WSM Model Evaluation and Proposed Modifications to Progress Reporting

William Keeling VADCR and Kenn Pattison PADEP

Modeling Workgroup Meeting

January 8, 2013

Presentation Outline

- Suggested testing period for Phase 6.x WSM and possible analysis to be conducted
- Impact of Constant Delivery Factors on 2009 Progress – Should CDF be used on progress runs?
- Suggested modification to how progress is simulated with the WSM

Phase 6.x Test Period and Criteria

- Proposed minimum 6 months to conduct analysis
- Determine which analysis to conduct and pass/fail criteria per analysis – MWG & STAC
- Determine and document appropriate scale of use and other limitations of WSM – MWG & STAC
- Uncertainty analysis done post correction of any failed criteria

Possible Tests - Hydrology

- Propose conducting similar analysis as done by VA on phase 5.x (HSPF EXP) in addition to standard CBP hydrologic evaluations
- HSPF EXP has established acceptable error per criteria evaluated
- Scale and hydrologic balancing
  - Small watersheds verses fall line stations

  e.g. Harrisonburg VA verses Potomac at Chain Bridge

HSPF EXP Criteria

- Total Volume ± 10%
- Base Flow Recession ± 0.3
- Lowest 50% of Flows ± 10%
- Highest 10% of Flows ± 15%
- Storm Volume ± 20%
- Summer Storm Volume ± 50%
- Storm Peaks ± 20%
- Summer Volume ± 30%
- Winter Volume ± 30%

WSM Input Files Sensitivity Tests

(Needing test and pass/fail criteria established)

- Examine outputs after varying inputs ± 50% & 90%
  - Maximum Crop Uptake
  - Uptake Curve
  - Fertilizer
  - Manure
  - Legumes
  - Percent Cover
  - Combinations of these inputs (e.g. manure and fertilizer)
- BMP Scenarios
  - Do we see what we expect from application of BMPs
    - Loading increases with the application of BMP or BMP treatment train in model would be an unexpected (failing) outcome
    - May require changes to Scenario Builder instead of WSM change

WSM Input Files Sensitivity Tests

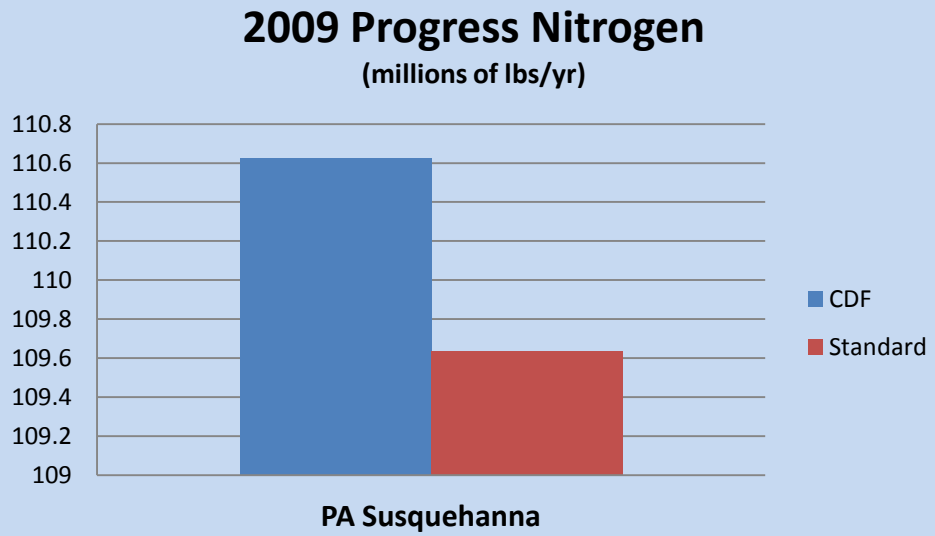
Example: Delivered Loading Reductions from Anthropogenic Input Reduction

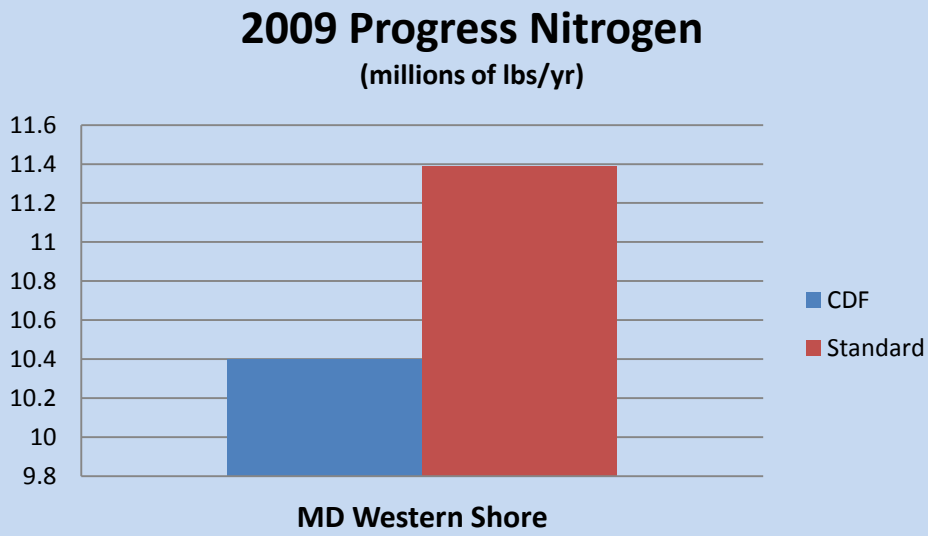
Land Use (Baywide)	Load Type	Pollutant	50% input reduction	99% input reduction
alf	del	TOTP	**51%**	**94%**
hom	del	TOTP	**75%**	**96%**
hwm	del	TOTP	**69%**	**93%**
hyw	del	TOTP	**54%**	**92%**
npd	del	TOTP	23%	46%
pas	del	TOTP	**3%**	**5%**
rpd	del	TOTP	23%	46%
trp	del	TOTP	24%	47%
urs	del	TOTP	**25%**	**50%**

Impact of Constant Delivery Factors on Annual Progress Runs

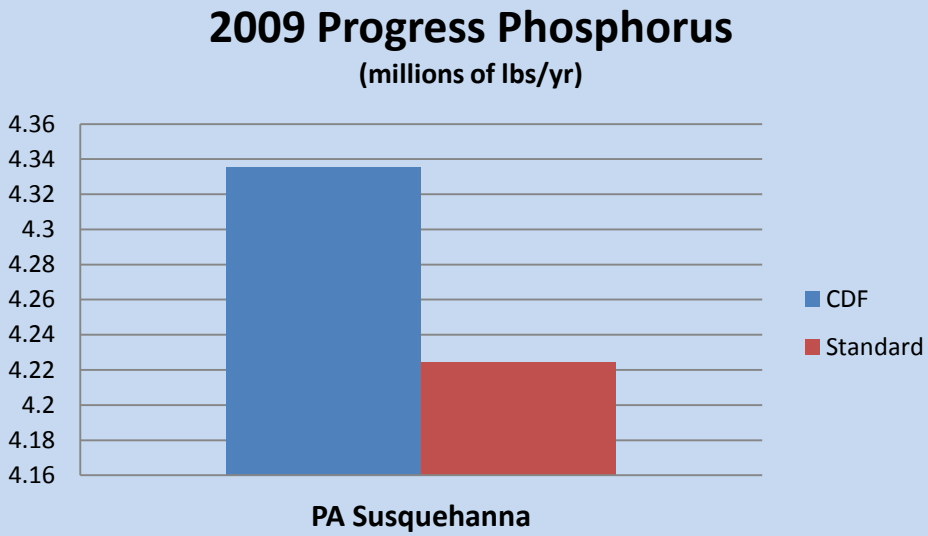
- Is the use of constant delivery factors on annual progress runs introducing error over the old or standard way where model delivery factors are generated per scenario?
- Is this error compounding what is communicated as progress with the use of 10-year averaging?
- Are we portraying a false since of progress?

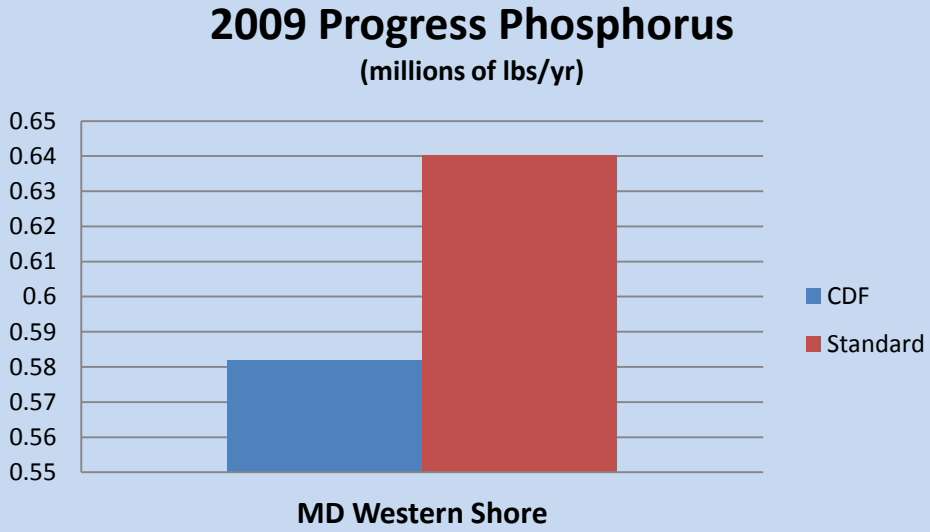
Impact of Constant Delivery Factors



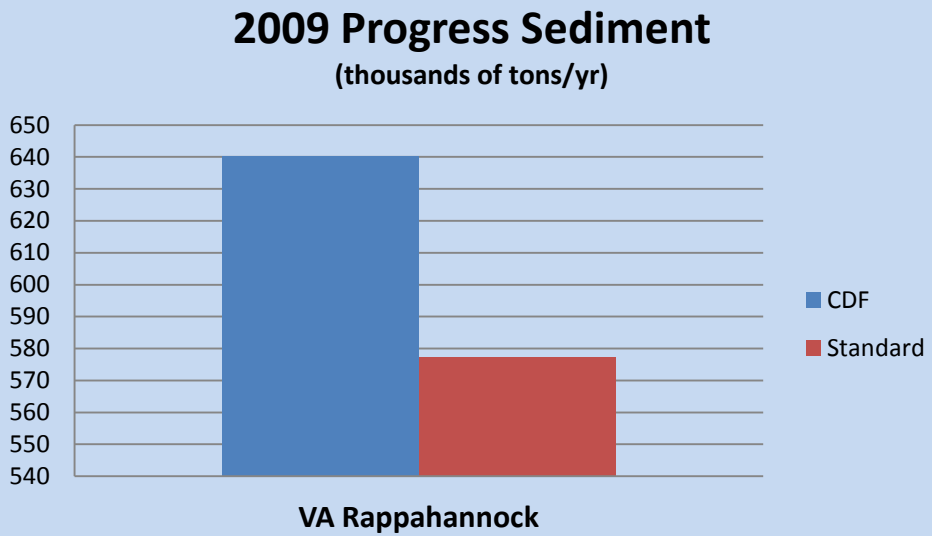


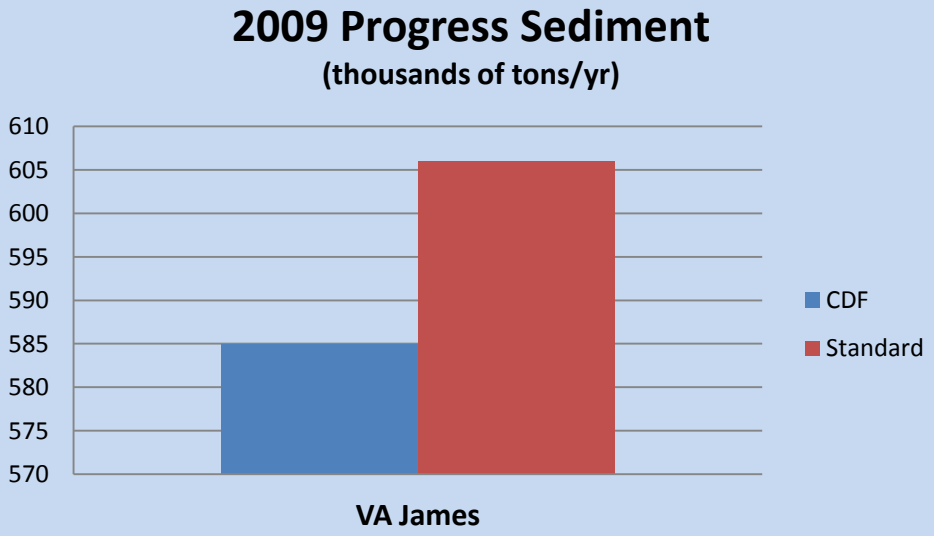
Impact of Constant Delivery Factors





Impact of Constant Delivery Factors

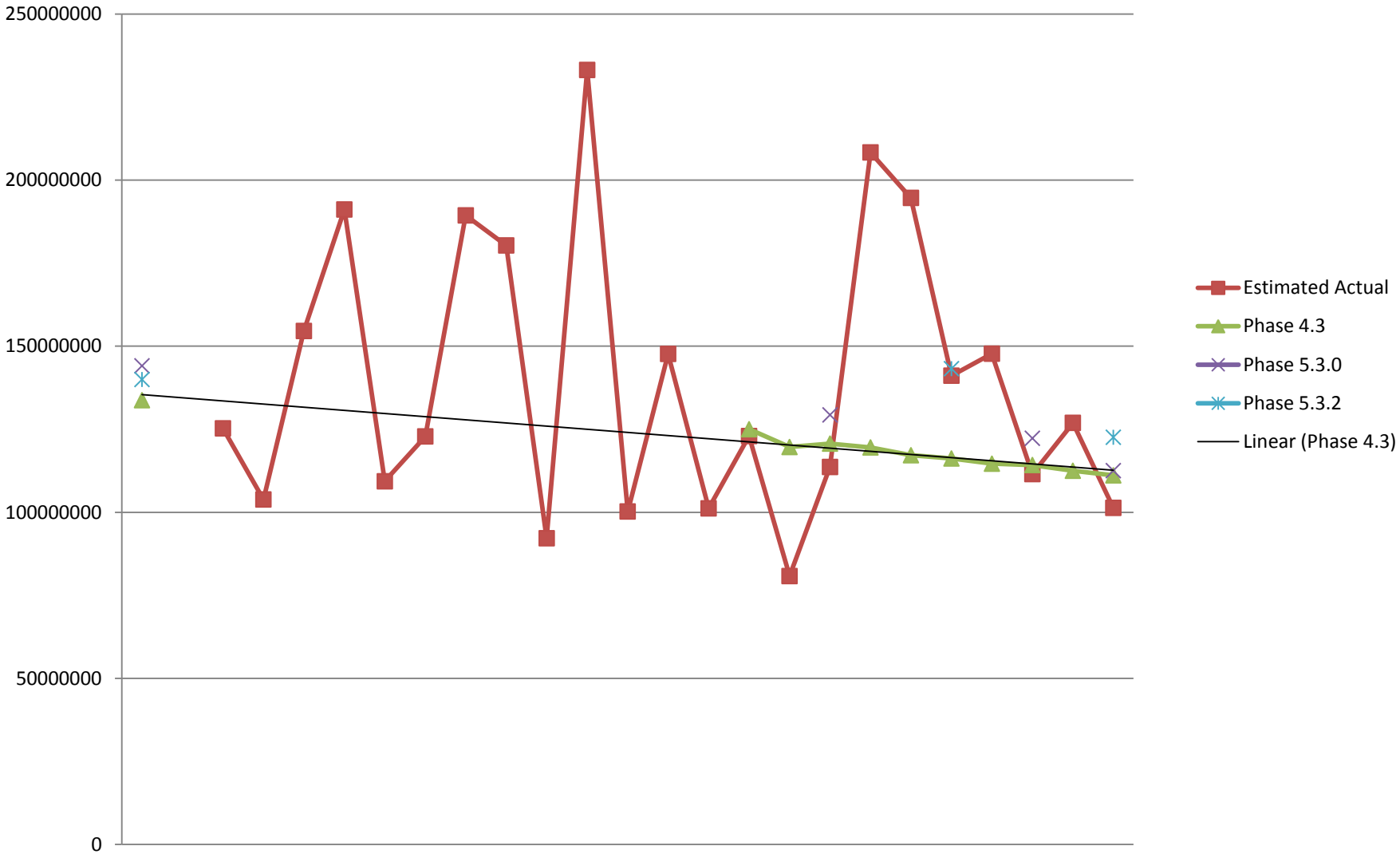




Another Way to Use the WSM for Progress Reporting

- Currently use 10-year averaging period to represent annual progress
- Same 10-year hydrologic and climatological data set used for all progress runs
- Different land use, point source discharges, and NPS BMP representation
- Creates confusion when comparing model results and actual annual loadings – Washington Post Story – OMB, GAO, EPA IG audits

Susquehanna Estimated Nitrogen Loadings
1985 to 2009



Another Way to Use the WSM for Progress Reporting

- Propose adding to annual progress modeling repertoire not replacing existing methods
- Propose using WSM to simulate actual annual data not a 10-year average
- Will require annual data inputs of climatological and hydrologic data in addition to other data sets currently used
- Benefits seen as improving credibility, ease of communication, removes Washington Post type criticism

Questions?