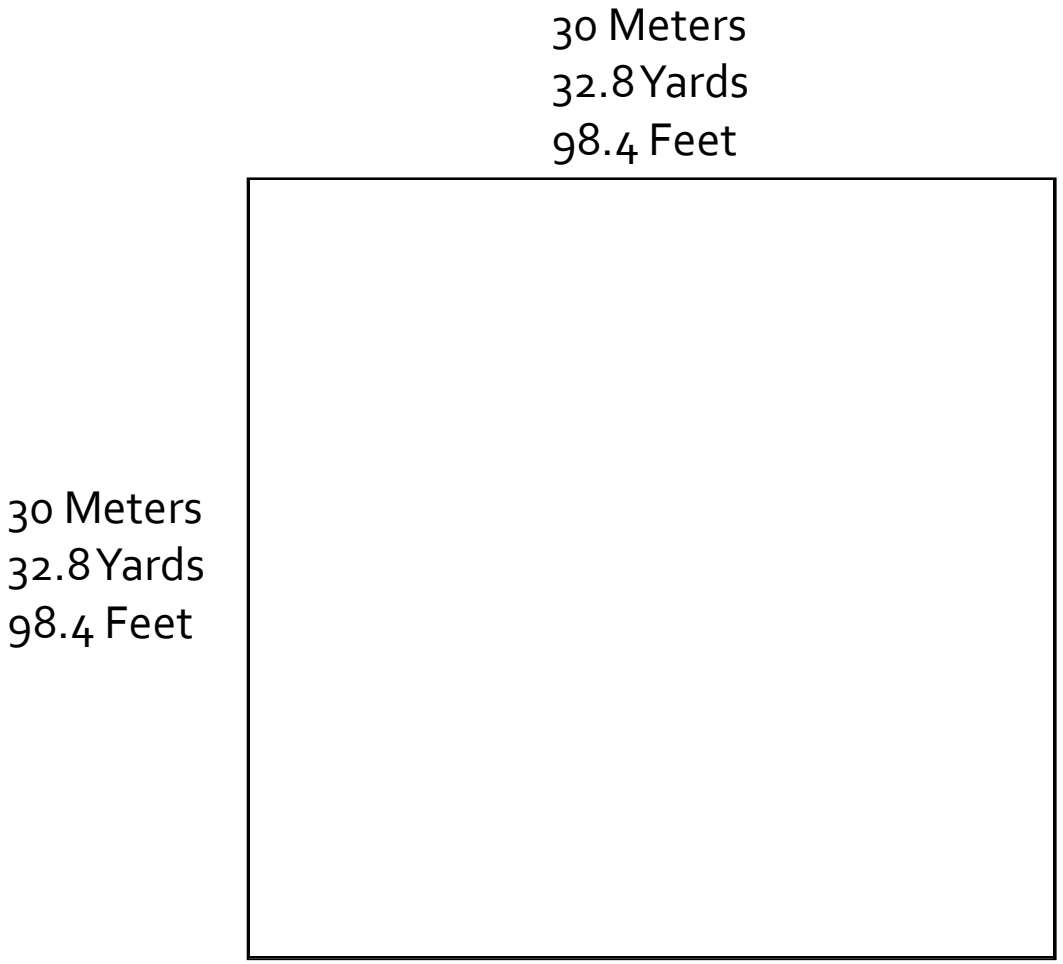
New Tools for the Mid-Point Assessment & WIP Development

James Davis-Martin
Bay Manager - VA DEQ
Chair - Water Quality GIT

November 11, 2016

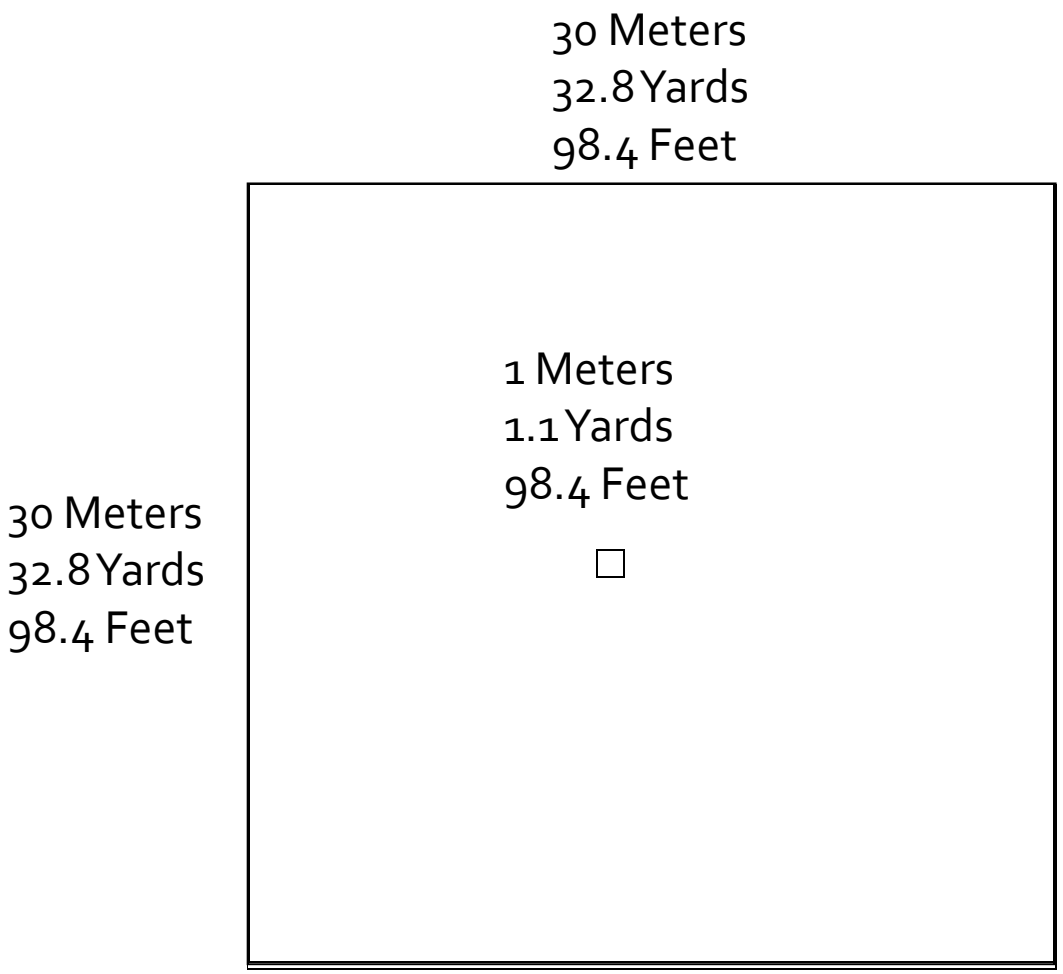
REFINING THE DATA

Land Use Land Cover Resolution



REFINING THE DATA

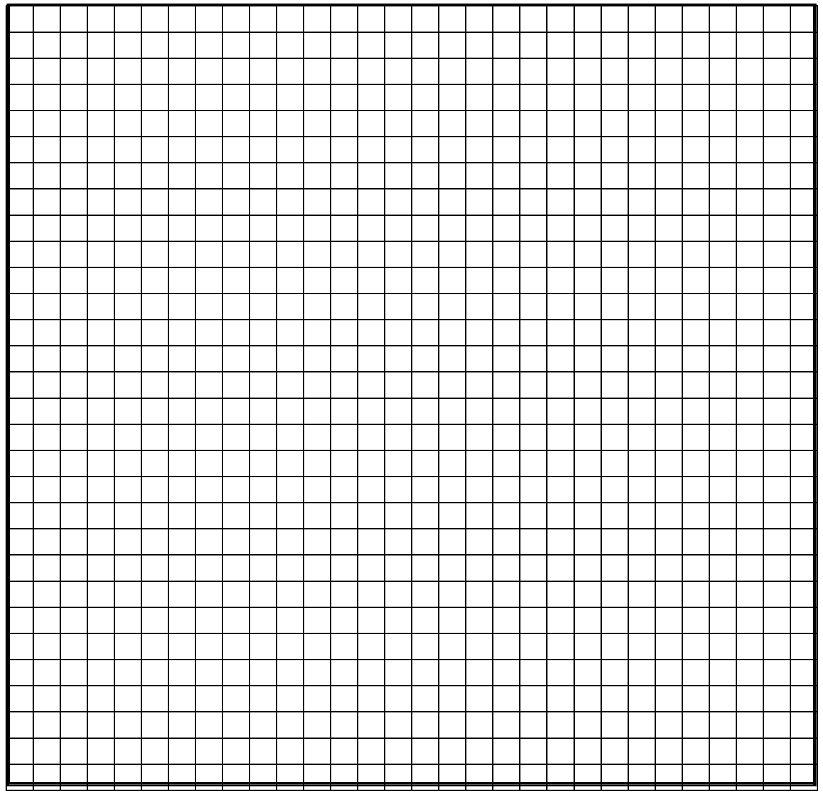
Land Use Land Cover Resolution



REFINING THE DATA

Land Use
Land Cover
Resolution

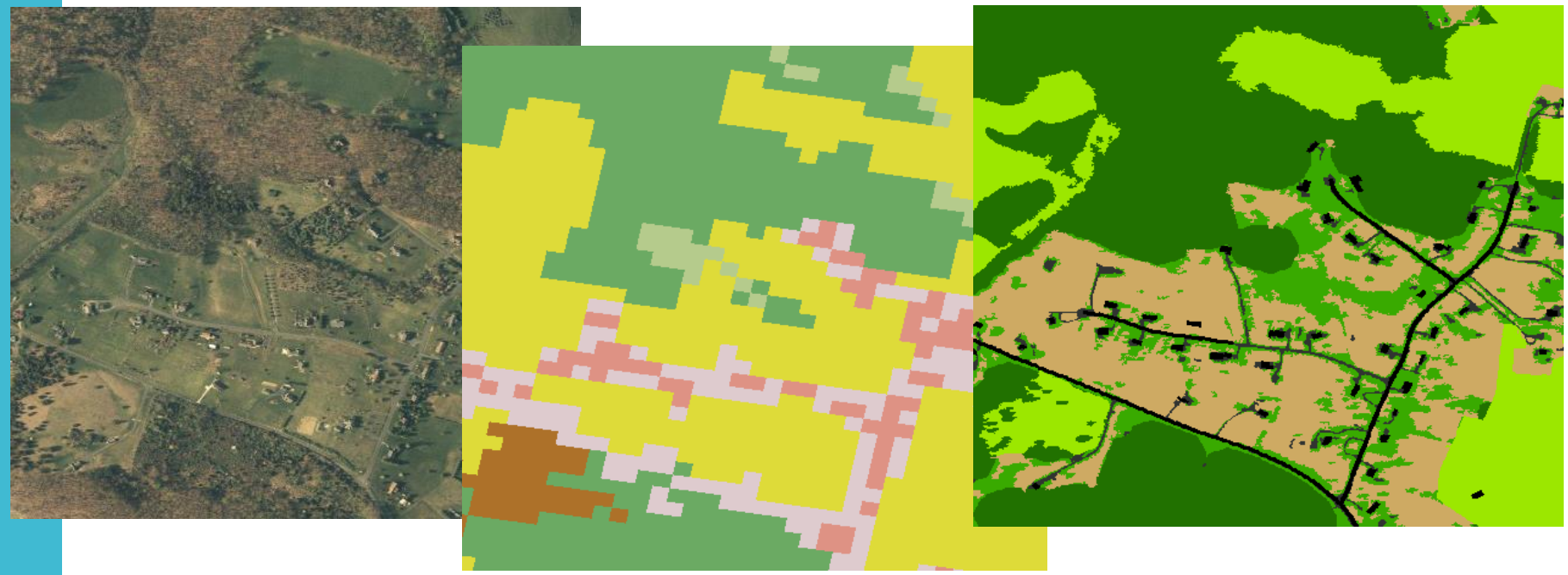
900 Times Better Resolution
184 Million pixels to 165 Billion pixels



REFINING THE DATA

Greatly Improved Land Use Land Cover Dataset

- Current input comes from latest NLCD, 30m resolution – 2011
- New LULC will have 1m resolution – 2012-2014
- Final Model Land Use supplemented with Local datasets and augmented by local review



NLCD 30-meter land cover dataset

- Underestimates impervious cover in rural areas
- Underestimates vegetation in dense urban areas
- Overestimates agricultural areas

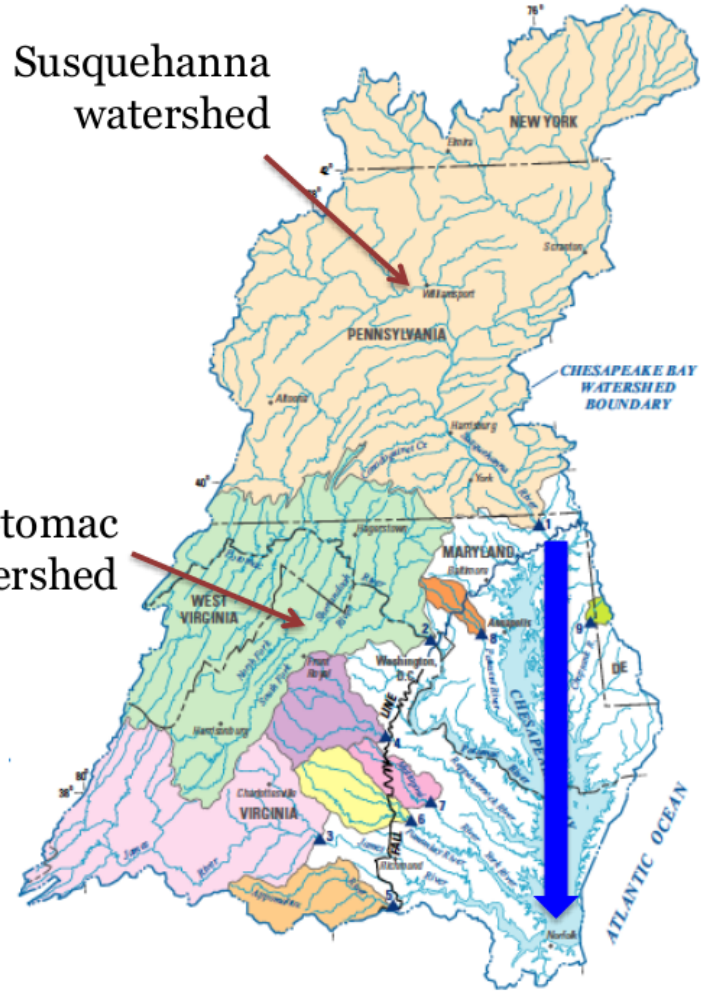
REFINING THE DATA

Conowingo

Susquehanna River Has a Major Influence on Chesapeake Bay Water Quality

Previous Understanding

- 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



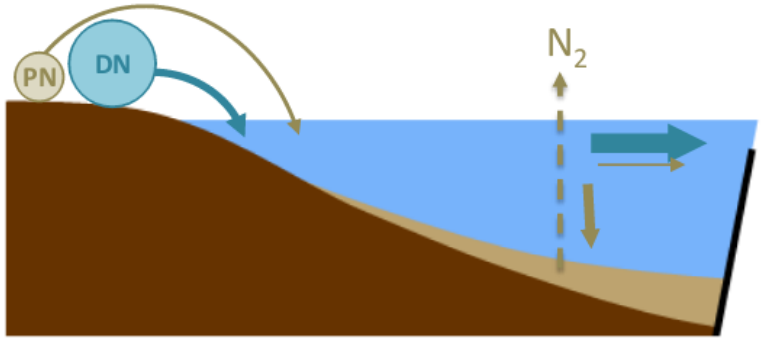
Source: Linker (2014)

REFINING THE DATA

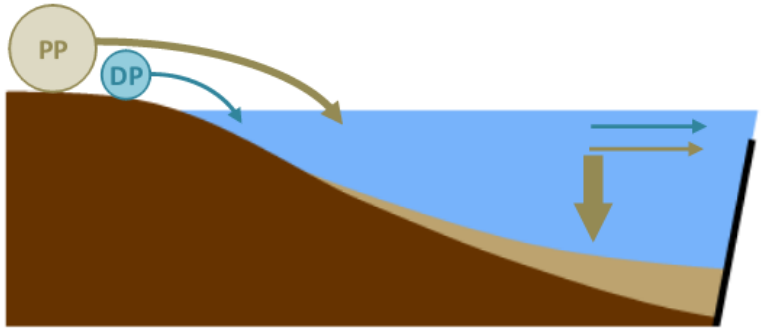
Conowingo

Characteristics of Net Reservoir Trapping

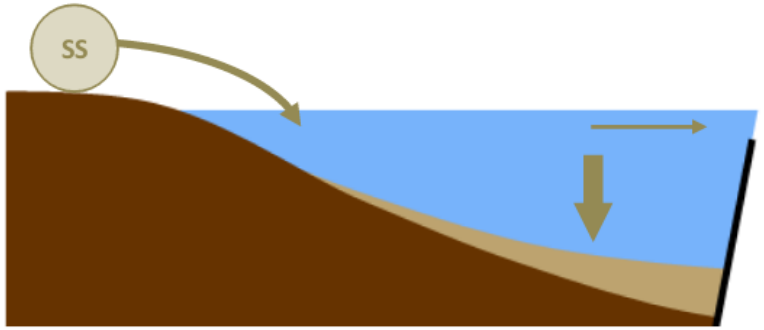
Nitrogen



Phosphorus



Sediment



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

Susquehanna River Has a Major Influence on Chesapeake Bay Water Quality

New Science

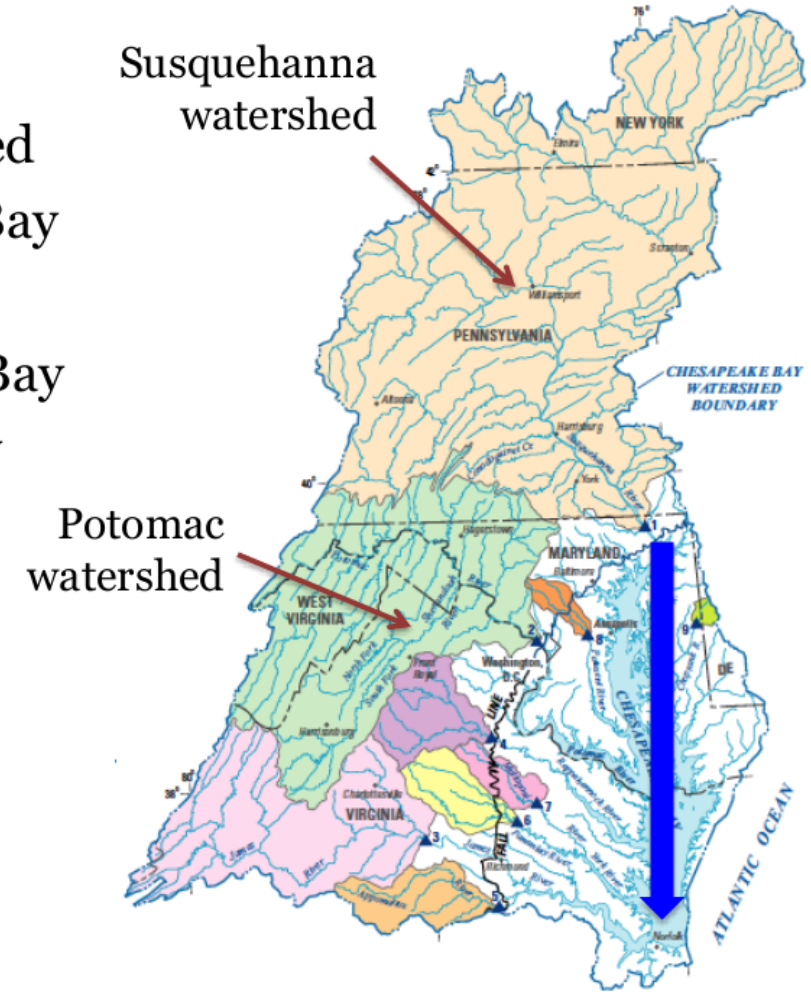
- 43% of Chesapeake Bay watershed
- 47% of freshwater flow into the Bay

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?**



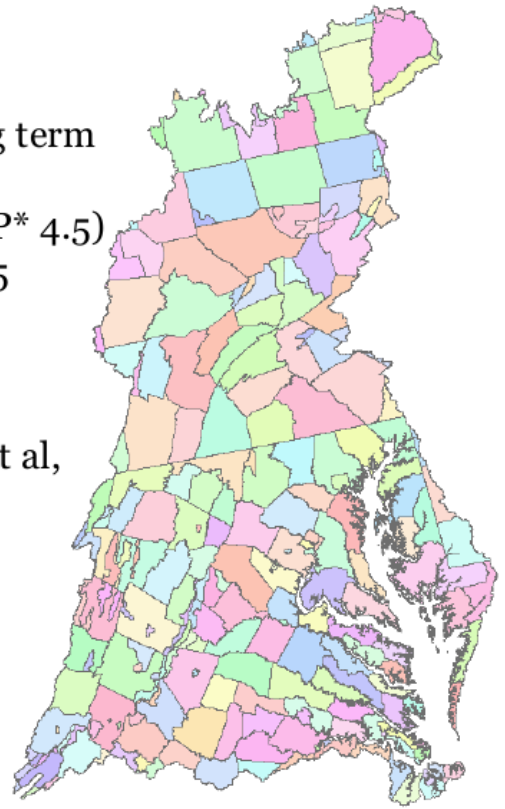
REFINING THE DATA

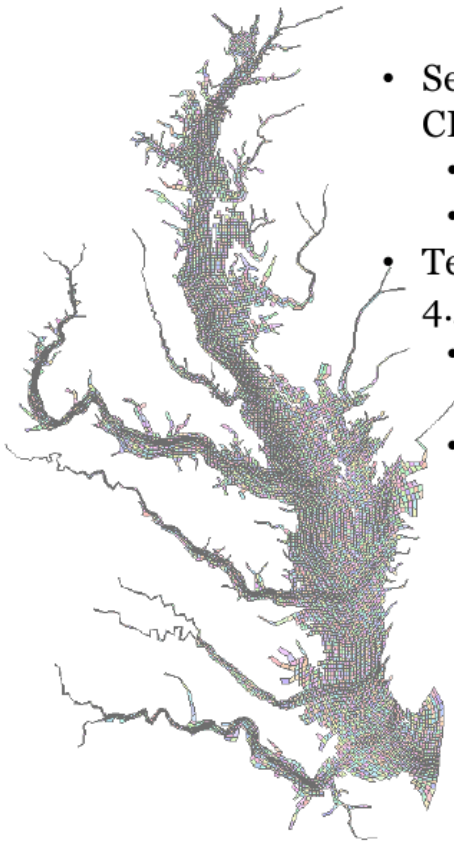
Climate Change

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

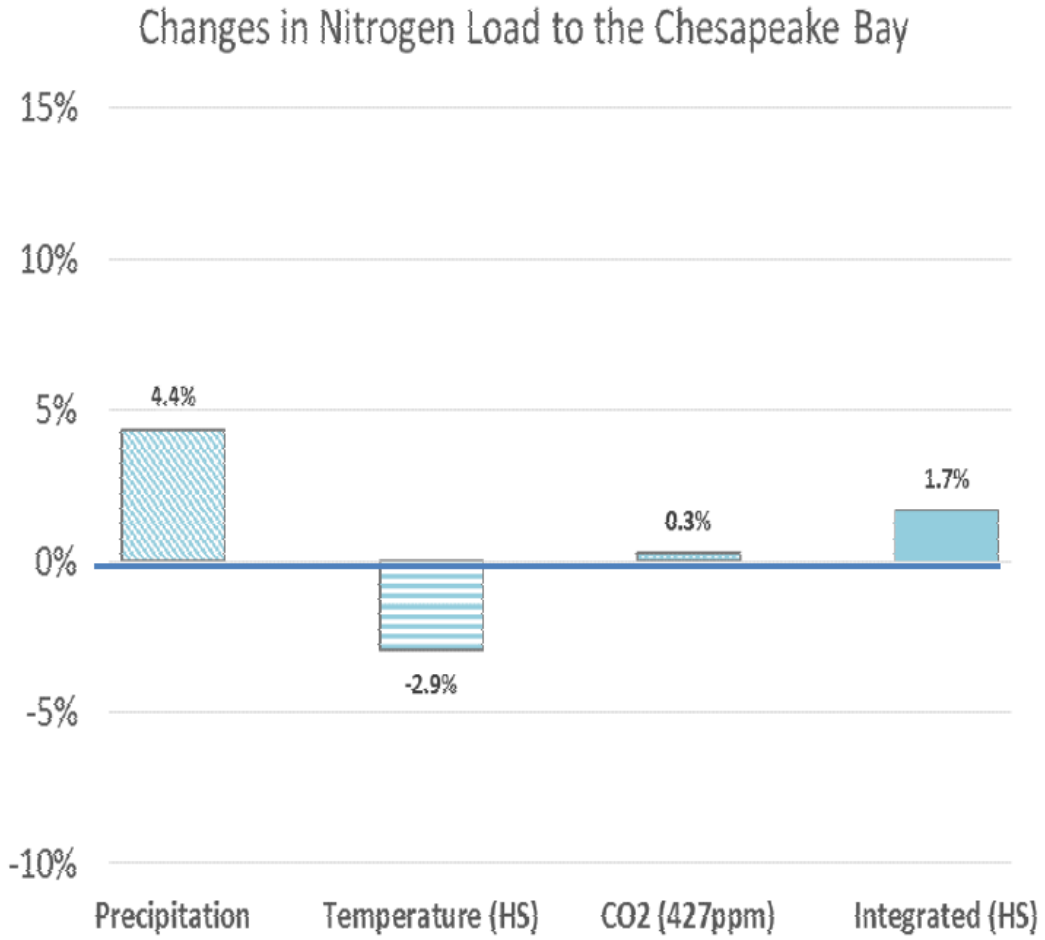
*RCP 4.5 signifies a specific Representative Concentration Pathway scenario as defined by the Intergovernmental Panel on Climate Change

**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

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

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

CREDIT IN THE MODEL

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

ENGAGE LOCAL PARTNERS

Local Area Goals

Why?

- Enhance local buy in and engagement in the WIP process
- Allow a jurisdiction to focus limited resources for implementation
- Assist local areas in understanding where best to target their efforts and resources
- Accelerate implementation progress to achieve the Chesapeake Bay TMDL

ENGAGE LOCAL PARTNERS

Local Area Goals

What is Local?

- Anything smaller than the jurisdiction-basin
  - Virginia – Potomac all sources
  - Pennsylvania – Susquehanna all sources
- Ideally it aligns with the scale and source at which implementation decisions are made
- May be variable within a jurisdiction and among jurisdictions
- **Flexibility for Jurisdictions is key**
- **No "one size-fits all" answer**

ENGAGE LOCAL PARTNERS

Local Area Goals

How is the Local Goal expressed?

- Could be quantitative
  - Pounds of N, P and S Load
  - Levels of Reduction Needed
  - Extent of BMPs to be Implemented
  - Yield goals - load/acre of a land use
- Could be Qualitative
  - Programmatic Goals
  - Pace of Implementation
- **Flexibility for Jurisdictions is key**
- **Should facilitate local planning and implementation**

ENGAGE LOCAL PARTNERS

Local Area Goals

Experience with Federal Facility Targets

- 2015 Process to develop targets for the Federal Facilities in the Bay Watershed
- Different approaches by most jurisdictions
  - EPA method applied as default
- Fostered increased engagement by Facilities
- Quantified what was needed beyond existing regulatory requirements
- Driven in part by Executive Order 13508
- **Do we have a Driver, like EO13508, that can help encourage local partners to join?**
  - **Executive/Legislative/Regulatory mandate?**
  - **Incentive Funding?**

SYSTEM INTEGRATION

Mid-Point Assessment

Phase 6 Model Development

- Historical BMP Data
- **New Land Cover Classes and Data**
- **BMP Updates**
- **Conowingo Infill**
- **Climate Change**
- Calibration to Monitoring Data
- Partnership Review and Approval

WIP 3

- Local Engagement
- EPA Expectations
- Jurisdiction-Basin targets
- **Local Area Goals**
- Planning Tools
- Optimization engine
- Implementation Forecast
- WIP Document

2017 Progress

- 60% Target Evaluation - current model
- WIP 3 planning - new model

Questions and Discussion

James.Davis-Martin@DEQ.Virginia.Gov
804-698-4298

James Davis-Martin
Bay Manager - VA DEQ