Agricultural Modeling Subcommittee Update to Ag Workgroup

04212016

Curtis Dell, USDA-ARS-PSWMRU

Matt Johnston, UMD

Revised April Beta Version

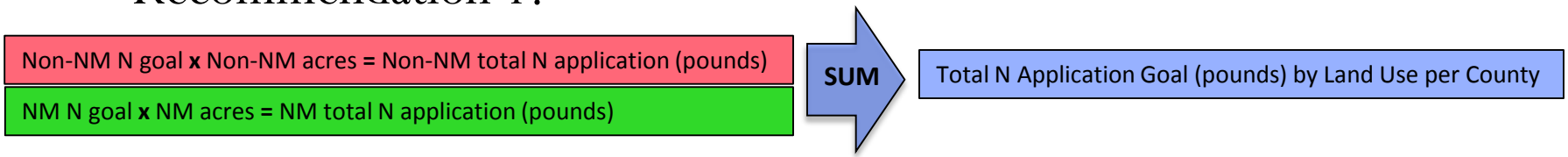
- Results available at: https://archive.chesapeakebay.net/Modeling/Phase6/Ph6CalibrationFiles_20151109/201 51109/.
- Improvements for April calibration include:
  - Inorganic fertilizer distributed to crops only after all BMPs are simulated.
  - Manure mineralization rates, which impact the amount of manure nutrients available to crops, updated to reflect typical nutrient management mineralization rates by decade.
  - Manure recoverability, or the amount of manure generated in a barnyard that can be made available to crops, before and after the implementation of Animal Waste Management Systems was updated to reflect estimates provided in http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_012131.pdf.
  - Acres of barnyards or feeding facilities were updated to reflect the Bay Program'shttps://archive.chesapeakebay.net best estimates per animal type.
  - Nutrient application goals for the minor crops, emmer, spelt and triticale, were based upon state-recommended applications on a per acre basis as very little yield data was available to vary the application goals by annual yield
  - New BMP information submitted by some states.
  - New biosolids data submitted by DE.
- Documentation currently being updated.

Work for July Beta Version

- Crop removal values will replace outdated crop uptake
- Biosolids data and methods will be revised
- Estimate of manure deposited within access area may change
- NM Panel recommendations will be accommodated (pending approval by Ag Workgroup)
- Legume fixation calculation will be updated
- Double crop acres will be investigated
- States will resubmit draft historic BMP data
- Dead animal nutrients will be investigated

Nutrient Spread Recommendations

- Recommendation 1:



- Recommendation 2:
  - Run nutrient spread once with Fertilizer Use = Redistributed Fertilizer Sales
  - Run nutrient spread second time with Fertilizer Use = Remaining Fertilizer Crop Goal After Manure Applied (ignore fertilizer sales)
  - Run nutrient spread third time with Fertilizer Use = Smaller of the first two runs in each county
- AMS Recommendation:
  - Adopt NM Panel's two recommendations, AND
  - Redistribute any unused fertilizer at the county level to all other counties so Total Watershed Fertilizer Use = Total Watershed Fertilizer Sales
  - Test these methods prior to making final recommendation to Ag Workgroup at May meeting.

Why the Cap?

- CEAP uses fertilizer sales at HUC4 level as a cap only to compare to estimated inputs on cultivated cropland.
- When pasture and hay inputs are added, total CEAP ag inputs COULD exceed fertilizer sales.
- Cultivated cropland inputs have never exceeded fertilizer sales at HUC4 level in CEAP analysis.
- NM Panel recommended using fertilizer sales as a cap at the county level to mimic logic.

Comparing USDA CEAP Fertilizer Inputs to CBPO Fertilizer Inputs Watershed-wide (avg. 2001-2006)

Parameter	N	P
CBPO Lbs	405,179,793	80,359,514
CEAP Tons	203,010	40,435
CEAP Lbs	406,020,000	80,870,000
Percent Difference Compared to CEAP lbs	-0.21%	-0.63%

How Would the Cap Work?

Counties in April Beta Version for 2012 in which Crop Goal for N was Less than Redistributed Fertilizer Sales

County	State	Crop N Goal After Manure	Redistributed Fertilizer N Sales	Estimated Excess Fertilizer N Sales
Prince Georges	MD	807,447	961,481	**154,034**
Lancaster	VA	422,065	500,296	**78,231**
Chester	PA	15,082,874	22,834,786	**7,751,912**

Total Excess at County Level: 7,984,177

Example Redistribution of Fertilizer Sales to DE Counties in 2012 After Cap

County	State	Crop N Goal After Manure and Red. Fert. Sales	Total Watershed N Goal After Manure and Red. Fert. Sales	County Fraction of Remaining Watershed N Goal	Excess Fertilizer Sales N Redistributed After Cap
New Castle	DE	1,580,324	318,749,180	**0.0050**	**39,585**
Sussex	DE	5,299,867	318,749,180	**0.0166**	**132,754**
Kent	DE	3,745,839	318,749,180	**0.0118**	**93,828**

- Testing the cap approach with April beta version, we found the following:
  - Out of 5,100 county applications (170 counties with ag X 30 years of simulation), the cap was used in 197 counties for N (3.8%) and 24 for P (0.4%).
  - This number will decrease once non-nutrient management acres are included.

Why the Redistribution After Cap?

- CBP Watershed-wide Fertilizer Applications are < CEAP Watershed-wide Fertilizer Applications
- Without redistributing, CBP Watershed-wide Fertilizer Applications would be much less in some years than Fertilizer Sales.
- With no redistribution, SB is simply cherry-picking the lowest of two numbers.

Additional Considerations

- Nutrient spread will be run three times, but will result in minimal changes from April version.
- Incorporating nutrient management acres will require thorough review of compliant core nutrient management acres by the Ag Workgroup before July beta version.
- Others?