High Value Forests
for Water Quality
Initial Estimates

Jeff Sweeney
Environmental Protection Agency
Chesapeake Bay Program Office
jsweeney@chesapeakebay.net
410-267-9844

Forestry Workgroup Meeting
Chesapeake Bay Program Office
June 7, 2017

High Value Forests
for Water Quality

- Purpose is to update the 2007 map of High Value Forests For WQ

- FWG decided "the model" would be good approach

- Which forests, if converted, would cause the greatest increase in nutrients and sediment to the Bay?
  - By state

- Today, asking for your thoughts and direction on the study

Methods:

- Control scenario is 2015 conditions in the watershed = 2015 forest acres and distribution

- Experiment scenario = urban development of some of the control's forest

  - Current estimates show about an 8,000 acre loss of forest per year (1984-2013) = 160K acres over 20 years = 0.5% loss over 20 years

High Value Forests
for Water Quality

Methods:

● Compared

1) loading rates (lbs. N delivered to the Bay per acre) for the urban-forest composite for the pre-condition (with forest)

2) loading rates (lbs. N delivered to the Bay per acre) for the urban-forest composite for the post-condition (0.5% less forest)
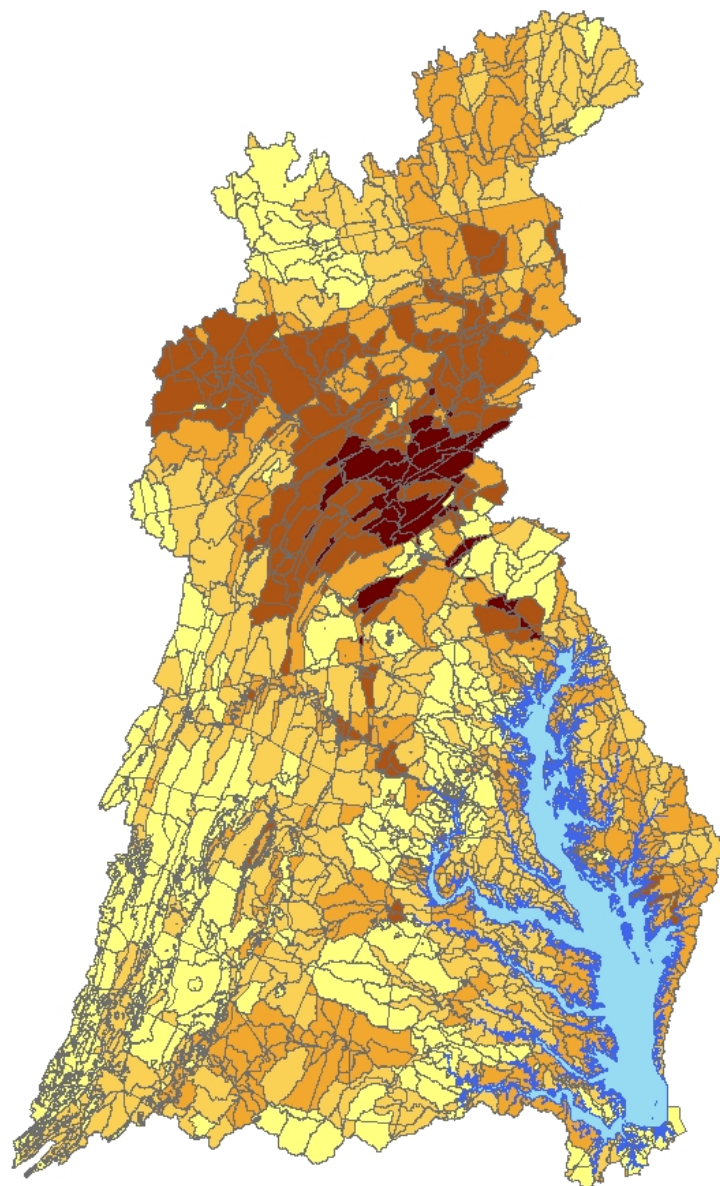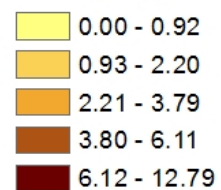
Change in pounds of Nitrogen Delivered per 100 acres of forest loss

- 0.00 - 0.92
- 0.93 - 2.20
- 2.21 - 3.79
- 3.80 - 6.11
- 6.12 - 12.79
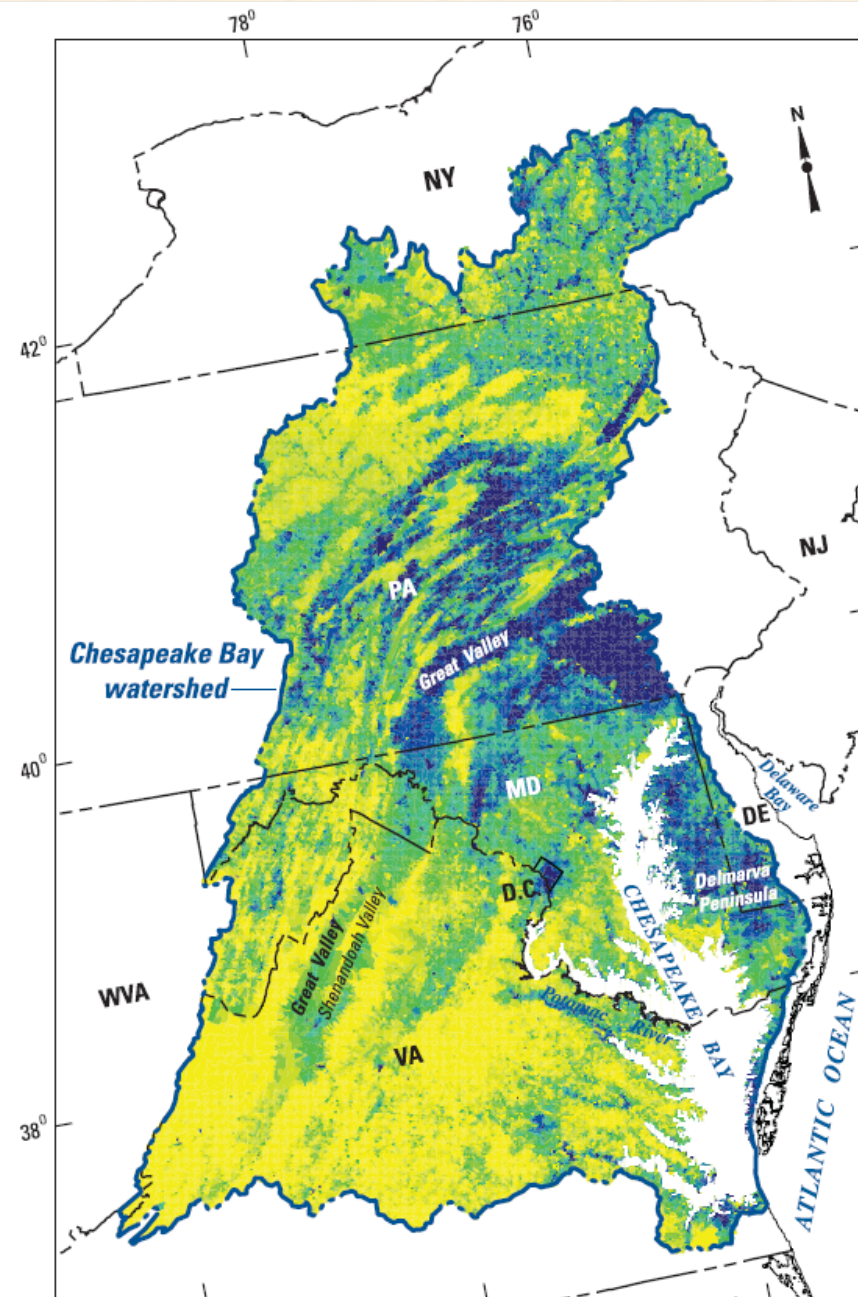
N

0   25   50   100 Miles

High Value Forests for Water Quality
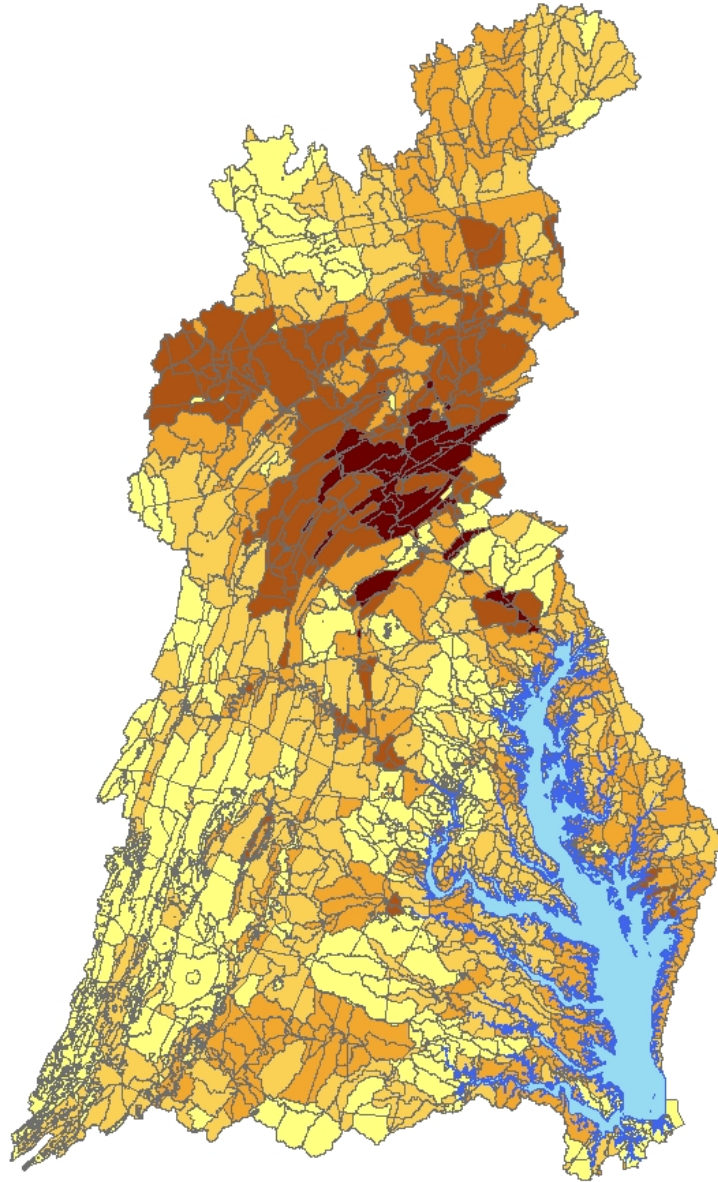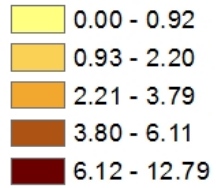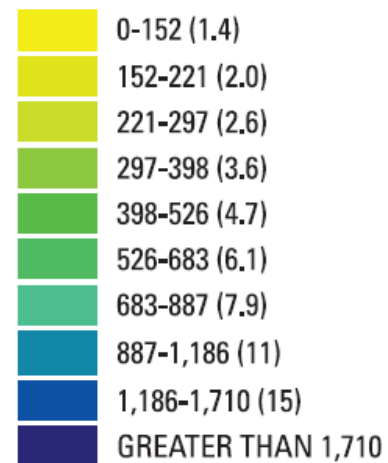
- Change in lbs. of N delivered to the Bay per 100 acres of forest loss

- Across CB watershed, higher pre-versus post-development of forest is along Susquehanna main stems

- In each state, higher pre- versus post-development of forest is along main tributaries and on coastal plain
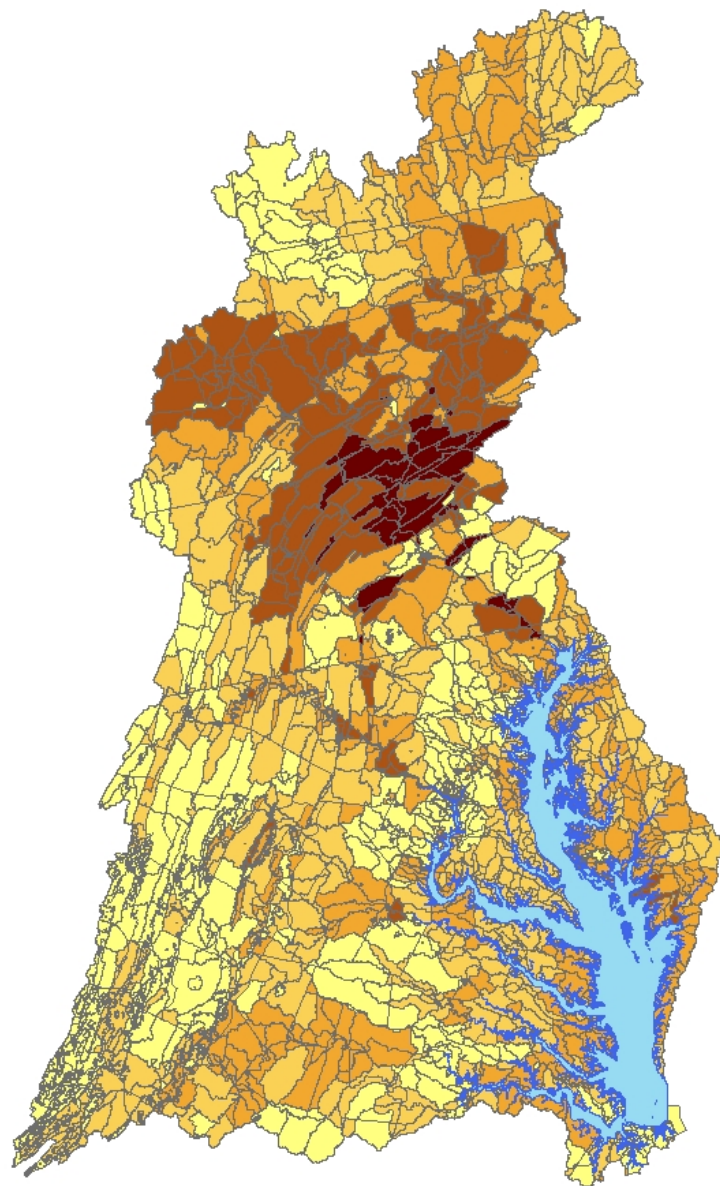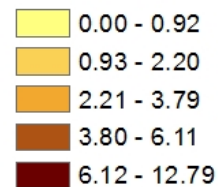
Change in pounds of Nitrogen Delivered per 100 acres of forest loss

- 0.00 - 0.92
- 0.93 - 2.20
- 2.21 - 3.79
- 3.80 - 6.11
- 6.12 - 12.79

N

0   25   50   100 Miles

ESTIMATED ANNUAL YIELD OF TOTAL NITROGEN,
in kilograms per square kilometer
(high value in pounds per acre)

- 0-152 (1.4)
- 152-221 (2.0)
- 221-297 (2.6)
- 297-398 (3.6)
- 398-526 (4.7)
- 526-683 (6.1)
- 683-887 (7.9)
- 887-1,186 (11)
- 1,186-1,710 (15)
- GREATER THAN 1,710

Chesapeake Bay watershed

NY

NJ

PA

Great Valley

MD

DE

D.C.

Delmarva Peninsula

WVA

Great Valley

Shenandoah Valley

VA

Potomac River

CHESAPEAKE BAY

ATLANTIC OCEAN

6

Change in pounds of Nitrogen Delivered per 100 acres of forest loss
- 0.00 - 0.92
- 0.93 - 2.20
- 2.21 - 3.79
- 3.80 - 6.11
- 6.12 - 12.79

N

0   25   50   100 Miles

Urban Sources of Total Nitrogen
Quartile Ranking within the Chesapeake Bay Watershed

Delivered Nitrogen
Urban Sector
- 75-100%
- 50-75%
- 25-50%
- 0-25%
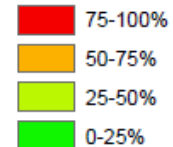
Delivered yield (load per area) is the amount of nutrient that is generated locally for each stream reach and weighted by the amount of in-stream loss that would occur with transport from the reach to Chesapeake Bay. The cumulative loss of nutrients from generation to delivery to the Bay is dependent on the traveltime and instream-loss rate of each individual reach. This map shows estimates based on mean conditions for the late 1990's time period.
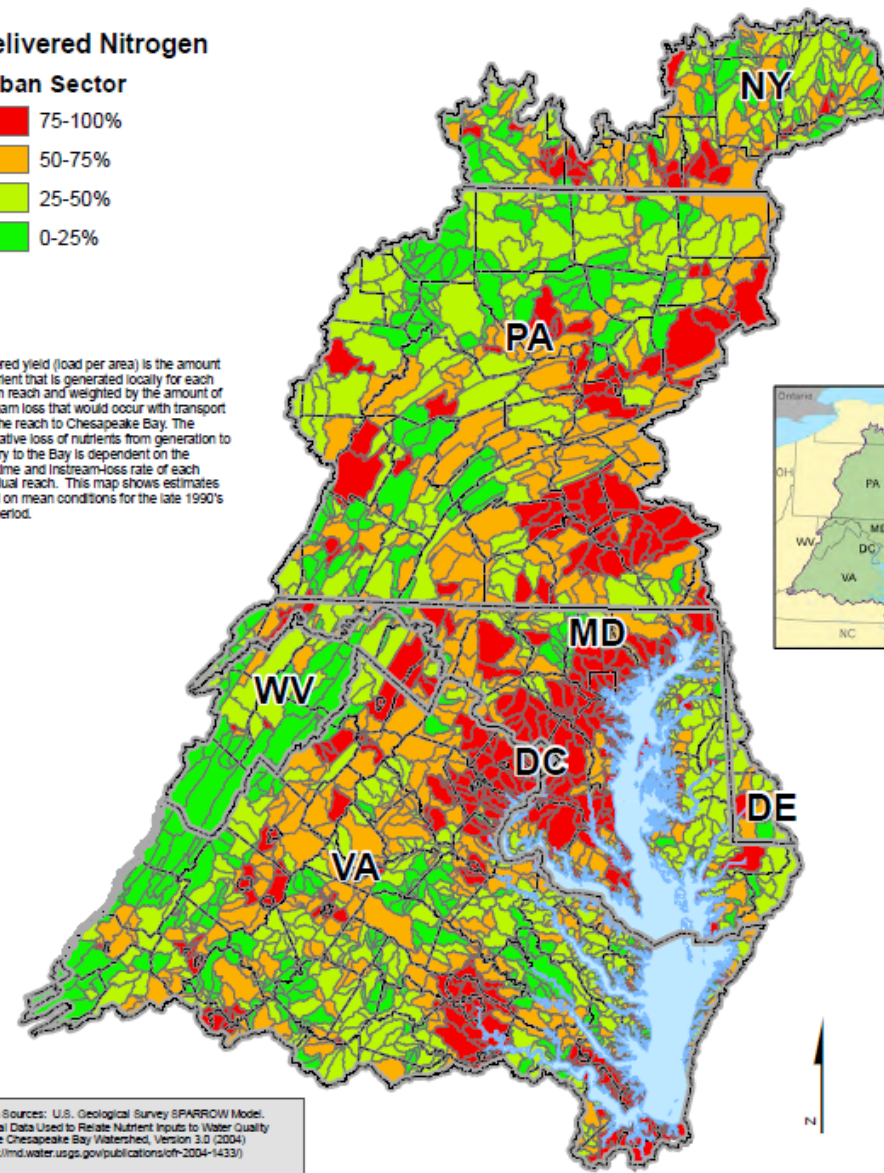
Data Sources: U.S. Geological Survey SPARROW Model.
Digital Data Used to Relate Nutrient Inputs to Water Quality in the Chesapeake Bay Watershed, Version 3.0 (2004) (http://md.water.usgs.gov/publications/ofr-2004-1433/)

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

NY
PA
MD
WV
DC
DE
VA

N

0   20   40   80 Miles

Created by JW, 03/05/2009

7

Change in pounds of Nitrogen Delivered per 100 acres of forest loss
- 0.00 - 0.92
- 0.93 - 2.20
- 2.21 - 3.79
- 3.80 - 6.11
- 6.12 - 12.79

High Value Forests for Water Quality

Recommendations:

- Consider several lines of evidence = multiple models

- Understand differences in results among them

- Use composite of results

- Include findings from Phase 6 model to be released next week for fatal flaw review

- Include P and SED in the study