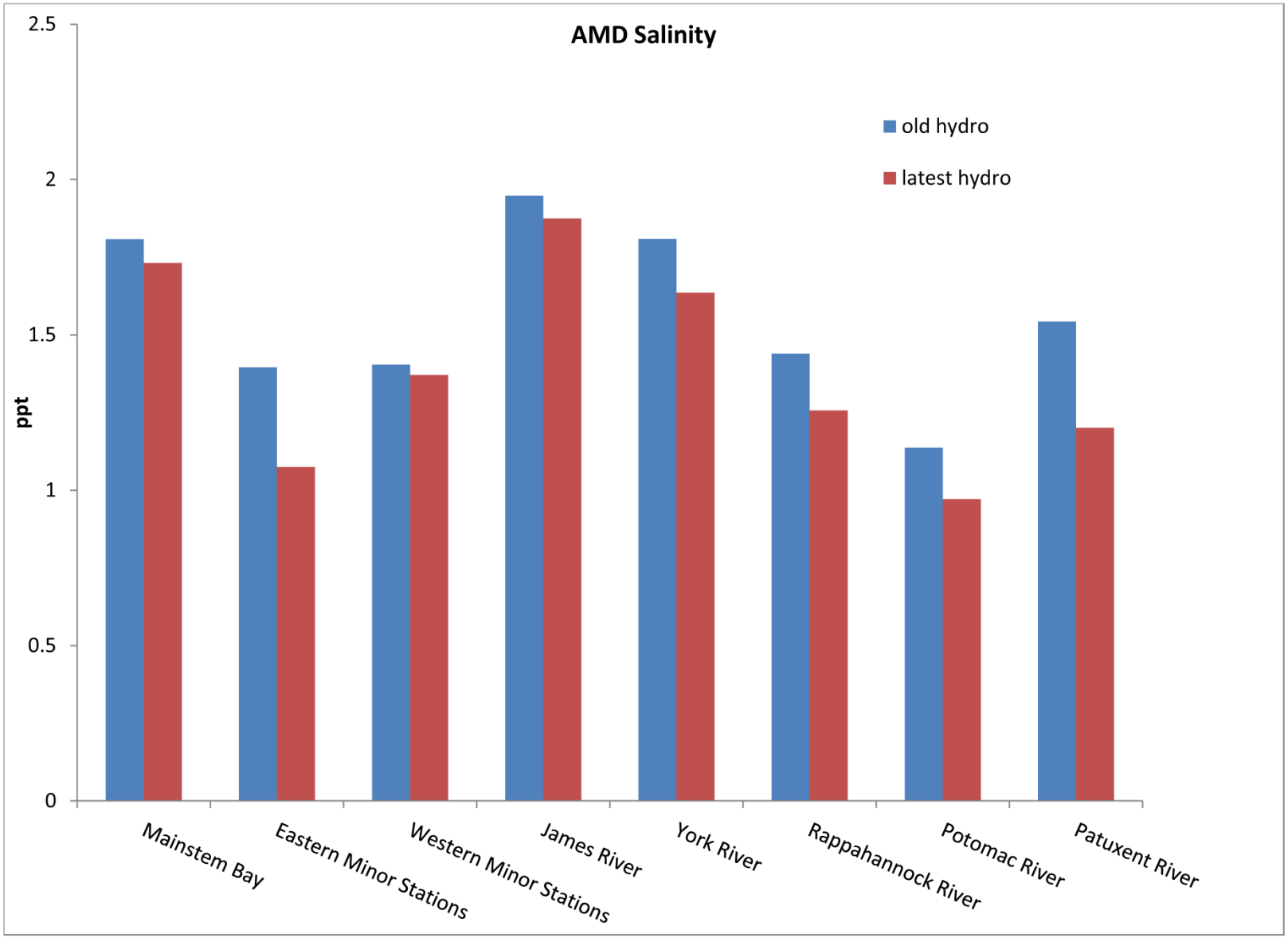
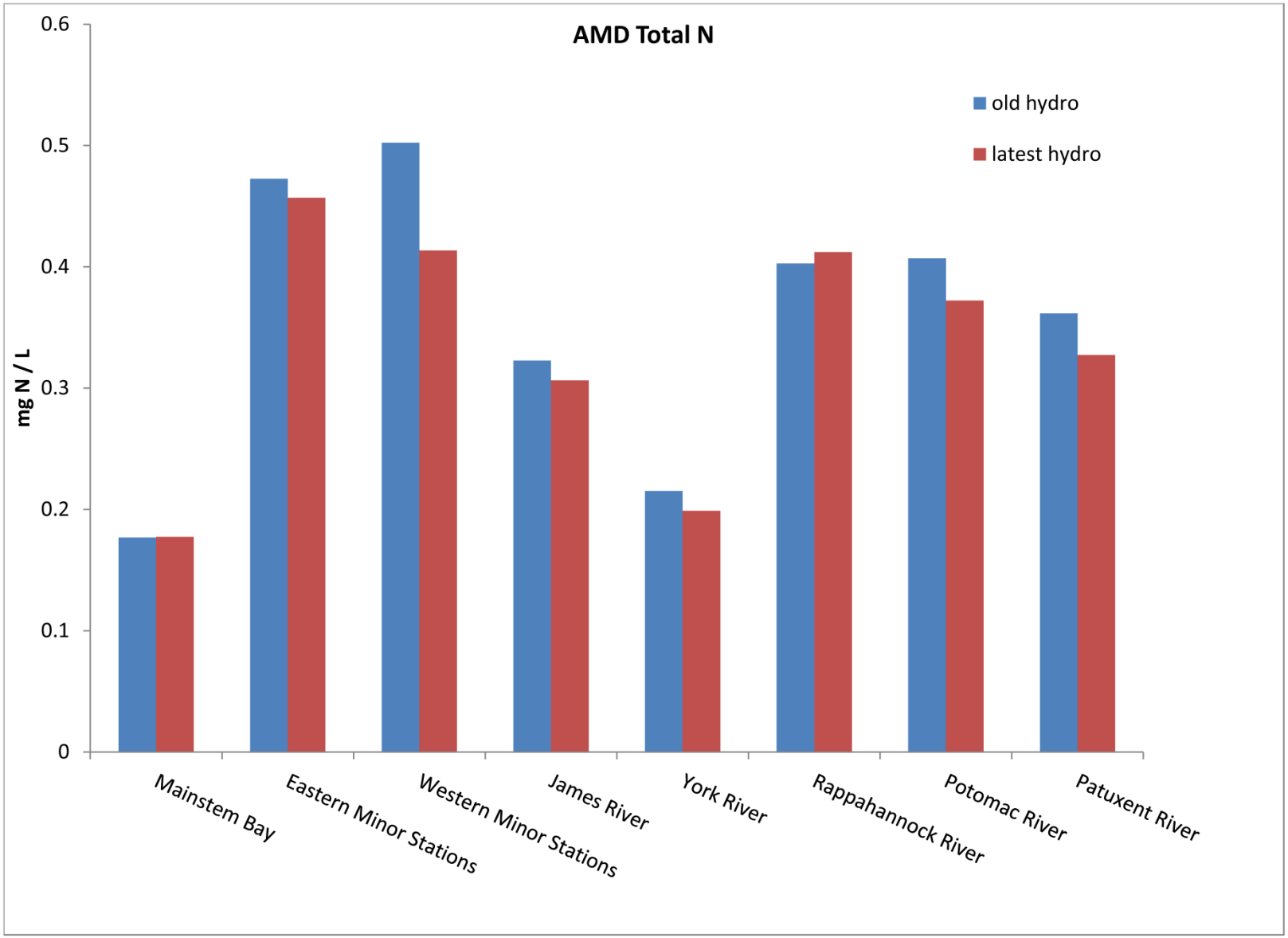
WQSTM Calibration to Phase 6 Beta 1 Loads

Last time we looked, it seemed we were experiencing some drift in our basic calibration. Since then, we have been engaged in multiple sensitivity runs combined with updated forcing functions.

Sensitivity Runs and Updates

- New hydrodynamics based on Phase 6 hydrology, correct problem with lateral flows.
- Experiment with Jeremy Testa's updates to sediment diagenesis model.
- Turn on/off benthic algae.
- Turn on/off benthic filter feeders.
- Make particulate inorganic phosphorus reactive.
- Examine labile/reactive/G3 splits at fall lines
- Develop wetlands module.


AMD Salinity
old hydro
latest hydro
ppt
2.5
2
1.5
1
0.5
0
Mainstem Bay
Eastern Minor Stations
Western Minor Stations
James River
York River
Rappahannock River
Potomac River
Patuxent River


AMD Total N
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latest hydro
mg N / L
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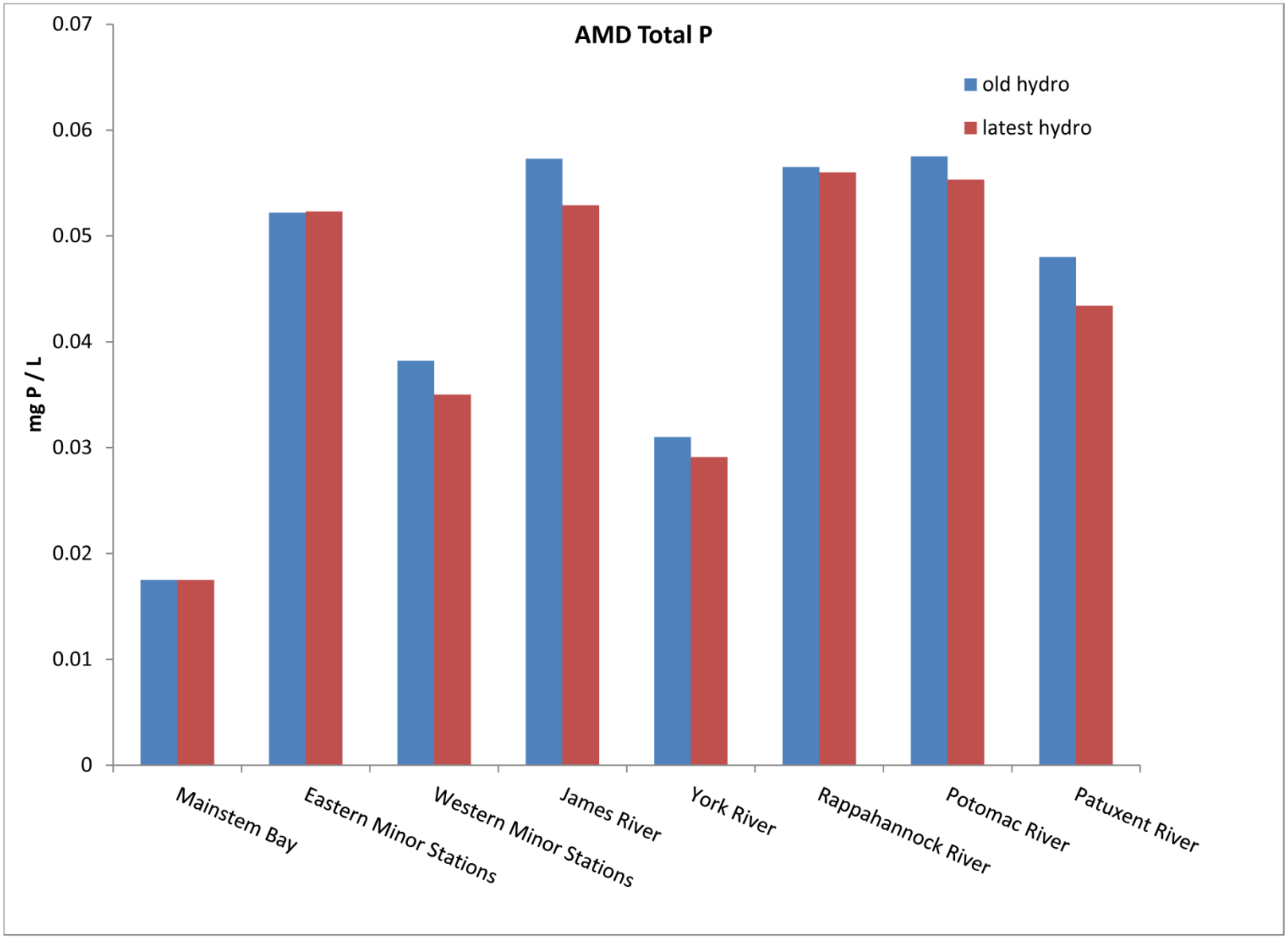
0.5
0.4
0.3
0.2
0.1
0
Mainstem Bay
Eastern Minor Stations
Western Minor Stations
James River
York River
Rappahannock River
Potomac River
Patuxent River


AMD Total P
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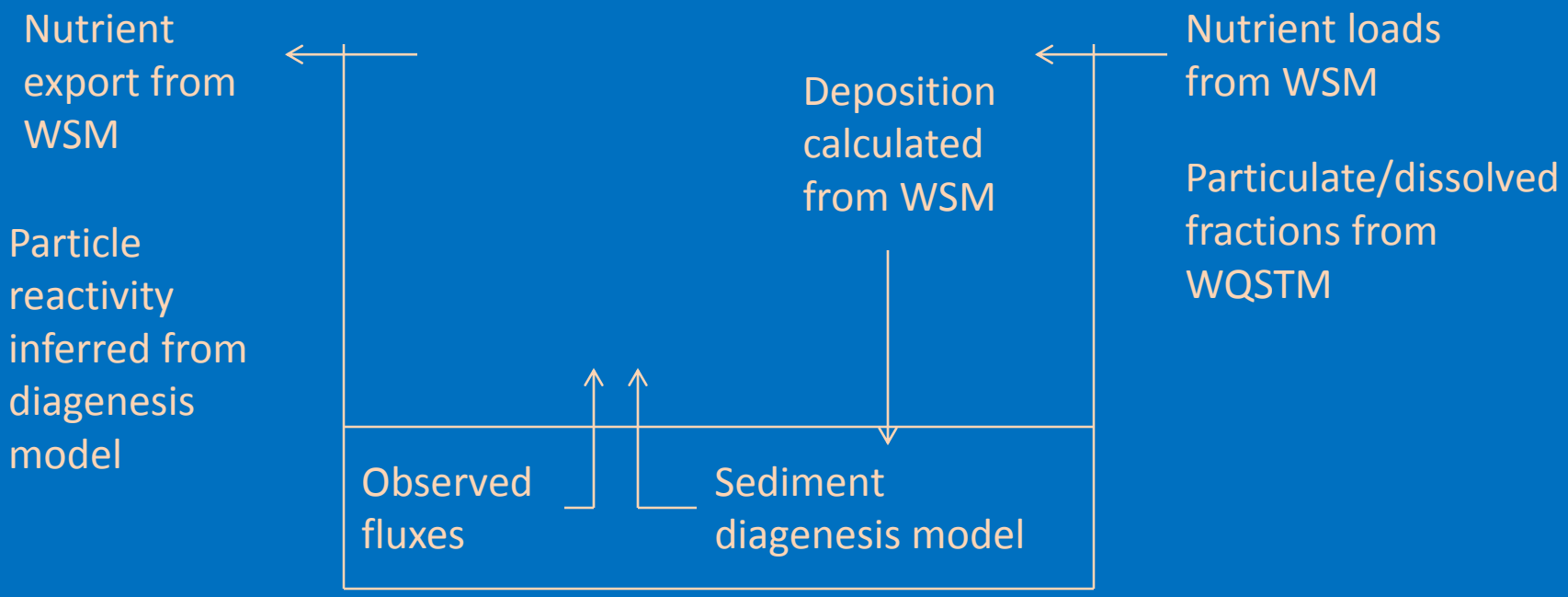
latest hydro
mg P / L
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Mainstem Bay
Eastern Minor Stations
Western Minor Stations
James River
York River
Rappahannock River
Potomac River
Patuxent River

Conowingo Particulate Reactivity



Conowingo Particulate Reactivity

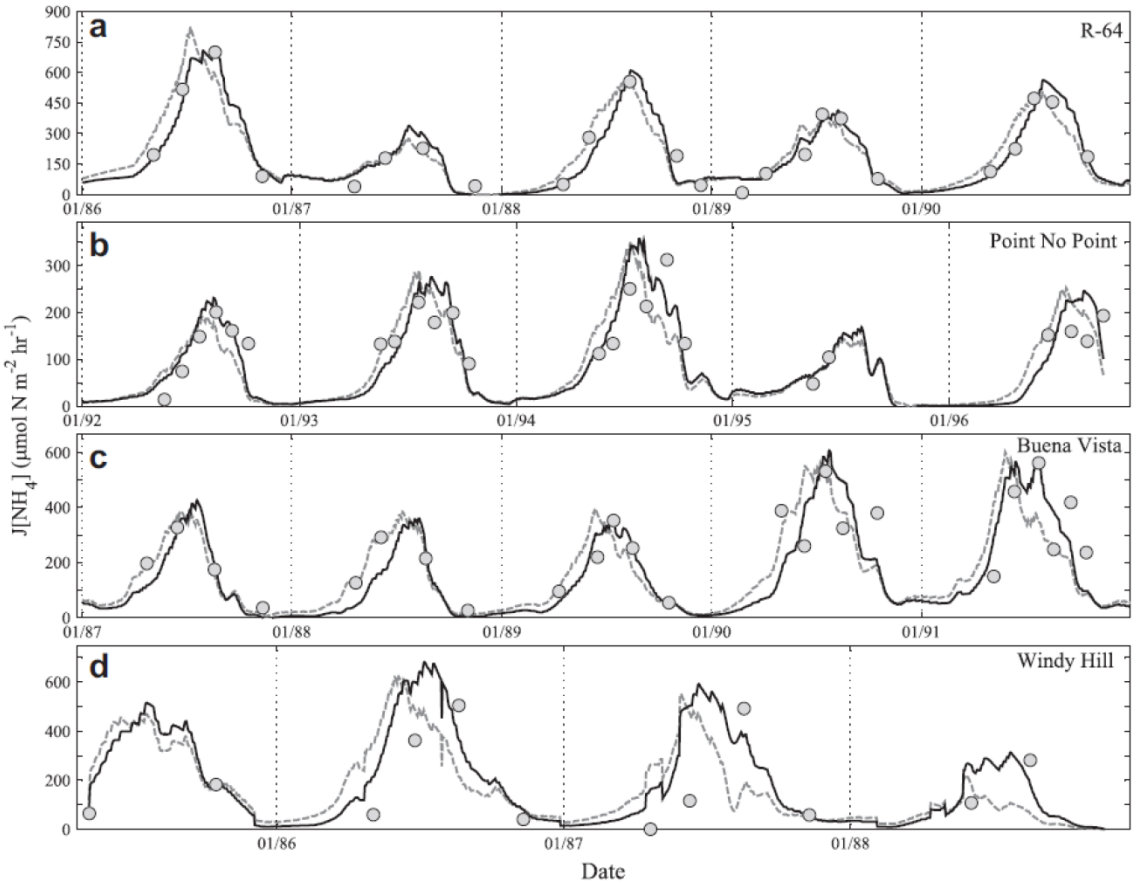


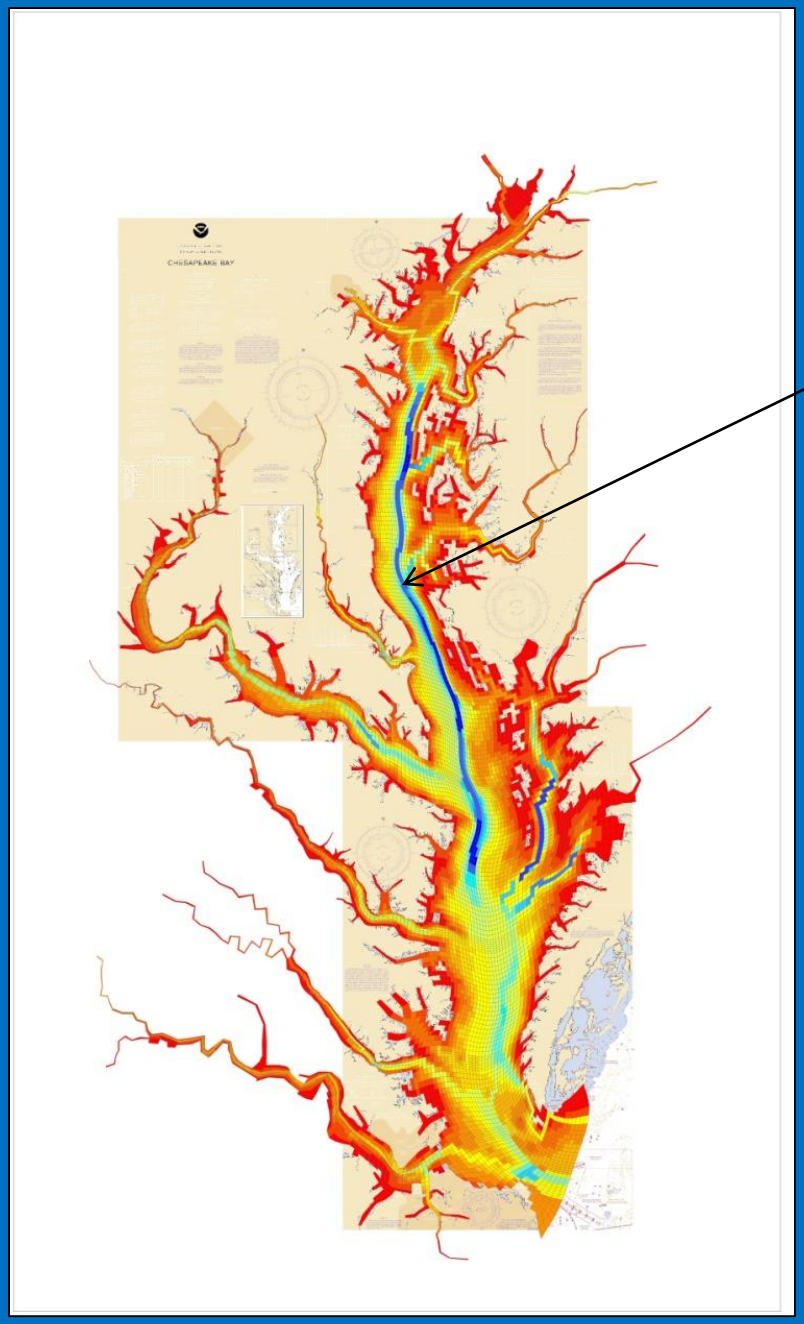
Figure 2. Modeled (lines) and observed (circles) time series of NH_4^+ flux from four stations in Chesapeake Bay (a: R-64, b: Point No Point, c: Buena Vista, d: Windy Hill). Gray dashed lines represent model output using the diagenesis rate (kPOC) of 0.03 day^{-1} [1] from the original calibration and black solid lines represent model output using a diagenesis rate of 0.01 day^{-1}. From Brady et al. (2013).

Revised labile (G1) particle decay rate in sediments (courtesy Jeremy Testa).

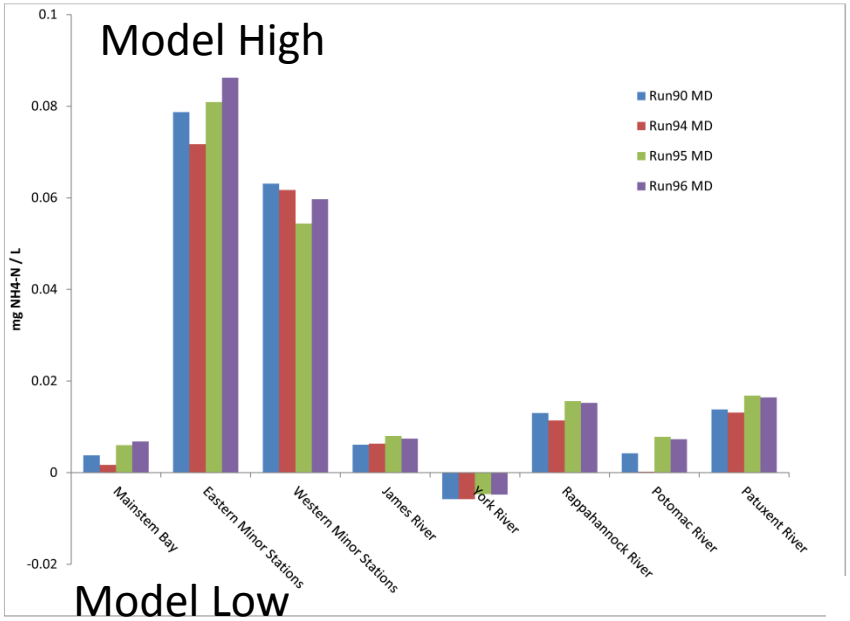
Conowingo Particulate Reactivity

Sensitivity Runs

- Run94 – Reduce G1 decay rate from 0.03 to 0.01/d.
- Run95 – Convert 30% of refractory (G2) material at fall lines to labile (G1). From 0% G1, 76% G2, 24% G3 to 23% G1, 53% G2, 24% G3. No added reactive nutrients.
- Run96 – Convert 30% of inert (G3) material at fall lines to refractory (G2). From 76% G2, 24% G3 to 83% G2, 17% G3. Additional reactive nutrients

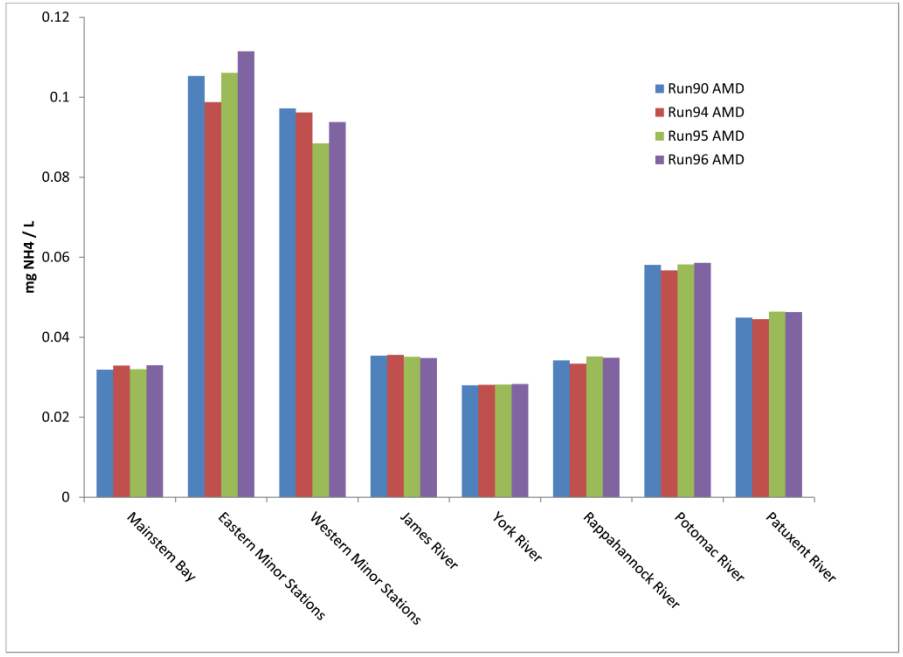


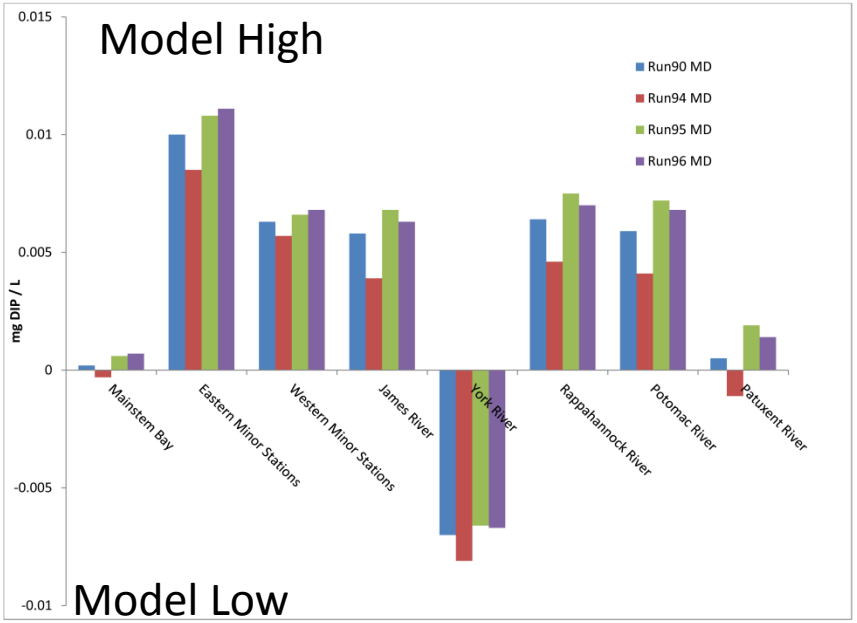
Let’s look at SONE model results at R-64.



NH4 Mean Difference

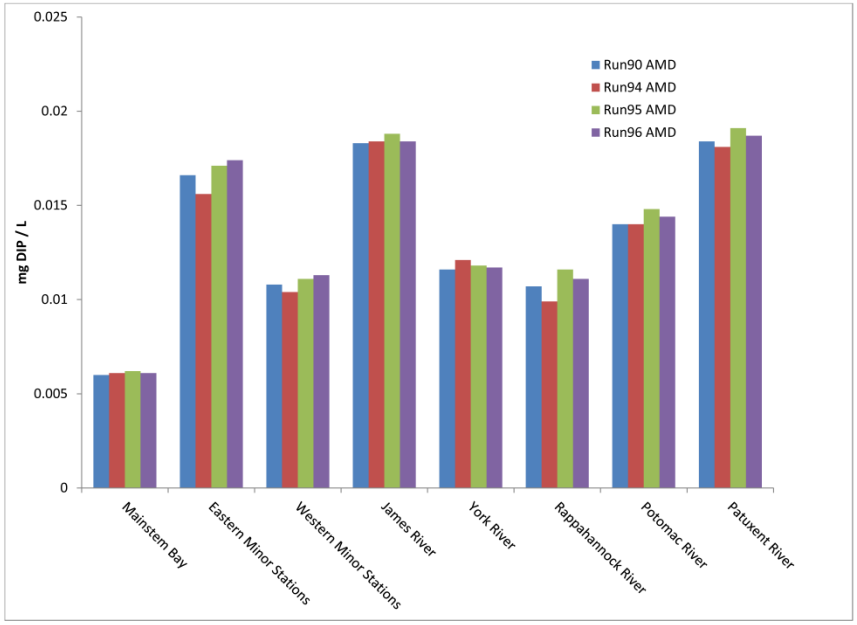
Absolute Mean Difference



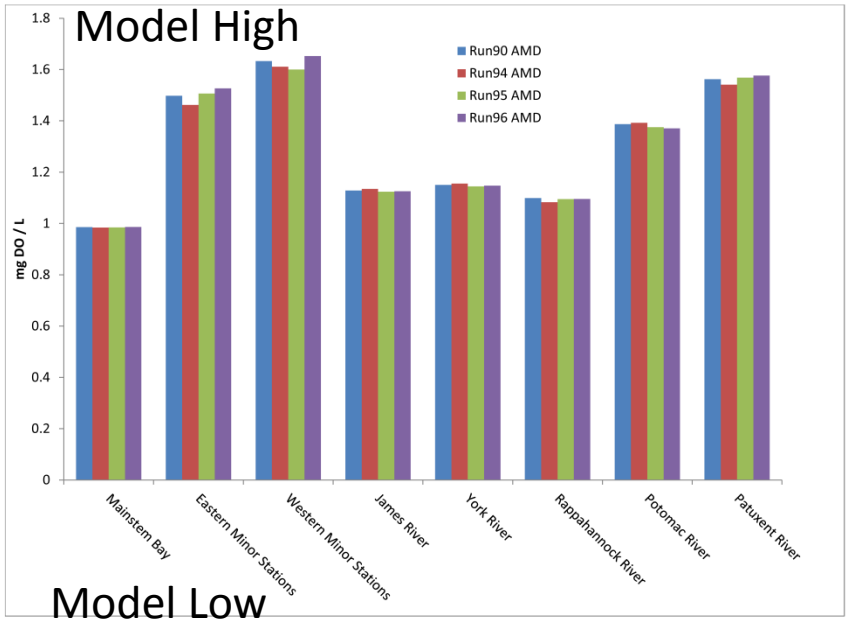


DIP Mean Difference

Absolute Mean Difference



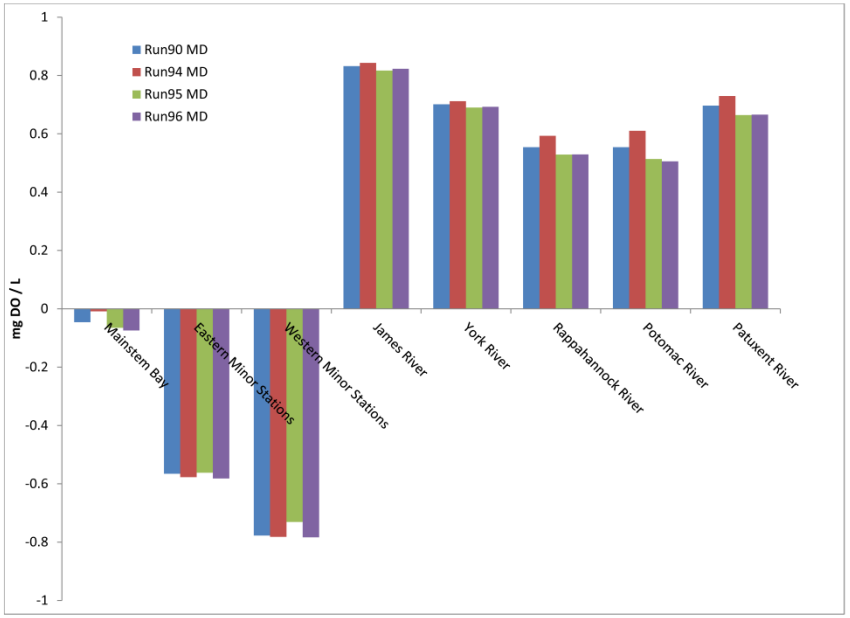
Model High



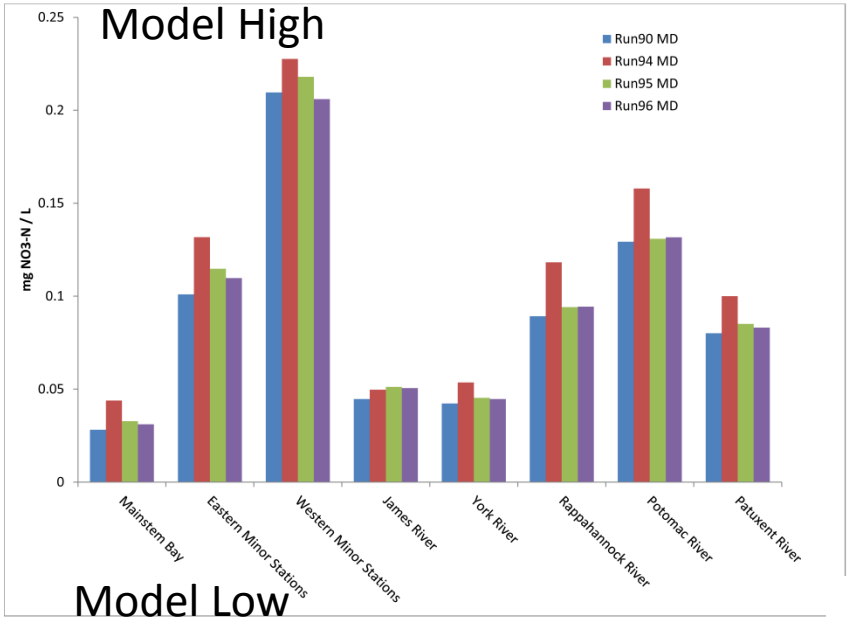
Model Low

DO Mean Difference

Absolute Mean Difference



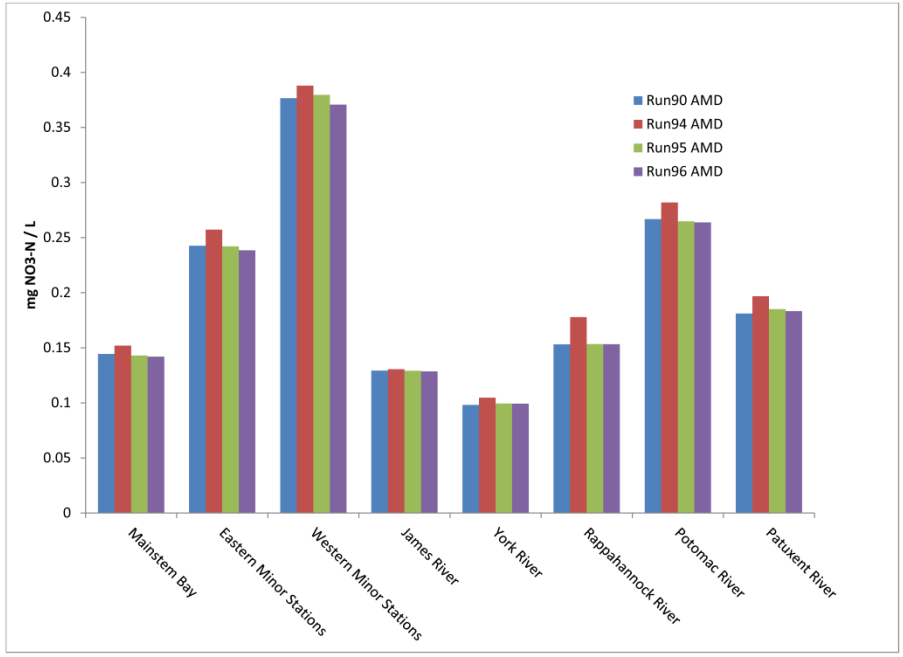
Model High



Model Low

NO3 Mean Difference

Absolute Mean Difference



Summary

- Calibration is underway and on schedule.
- We're continuously updating to reflect WSM revisions, latest information from the field.
- We want to settle on a final parameter set from the Conowingo but it doesn't look like a "game changer."