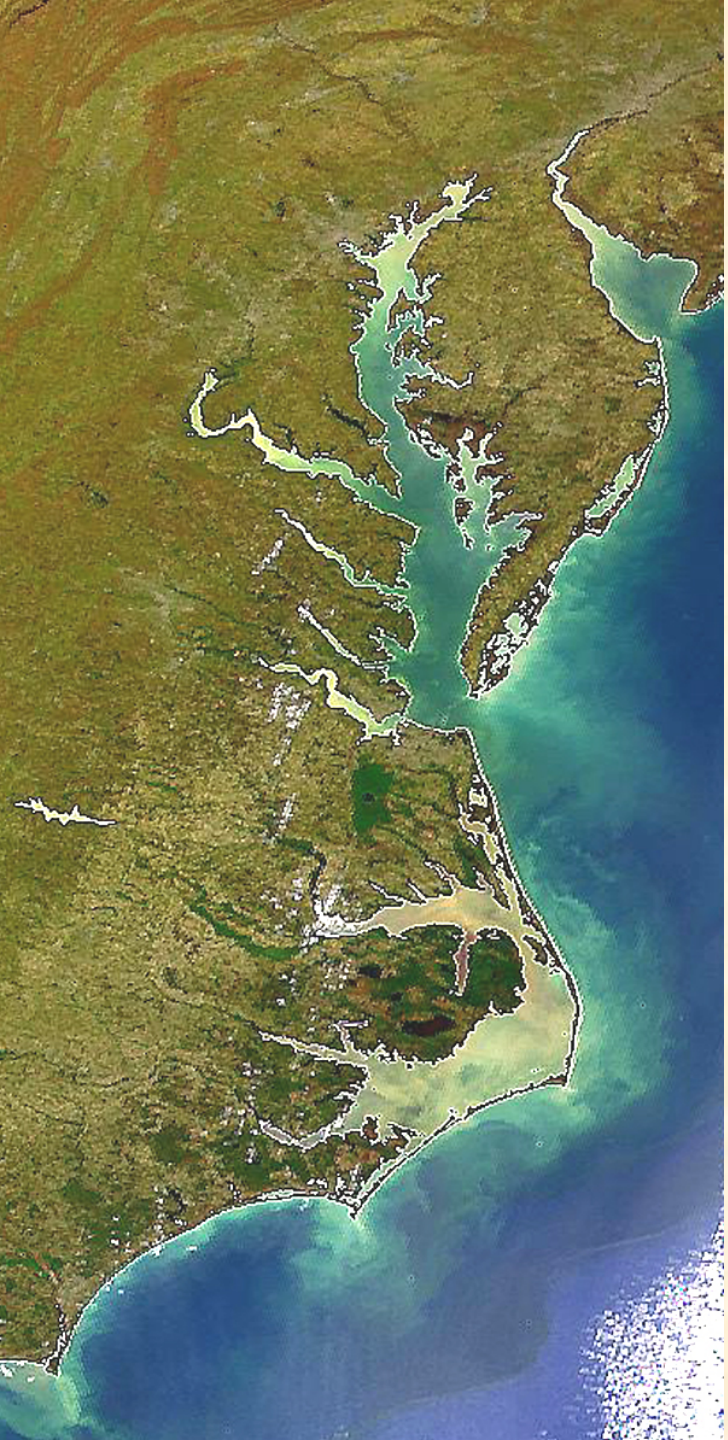

Milestone and Progress Load Changes Due to New Data

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Milestone Workgroup Meeting
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Impacts of New Data on Model Loads

Evaluation

- Milestone Workgroup requested model runs of their 2015 plans with new data that became available after 2015 Milestones were developed.

- The new data includes:
  - 2012 Agricultural Census = landuse acres and animal populations
  - Urban sector = population projections and 2011 National Land Cover Dataset

Impacts of New Data on Model Loads

Evaluation

- New data alters previous projections through 2015 = landuse acres, animal and human populations, septic systems, etc.

- We agreed to 2015 Milestones scenario runs with the new data for informational purposes
  - Also providing comparison against 2013 Progress scenario
  - All scenarios are draft in that some states were still reviewing background condition data for 2014 Progress and septic data had not yet been finalized.

Impacts of New Data on Model Loads

- Results of the 2015 scenario with the new data:
  - Nitrogen loads greater in several jurisdictions (PA, MD, WV, NY) and lower in others.
  - Phosphorus loads lower in most states.

- Similar pattern is seen with a 2013 scenario with the new data when compared to 2013 Progress.

- Model loads will change quite a bit for some sectors in some jurisdictions for Progress and Milestones, not because of changes in reported BMP implementation.
  - Background conditions change from year to year for every Progress assessment for every version of the models.

Impacts of New Data on Model Loads

2013 Old Projection Versus New Data/Projection

DRAFT	Change in 2013 N loads (percent change)	Change in 2013 P loads (percent change)
PA	4.7 million lbs (4.2%)	-0.06 million lbs (-1.3%)
MD	1.8 million lbs (3.8%)	-0.07 million lbs (-2.3%)
VA	-1.1 million lbs (-1.8%)	-0.84 million lbs (-10.9%)
WV	0.2 million lbs (3.1%)	-0.01 million lbs (-1.0%)
DE	-0.3 million lbs (-7.0%)	-0.06 million lbs (-16.1%)
NY	0.4 million lbs (3.8%)	0.01 million lbs (1.1%)
DC	-0.007 million lbs (-0.4%)	-0.0002 million lbs (-0.3%)
CBW	5.8 million lbs (2.4%)	-1.02 million lbs (-5.9%)

Impacts of New Data on Model Loads

2013 Old Projection Versus New Data/Projection

DRAFT	**Change in 2013 N loads (percent change)**	**Change in 2013 P loads (percent change)**
Agriculture	5.1 million lbs (4.7%)	-1.08 million lbs (-10.9%)
Urban	0.6 million lbs (1.4%)	0.06 million lbs (2.3%)
Septic	Not finalized at time	N/A
CBW All Sources	5.8 million lbs (2.4%)	-1.02 million lbs (-5.9%)

Impacts of New Data on Model Loads

- Greatest changes by sector are agriculture Nitrogen (load increases) and agriculture Phosphorus (load decreases), generally.

- In these examples for urban, the impact of new urban data is:
  - Positive (decrease in acres from the original projection) in VA, DE and DC
  - Negative (increase in acres from the original projections in PA, MD, WV and NY

Impacts of New Data on Model Loads

Explanations

- Changes in agriculture are mostly attributable to increases in fertilizer N applications because of greater acres of row crops (e.g., corn, soybeans – than was originally projected) while there are losses of lands that are low loaders (e.g., hay, pasture – than was originally projected).

- P loads are lower because the changes in animal populations are typically less $\Rightarrow$ less manure P on crops than originally projected.
  - Farmers are typically fertilizing for N because there's a need while the P need is not as prevalent.

Impacts of New Data on Model Loads

Change in Crop Acres between 2007 and 2012 Ag Census

	Harvested Cropland	Row Crops	Corn	Soybeans	Wheat
PA	3.1%	5.8%	2.5%	22.1%	-5.4%
MD	2.8%	8.1%	-8.7%	23.0%	26.2%
VA	0.2%	1.0%	-15.1%	14.0%	12.3%
WV	7.8%	7.4%	12.6%	10.7%	-30.3%
DE	2.9%	7.1%	-4.6%	7.8%	46.0%
NY	2.3%	15.6%	7.7%	81.3%	-4.1%
CBW	2.4%	6.5%	-2.2%	20.8%	14.3%

- Keep in mind that the previous load comparisons are old projections versus new data/projections, while the above table is 2007 $\rightarrow$ 2012.

Impacts of New Data on Model Loads

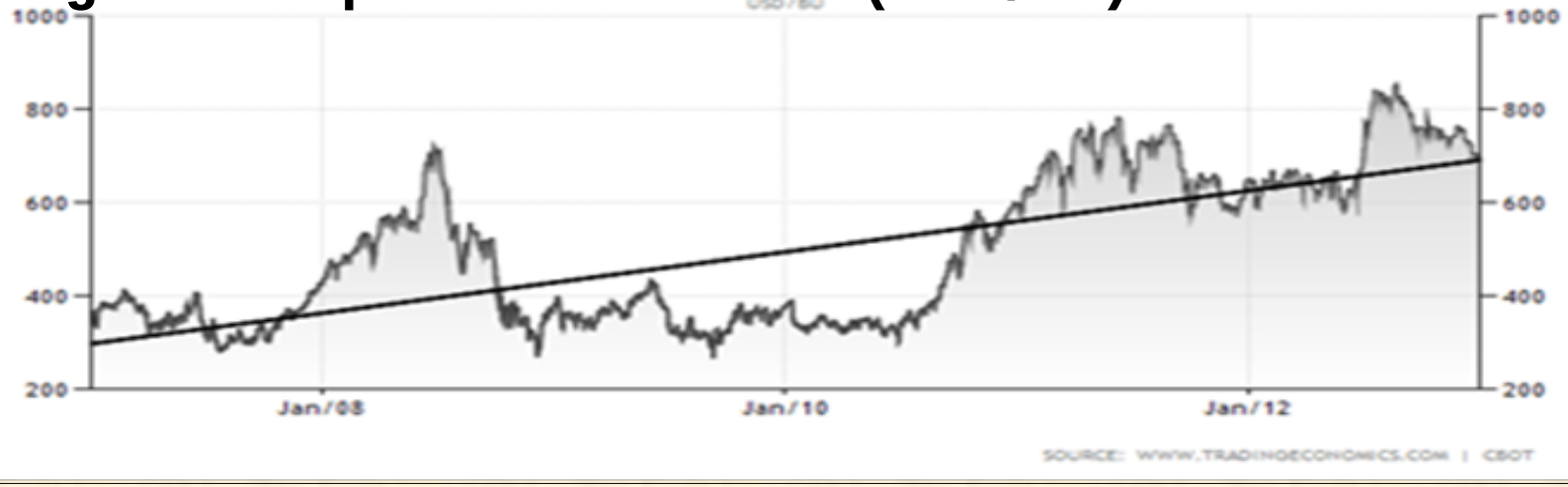
Explanations

- More commodity crops are being grown throughout the watershed and that requires more nutrients.
  - The 2012 Agriculture Census shows that agricultural production took off after the recession, and this assumption is also backed up by grain price trends.

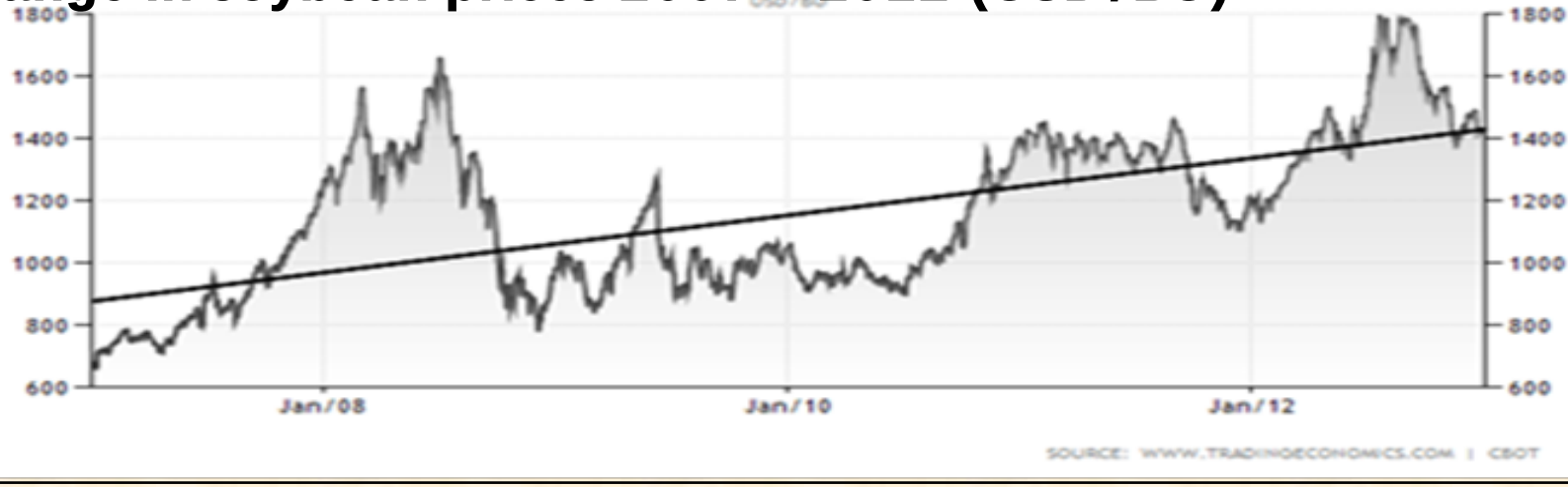
Impacts of New Data on Model Loads

Explanations

Change in corn prices 2007 – 2012 (USD/BU)



Change in soybean prices 2007 – 2012 (USD/BU)



Impacts of New Data on Model Loads

Explanations

- Original 2007–2012 projection had commodity crops (e.g., corn, soybeans) decreasing. New data shows increases in these crops 2007 $\rightarrow$ 2012.

- Historic Agriculture Census data gave us no reason to expect this kind of increase of productivity.

Impacts of New Data on Model Loads

Explanations

- Increase in fertilizer use can be substantiated.
  - According to AAPFCO (Association of American Plant Food Control Officials), between 2007 and 2012 for CB watershed counties as a whole:
    - 16.8% increase in fertilizer N sold
    - 0.9% increase in fertilizer P2O5 sold

Impacts of New Data on Model Loads

Explanations

- Increase in nitrogen and phosphorus use can be substantiated:
  - "Impacts of Conservation Adoption on Cultivated Acres of Cropland in the Chesapeake Bay Region", 2003-06 to 2011, USDA Conservation Effects Assessment Project (CEAP), Conservation Progress Report, November, 2013.
  - USDA's comparison of almost a thousand sample points from farmer surveys (the NRI-CEAP Cropland Survey) over a 5-8 year period representing the diversity of soils and other conditions for cropped acres in the Chesapeake Bay region.
  - Assessment of what conservation practices were in use and to collect detailed information on farming practices – including how farmer behavior regarding all elements of Nutrient Application Management has changed.

Impacts of New Data on Model Loads

Explanations

- Increase in nitrogen use can be substantiated:
  - Annual nitrogen application: 10 percent increase, from 95.0 to 104.5 pounds per acre per year, including a 9 percent increase in commercial fertilizer application (6.7 pound per acre and a 13 percent increase in manure nitrogen application (2.8 pound per acre per year increase).”
  - Appropriate nitrogen application rate on all crops in rotation, including manure applications: 9 percentage point decline, from 32 to 23 percent of cropped acres;
  - Appropriate nitrogen application timing on all crops in rotation, including manure applications: 14 percentage point decline, from 50 to 36 percent of cropped acres; and
  - Appropriate nitrogen application method on all crops in rotation, including manure applications: 7 percentage point decline, from 34 to 27 percent of cropped acres.”

Impacts of New Data on Model Loads

Explanations

- Increase in phosphorus use can also be substantiated but, generally, not to the degree as nitrogen:
  - Annual phosphorus application: 6 percent increase, from 23.8 to 25.2 pounds per acre per year, including a 5 percent increase in commercial fertilizer application (1.0 pound per acre per year increase) and an 11 percent increase in manure application (0.4 pound per acre per year increase).”
  - Appropriate phosphorus application rate on all crops in rotation, including manure applications: maintained 2003-06 conservation level, 54 and 57 percent of cropped acres in 2003-06 and 2011, respectively;
  - Appropriate phosphorus application timing on all crops in rotation, including manure applications: 11 percentage point decline, from 53 to 42 percent of cropped acres; and
  - Appropriate phosphorus application method on all crops in rotation, including manure applications: maintained 2003-06 conservation level, 42 and 37 percent of cropped acres in 2003-06 and 2011, respectively.”

Impacts of New Data on Model Loads

Explanations

- CEAP's considerations of yield increases over the period 2003-06 to 2011 indicate that even after crop yield improvements, there are still net increases in N and P losses to the environment for the CB watershed as a whole from increases in application rates and, general, decreases in appropriate rate, timing, and method.
  - 11% increase in N above crop need
  - 4% increase in P above crop need

Impacts of New Data on Model Loads

Explanations

- Bay Journal articles going back to 2007 explain well potential consequences of increased crop/corn production:

  "The figures show that this year's plantings alone could have the potential to largely offset other Bay-related cleanup efforts."

  - Census: Farmland growing in Bay states, by Karl Blankenship and Whitney Pipkin on July 20, 2014 – Increase in acreage has implications for Bay restoration strategies.
  - Nation's new thirst for ethanol could leave Bay with hangover, by Karl Blankenship on April 01, 2007 – Increase in corn production would likely lead to more nutrients entering the Chesapeake.
  - Increase in watershed's corn acres could offset Bay cleanup efforts, by Karl Blankenship on September 01, 2007 – Nitrogen loss from corn is greater than any other crop.
  - States urged to boost efforts to curb runoff from cornfields, by Karl Blankenship on July 01, 2007 – Spurred by demand for ethanol, increase in crop acreage could reverse progress in Bay cleanup effort.

Milestone Evaluations

- CBPO will be providing detailed data for these scenarios for your evaluations.
  - Findings of your assessments and other data are welcome.
- 2014 Progress and 2015 Progress will be compared to trajectory targets for EPA evaluations.
- BMP and wastewater data (QA) covering the period 7/1/13 – 6/30/14 (with exceptions) are due 2 weeks today on 12/1/14.
- Please don’t hesitate to contact the ScenarioBuilder team.

Milestone Evaluations