Partnership Priorities for 2017 and a Suggested Watershed Modeling Approach

WTWG

12/03/12

Lessons Learned through TMDL

- The CBP Partnership wants transparency:
  - Simplicity
  - Scalability
  - Ease of Use
  - Understandability

- Quote from State Government Representative:

"***We*** *want to be able to explain the models to our stakeholders and have them be* relevant *at the local scale*."

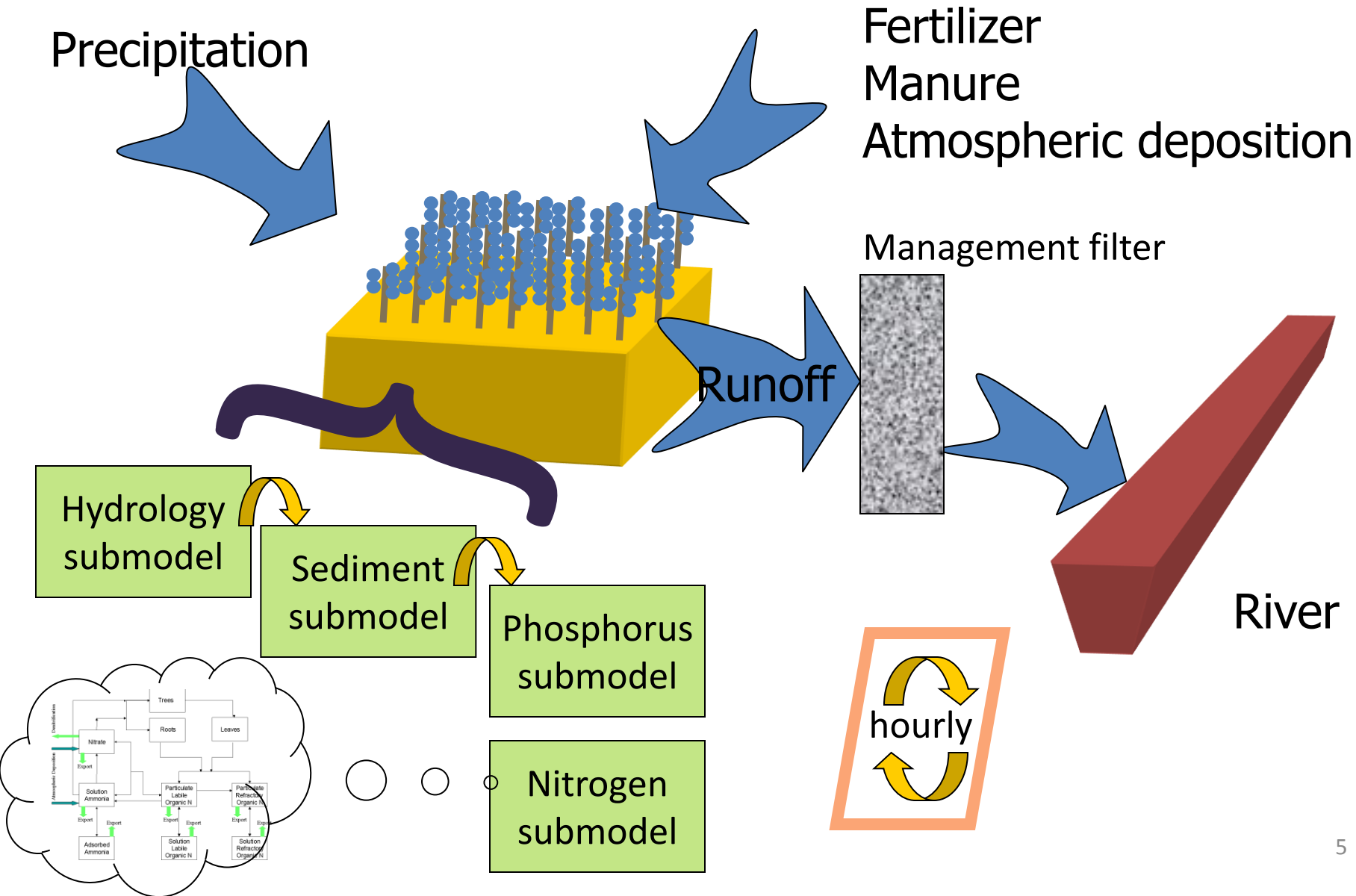
Simulated BMPs vs Percent Reduction

- **Which Description Works Best for Management?**
- **What's my reduction from Nutrient Management?**
  - Well, based on the rules developed by the partnership and the data supplied by national sources and the states, the balance of inputs and outputs for your land use is such that there is an overabundance of manure in your county, as opposed to the next county over where nutrient management has almost no effect. Now when you apply nutrient management, that will attract manure to the nutrient management land use, so it will have a higher load, but since it's pulling manure from other land uses, the total segment load will usually decrease, however in some circumstances when nutrient management is applied to pasture, it can push so much manure back on to other land uses, that the marginal effect …
- **What's my reduction from Cover Crops?**
  - Based on the Cover Crop Panel, who based their decision on multiple referenced data sources and models, your reduction for Early Drilled Barley in the Valley and Ridge Carbonate region is 38%

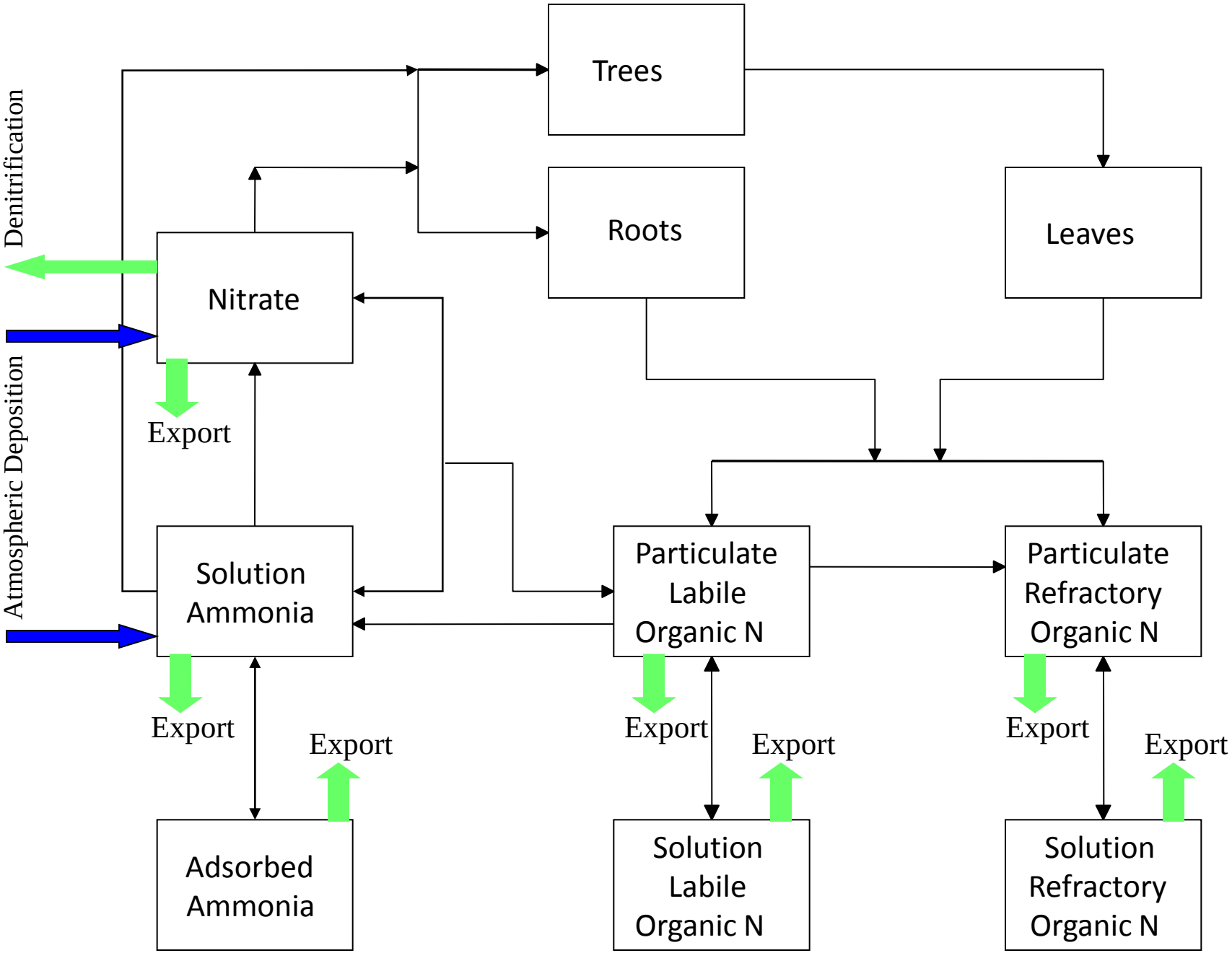
Land Use Loading Rates

- **Which Description Works Best for Management?**
- **Why is my edge of stream load 10 while theirs is 8 in the next county?**
  - Based on the application of the calibration targets, methods, and rules agreed upon by the partnership, your load is 10 lb/ac/year. The targets, methods, and rules are available in several sections of the watershed model documentation, several journal articles, and the modeling workgroup minutes
  - You're in the piedmont region on a class B soil with a 5% slope and have an atmospheric deposition rate of 14 lbs/ac/year. Based on a review of the available literature and models, the review panel determined the proper load equation to be: x + y * z, etc

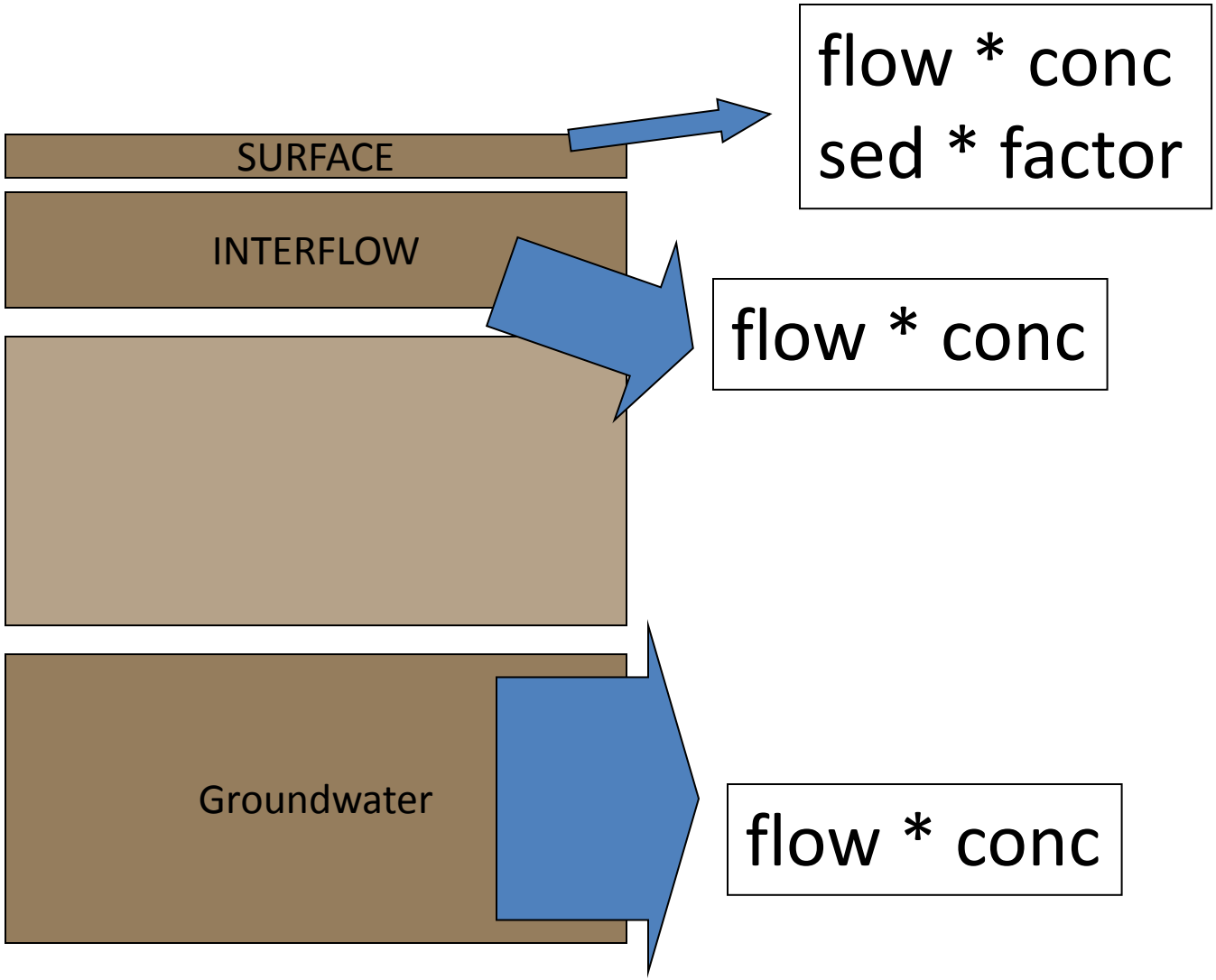
How the Watershed Model Works



AGCHEM Nitrogen Cycle



PQUAL loading model

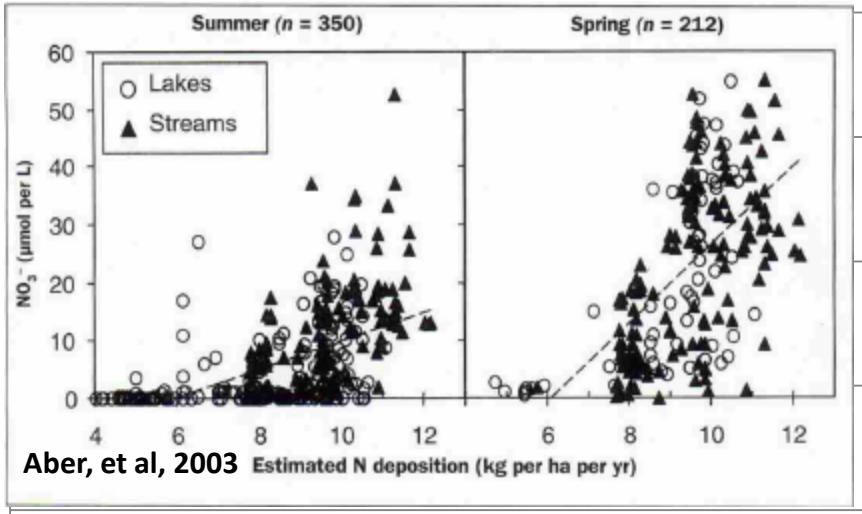


AGCHEM *vs* PQUAL

- Calibration is complex and time consuming
- Calibration is imprecise
- Longer run time
- Simulated sensitivity to inputs

- Calibration is relatively simple and fast
- Calibration is precise
- Shorter run time
- Sensitivity to inputs must be specified

Reduction in forest loads from 1985 to CAIR



Export Reduction

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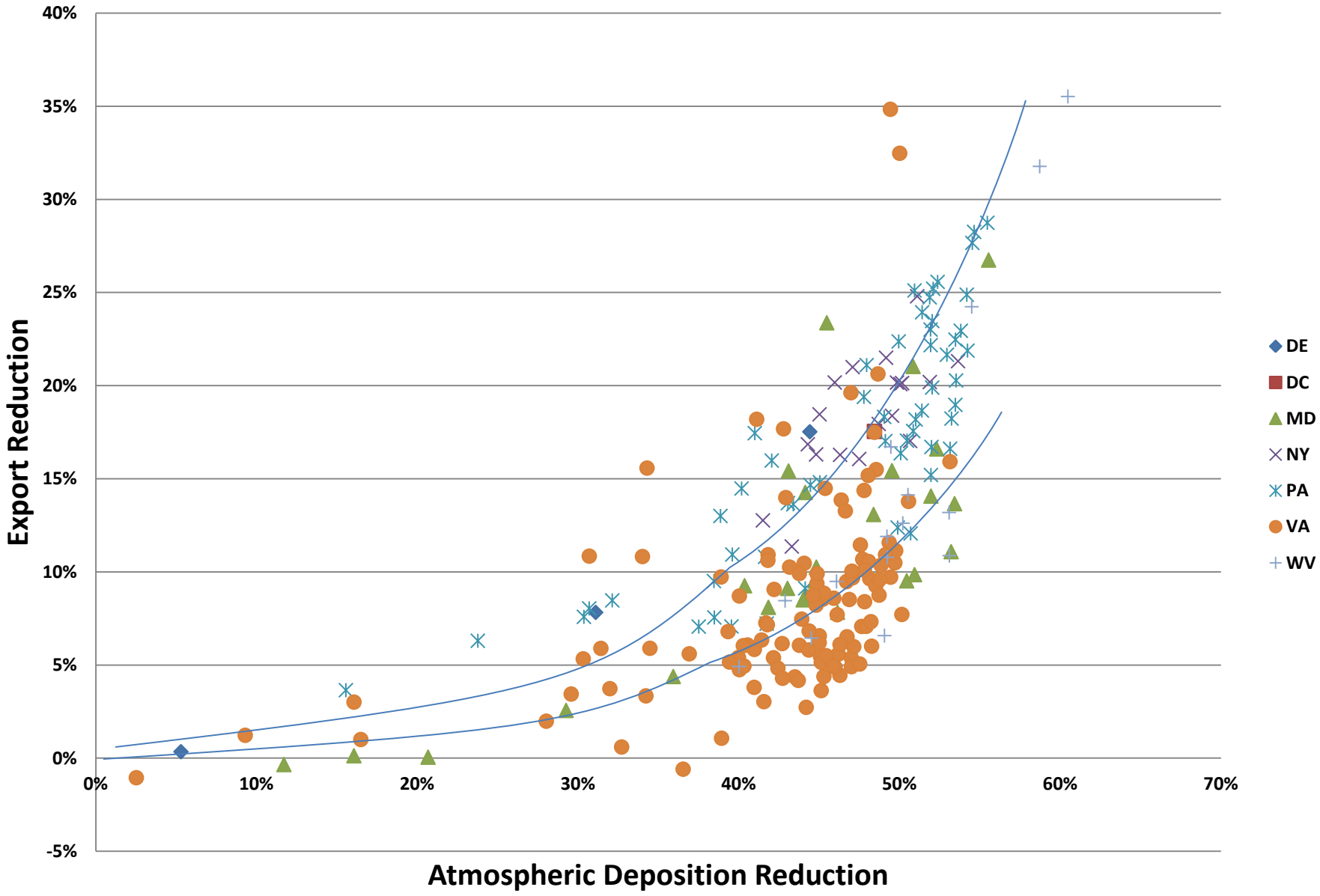
Atmospheric Deposition Reduction


Reduction in forest loads 1985 to CAIR
Export Reduction
Atmospheric Deposition Reduction
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Management vs Research Model (IMHO)

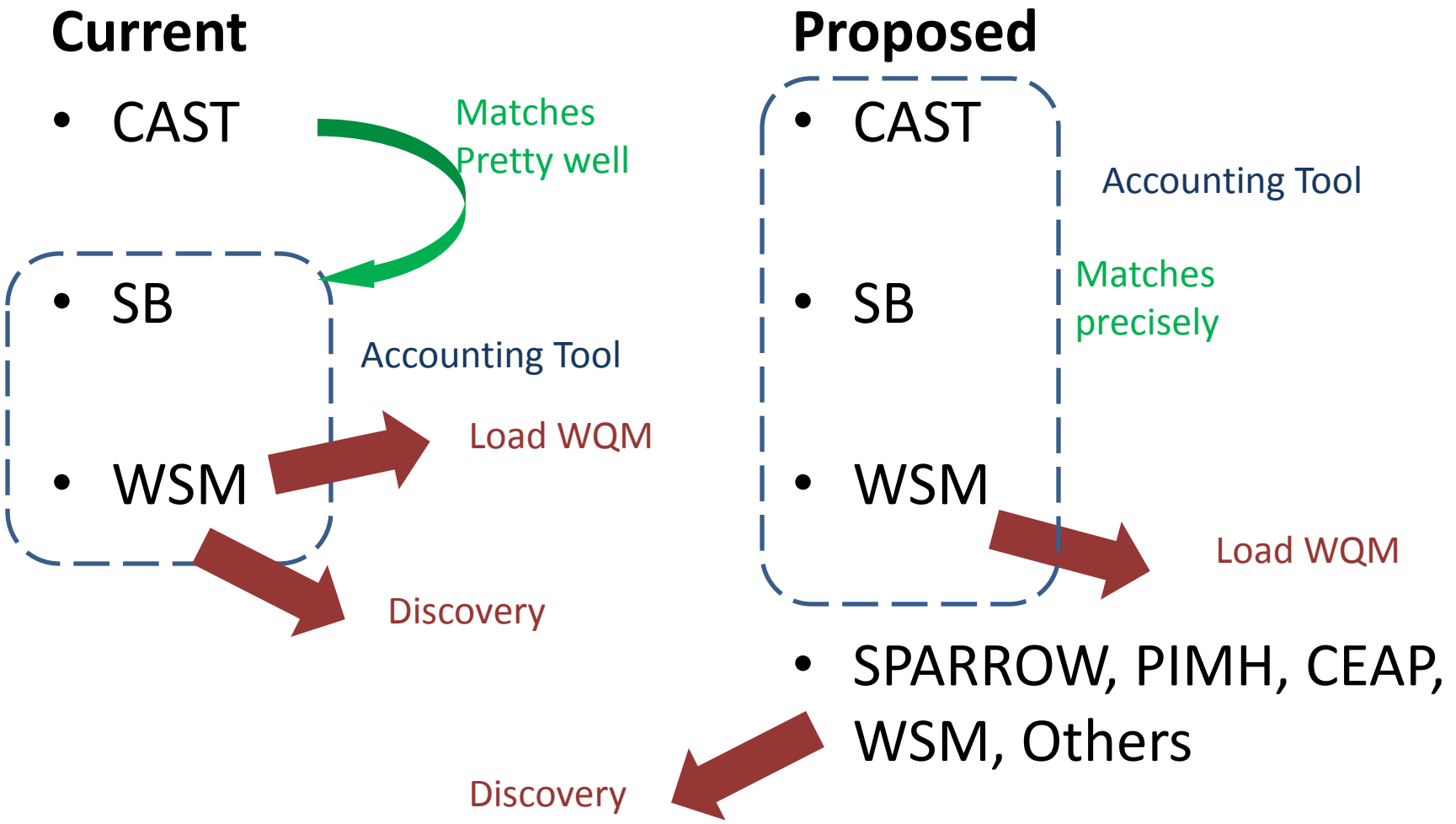
- Management models should integrate knowledge, rather than create knowledge.

- The Watershed model does not tell us anything we don't already know, it just puts all of the knowledge in one place and allows us to see how different sources, watershed processes, and management practices interrelate.

Purposes of the CBP watershed model

- Accounting tool – Add up loads from all land uses, subject to BMPs, in a flow-normalized manner
  - Exhaustive of land uses and BMPs
  - Include political and watershed boundaries
  - Calibrate to match annual average load
  - Easy to use
- Load the estuarine models – original sole purpose
  - Short time step
  - Calibrate to match observed flow-concentration relationship
- Discovery – can take many forms
  - First principles
  - Statistical
  - Can be any spatial extent or granularity
  - Can be any temporal extent or granularity

Possible Re-configuration



Benefits

- The CBP Partnership wants transparency:
  - Simplicity
  - Scalability
  - Ease of Use
  - Understandability
- Ease of calibration and operations
- Clear role for multiple models

Rapid Development and Review

- Traditional model development
  - Gather Data (1/2 of the time)
  - Calibration (1/2 of the time)
- However
  - Calibration routines developed for p5.3.x and model simplification cut calibration time to <1 month
  - Data will take much longer with some data available much sooner than others

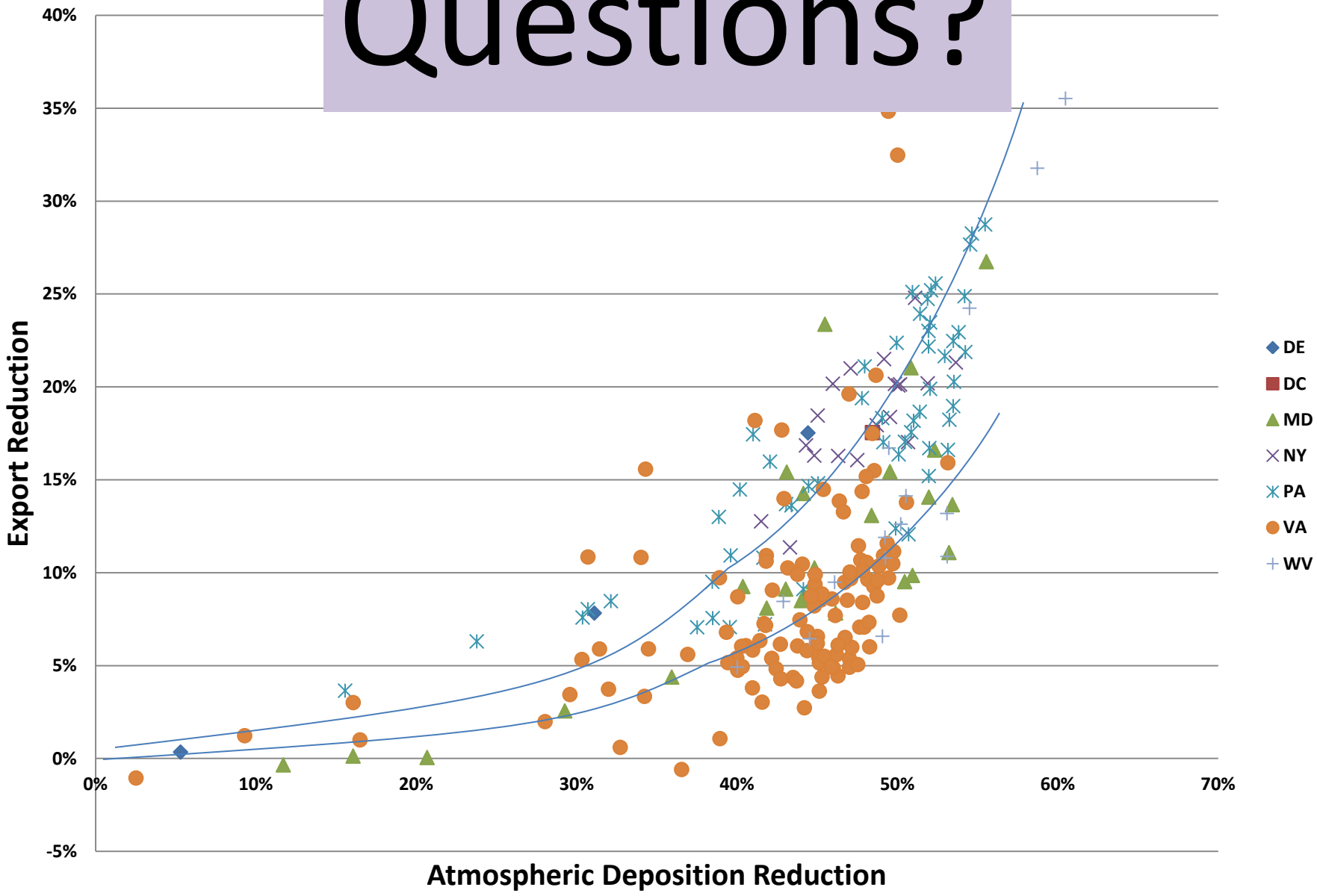
Rapid Development and Review

- Continual cycle of model versions with partnership review
- Gather all data and revisions from WGs and panels and produce a model version for the partnership to review every six months from now until Phase III WIPs begin
  - For example
    - 3/2013: PQUAL version of current model
    - 7/2013: a few new land uses; new cover crop BMPs
    - 1/2014: near real-time; new stream restoration
    - 7/2014: nutrient application changes
    - 1/2015: V4.1 of land use change model
    - Etc.

Implementation Plan – by early 2014

- Produce PQUAL version of p5.3.2
  - Calibrate land loads to existing p5.3.2
- Determine existing AGCHEM sensitivities
  - Document and web-publish sensitivities
- Reproduce smoothed sensitivities within PQUAL p5.3.2

Questions?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