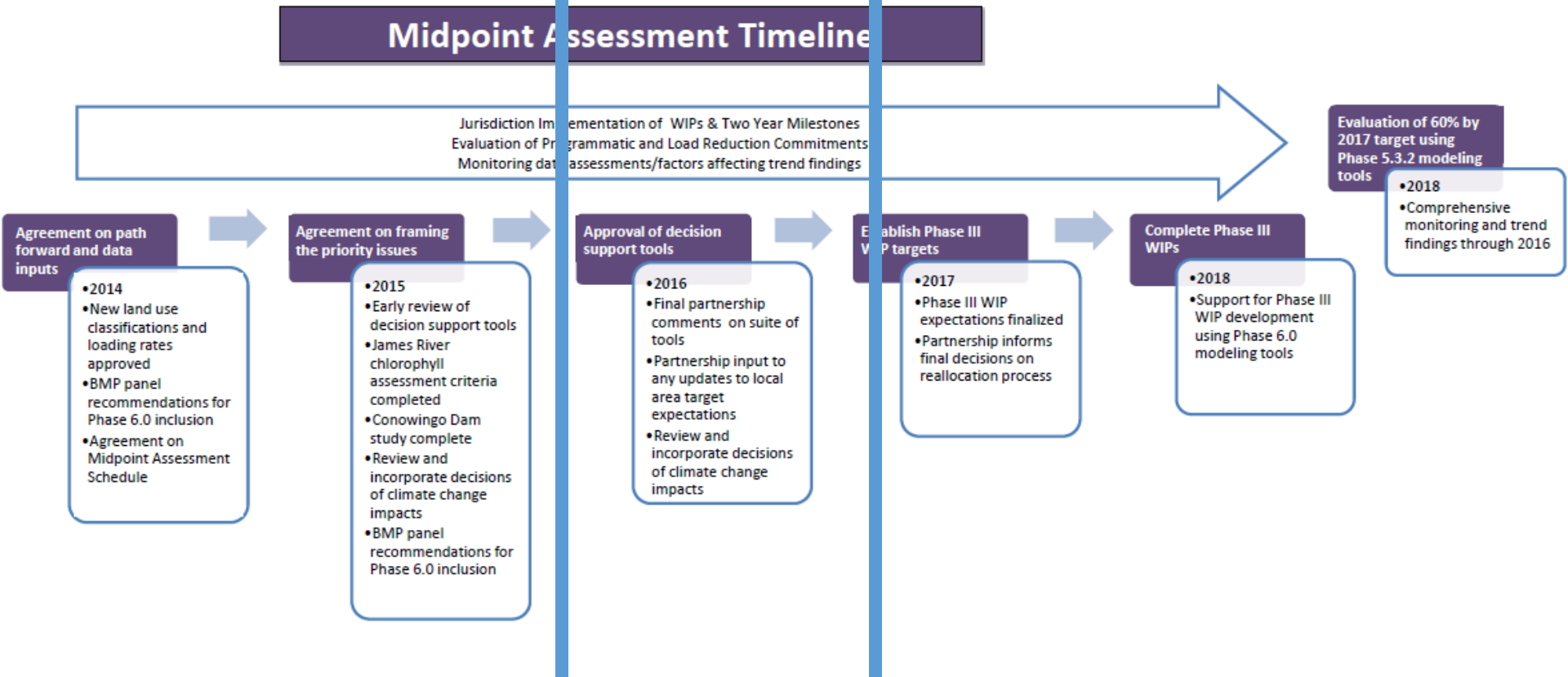
Scenario Builder and Watershed Model Progress toward the MPA

Gary Shenk Modeling Workgroup 4/22/2015



CREATE The Models

6 months of development to go

REVIEW The Models

Expect changes
Nothing guaranteed

USE The Models

1-Slide Status Report

• Land Use Types and Acreage	Wed 10:25
• Land Use Loading Rates	Wed 11:30
• Sensitivities to inputs	Wed 1:30
• Watershed Model Development	Wed 2:30
• Groundwater Lag	Wed 2:30
• Calibration Methodology	Wed 2:30
• Fine-scale Processes	Thurs 2:30
• Time Series Data	
• Reservoirs	
• Atmospheric Data	
• Climate Change	Early January
• Scenario Builder Development	SEP

Phase 6

Nutrients

Initial Calibration Load =

Estimated Average Load + **Sensitivity** * **Δ Inputs**

Estimate Spatial Average EOS Based on land use and inputs

BMPs

*

Estimate watershed delivery variance based on landscape parameters

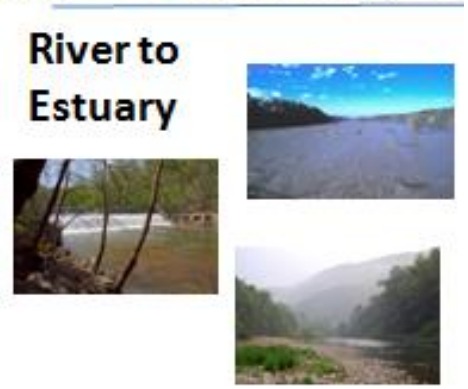
Watershed Delivery Variance Centered on 1

*

Estimate small stream effects

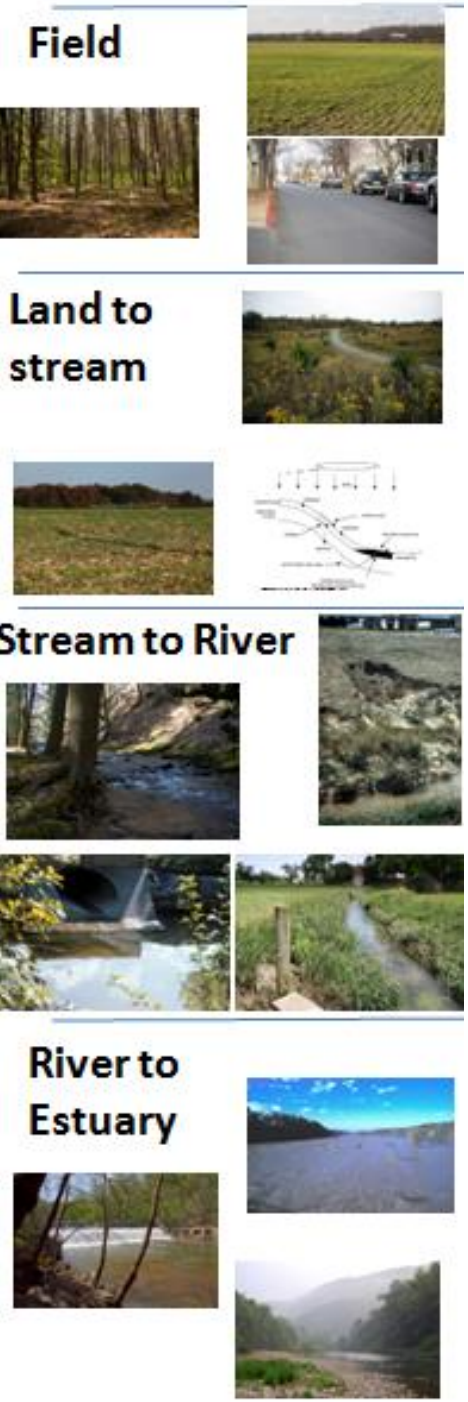
Stream Delivery

*



Directly Simulated in HSPF

River Delivery



Phase 6

Initial Calibration Load =

Multiple models

Multiple Lines of Evidence → **Estimated Average Load** + **Sensitivity** * **Δ Inputs**

*

BMPs ← Scenario Builder

*

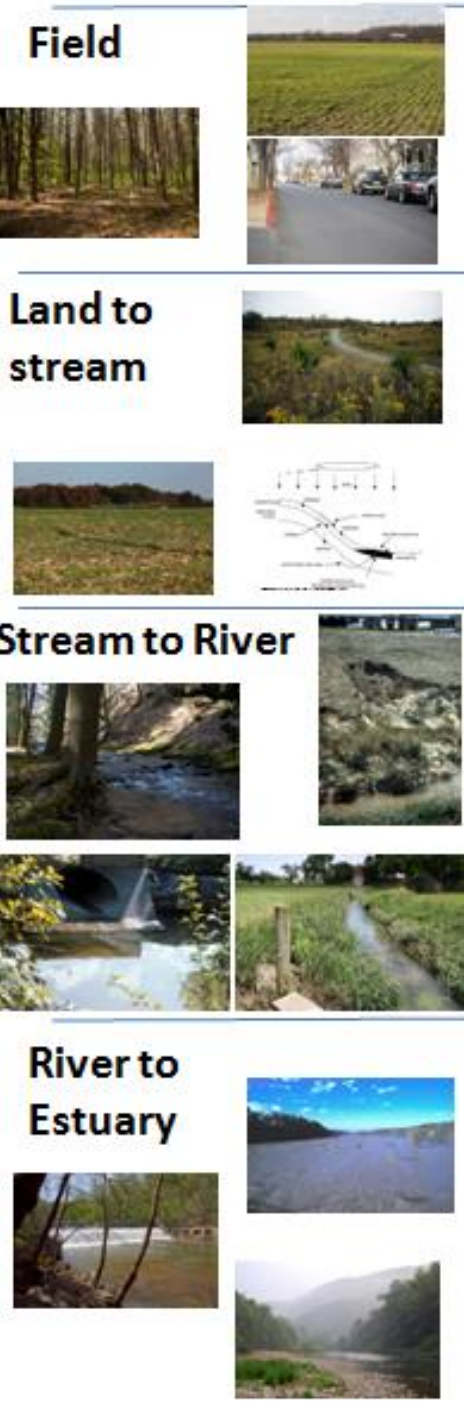
Estimated with Sparrow
Estimated by Land Data team → **Watershed Delivery Variance Centered on 1**

*

Estimated with Sparrow
Estimated by USGS / WVU / Land Data team → **Stream Delivery**

*

Simulated in HSPF
Calibrated with data, WRTDS, and Sparrow → **River Delivery**



Phase 6

Initial Calibration Load =

Multiple Lines of Evidence → **Estimated Average Load** + **Sensitivity** * **Δ Inputs** ← Multiple models

*

BMPs ← Scenario Builder

*

Estimated with Sparrow
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Simulated in HSPF
Calibrated with data, WRTDS, and Sparrow → **River Delivery**

TN Target Development

Decision Point #1

Global Model:
e.g. Sparrow

Crop
X Lbs/A/Yr

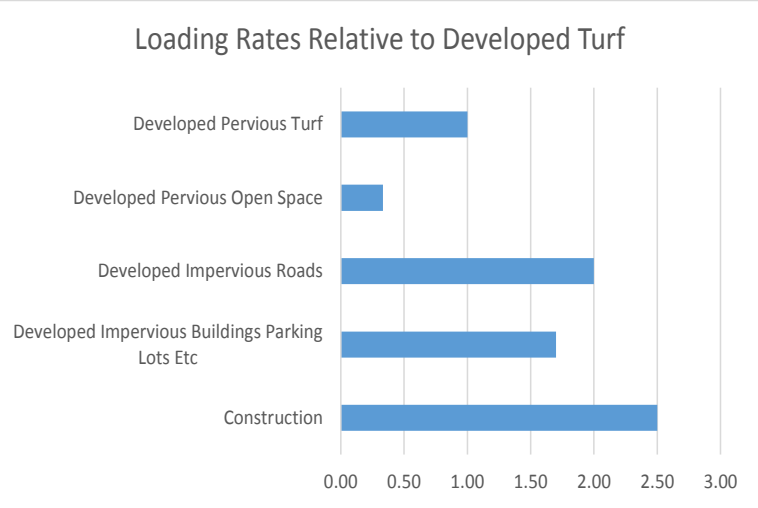
Pasture/Hay
Y Lbs/A/Yr

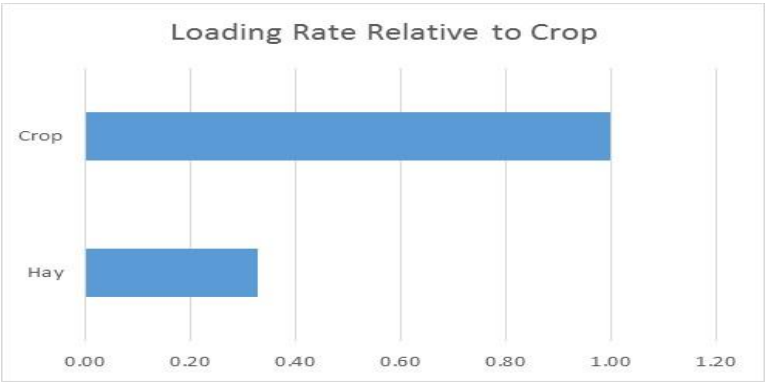
Urban
Z Lbs/A/Yr

Natural
A Lbs/A/Yr

Decision Point #2

Land use specific information:
Literature and models





Decision Point #3

Map the land uses

Crop

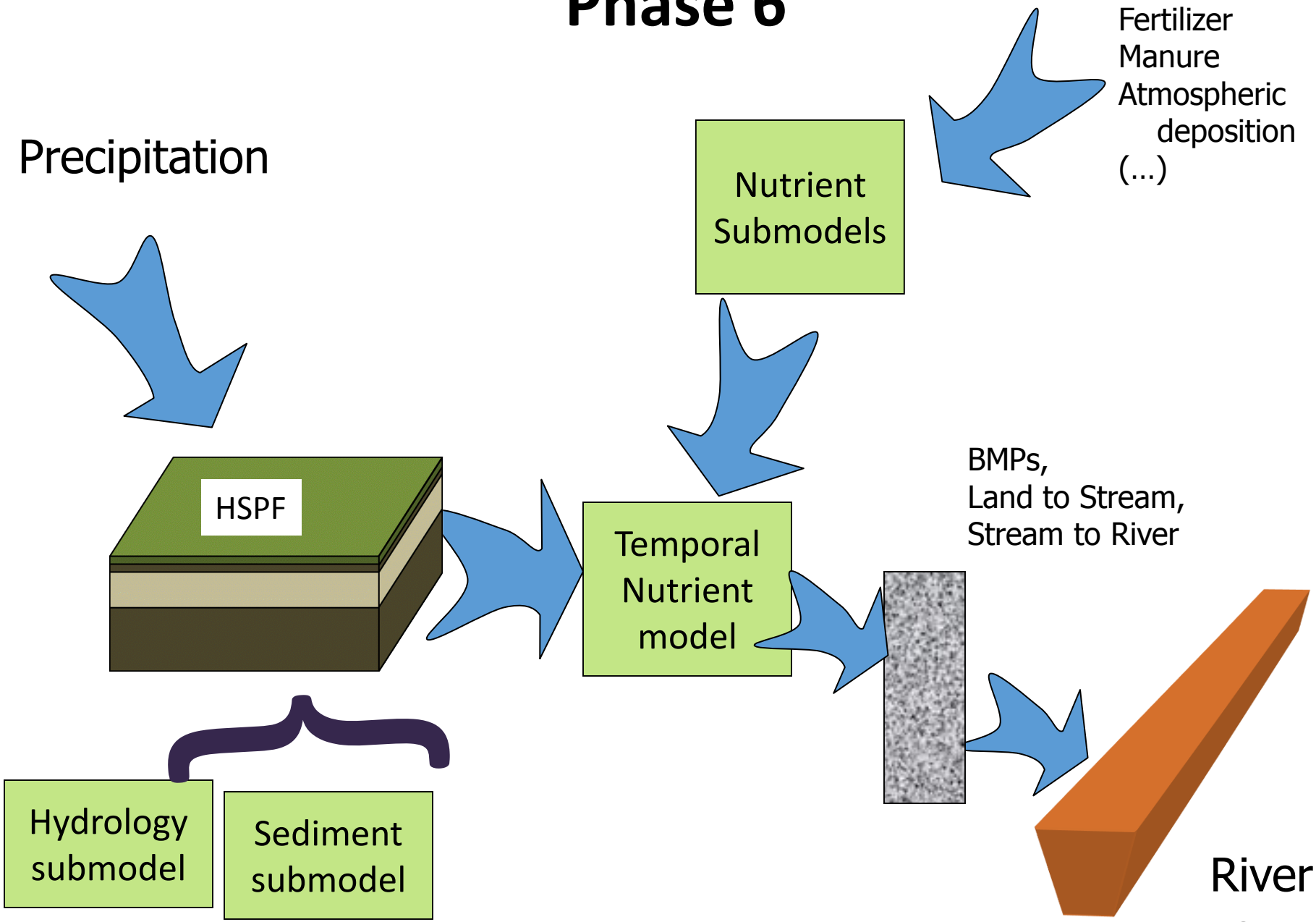
Hay

Pasture

Level 3
2.1.1.1 Grain - fallow
2.1.1.2 Grain - fall sm grain
2.1.1.3 Silage - fallow
2.1.1.4 Silage - fall sm grain
2.1.2.1 Fall fallow
2.1.2.2 Fall sm grain
2.1.3.1 Sm grain - Dbl Crop Beans
2.1.3.2 Forage
2.1.3.3 Sm grain - fallow
2.1.4.1 Grain - fallow
2.1.4.2 Grain - fall sm grain
2.1.4.3 Silage - fallow
2.1.4.4 Silage - fall sm grain
2.1.2.1 Fall fallow
2.1.2.2 Fall sm grain
2.1.5.1 Sm grain - Dbl Crop Beans
2.1.5.2 Forage
2.1.5.3 Sm grain - fallow
2.2.1.1 Alfalfa and Other Legumes with manure
2.2.1.2 Alfalfa and Other Legumes without manure
2.2.2.1 Non-Legume Forage with manure
2.2.2.2 Non-legume Forage without manure
2.2.3 Pasture and pastured cropland
2.3.1.1 High nutrient input
2.3.1.2 Medium and low nutrient input
2.3.2.1 High nutrient input
2.3.2.2 Medium and low nutrient input
2.3.3.1 High nutrient input
2.3.3.2 Medium and low nutrient input
2.4.1.1 CAFO (regulated)
2.4.1.2 AFO (unregulated)
2.5.1 Impervious
2.5.2 Pervious

Olivia Devereux 11:30

Phase 6


Fertilizer
Manure
Atmospheric deposition
(…)
Nutrient Submodels
Precipitation
HSPF
Temporal Nutrient model
BMPs,
Land to Stream,
Stream to River
Hydrology submodel
Sediment submodel
River

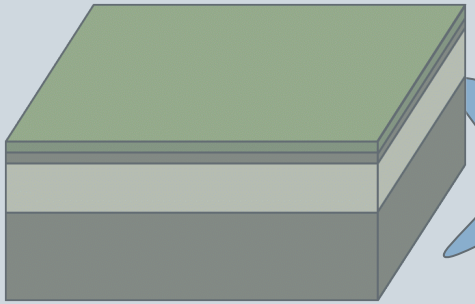
Phase 6

Fertilizer
Manure
Atmospheric deposition
(…)

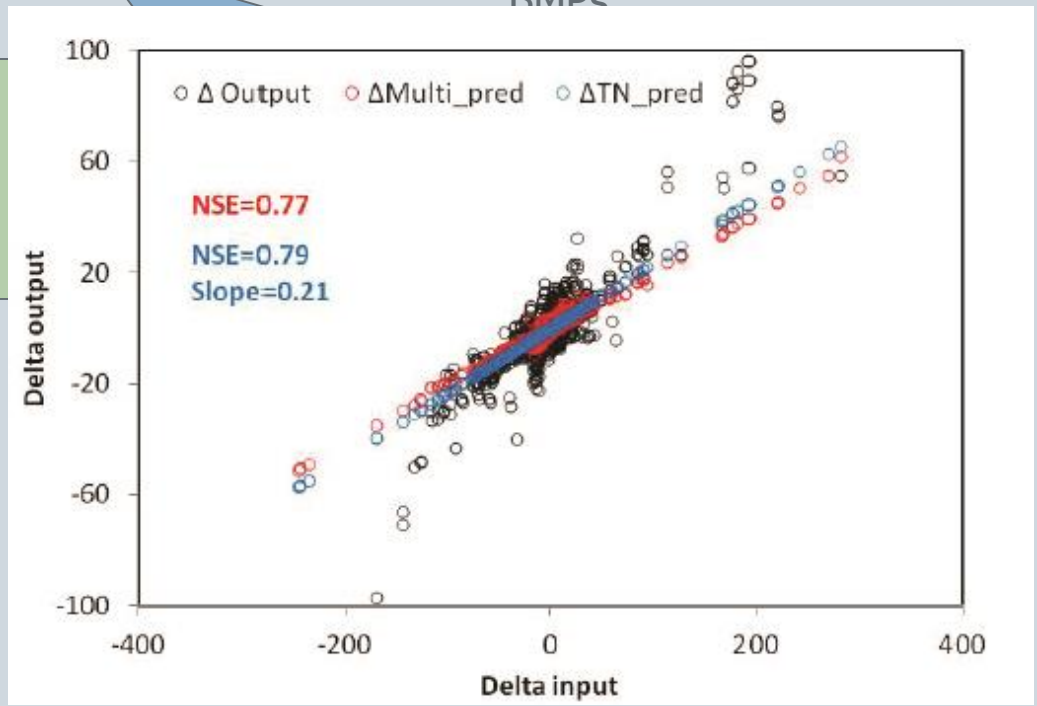
Nutrient Submodels

Precipitation

Guido Yactayo
Richard Tian - 1:30



BMPs



Hydrology submodel

Sediment submodel

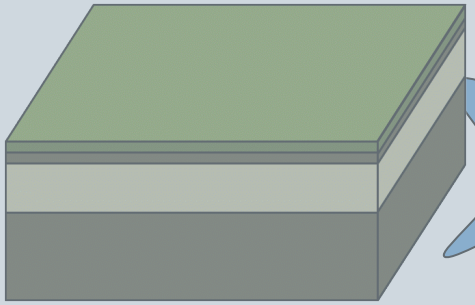
Phase 6

Fertilizer
Manure
Atmospheric deposition
(…)

Precipitation

Nutrient Submodels

Gopal Bhatt - 2:30



Temporal Nutrient Model

BMPs,
Land to Stream,
Stream to River

Hydrology submodel

Sediment submodel

River

Phase 6

Fertilizer
Manure
Atmospheric deposition
(…)

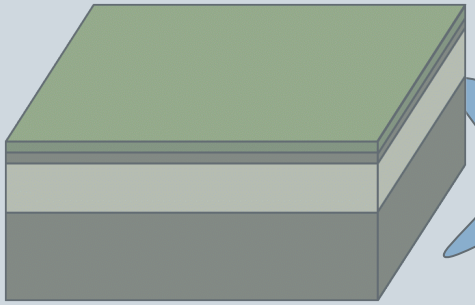
Precipitation

Nutrient Submodels

Gopal Bhatt - 2:30

PQUAL
No Lag

MPs,
Land to Stream,
Stream to River



UNEC
Looking
Forward

rSAS
Looking
Back

Hydrology submodel

Sedime submodel

River

Phase 6


Fertilizer
Manure
Atmospheric
deposition
Precipitation
Peter Claggett and Reid Christianson
Tomorrow - 2:30
BMPs,
Land to Stream,
Stream to River
Temporal
Nutrient
model
Hydrology
submodel
Sediment
submodel
River

Calibration Timeline

- **October 2014** – Rough Draft of major changes to nutrient processing in Scenario Builder will need to be complete. Continued sensitivity refinement
- **February 2015** - draft targets for draft land Uses
- **March 2015** – All major partnership decisions are made on changes to scenario builder processing and data. Scenario builder final modifications begin.
- **April 2015** - final targets approved by Modeling Workgroup for draft land uses
- **Early October 2015** – All inputs are final and delivered to the WSM by the scenario builder team for the final calibration run. Final targets are based on this information.
- **December 2015** - Phase 6 draft model is complete.
- **December 2015 – December 2016** - Evaluation followed by fine tuning during the next year. Key scenarios available
- **September 2016** – Final comments on the draft Phase 6 model
- **December 2016** - All models are final. The partnership decision-making process begins to discuss how these new models will be used in the WIP3 process

STAC Workshops June 2015 – May 2016

- Assessing **Uncertainty** in the CBP Modeling System
- **Conowingo** Infill Influence on Chesapeake Water Quality
- The Development of **Standardized Climate Projections** for Use in Chesapeake Bay Program Assessments
- Comparison of **Shallow Water Models** for Use in Supporting Chesapeake Bay Management Decision-making
- **Optimization** for TMDL Implementation Planning
- Enhancing Capacity to Support the Chesapeake **Agreement Outcome** though Increased Integration of Regional Science and Management Efforts
- Integrating and Leveraging **Monitoring Networks** to Support the Assessment of Outcomes in the New Bay Agreement