

Next Version of CAST: Data Updates and Effects on Loads

MAY 17, 2022

CAST-21 Release

- An updated version of the Chesapeake Bay Program Watershed Model (CAST-21) has been completed.
 - Aligns with the new 2022-2023 Milestone period and includes updated data and methods reviewed by the Partnership.
 - These biannual releases of CAST ensure new science and information is incorporated.

New Data and Methods in CAST-21

- The 2013–2025 land use acres updated using latest high-resolution land cover data
- Jurisdictional revisions to reported BMP implementation as far back as 1985 – to 2021
- BMP updates for urban stream restoration, tree and forest planting, forest buffers, impervious disconnection, agricultural ditch management, water control structures, abandoned mine land reclamation, wetland creation and rehabilitation – now available for annual progress scenarios
- Total agricultural land use acres determined by a new and better method
- Updated jurisdiction data for the following from one or several jurisdictions:
 - Biosolids nutrients applied to land
 - Splits between permitted/non-permitted feeding space
 - Number of septic systems and sewer service areas
 - Effects of separating combined sewers and overflows
 - Significant and non-significant wastewater data
 - Acres in harvested forest and construction

Errors and Omissions

- Chesapeake Bay Program Office (CBPO) staff alerted states that some agricultural fertilizer sales data had been erroneous in CAST-19 and was corrected in the review version of CAST-21 prior to the review.
- Other missing and new data was identified for CAST-21 during the review period, namely
 - one year of broiler populations, and
 - four years of crop yield data for six major crop types
- The CBPO held one-on-one meetings with all jurisdictions and addressed the omissions in Bay Program forums.
- New procedures are in place to prevent these errors in the future.

Jurisdictional Comments

- Jurisdictions conducted a thorough review following the timeline and provided well articulated comments, even while staff were focusing on preparing annual progress submissions. Thank you!
- Most common comment: When to introduce farm and non-farm fertilizer sales data to the modeling tools and the quality of that data.
- Other comments are state specific or related to functionality in the user interface

Change in Nutrient Loads to the Chesapeake Bay

Differences between CAST versions with each update: 6.3M lbs. TN, -0.5M lbs. TP

By source sector; 2020 Progress scenario

Nitrogen

		CAST19 to CAST21	CAST21	CAST21	CAST19 to CAST21	CAST19 TMDL Goal	CAST21 TMDL Goal
		New Fertilizer Data, Land Cover, etc.	Effect of Broiler Data	Effect of Yield Data	All Effects	Achieved To-Date	Achieved To-Date
Jurisdiction	Source	(M lbs)	(M lbs)	(M lbs)	(M lbs)	(%)	(%)
AllJurisdictions	Agriculture	4.056	0.024	1.863	5.943	10%	0%
AllJurisdictions	Developed	0.177	0	0	0.177	0%	0%
AllJurisdictions	Wastewater	0	0	0	0	100%	100%
AllJurisdictions	Septic	-0.080	0	0	-0.080	0%	100%
AllJurisdictions	Natural	0.120	0.001	0.094	0.215	23%	20%
AllJurisdictions	AllSources	4.273	0.025	1.957	6.255	41%	35%

Phosphorus

		CAST19 to CAST21	CAST21	CAST21	CAST19 to CAST21	CAST19 TMDL Goal	CAST21 TMDL Goal
		New Fertilizer Data, Land Cover, etc.	Effect of Broiler Data	Effect of Yield Data	All Effects	Achieved To-Date	Achieved To-Date
Jurisdiction	Source	(M lbs)	(M lbs)	(M lbs)	(M lbs)	(%)	(%)
AllJurisdictions	Agriculture	0.086	0.001	-0.029	0.058	17%	11%
AllJurisdictions	Developed	-0.454	0	0	-0.454	0%	100%
AllJurisdictions	Wastewater	0	0	0	0	97%	100%
AllJurisdictions	Septic	-0.003	0	0	-0.003	0%	100%
AllJurisdictions	Natural	-0.127	0.000	-0.006	-0.134	34%	50%
AllJurisdictions	AllSources	-0.498	0.001	-0.036	-0.533	64%	78%

Change in Nutrient Loads to the Chesapeake Bay

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By source sector; [2020 Progress scenario](#)

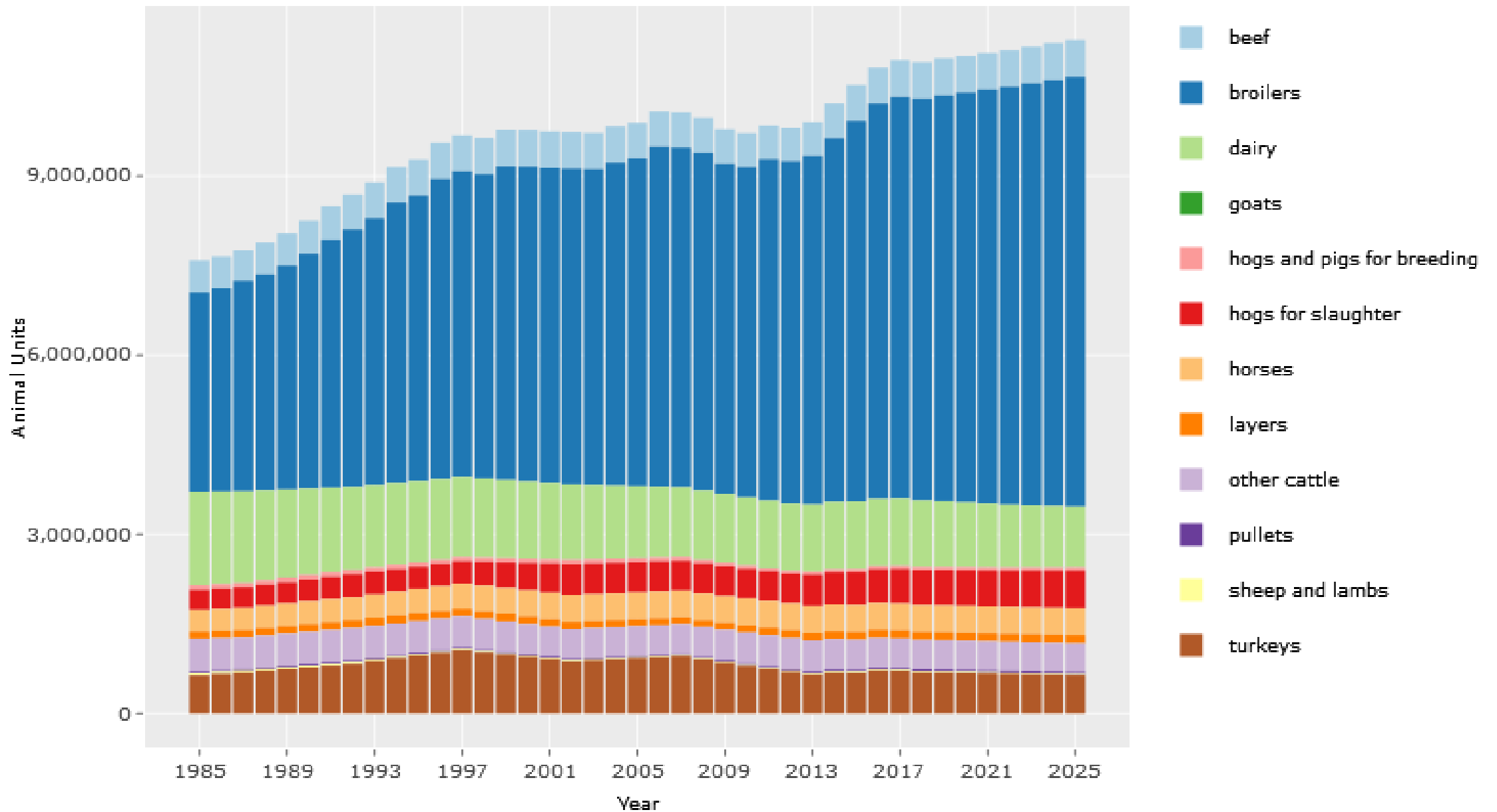
Nitrogen

		CAST19 to CAST21	CAST21	CAST21	CAST19 to CAST21	CAST19 TMDL Goal	CAST21 TMDL Goal
		New Fertilizer Data, Land Cover, etc.	Effect of Broiler Data	Effect of Yield Data	All Effects	Achieved To-Date	Achieved To-Date
Jurisdiction	Source	(M lbs)	(M lbs)	(M lbs)	(M lbs)	(%)	(%)
NY	AllSources	0.697	0.000	-0.042	0.655	45%	18%
PA	AllSources	1.772	0.124	0.868	2.764	18%	12%
MD	AllSources	1.017	-0.016	0.482	1.483	82%	73%
VA	AllSources	0.566	-0.015	0.434	0.985	66%	65%
WV	AllSources	-0.153	-0.016	-0.005	-0.173	100%	100%
DE	AllSources	0.374	-0.052	0.220	0.542	0%	0%
DC	AllSources	-0.002	0	0	-0.002	100%	100%
AllJurisdictions	AllSources	4.273	0.025	1.957	6.255	41%	35%

Phosphorus

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Jurisdiction	Source	(M lbs)	(M lbs)	(M lbs)	(M lbs)	(%)	(%)
NY	AllSources	0.004	0.000	-0.002	0.002	61%	60%
PA	AllSources	-0.027	0.004	-0.014	-0.036	46%	47%
MD	AllSources	-0.392	0.000	-0.014	-0.406	96%	100%
VA	AllSources	-0.159	0.001	-0.004	-0.163	65%	81%
WV	AllSources	0.067	0.000	0.000	0.067	94%	60%
DE	AllSources	0.013	-0.004	-0.001	0.008	47%	0%
DC	AllSources	-0.003	0	0	-0.003	100%	100%
AllJurisdictions	AllSources	-0.498	0.001	-0.036	-0.533	64%	78%

Animal Units by Year and Animal



USDA NASS Corn for Grain Yields (2010-2021)



https://quickstats.nass.usda.gov/results/22518199-8A05-3923-9006-7BC375910F78

USDA United States Department of Agriculture
National Agricultural Statistics Service

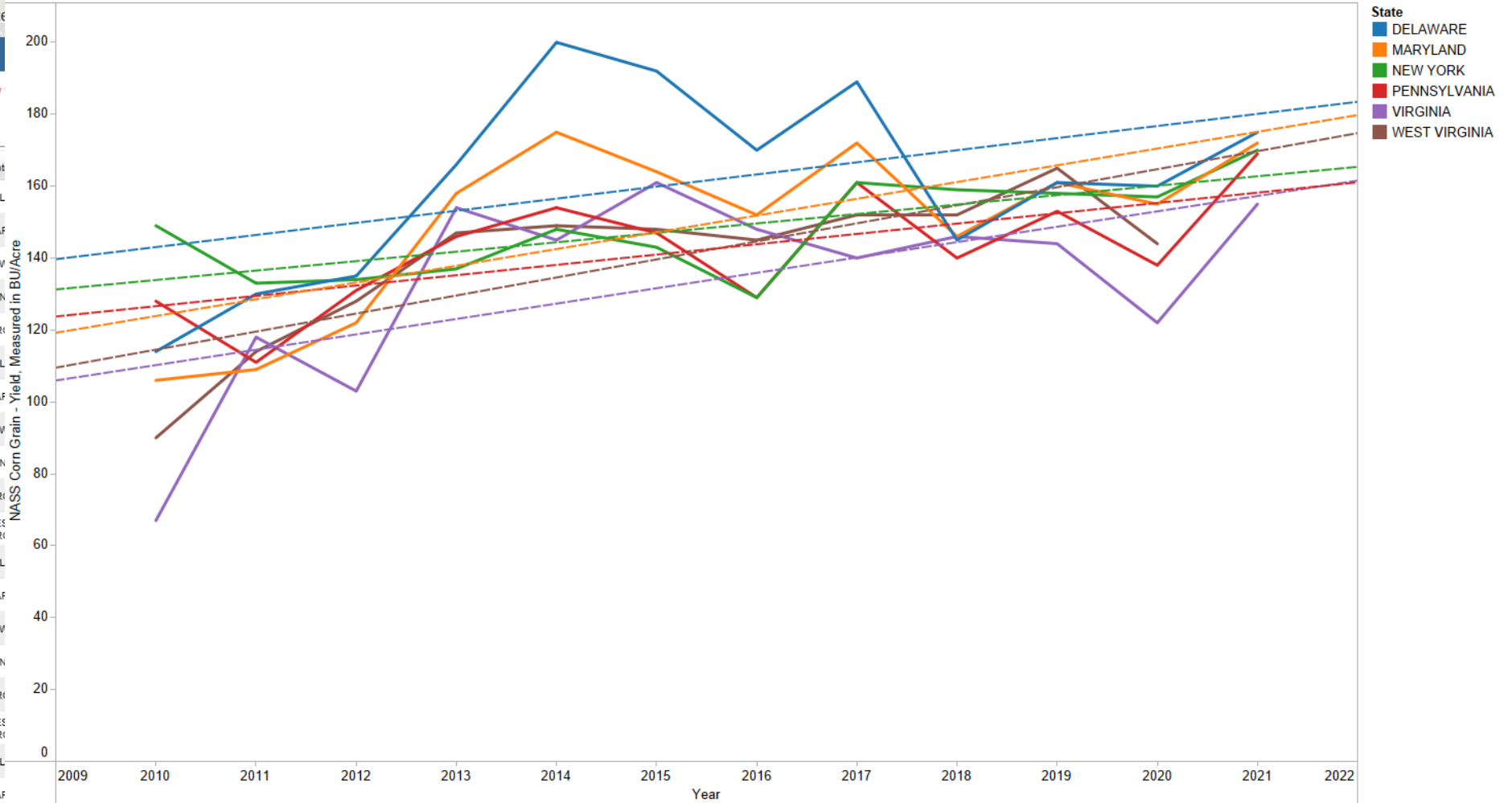
Quick Stats

Navigation History: Data

Double click any cell below!

Program	Year	Period	Geo Level	Stat							
SURVEY	2021	YEAR	STATE	DEL							
SURVEY	2021	YEAR	STATE	MAF							
SURVEY	2021	YEAR	STATE	NEV							
SURVEY	2021	YEAR	STATE	PEN							
SURVEY	2021	YEAR	STATE	VIRI							
SURVEY	2020	YEAR	STATE	DEL							
SURVEY	2020	YEAR	STATE	MAF							
SURVEY	2020	YEAR	STATE	NEV							
SURVEY	2020	YEAR	STATE	PEN							
SURVEY	2020	YEAR	STATE	VIRI							
SURVEY	2020	YEAR	STATE	WES VIRI							
SURVEY	2019	YEAR	STATE	DEL							
SURVEY	2019	YEAR	STATE	MAF							
SURVEY	2019	YEAR	STATE	NEV							
SURVEY	2019	YEAR	STATE	PEN							
SURVEY	2019	YEAR	STATE	VIRI							
SURVEY	2019	YEAR	STATE	WES VIRI							
SURVEY	2018	YEAR	STATE	DEL							
SURVEY	2018	YEAR	STATE	MAF							
SURVEY	2018	YEAR	STATE	NEW YORK	36	00000000	CORN	CORN, GRAIN - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	159
SURVEY	2018	YEAR	STATE	PENNSYLVAN	42	00000000	CORN	CORN, GRAIN - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	140

NASS Trends



- State
- DELAWARE
 - MARYLAND
 - NEW YORK
 - PENNSYLVANIA
 - VIRGINIA
 - WEST VIRGINIA

▶ CBW Change in Nutrient Applications to the Land

(2012 – 2016)

Nitrogen							
	Manure Applied	Biosolids Applied	Fertilizer Applied	Legume Fixed	Pasture Manure	Total Agriculture Applied/Fixed	Urban Fertilizer
2012-2016 Change (lbs)	14,460,000	-3,389,000	64,886,000	29,263,000	1,449,000	106,668,000	4,086,000
2012-2016 Change (%)	7%	-17%	16%	7%	1%	9%	6%
Phosphorus							
	Manure Applied	Biosolids Applied	Fertilizer Applied		Pasture Manure	Total Agriculture Applied	Urban Fertilizer
2012-2016 Change (lbs)	5,453,000	-1,616,000	5,581,000		681,000	10,098,000	6,643,000
2012-2016 Change (%)	9%	-15%	9%		2%	6%	62%

Friday, 2/18 - Release of revised CAST-21 with updated poultry, crop yields

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graph TD; A[Friday, 2/18 - Release of revised CAST-21 with updated poultry, crop yields] --> B[Friday, 4/15 - Comments due from partnership]; B --> C[Week of 5/16- Response to comments, both those provided in November and those provided most recently. Also, Comms piece released]; C --> D[Release of CAST-21 to occur after response to comments];
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Friday, 4/15 - Comments due from partnership

Week of 5/16- Response to comments, both those provided in November and those provided most recently. Also, Comms piece released

Release of CAST-21 to occur after response to comments

Draft Schedule for Deliberative Purposes

CAST Communications Documents

Currently on CAST website under About, Model Documentation
(<https://cast.chesapeakebay.net/Documentation/ModelDocumentation>)

- [Fact Sheet](#) – General 2 page overview of CAST – **Remains as is**
- [Understanding Chesapeake Bay Modeling Tools](#) – A history of updates, governance, policy and procedures – **Update to take out page 5-6 specifics related to CAST19 – then remains constant**
- [Comparison of Loads and Inputs Between CAST-17d and CAST-19--Data Visualization Tool](#) – Visual aid to assist in comparing CAST versions as they change – **New version for CAST19 to CAST21 Change**
- [Technical Documentation of the Change Between CAST-17d and CAST-19](#) – Description of data/methods updated from one CAST version to the next – **New Version for CAST19 to CAST21 Change**
- [Comments from the Jurisdictions and the Chesapeake Bay Program Responses](#) – Comment and response document for the version of the model – **New Version for CAST21**
- **New Document – Assistance to explain changes from CAST19 to CAST21 to partners and stakeholders (those not experienced with CAST and it's use)**

Path Forward

Jurisdictions are expected to account for these additional loads by either

1. Amending the Phase III WIPs

or

1. Updating the 2022/2023 or 2024/2025 milestones

Questions?