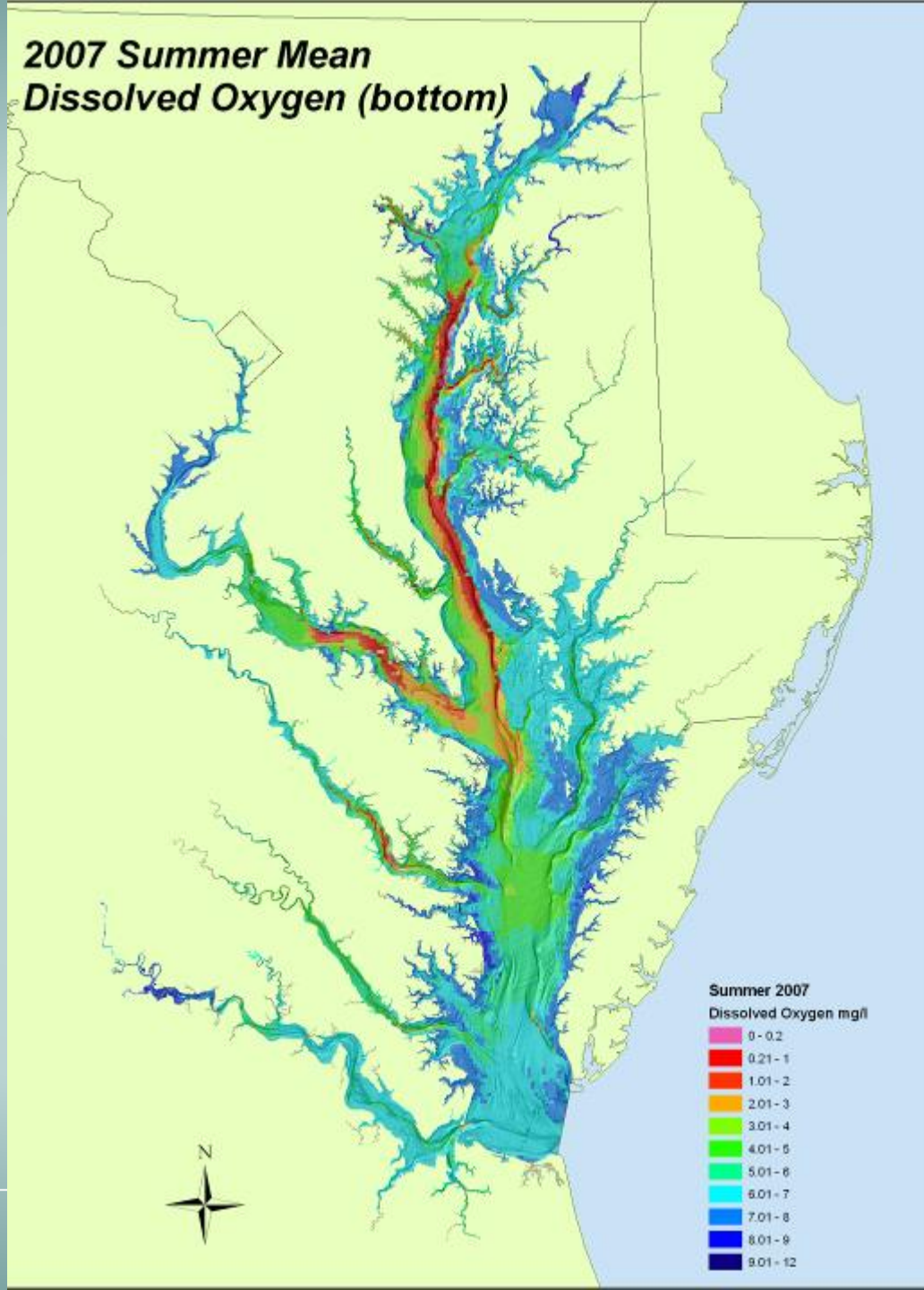
- Commit to long-term monitoring of sediment and nutrient processes in the lower Susquehanna River system and upper Chesapeake Bay to promote adaptive management.

LSRWA Study Report Peer Review

- Multiple report peer reviews by Federal and State agencies
- Stakeholder reviews
- Chesapeake Bay Program Scientific Technical Advisory Committee (STAC) provided thorough report review
  - ►STAC review is included as Appendix I-7
  - ►STAC supported the report conclusions and recommendations

Water Quality Impairment

Extensive low to no summer dissolved oxygen conditions persist throughout the Chesapeake Bay and its Tidal Tributaries

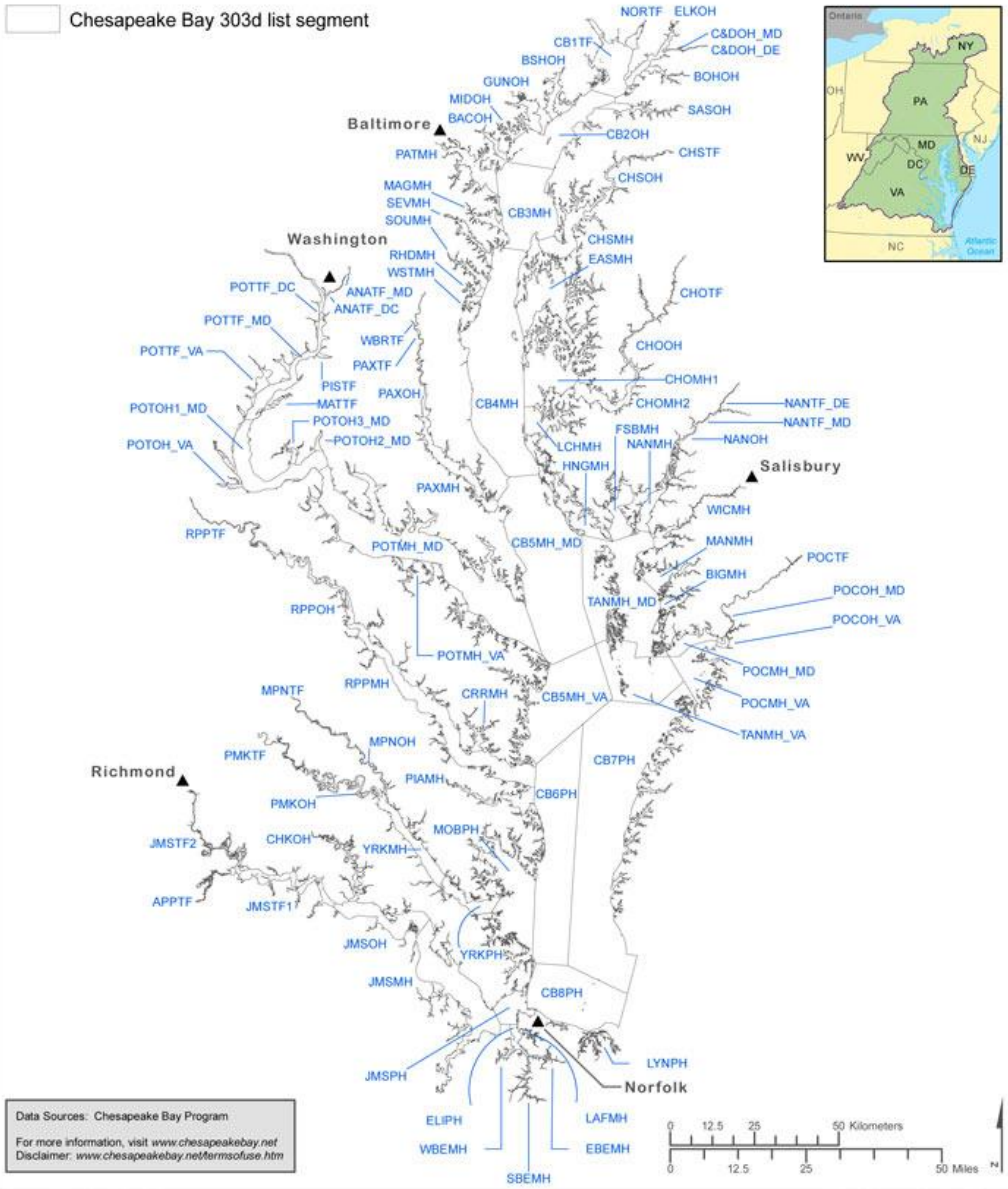


Source: www.chesapeakebay.net/data

Chesapeake Bay Segmentation Scheme

(For 303d listing - 92 segments)

Chesapeake Bay Program
A Watershed Partnership



Data Sources: Chesapeake Bay Program

For more information, visit *www.chesapeakebay.net*
Disclaimer: *www.chesapeakebay.net/termsofuse.htm*

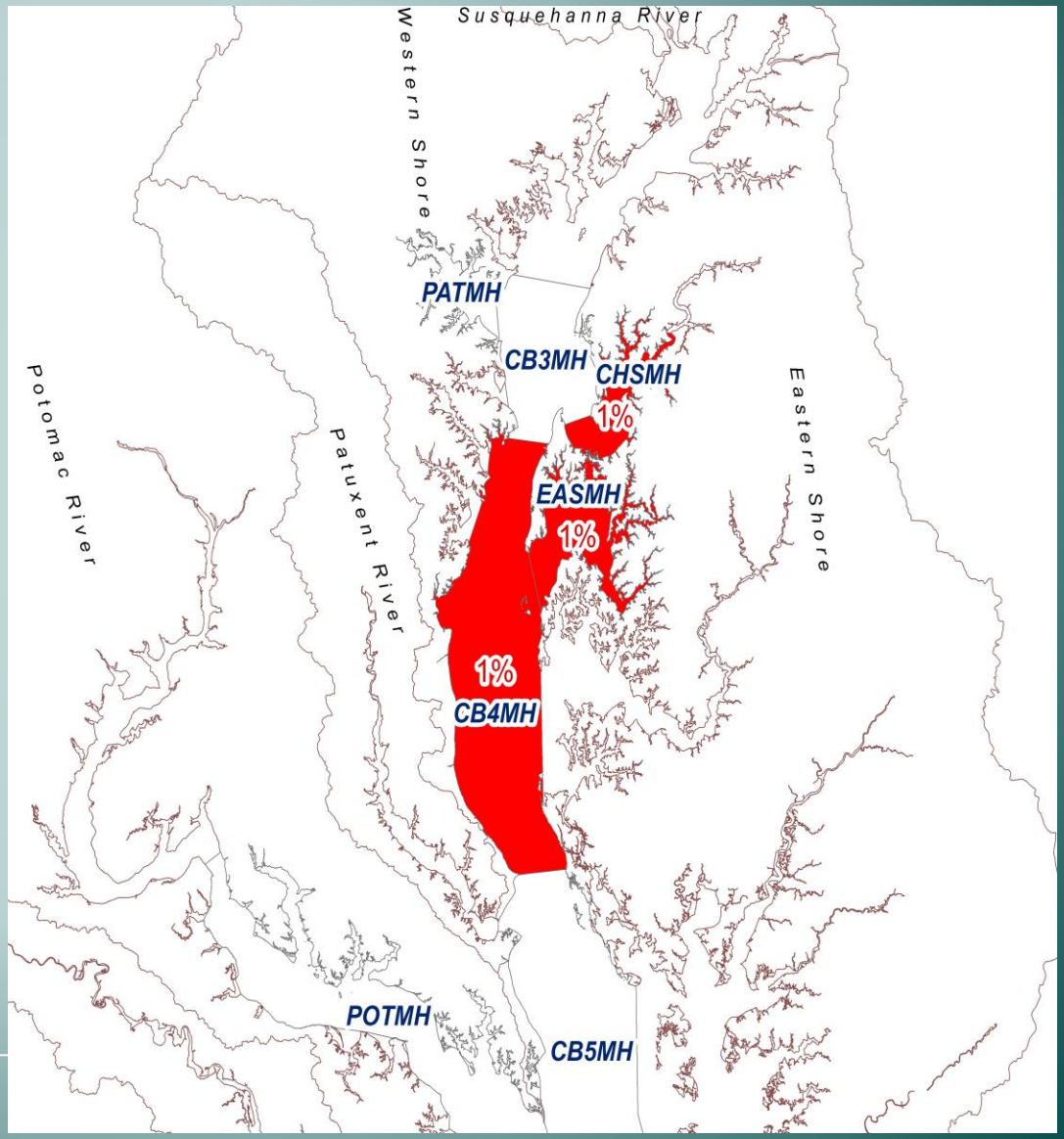
Created by HW, 6/4/08

UTM Zone 18N, NAD 83

Deep-Channel DO Impairments Are Estimated Under Conowingo Scour Conditions

Under conditions of full achievement of the Watershed Implementation Plans no impairments to the deep-channel DO water quality standard are estimated.

Estimated additional impairments with Conowingo scour under the January 1996 Big Melt conditions compared to no Conowingo scour under WIP conditions.

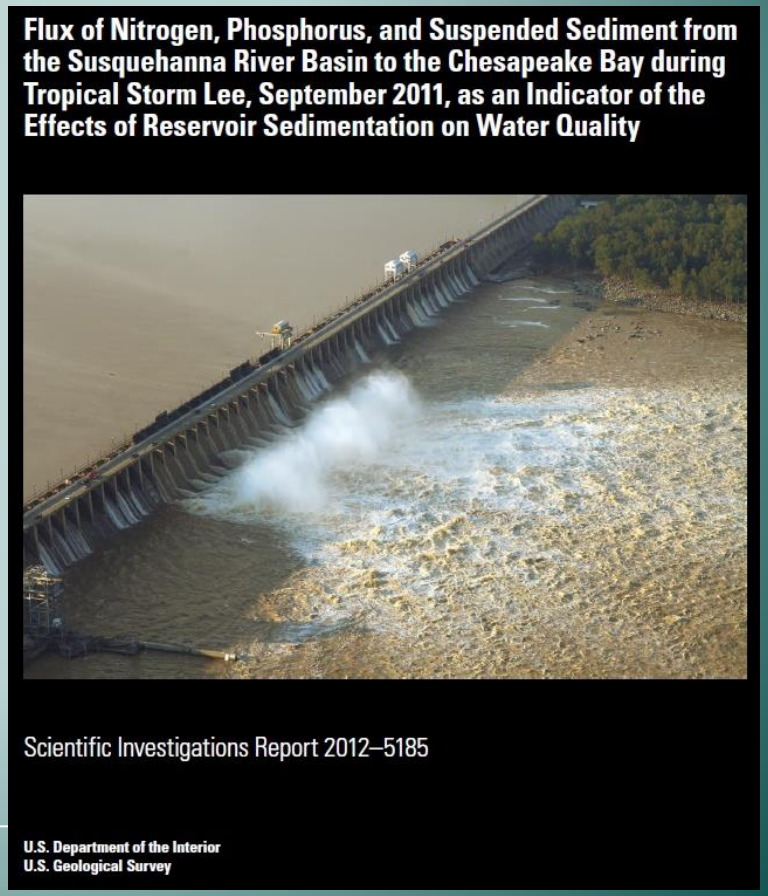


Background and Overview on Conowingo Infill

- The Conowingo Reservoir has been filling in with sediment for almost a century.

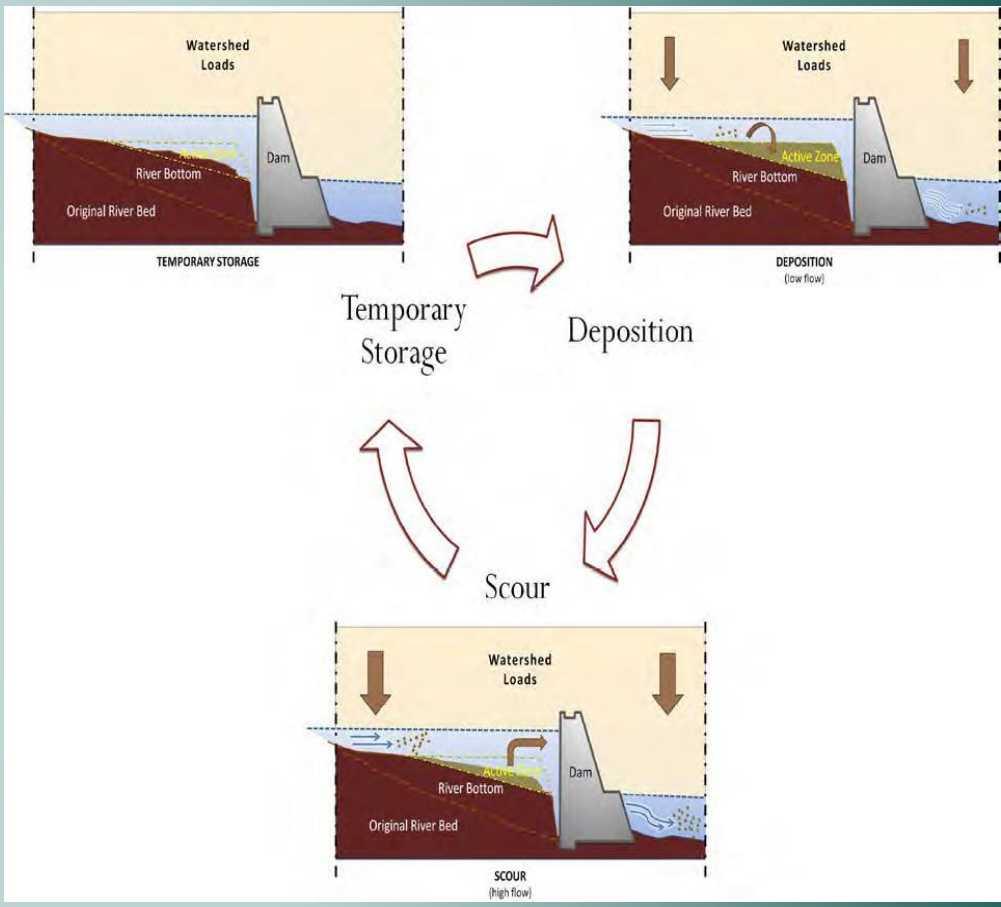
- It has acted like a BMP, but it's a BMP that's losing its effectiveness.

- When developing the Chesapeake TMDL, perception was that the Conowingo was still effectively trapping sediment and nutrients but it's now in a state of near-full capacity called dynamic equilibrium.



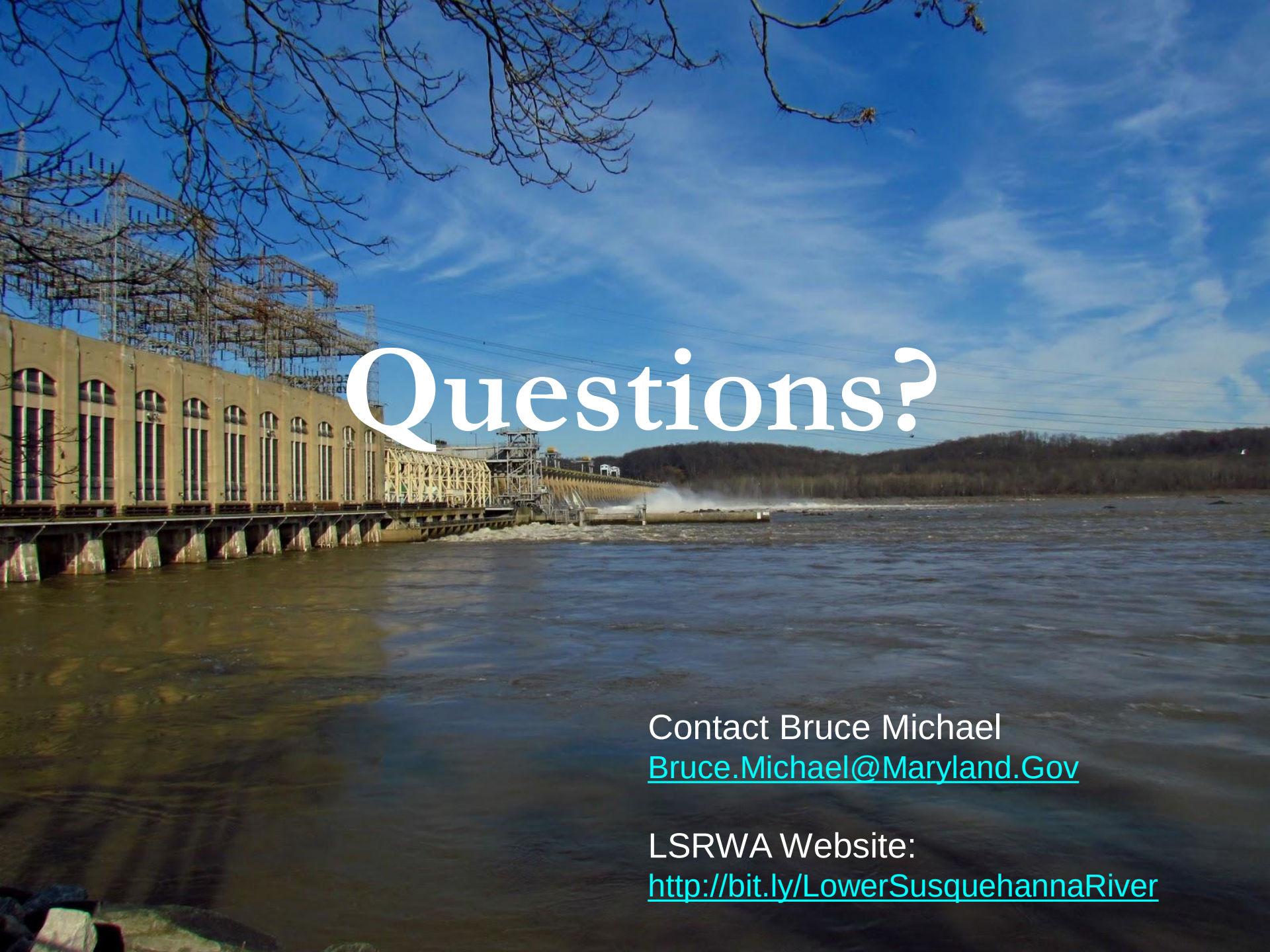
Dynamic Equilibrium Means High Flow, Scour, Fill, Repeat

Appendix T describes the case where “future monitoring shows that the trapping capacity of the reservoir has been reduced” and suggests that “then the Chesapeake Bay Program Partners will need to consider adjusting... milestone loads based on the new delivered loads to ensure that all are meeting their target load obligations.”



Implications if We Do Not Mitigate for Sediment Behind the Dam

- If full implementation of the WIPs by 2025
  - Will not meet Dissolved Oxygen criteria in 3 Chesapeake Bay segments – CB4; Chester River mesohaline; and Eastern Bay
  - There are some negative short-term water quality impacts to tributaries down to the Potomac River
  - No water quality criteria impact to tributaries except the Chester River and Eastern Bay
  - This will be addressed in the Bay TMDL 2017 Mid Point Assessment



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LSRWA Website:
http://bit.ly/LowerSusquehannaRiver