

Updates on 2025 Climate Change Projections

WQGIT

November 13, 2018

Lew Linker (EPA-CBP)
and the CBP Modeling Team

linker@chesapeakebay.net



Chesapeake Bay Program
Science, Restoration, Partnership



Management Actions on CB Climate Change:

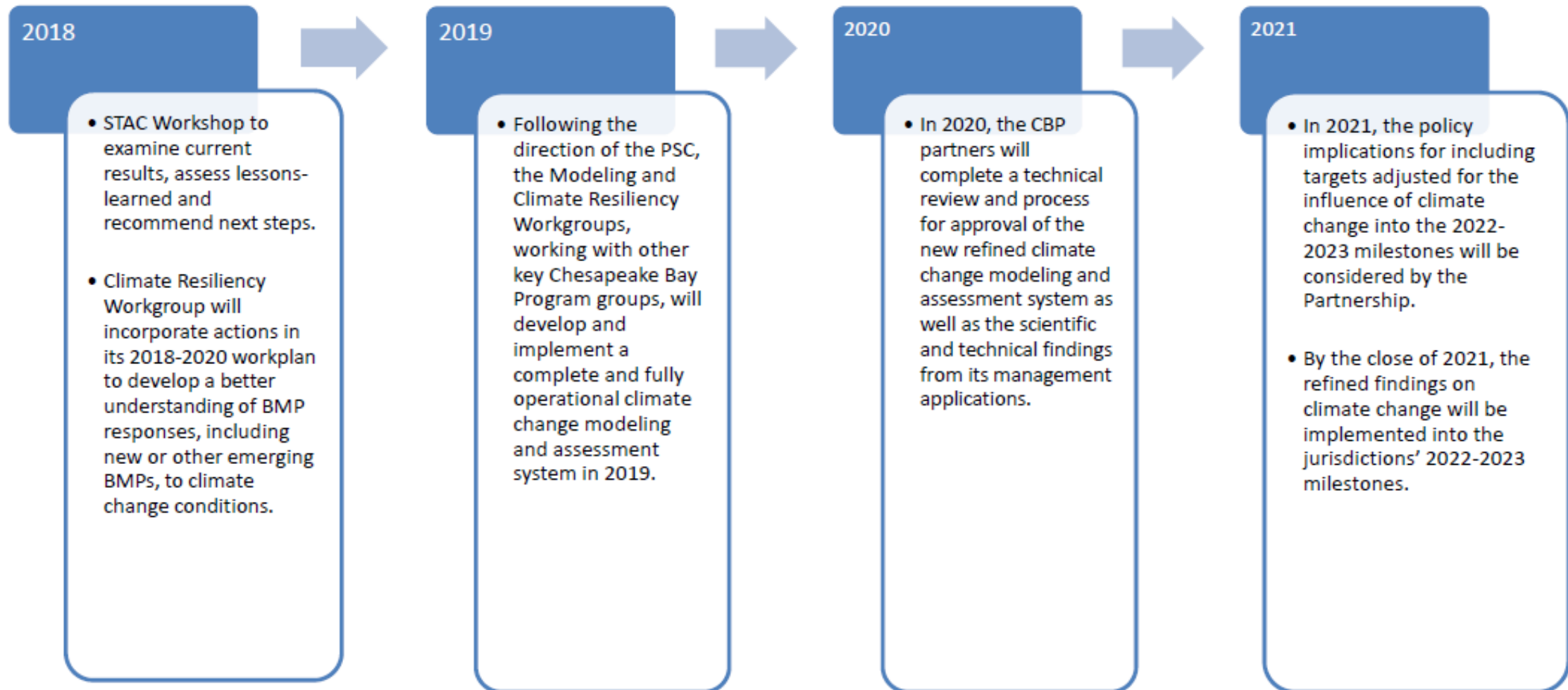
The Principal Staff Committee (PSC) in December 2017 directed the CBP, through the Modeling and Climate Resiliency Workgroups, to direct immediate efforts toward a more refined analysis of climate change influence on Chesapeake water quality, to be delivered as a complete and fully operational modeling system by the close of 2019.

PSC Decisions of December 2017

Understand the Science - Address the uncertainty by documenting the current understanding of the science and identifying research gaps and needs:

- Develop an estimate of pollutant load changes (N, P, and S) due to climate change conditions [so that] starting with the 2022-2023 milestones, [the CBP will] determine how climate change will impact the BMPs included in the WIPs and address these vulnerabilities in the two-year milestones.
- Develop a better understanding of the BMP responses, including new or other emerging BMPs, to climate change conditions.
- In 2021, the Partnership will consider results of updated methods, techniques, and studies and revisit existing estimated loads due to climate change to determine if any updates to those load estimates are needed.
- Jurisdictions will be expected to account for additional nutrient and sediment pollutant loads due to 2025 climate change conditions in a Phase III WIP addendum and/or 2-year milestones beginning in 2022.

Next Steps Directed by the PSC: Understanding the Science and Refining the Model Estimates





The 2019 CBP Climate Change Assessment

- The CBP is developing the tools to quantify the effects of climate change on Chesapeake water quality standards through changes in watershed flows and loads, storm intensity, estuarine temperatures, sea level rise, and ecosystem influences including loss of tidal wetland attenuation with sea level rise.
- Current efforts are to frame initial future climate change scenarios based on estimated 2025 (short term), 2035 (moderate term), and 2045/2055 conditions (long term) by the close of 2019.



Understanding the Science: Guidance From STAC

Status: STAC’s peer reviews and workshops on the assessment of climate change in the Chesapeake watershed and Bay (Pyke et al. 2008; STAC 2011; Pyke et al. 2012; DiPasquale 2014; Johnson et al. 2016;; Wainger 2016; Benham 2018; STAC 2019 [in preparation]) have made a substantial contribution as part of STAC’s essential ongoing advice on the state of the science in this field, and particularly with respect to watershed and coastal water restoration in the Chesapeake region.



Understanding the Science: Recent STAC Workshop

Chesapeake Bay Program Climate Change Modeling 2.0

September 24-25, 2018

The motivation for the workshop stems from the decision of the Chesapeake Bay Program (CBP) Principals' Staff Committee to develop a framework for addressing climate change impacts in jurisdictions Phase III Watershed Implementation Plans (WIPs). The goal is to develop recommendations for new and/or refined methods and modeling techniques to be completed and fully operational by 2019, to assess the potential impacts of 2025 and longer term climate change on watershed loads and estuarine processes, to characterize and manage the risk of climate change impacts to CBP goals.

A decision on the WIP Guidance for the Climate Change Narrative:

“The Chesapeake Bay Program (CBP) relayed its *preliminary* modeling results of climate change in 2025 to the jurisdictions at the March 2018 Principals Staff Committee (PSC) meeting. The jurisdictions will document these preliminary numeric targets in their respective Phase III WIPs and will include a narrative strategy, outlining their programmatic and/or numeric commitments to address projected impacts...”

Climate Change Loads: Nitrogen

Jurisdiction	1985 Baseline	2013 Progress	Climate Change	Phase III Planning Target
NY	18.71	15.44	0.400 (3.8%)	11.59
PA	122.41	99.28	4.135 (5.7%)	73.18
MD	83.56	55.89	2.194 (4.8%)	45.30
WV	8.73	8.06	0.236 (3.7%)	8.35
DC	6.48	1.75	0.006 (0.3%)	2.43
DE	6.97	6.59	0.397 (8.5%)	4.59
VA	84.29	61.53	1.722 (3.1%)	55.82
Basinwide	331.15	248.54	9.09 (4.6%)	201.25

*Units: millions of pounds

Climate Change Loads: Phosphorus

Jurisdiction	1985 Baseline	2013 Progress	Climate Change	Phase III Planning Target
NY	1.198	0.710	0.014 (2.9%)	0.606
PA	6.282	3.749	0.141 (4.7%)	3.073
MD	7.495	3.942	0.114 (3.2%)	3.604
WV	0.902	0.617	0.019 (3.9%)	0.456
DC	0.090	0.062	0.001 (0.8%)	0.130
DE	0.225	0.116	0.006 (5.1%)	0.120
VA	14.244	6.751	0.193 (3.0%)	6.186
Basinwide	30.44	15.95	0.489 (3.4%)	14.173

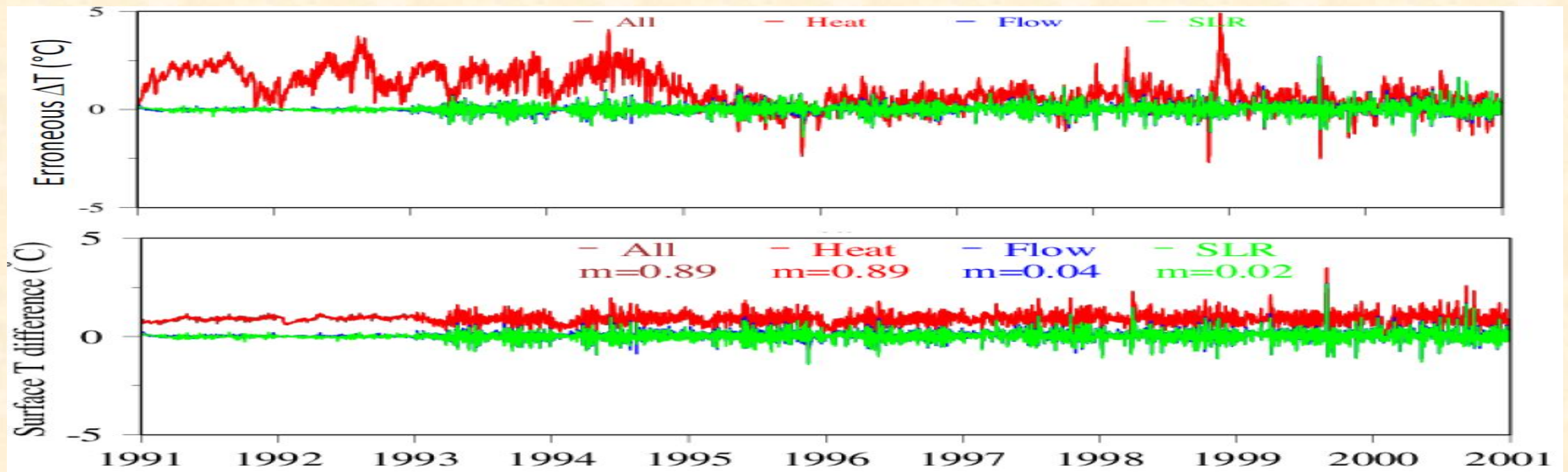
*Units: millions of pounds



Status: Small Corrections to CC Guidance Targets

In the Phase 6 Watershed Model: Correction to a bug in temperature inputs to the HSPF SNOW Module (and intentional corrections to the Phase 6 Model prior to the final model in July 2018)

In the Water Quality and Sediment Transport Model (WQSTM or Bay Model): Correction to meteorological forcing for years 1991 to 1995.





Status: Small Corrections to CC Guidance Targets

Jurisdiction	Oct-18 TN CC Targets	Jul-18 TN CC Targets		Oct-18 TP CC Targets	Jul-18 TP CC Targets
NY	0.400	0.359		0.014	0.013
PA	4.135	3.712		0.141	0.129
MD	2.194	1.969		0.114	0.105
WV	0.236	0.211		0.019	0.015
DC	0.006	0.005		0.001	0.001
DE	0.397	0.356		0.006	0.005
VA	1.722	1.546		0.193	0.168
Basinwide	9.090	8.159		0.489	0.436



Decision requested:

Decision requested: Retain the current guidance knowing that a final 2019 update will be available at the close of next year, or update the guidance with the July 2018 estimated climate change targets.

Jurisdiction	Oct-18	Jul-18	Oct-18	Jul-18
	TN CC	TN CC	TP CC	TP CC
	Targets	Targets	Targets	Targets
NY	0.400	0.359	0.014	0.013
PA	4.135	3.712	0.141	0.129
MD	2.194	1.969	0.114	0.105
WV	0.236	0.211	0.019	0.015
DC	0.006	0.005	0.001	0.001
DE	0.397	0.356	0.006	0.005
VA	1.722	1.546	0.193	0.168
Basinwide	9.090	8.159	0.489	0.436