Updating Models for the 2017 Reevaluation & WIP 3 Development

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December 8, 2016

REFINING THE DATA

Current Land Use Land Cover Resolution

30 Meters
32.8 Yards
98.4 Feet

NLCD 30-meter land cover dataset

- Satellite derived
- 16 classes, 11 applicable here
- Overall accuracy around 80%
- Underestimates impervious cover in rural areas
- Underestimates vegetation in dense urban areas
- Overestimates agricultural areas

REFINING THE DATA

New
Land Use
Land Cover
Resolution

900 Times Better Resolution

1 Meters
1.1 Yards
3.28 Feet

□

New 1-meter land cover dataset

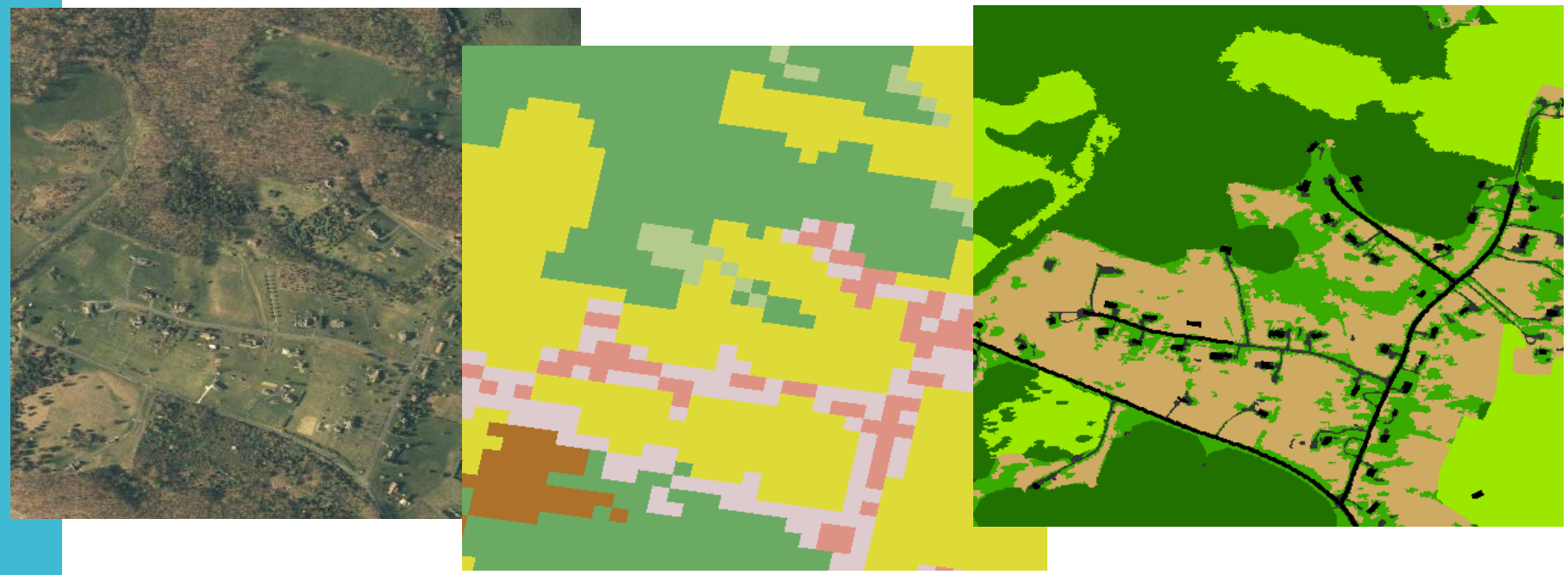
- 2012-2014 Aerial Imagery derived
- 11 classes
- Statewide
- Publicly available from VGIN
- Overall accuracy around 90%

http://vgin.maps.arcgis.com/home/item.html?id=6ae731623ff847df91df767877dboeae#!
Or Search – "VA Land Cover Service Download"

REFINING THE DATA

Greatly Improved Land Use Land Cover Dataset for Model

- Final Model Land Use supplemented with Local datasets and augmented by local review
- http://chesapeake.usgs.gov/phase6/

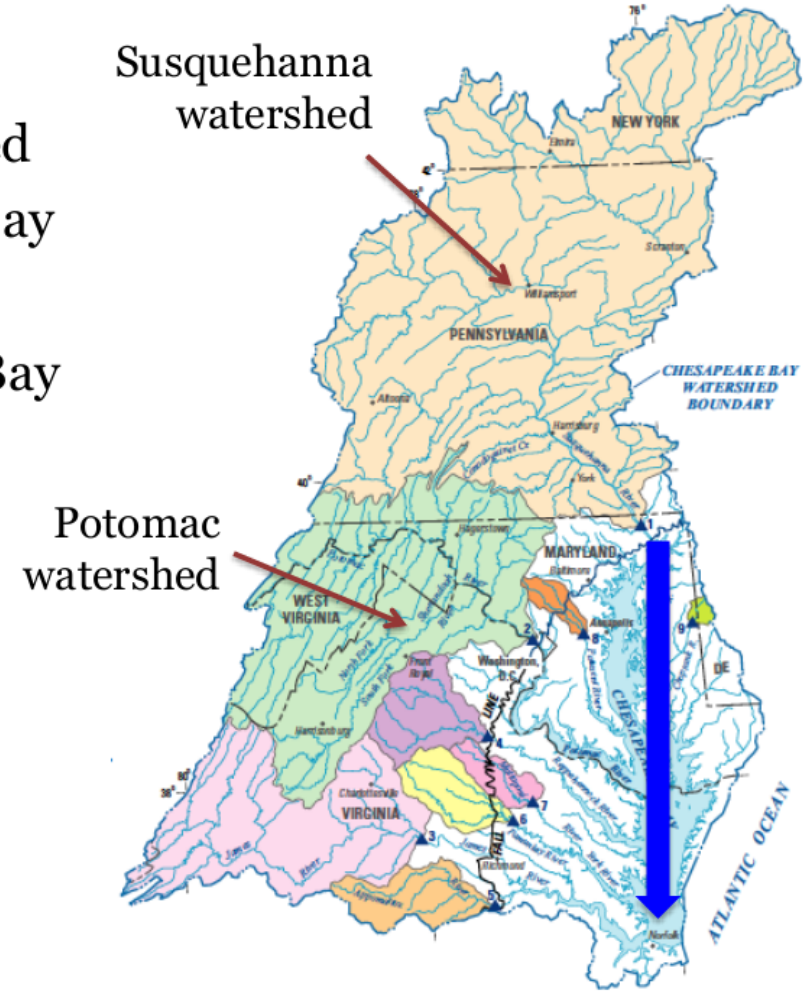


REFINING THE DATA

Conowingo as Currently Modeled

Susquehanna River Has a Major Influence on Chesapeake Bay Water Quality

- 43% of Chesapeake Bay watershed
- 47% of freshwater flow into the Bay
- 41% of nitrogen loads to the Bay
- 25% of phosphorus loads to the Bay
- 27% of sediment loads to the Bay
- Influences Bay water quality well into Virginia's portion of the Bay

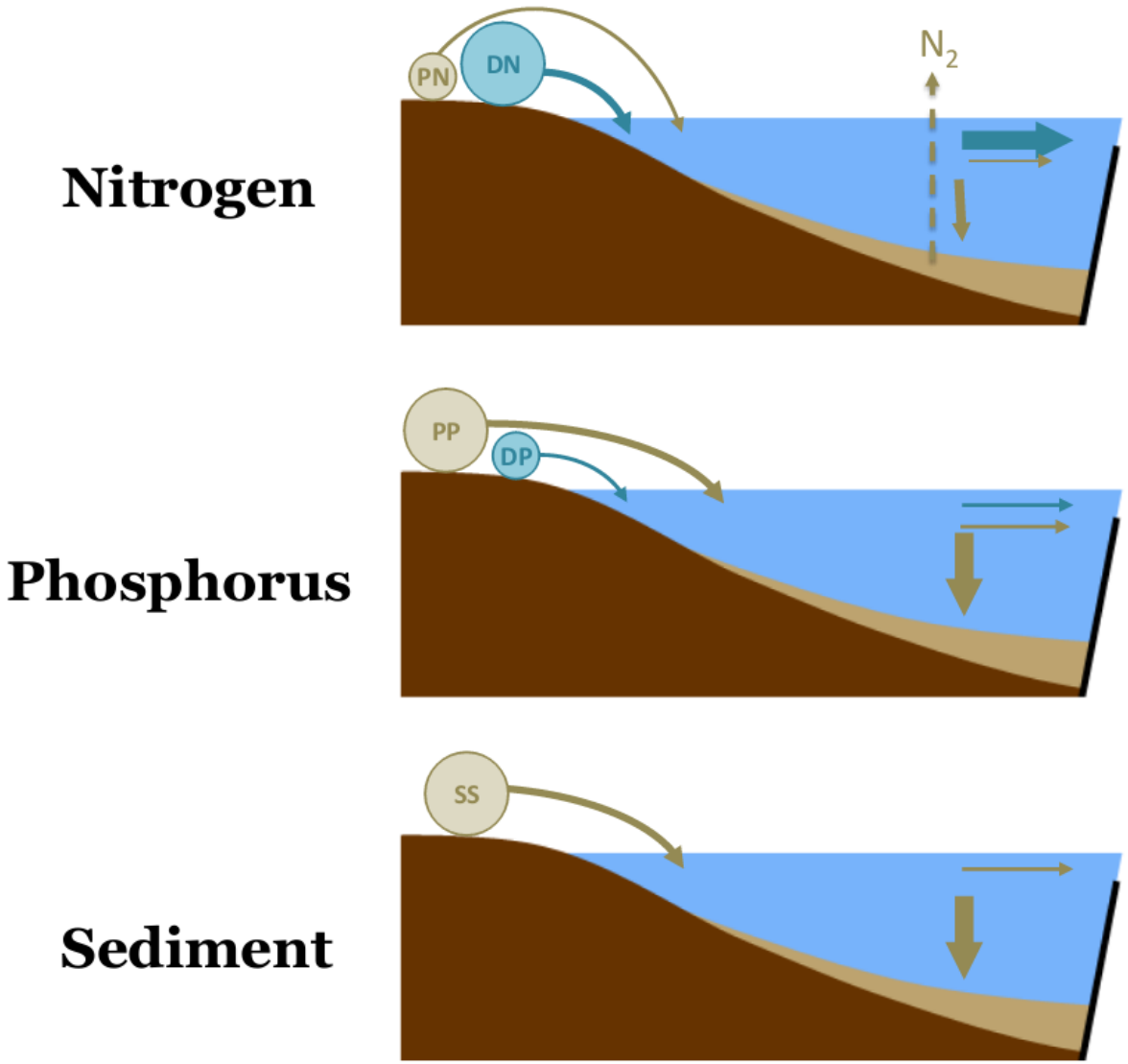


Source: Linker (2014)

REFINING THE DATA

Conowingo Reservoirs Acting Like Giant BMPs

Characteristics of Net Reservoir Trapping



Key:	
PN=	Particulate Nitrogen
DN=	Dissolved Nitrogen
PP=	Particulate Phosphorus
DP=	Dissolved Phosphorus
SS=	Suspended Sediment

Source: Currey, MDE, Personal Communication

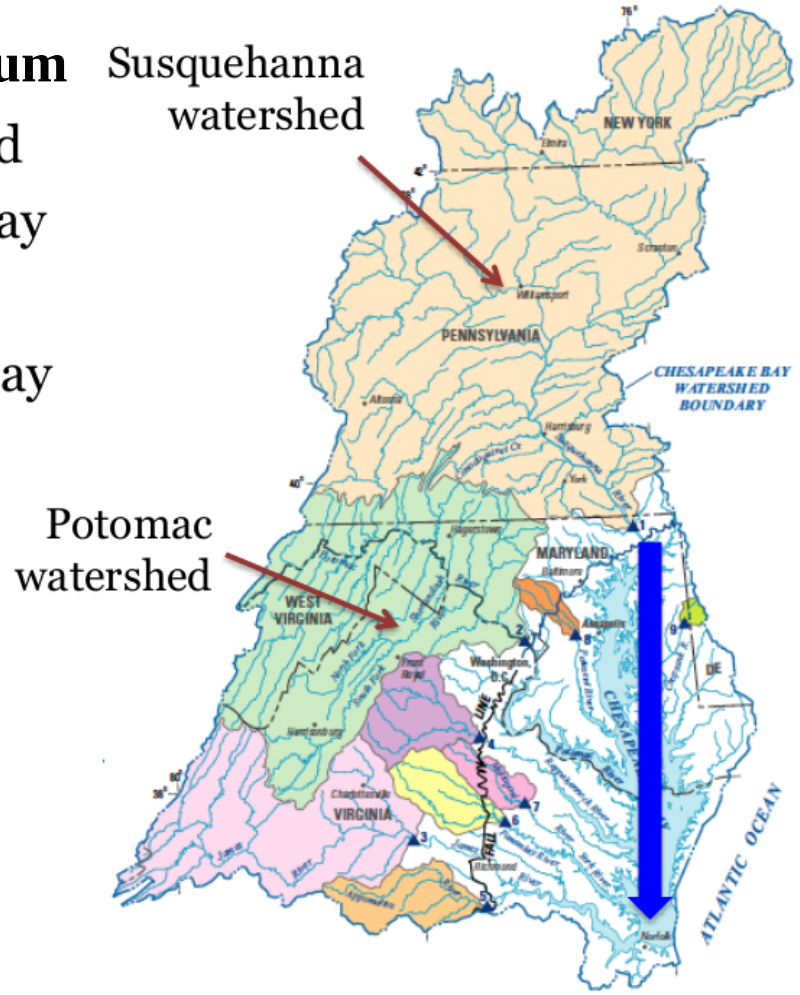
REFINING THE DATA

Conowingo New Science

Susquehanna River Has a Major Influence on Chesapeake Bay Water Quality

- **Reservoirs at dynamic equilibrium**
- 43% of Chesapeake Bay watershed
- 47% of freshwater flow into the Bay
- 45± ~~41~~% of nitrogen loads to the Bay
- 45 ± ~~25~~% of phosphorus loads to the Bay
- 45 ± ~~27~~% of sediment loads to the Bay

- **Previously unaccounted for loads will require additional effort to meet goals.**
- **How to allocate loads among jurisdictions?**



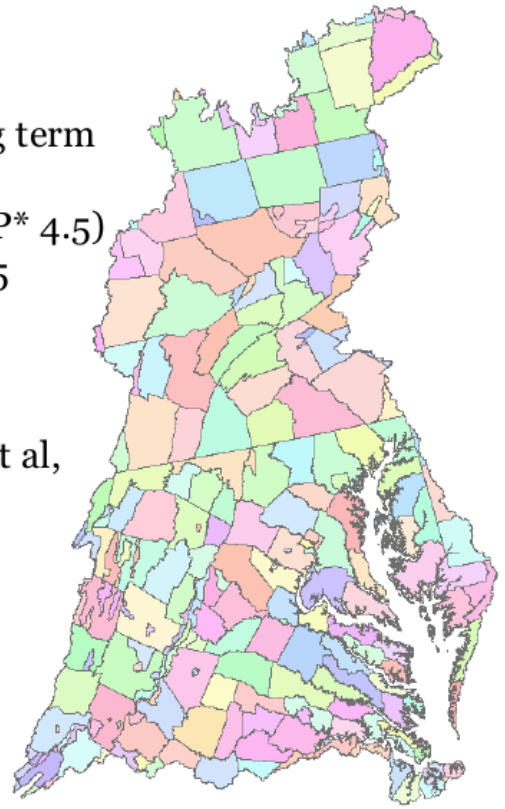
REFINING THE DATA

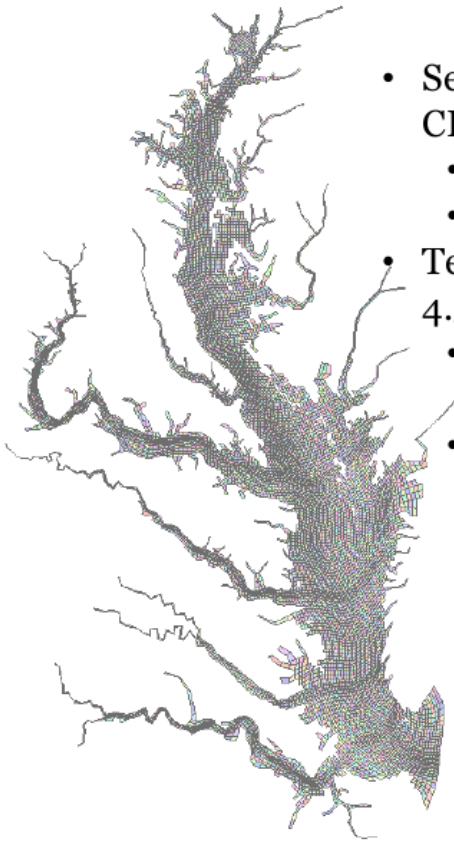
Climate Change

Model Climate Inputs

Model inputs were consistent with STAC Workshop and Climate Resiliency Workgroup Guidance

- Precipitation Volume
  - 2025: +3.1% (long term trends)
  - 2050: +7.3% (RCP* 4.5)
- Temperature: RCP 4.5
  - 2025: +1.05 ^{0}C
  - 2050: +2.08 ^{0}C
- CO_2 Concentration: Meinhausen, Malte, et al, (2011)
  - 2025: 427 ppm
  - 2050: 487 ppm





- Sea Level Rise: CRWG**
  - 2025: +0.3 m
  - 2050: +0.5 m
- Temperature: RCP 4.5
  - 2025: +0.95 ^{0}C
  - 2050: +1.86 ^{0}C

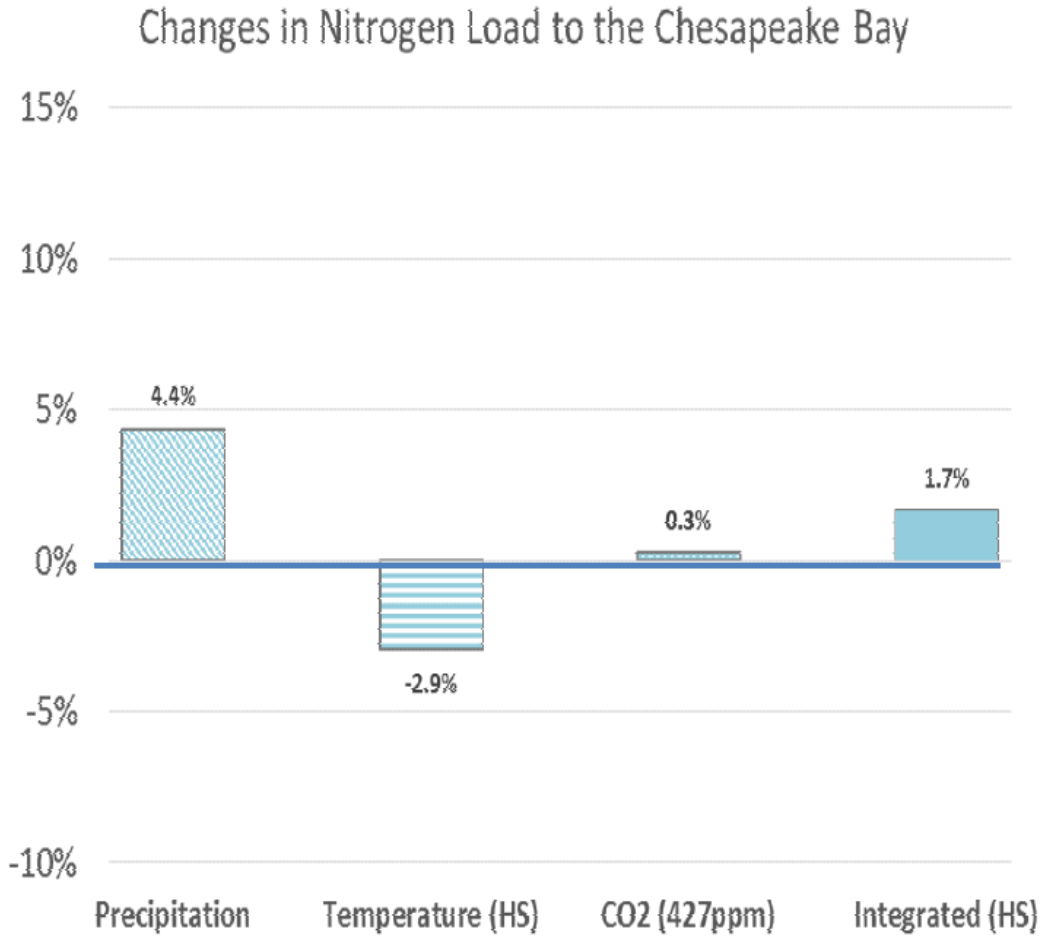
*RCP 4.5 signifies a specific Representative Concentration Pathway scenario as defined by the Intergovernmental Panel on Climate Change

**Based upon guidance provided by the Climate Resiliency Workgroup

REFINING THE DATA

Climate Change

Estimated Influence of 2025 Increased Precipitation Volume & Intensity on Total Nitrogen Loads



- How much Climate Change should we factor into our Models and Plans?
- What is the best way to incorporate the new information?
- How can we account for the uncertainty in the science?

Source: Gopal Bhatt, Penn State; Kyle Hinson, CRC; and Andrew Sommerlot, UMCES

CREDIT IN THE MODEL

BMP Expert Panels

Animal Waste Storage Systems	Phase 6 Nutrient Management	Advanced Onsite Systems (Attenuation) Part II
Phase 6 Conservation Tillage	Wetlands	Cropland Irrigation Management
Manure Injection/ Manure Incorporation	Urban Tree Canopy	Manure Treatment Technologies
Oyster Restoration/ Aquaculture	Floating Wetlands	Impervious Disconnection
Boat Pump-Out	Advanced Onsite Systems, Part III	Agricultural Ditch
Phase 6 Cover Crops		Agriculture Stormwater Structures

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BMP Expert Panels

- Calibration critical BMPs will be completed by December 31st
- All others will be completed by September 2017, to be available for use in Watershed Implementation Plans and 2018-2019 Milestones

Mid-Point Assessment Schedule

Deliverable	Schedule/Deadline
Rolling local review of land use	October - mid-December 2016
All Phase 6 inputs due (except Land Use)	December 31, 2016
Final Phase 6 Land Use dataset complete	January 2017
EPA releases draft expectations for WIP 3	January 2017
Final calibration of Phase 6 model	January – March 2017
Partnership fatal flaw review of Phase 6 model	March – May 2017
EPA releases final expectations for WIP 3	April 2017
Phase 6 model approval	June 2017
EPA release of draft State-basin planning targets	June 2017
EPA release of final State-basin planning targets	December 2017
Draft WIP 3 due to EPA and release for public comment	August 2018
EPA feedback on draft WIP 3	October 2018
Final WIP 3 due to EPA	December 2018

Questions and Discussion

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