Update on CAST-19

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MAY 26, 2020

Timeline for CAST-19 Review

- February 21, 2020
  - Review initiated.
- March 5, 2020
  - Presentation on updates to the Watershed Technical Workgroup
- February 21 to March 22, 2020
  - Comments received from WV, MD, PA, DE, and VA and meetings held with each state
- March 23, 2020
  - CAST-2019 is presented to the WQGIT
- April 2, 2020
  - Presentation on updates to the Watershed Technical Workgroup
- April 27, 2020
  - Updates presented to the WQGIT
  - No comments received since
- May 26, 2020 – Decision Requested to Release CAST-19

Model Documentation

CAST-2019 version

CAST-2017d is updated to CAST-2019 with changes to data and BMPs used in the Phase 6 model for the milestone period. This follows the Principals' Staff Committee decision of July 9, 2018 that changes are made only in advance of the two-year milestone period. The decision can be found in the July 9, 2018 PSC meeting minutes. These changes were agreed to by the WQGIT and its workgroups. The changes are limited in scope so that they do not: 1) impact modeled runoff during the 1993-1995 critical period; or 2) alter the base conditions (land uses, septics, animals, etc.) from 1984 through 2013. Preservation of these estimates enables a consistent assessment of how new management actions and changes in base conditions have influenced loads over time.

Fact Sheet

Comparison of Loads and Inputs Between CAST-17d and CAST-19--Data Visualization Tool

Technical Documentation of the Change Between CAST-17d and CAST-19

Comments from the Jurisdictions and the Chesapeake Bay Program Responses

Fact Sheet

https://cast.chesapeakebay.net/Documentation/ModelDocumentation

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CAST-19

The Chesapeake Assessment Scenario Tool, or CAST, is a free, web-based tool that estimates what the most cost-effective, and relevant, best management practices are in reducing nitrogen, phosphorus and sediment pollution for a given geographic area. Users can run simulations for various scenarios that are relevant to their communities to identify what pollution prevention strategies make the most sense, given their available resources. CAST has recently been updated to a new version, CAST-19.

What's new in CAST-19?

CAST-19 features a wealth of new data, including:

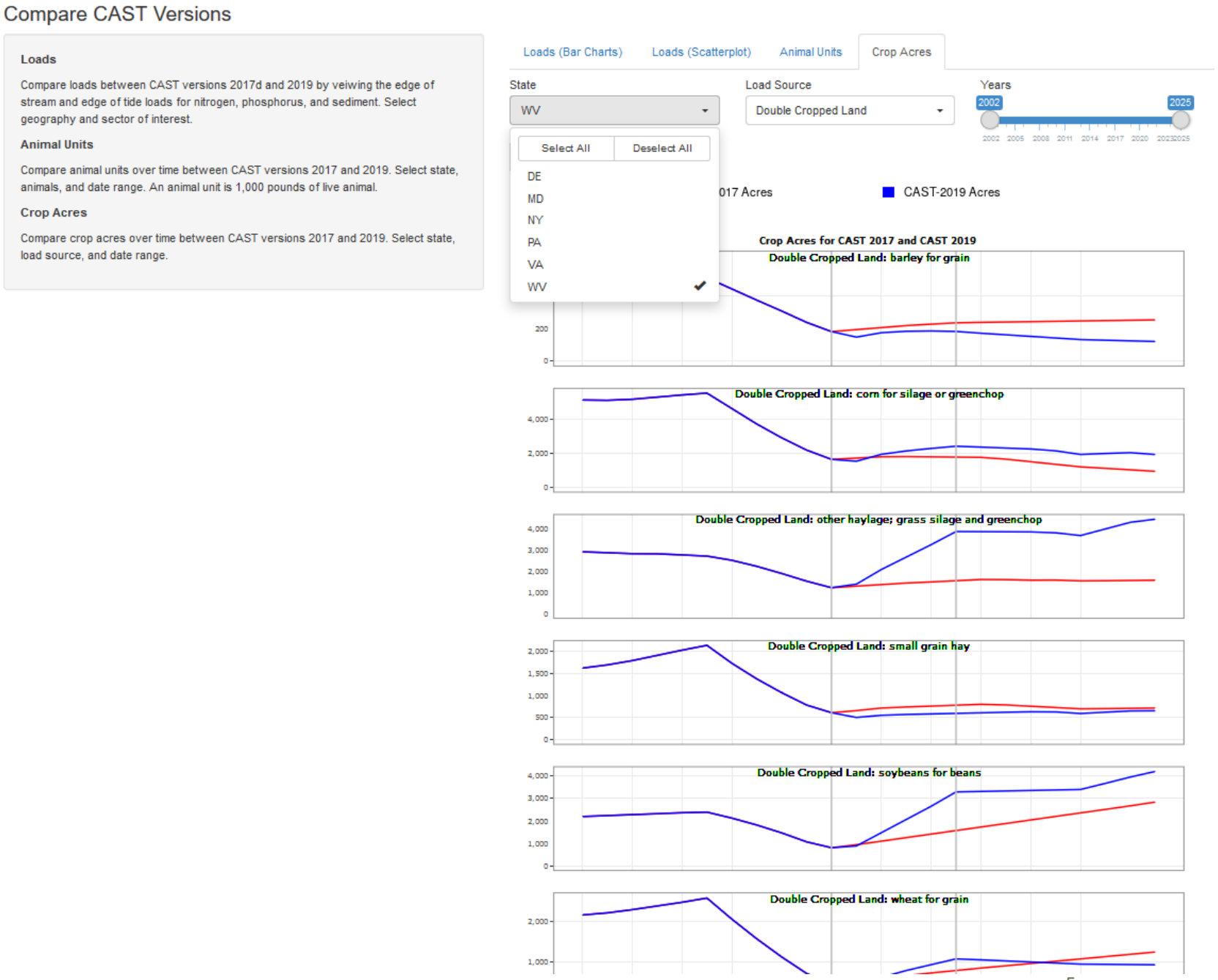
- Updated information from the 2017 U.S. Department of Agriculture Census, which has been incorporated into information on land use, crop yields and animal populations.
  - It also includes the use of an updated method for integrating land cover data with census data.
- Actual and projected data from 2013 – 2025 on land use acres, septic systems and sewer service areas. This also includes data on MS4 areas in Virginia only.
- Sales of fertilizer in both agricultural and urban areas.

CAST-19 features the following updates:

- Consistency in wastewater year with best management practice year (July 1 – June 30) for all jurisdictions.
- A calculation change that now includes agency for loads reduced in stream beds and banks.
- Updated nitrogen fixation rates for "other haylage; grass silage and green chop" and inputs for over-winter crops.
- Projections from the 2017 U.S. Department of Agriculture Census for 2018 and beyond. Previously, projections were only included from 2013 and beyond. Please note that the mapped land use continues to project from 2013 and beyond.
- What best management practices have been submitted, including during the Bay TMDL critical period.
- Best management practice costs from 2010 dollars to 2018 dollars.

Data Available

https://cast.chesapeakebay.net/Shiny/misc/castver/



Technical Documentation

https://cast.chesapeakebay.net/Documentation/ModelDocumentation

CAST-2019 Release

Changes between the CAST-2017d and CAST-2019 versions

- **Updates may increase or decrease the loads in all scenarios.**
- The 2013 – 2025 land use acres and septic systems changed with updates to the following.
  - Updated 2025 Current Zoning land use to use new data for population projections, protected lands, sewer service areas, and agricultural lands. The agricultural land use acres are determined by the National Agricultural Statistical Service's Agricultural Census crop and animal data.
  - Updated sewer service areas for 51 local jurisdictions to use new data for the population on sewer and septic systems for 2013 through 2025
  - Updated MS4 area for 19 local jurisdictions in Virginia. **Loads from the MS4 load sources may increase or decrease in the 19 local jurisdictions in Virginia because of the change in area.**
- 2017 Agriculture Census data was incorporated into the land use; crop, hay and pasture acres; crop yields; and animal numbers. The data between years 2013 and 2017 is now interpolated and years 2018 to 2025 are projected.
  - This information is used in producing the new 2013 – 2025 current zoning land use.
  - Consistent with CAST-2017, animal numbers are forecast at the state scale. State numbers are then proportioned to individual counties according to latest Census of Agriculture. The animal numbers are used to calculate the feeding space acres, so these will change for years 2013 through 2025. **This update will increase or decrease animal manure nutrients related to the degree of the change:**
    - **Increases in animal manure nutrients can be offset by BMPs, changes in crop types the manure is applied to, and less chemical fertilizer use.**
    - **Decreases in animal manure nutrients, generally, reduce loads.**
  - Crops are forecast by crop categories at the county scale. Categories are then proportioned to individual land use types according to latest Census of Agriculture. **This update will increase or decrease nutrient and sediment loads related to the degree of the change and, primarily, the crop nutrient needs.**
  - Agricultural fertilizer sales data for 2013 and 2014 are incorporated into the model. **The crop need will change for all scenarios. This update will increase or decrease loads depending on the change in crop need from CAST-2017.**

Comments Received

- Implications in changing loads for planning and impact on communication
- Change in hay acres
- Developed acres
- Double cropped acres
- Dairy animals
- Nutrient applications compared to acres
- Soybean nutrient application
- PA's Hillandale Operation animal numbers

https://cast.chesapeakebay.net/Documentation/ModelDocumentation

Updated: 5/6/2020

Comment—Implications in changing loads for planning

Concern was expressed that the increase in nitrogen in CAST-19 would result in the Phase III WIP Planning Targets changing, resulting in a requirement that the Phase III WIPs be updated. There was also a question of how the milestone goals are recalculated for each milestone period, and whether the latest version of CAST would be used for each recalculation.

Jill Whitcomb-PA-DEP; James Martin-VA-DEQ

Response

The 2025 Phase III Planning Targets do not change. The milestone goals do change. The 2009 progress changes since the entire history of BMP implementation is re-run with each new version of CAST. With the 2009 starting point adjustment, the trajectory to the 2025 planning target endpoint shifts. As we get closer to 2025, the effect of the shift is not as much as earlier years since we are closer to the anchored 2025 target. The 70% milestone goal will step up with each cycle (80% in 2021, 90% in 2023).

Resolution

The Chesapeake Bay Program will send jurisdictions communications pieces with full explanations as to why the nitrogen load is higher in CAST-19 than CAST-17d. PA-DEP requested that the percent from nitrogen fixation, inorganic fertilizer, and manure be shown in a visual interpretation by the May 25, 2020 WQGIT. These communication pieces should help translate for stakeholders the implications of additional nitrogen load in their jurisdiction. The pieces will specifically address what jurisdictions should do with this information and why the changes occurred. It was suggested that the CBPO Communications Office help prepare the communication pieces.

Comment—Hay

The acres in the load source Ag Open Space increases while the acres in the load source Hay have decreased in CAST-19 compared to CAST-17d.

Greg Sandi-MDE; Dave Montali-Tetra Tech; William Keeling-VA-DEQ

Response

The 2017 Agricultural Census collapsed three categories of hay that were separate in previous censuses—wild hay, other hay, and small grain hay. The early CAST-19 beta split the acres equally among the three categories.

Approval of CAST-19 Release

DECISION REQUESTED

CAST-21 Schedule

September 1, 2021 - All data and approved methods

November 1, 2021 - CAST-2021Beta release

January 1, 2022 - Final CAST-2021 release