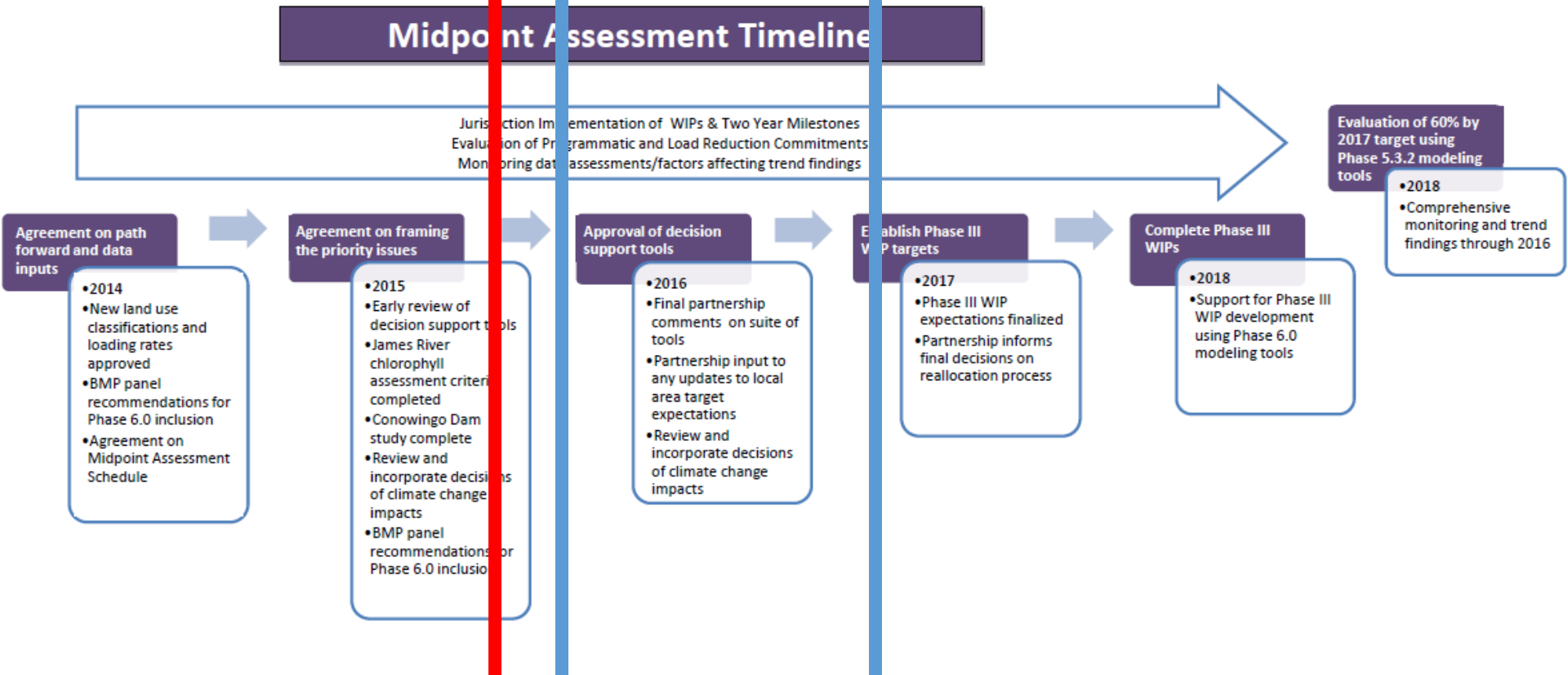
Scenario Builder and Watershed Model Progress toward the MPA

Gary Shenk Modeling Workgroup 7/21/2015



CREATE
The Models

2 months of development to go

REVIEW
The Models

Expect changes
Nothing guaranteed

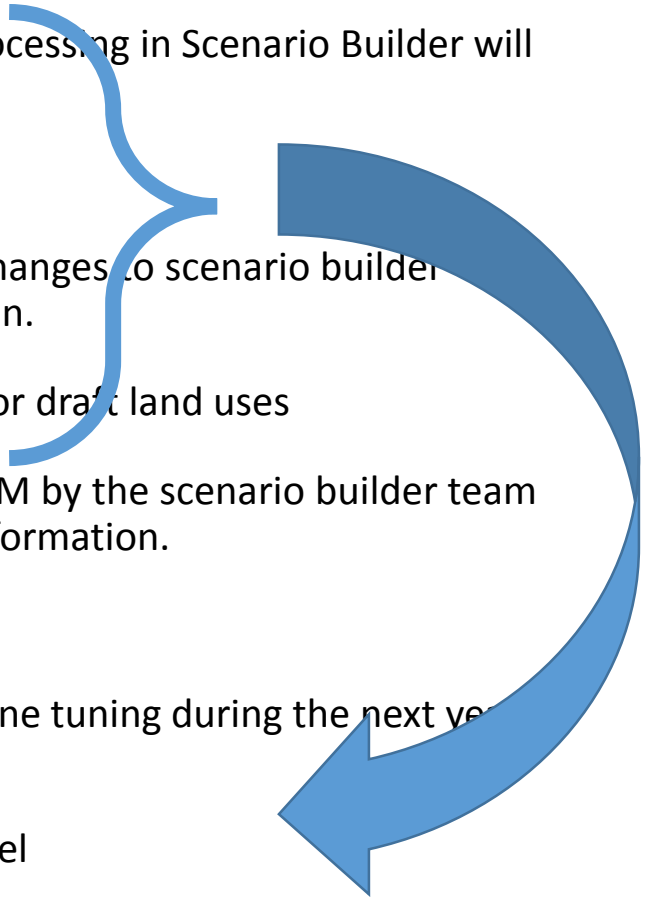
USE
The Models

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
- **October 1 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

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
- **October 1 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 ye 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



1-Slide Status Report

• Land Use Types and Acreage	Claggett
• Land Use Loading Rates	Jordan/Yagow/Devereux
• Sensitivities to inputs	Yactayo
• Watershed Model Development	Bhatt
• Groundwater Lag	Bhatt
• Calibration Methodology	Bhatt
• Fine-scale Processes	
• Time Series Data	Yactayo – but not presenting
• Reservoirs	
• Atmospheric Data	
• Climate Change	
• Scenario Builder Development	

Finished

Potentially Finished

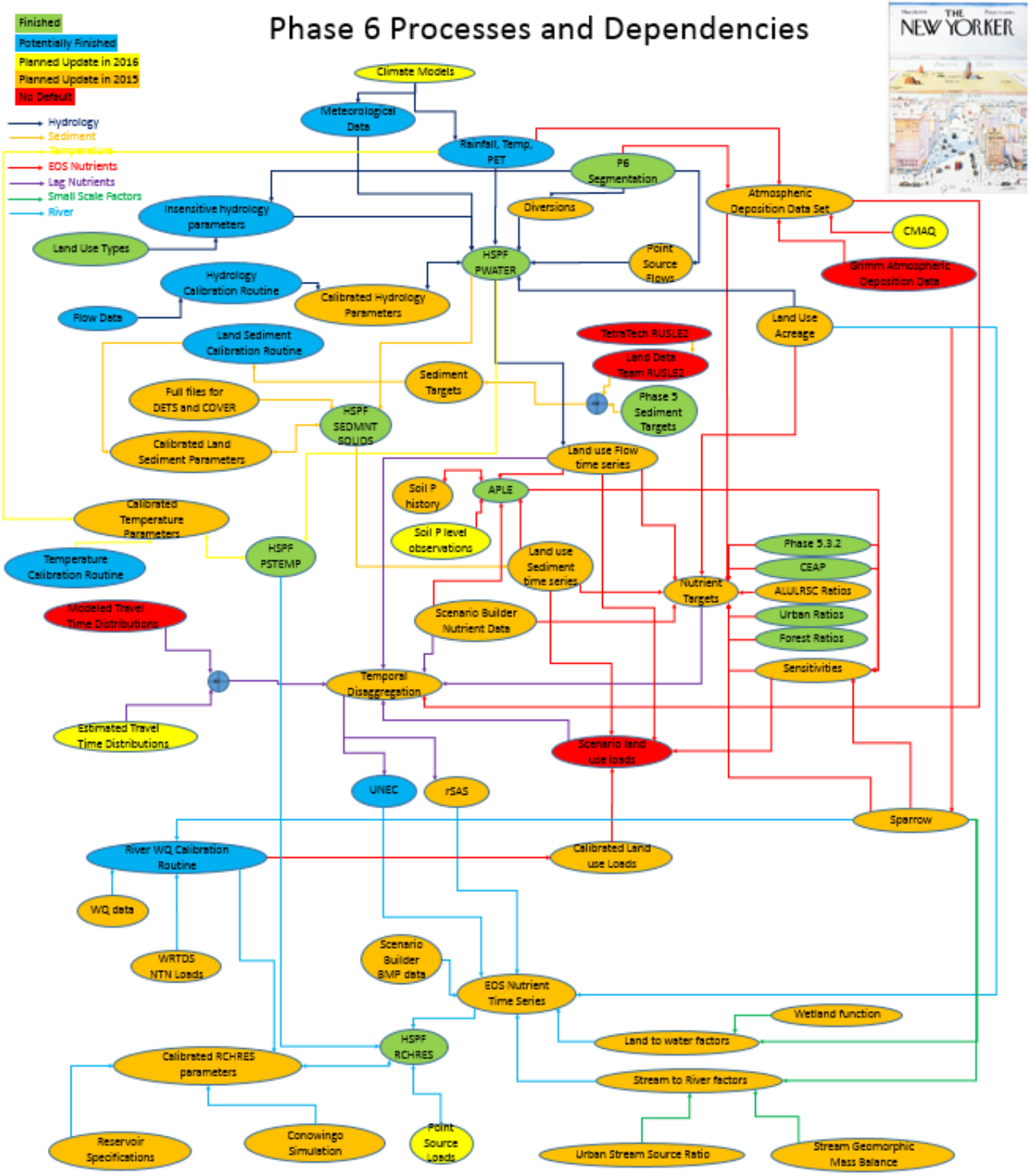
Planned Update in 2016

Planned Update in 2015

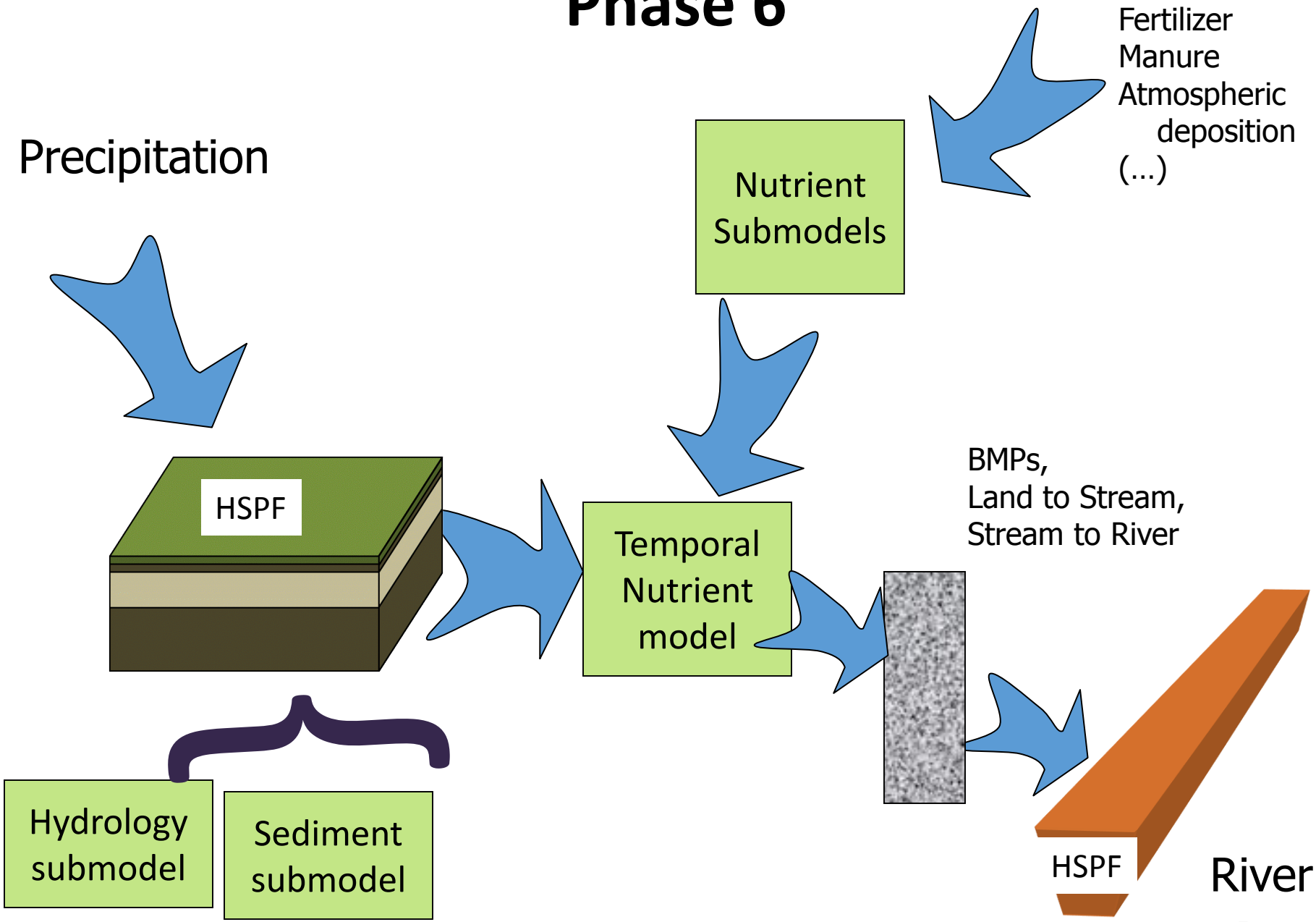
No Default

Each box represents a dataset, model, or process

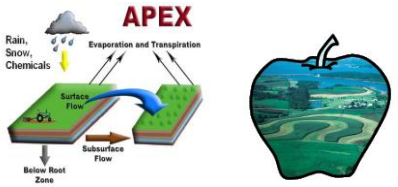
Still a lot to get done, but all in the plan.



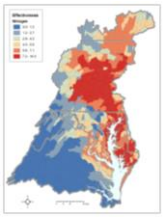
Phase 6

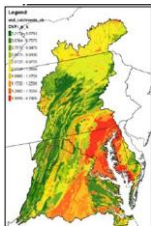

Fertilizer
Manure
Atmospheric deposition
(…)
Precipitation
Nutrient Submodels
HSPF
Temporal Nutrient model
BMPs,
Land to Stream,
Stream to River
Hydrology submodel
Sediment submodel
HSPF
River

Phase 6 New Elements



Simple relationships between input and output informed by multiple models





Nutrient Submodels

Temporal Nutrient model

Estimate of lag time
Does not change the overall load

BMPs,
Land to Stream,
Stream to River

Spatial variability parameters
Informed by models, analyses, and calibration





Load for a land use in a segment =

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

*

BMPs

*

Watershed Delivery Variance

*

Stream Delivery

*

River Delivery

Phase 6

Multiple Lines of Evidence And multiple models

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

Multiple models

*

BMPs ← Scenario Builder

*

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

*

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

*

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

Jordan/Yagow
1:00 pm
Devereux
2:00 pm

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

*

BMPs

*

Watershed Delivery Variance

*

Stream Delivery

*

River Delivery

TN Target Development

Decision Point #1

Global Model:
e.g. Sparrow

Crop
X Lbs/A/Yr

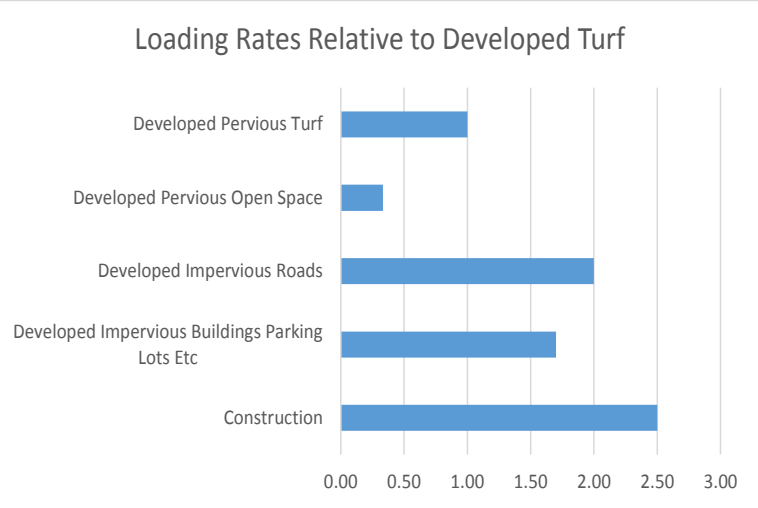
Pasture/Hay
Y Lbs/A/Yr

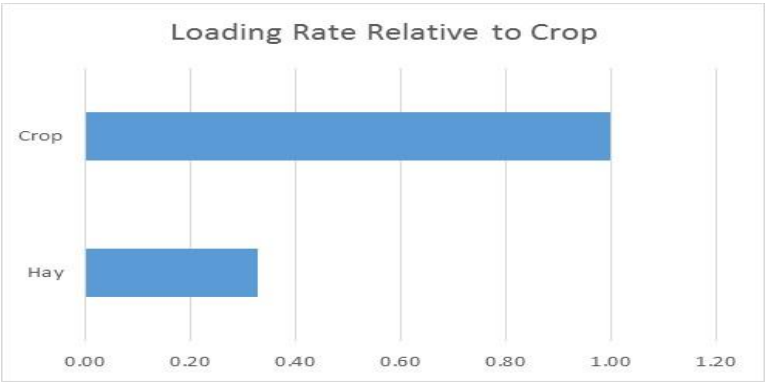
Urban
Z Lbs/A/Yr

Natural
A Lbs/A/Yr

Decision Point #2

Land use specific information:
Literature and models





Decision Point #3

Map the land uses

Jordan/Yagow 1pm – Devereux 2pm

Yactayo
2:30 pm

Estimated Average Load + Sensitivity * Δ Inputs

*

BMPs

*

Watershed Delivery Variance

*

Stream Delivery

*

River Delivery

Bhatt
11:00 am

Estimated Average Load

+ Sensitivity * Δ Inputs

*

BMPs

*

Watershed Delivery Variance

*

Stream Delivery

*

River Delivery

Claggett
1:30 pm

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

*

BMPs

*

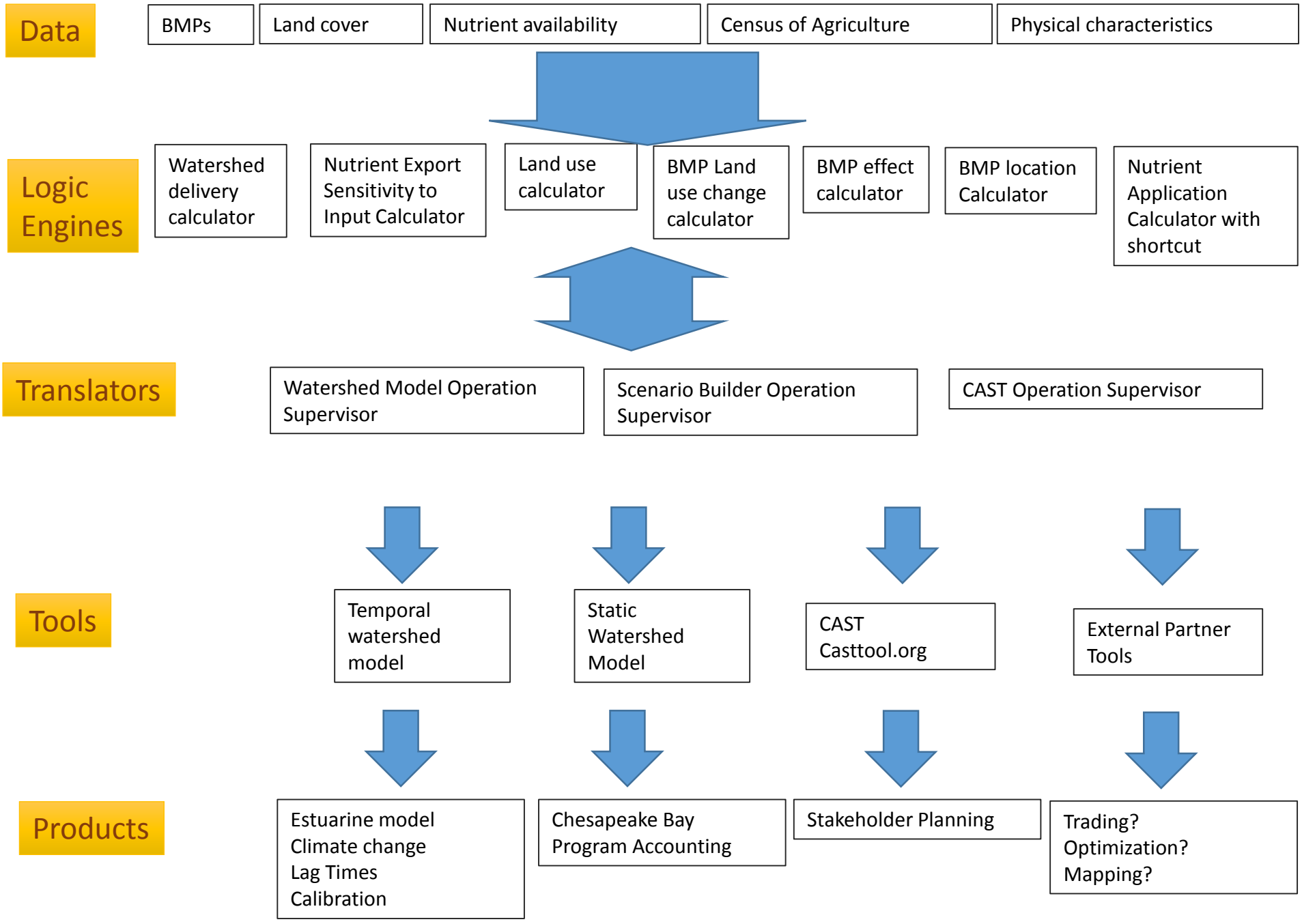
Watershed Delivery Variance

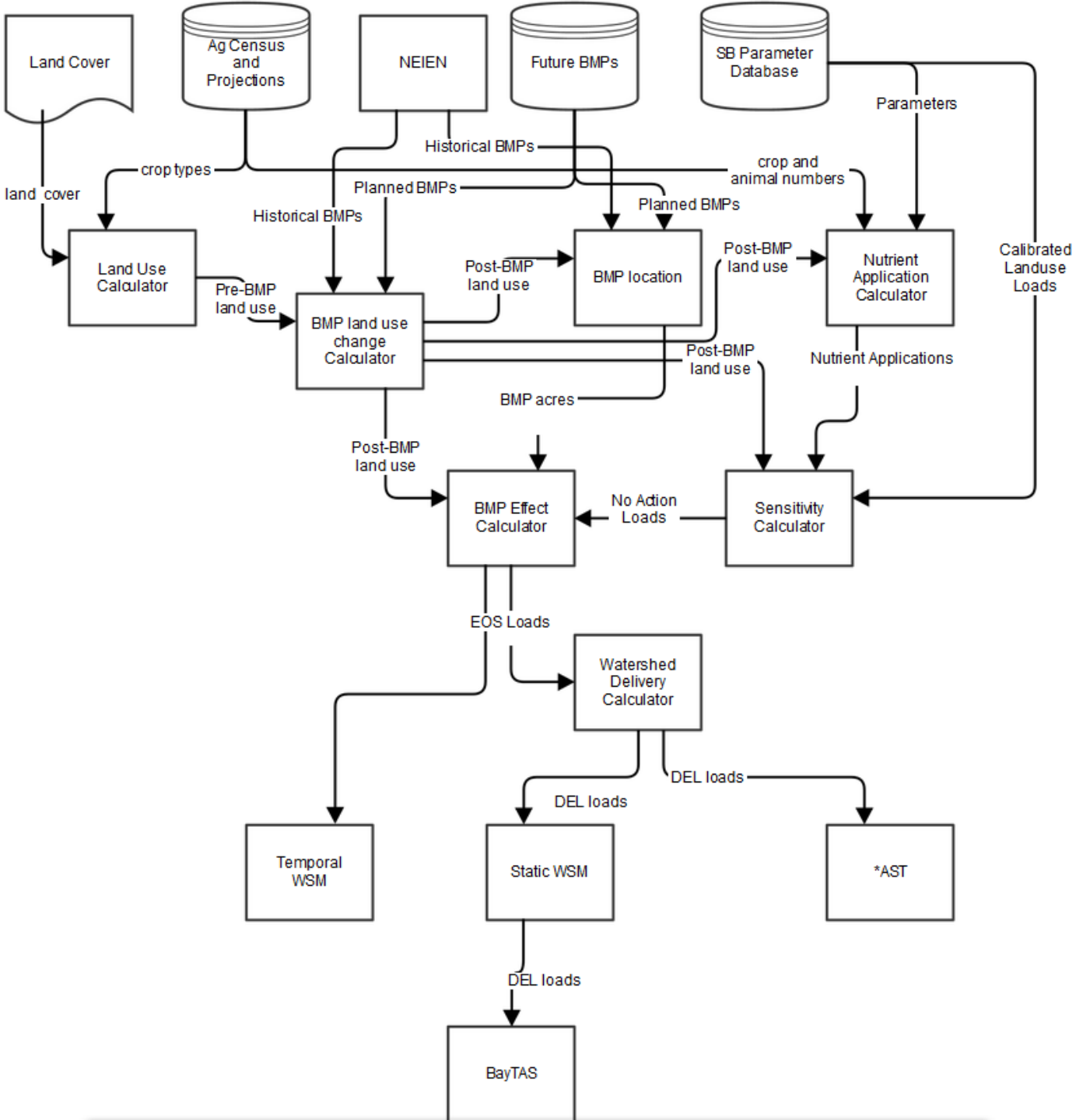
*

Stream Delivery

*

River Delivery


Data
BMPs
Land cover
Nutrient availability
Census of Agriculture
Physical characteristics
Logic Engines
Watershed delivery calculator
Nutrient Export Sensitivity to Input Calculator
Land use calculator
BMP Land use change calculator
BMP effect calculator
BMP location Calculator
Nutrient Application Calculator with shortcut
Translators
Watershed Model Operation Supervisor
Scenario Builder Operation Supervisor
CAST Operation Supervisor
Tools
Temporal watershed model
Static Watershed Model
CAST Casttool.org
External Partner Tools
Products
Estuarine model
Climate change
Lag Times
Calibration
Chesapeake Bay Program Accounting
Stakeholder Planning
Trading?
Optimization?
Mapping?


Land Cover
Ag Census and Projections
NEIEN
Future BMPs
SB Parameter Database
Parameters
Historical BMPs
crop types
crop and animal numbers
land cover
Planned BMPs
Planned BMPs
Historical BMPs
Land Use Calculator
Pre-BMP land use
Post-BMP land use
BMP location
Post-BMP land use
Nutrient Application Calculator
Calibrated Landuse Loads
BMP land use change Calculator
Post-BMP land use
Nutrient Applications
BMP acres
Post-BMP land use
BMP Effect Calculator
No Action Loads
Sensitivity Calculator
EOS Loads
Watershed Delivery Calculator
DEL loads
DEL loads
Temporal WSM
Static WSM
*AST
DEL loads
BayTAS