Phase 7 Plans
Phase 7 Watershed Model Plans

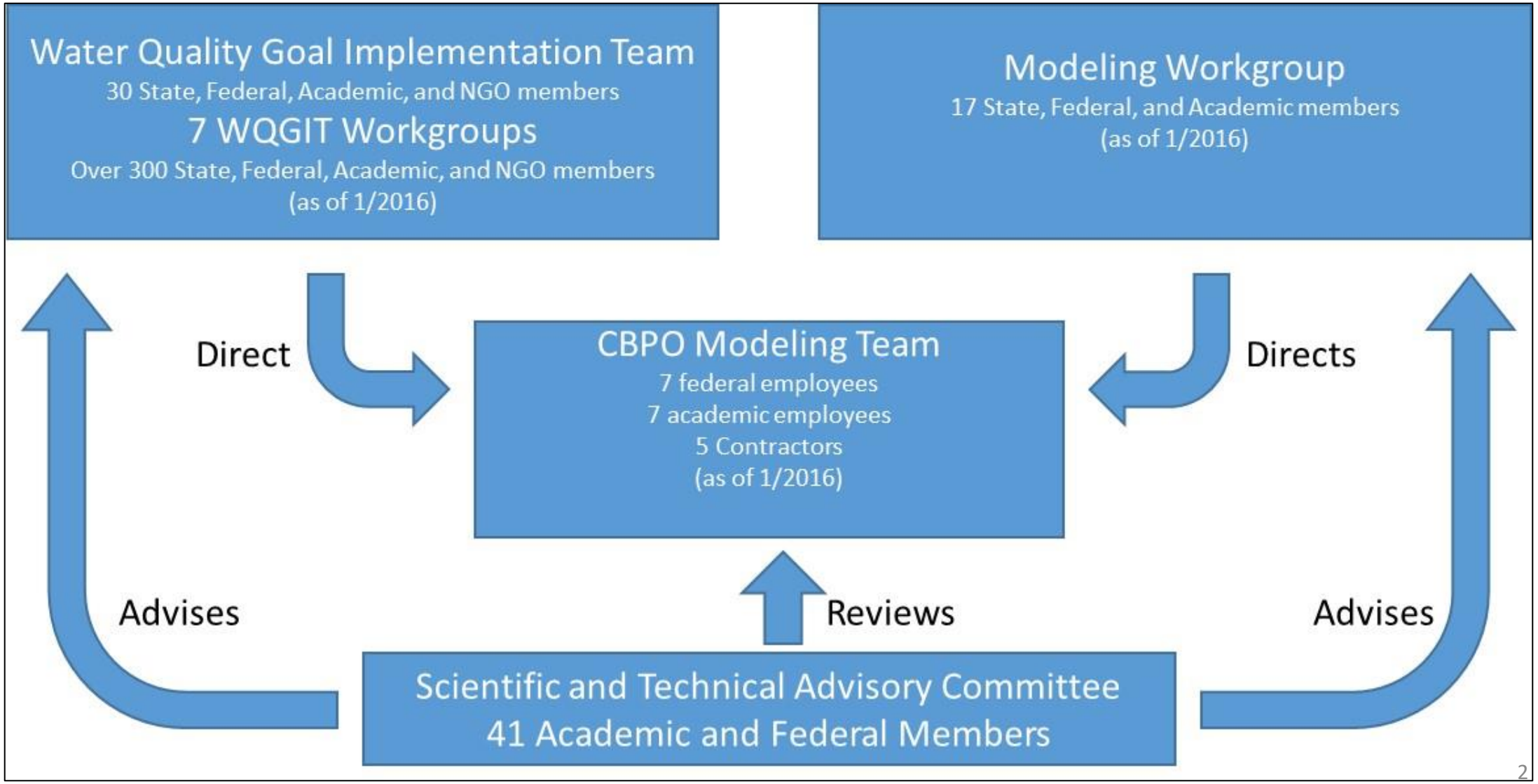
Gary Shenk – CBPO

MWG

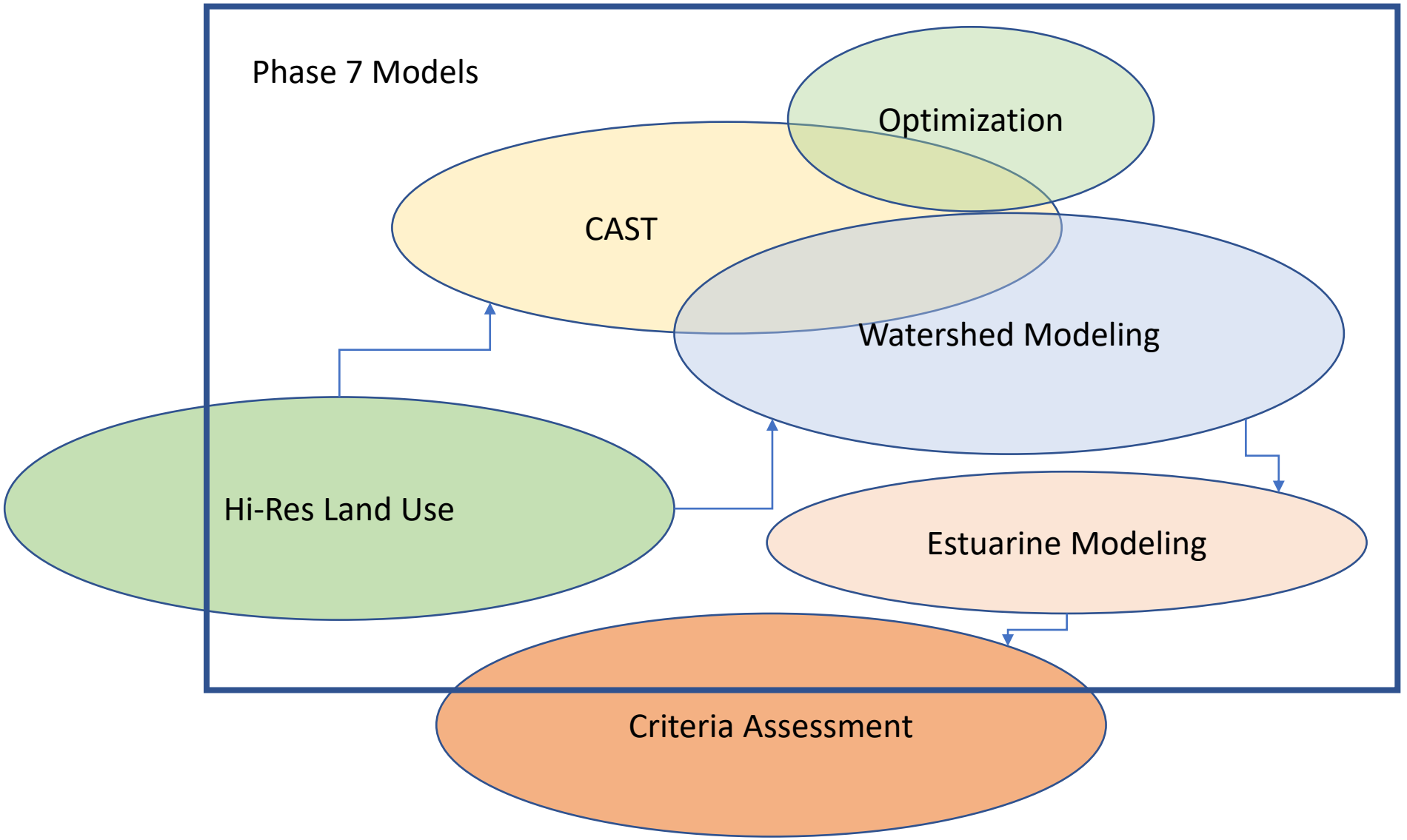
04/06/2022

Governance

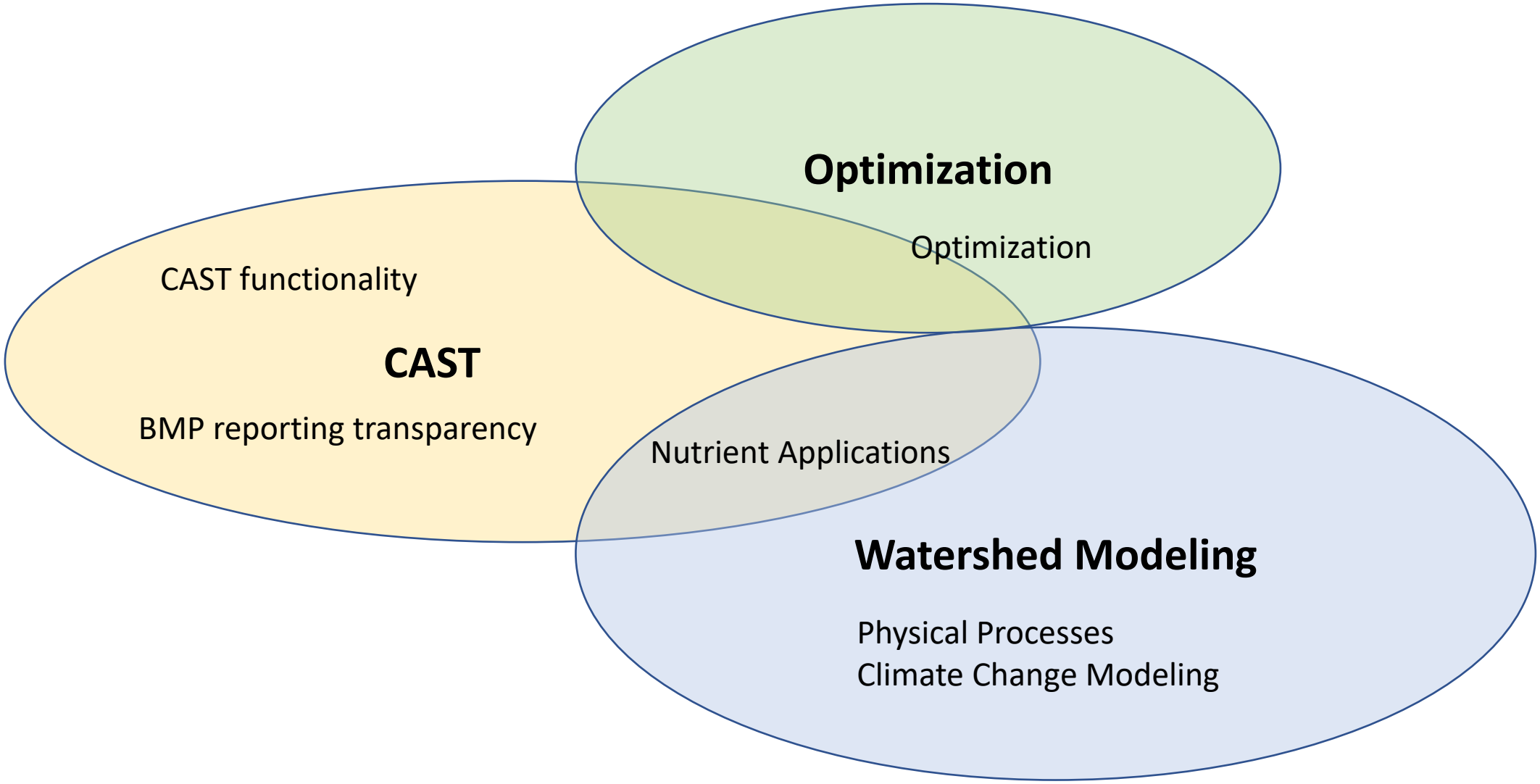
https://cast-content.chesapeakebay.net/documents/P6ModelDocumentation%2F1%20Overview%202018%2005%2022.pdf
https://www.chesapeakebay.net/who/group/modeling_team
https://www.chesapeakebay.net/what/programs/modeling



Phase 7 Development Tracks

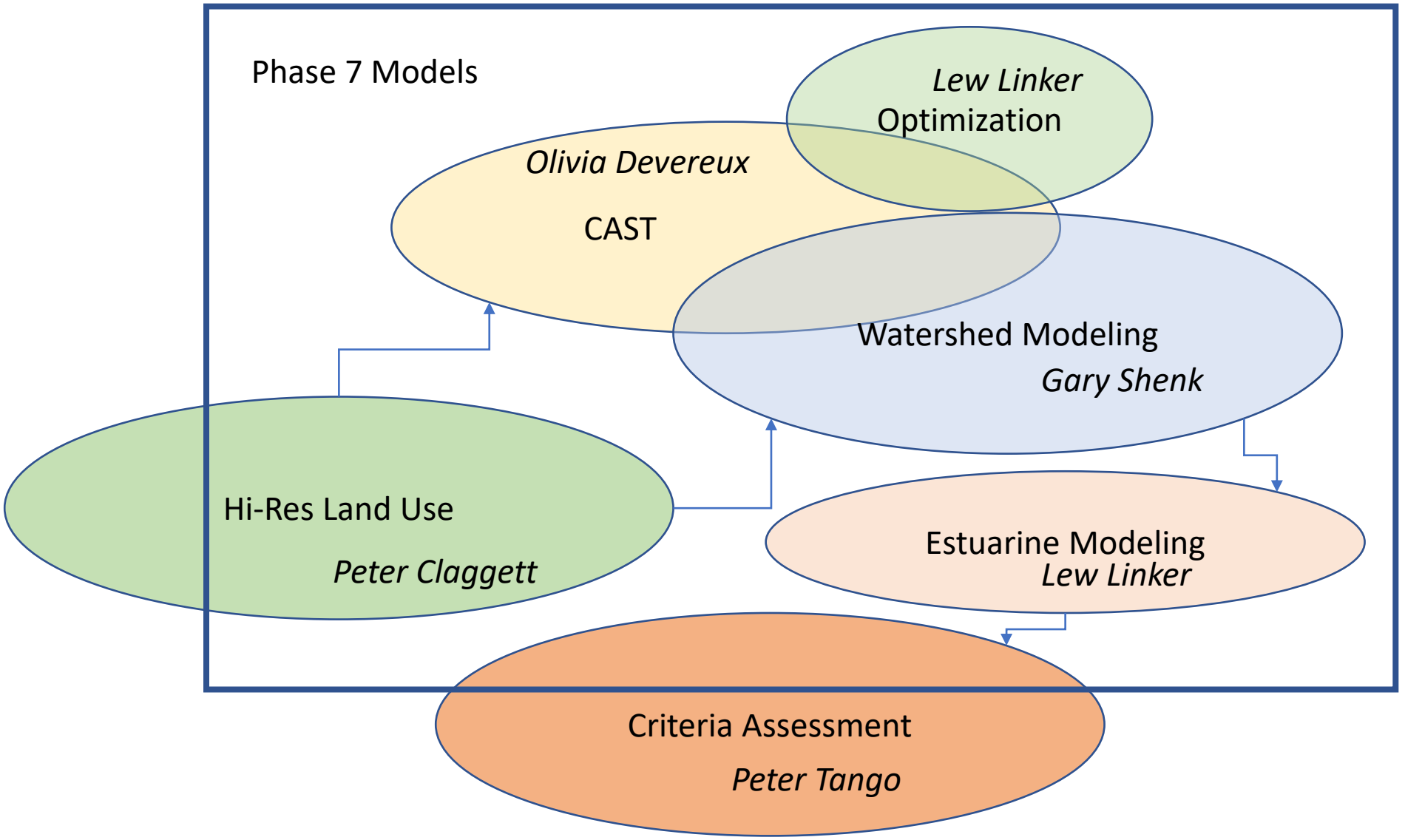


Phase 7 Development Tracks



Phase 7 Development Tracks

Lead organizer



Additional Topics from the Partnership

- WQGIT processes – Jeremy Hanson
  - Ongoing discussion of WQGIT processes
- Planning Target calculations – Gary Shenk
  - Next decisions in 2027
  - Focus in 2025-2026
  - Can discuss any time
- Co-benefits
  - CBP partnership still figuring this out
  - Require participation from CBP GITs and WGs

Each Track Has Provided Schedule Documents

Format will vary by Track

	2022 1	2022 2	2022 3	2022 4	2023 1	2023 2	2023 3	2023 4	2024 1	2024 2	2024 3	2024 4	2025 1	2025 2	2025 3	2025 4
Phase 7 Activity	Work plan			Build	Work plan	Build Models			Work plan	Build Models			Work plan	Build Models		
General	1 Develop CalCAST using P6 data								1 Use CalCAST as primary calibration tool							
	3 Determine official CBPO GIS layers															
	5 system of annual meteorology updates															
	25 BMP updates															
			35 Dynamic model for hydrology, sediment, and temperature													
						29 Investigate tidal flooding loads										
									30 Update to Wastewater							
			31 Update to CSOs													
Variable Scale Modeling																

Item	Category	What: short description	Why: who asked for it or why is it necessary	Who in C elsewhen the work		development time	
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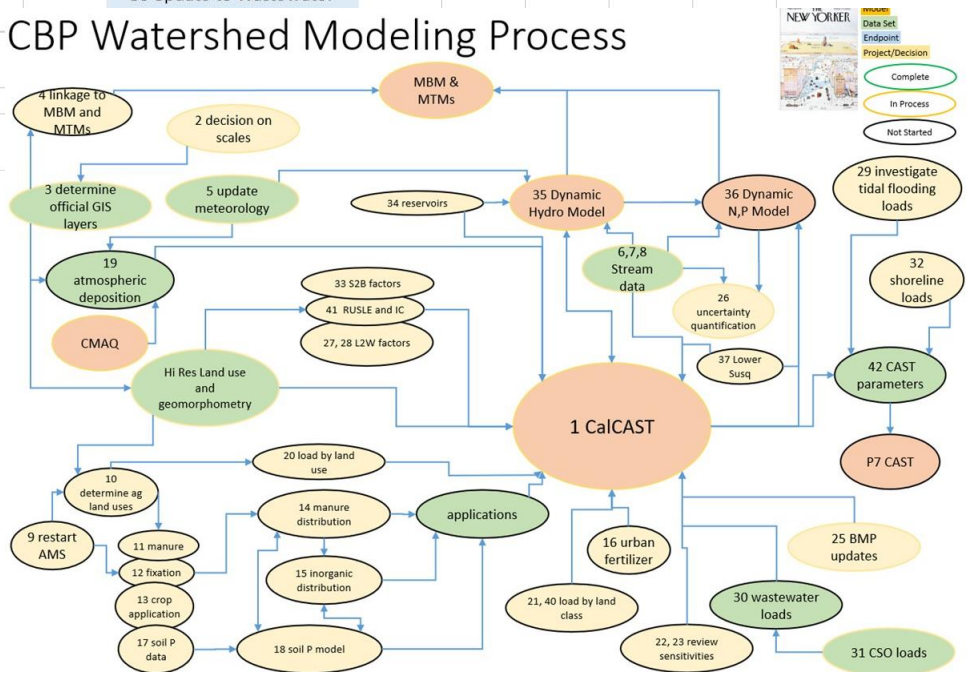
2	variable scale modeling	Discuss scale and reach decision	Development of various Phase 7 tasks will benefit from knowledge of the output scale	Shenk	WQGIT, MWG	2022-2025	Presentation to WQGIT and MWG on various aspects, discussed in section 2
3	General	determine official versions of GIS layers: NHD, county, shoreline, Lrseg	Counties have updated boundaries. NHD necessary to use many important data sets, shoreline determines watershed/estuarine parameters. Lrseg may change for NHD boundaries	McDonald, Fitch, Ahmed, Bhatt	MWG	early 2022	CBPO discussions, with results to be written into section 2
4	Main bay and tributary models	physical and chemical linkage with estuarine model	Needed to run estuarine models	Bhatt	MWG	late 2022. Need to determine form of dynamic model first for the variable description.	Indentify set of terminal segments. Identify estuarine cell for each terminal segment. Compare old ICM variables with new ICM variables. Do new WSM variables match up?



Each Track Has Provided Schedule Documents

Gantt Chart

	2022 1	2022 2	2022 3	2022 4	2023 1	2023 2	2023 3	2023 4	2024 1	2024 2	2024 3	2024 4	2025 1	2025 2	2025 3	2025 4
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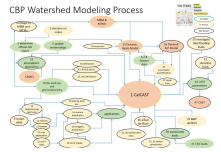
									30 Update to Wastewater Loads							
															42 CalCAST transfer to CAST	
			31 Update to CSOs													
Variable Scale Modeling													2 Partnership decision on Scales			

Format will vary by Track



Each Track Has Provided Schedule Documents

Task List

Item	Category	**What**: short description	**Why**: who asked for it or why is it necessary	**Who** in CBPO or elsewhere will do the work	**Where** in the CBP organizational chart do the decisions lie	**When** does this need to be done, including general dependencies and development time	**How**: A very short description with a link to the longer documentation
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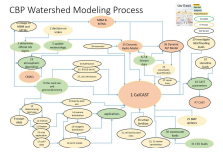
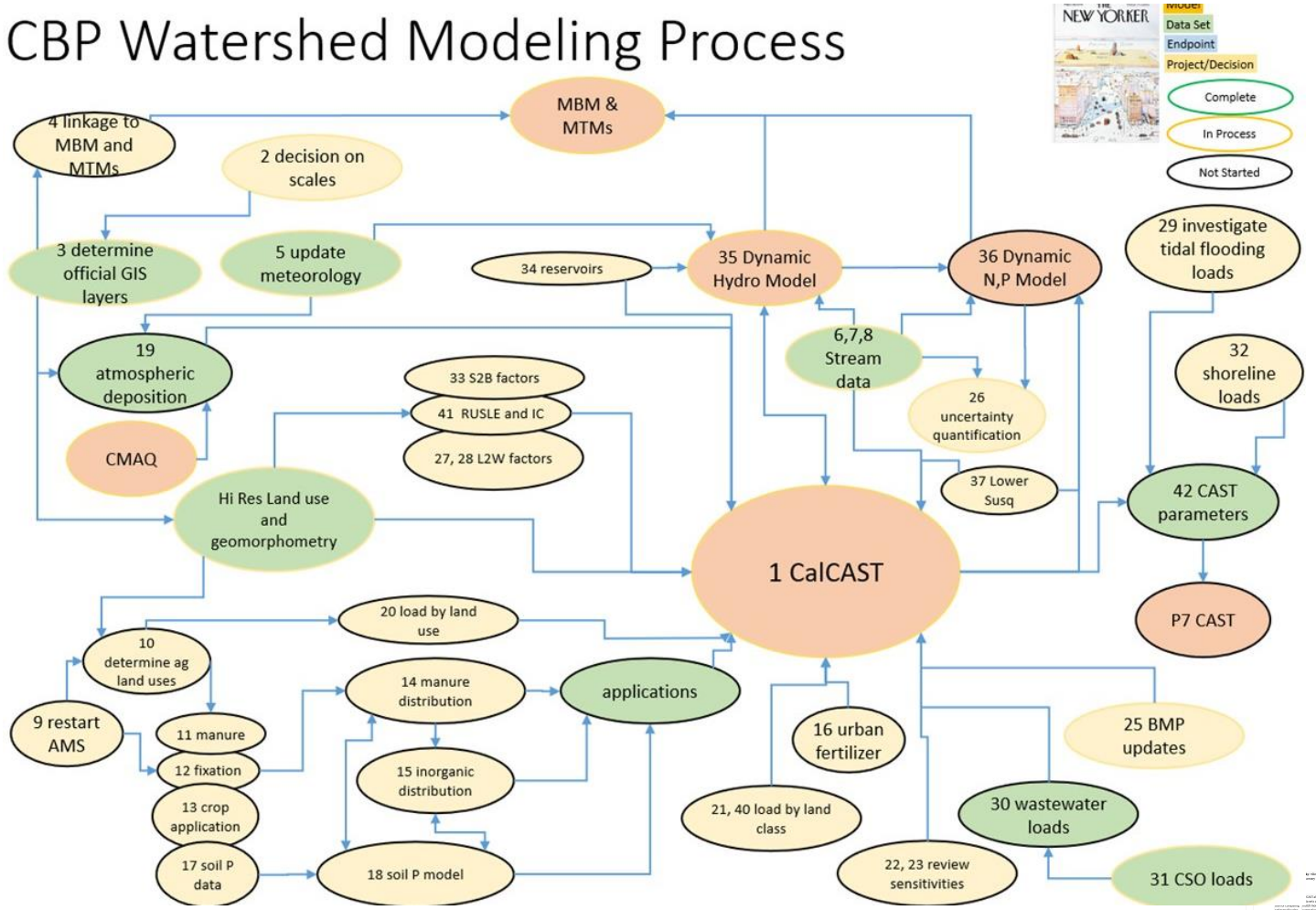


Each Track Has Provided Schedule Documents

Flow Chart



Format will vary by Track

Web page

- Overview

Phase 7 Model Development | Ch

chesapeakebay.net/what/programs/modeling/phase_7_model_development

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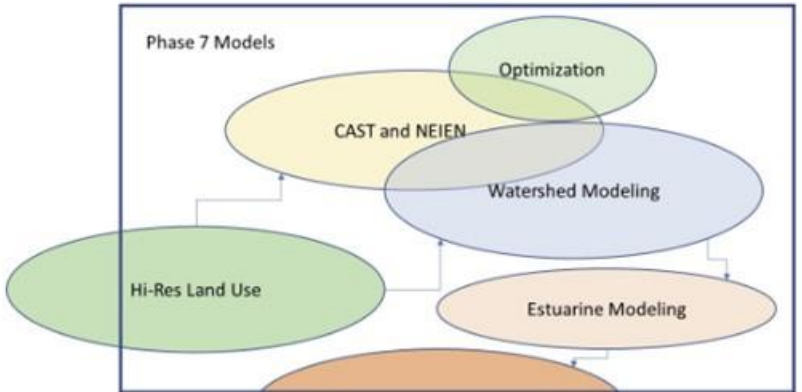
WHAT WE DO > PROGRAMS & PROJECTS > PHASE 7 MODEL DEVELOPMENT

Phase 7 Model Development

The Chesapeake Bay Program is updating its modeling and analysis tools used in the Chesapeake Bay TMDL.

Currently in development, the Phase 7 Modeling Tools will be used by the partnership to inform decisions related to nutrient and sediment reduction goals outlined in the Chesapeake Bay Watershed Agreement. Integral to this updated suite of tools is the ability to project climate change effect through 2035. The model, which will be ready for use by 2027, consists of six interrelated projects:

1. High Resolution Land Use
2. Chesapeake Assessment Scenario Tool (CAST)
3. Optimization
4. Watershed Modeling
5. Estuarine Modeling
6. Criteria Assessment



Modeling

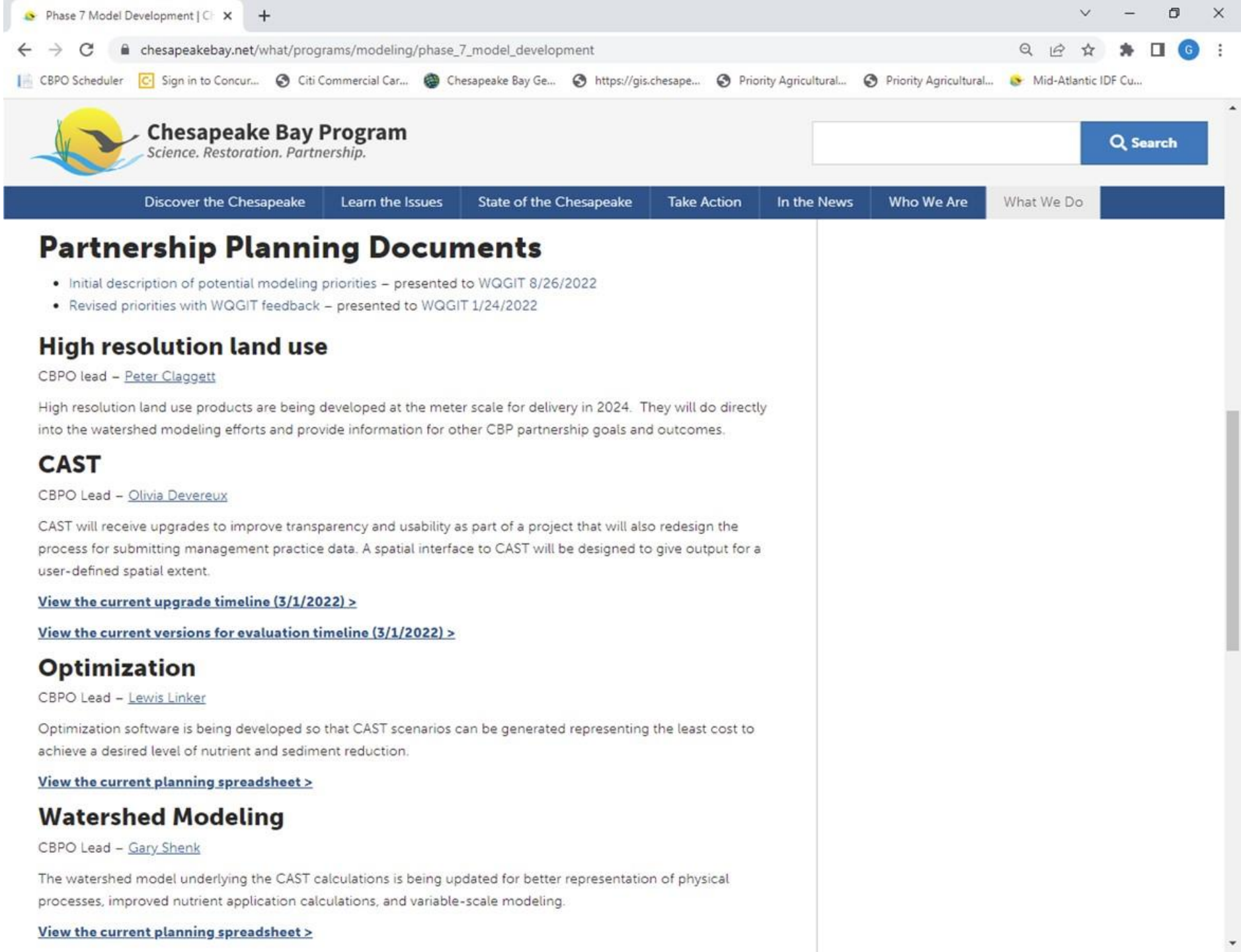
Phase 7 Model Development

Programs & Projects

- Modeling
- Monitoring
- Quality Assurance
- Resource Lands Assessment
- Chesapeake Bay TMDL
- Watershed Implementation Plans
- BMP Verification

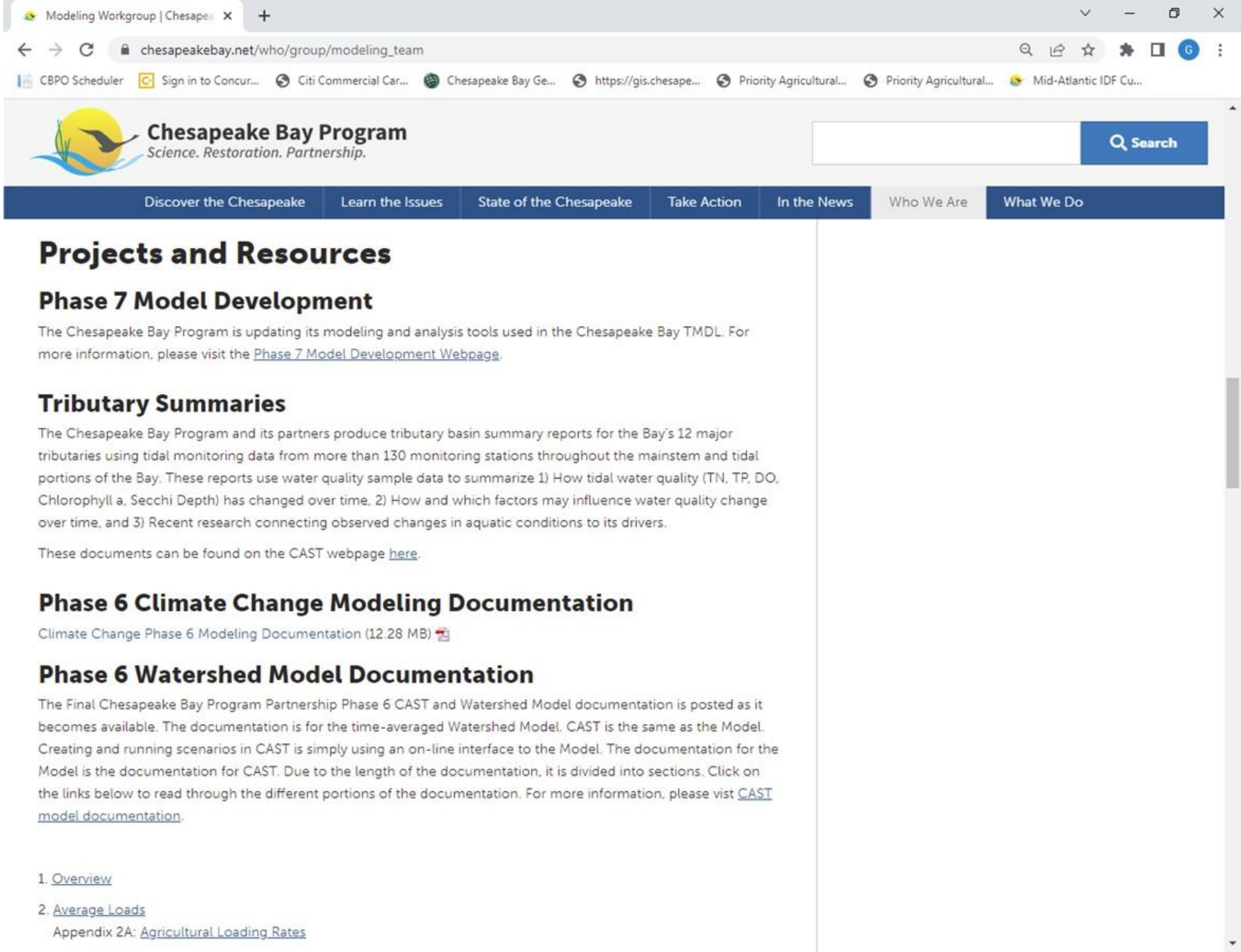
Web page

- All six projects

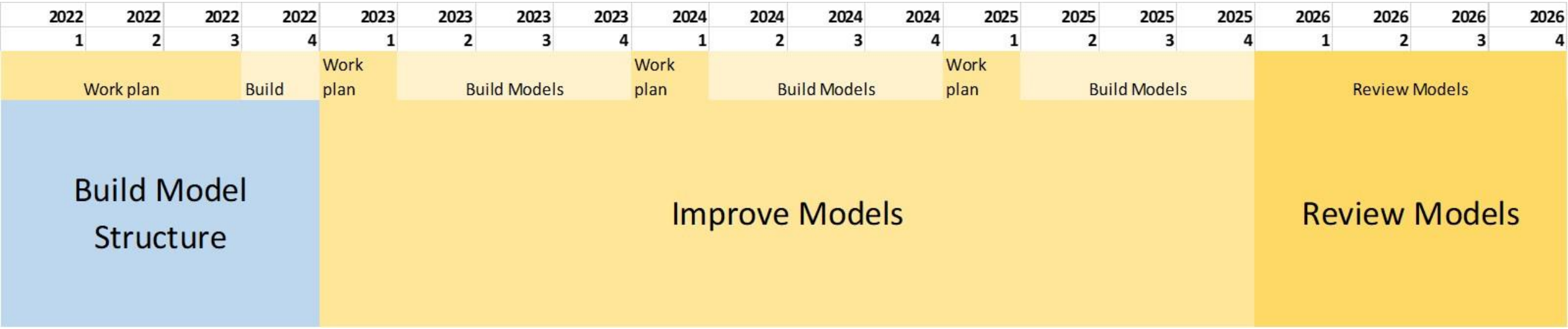


Web page

- Linked from
  - Modeling Workgroup
  - WQGIT
  - Many WQGIT WGs



Watershed Model Plan – Big Picture



Watershed Model Plan – slightly more detail

	2022	2022	2022	2022
	1	2	3	4
Phase 7 Activity	Work plan			Build
General	1 Develop CalCAST using P6 data			
	3 Determine official CBPO GIS layers			
	meteorology updates			
		35 Dynamic model for hydrology, sediment, and temperature		
		36 Dynamic model for nutrients		
Physical Process Simulation	6 Streamflow data			
	7 stream conc data			
		8 Stream load data		
Uncertainty Quantification	26 Methods			

Watershed Model Plan – A little more detail

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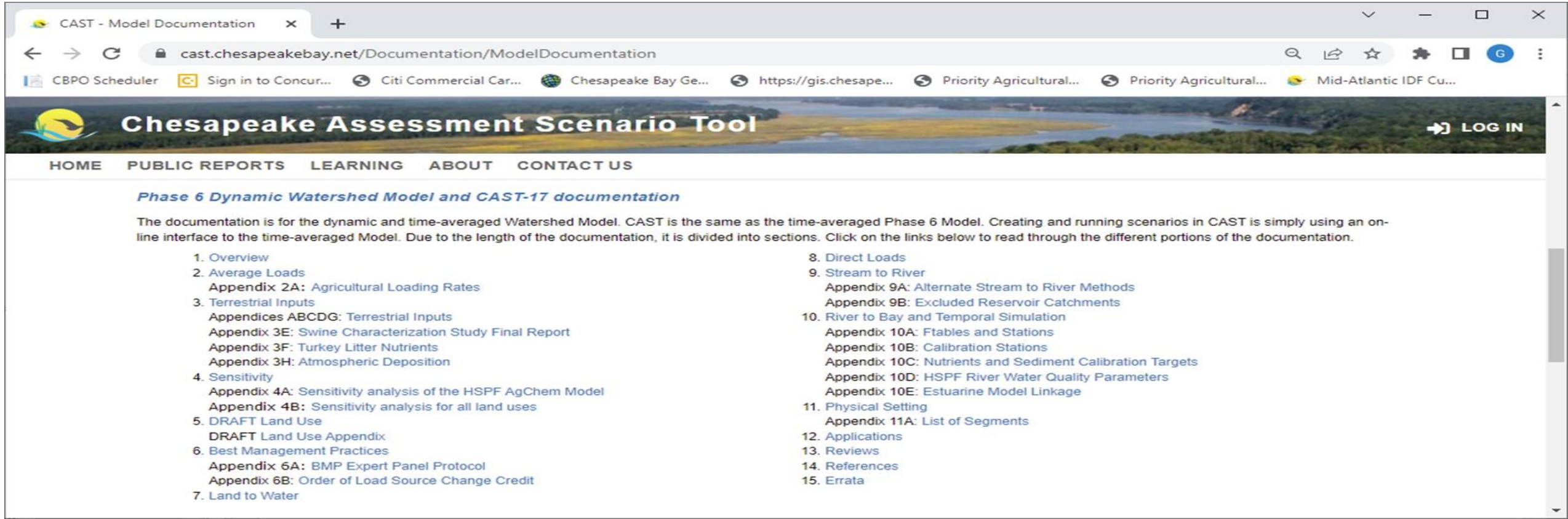
…

Watershed Model Plan – sample task

Item	4
Category	Main bay and tributary models
What: short description	physical and chemical linkage with estuarine model
Why: who asked for it or why is it necessary	Needed to run estuarine models
Who in CBPO or elsewhere will do the work	Bhatt
Where in the CBP organizational chart do the decisions lie	MWG
When does this need to be done, including general dependencies and development time	late 2022. Need to determine form of dynamic model first for the variable description.
How: A very short description with a link to the longer documentation	Section 2 of P7 documentation. Indentify set of terminal segments. Identify estuarine cell for each terminal segment. Compare old ICM variables with new ICM variables. Do new WSM variables match up?

Full Details in Draft Documentation

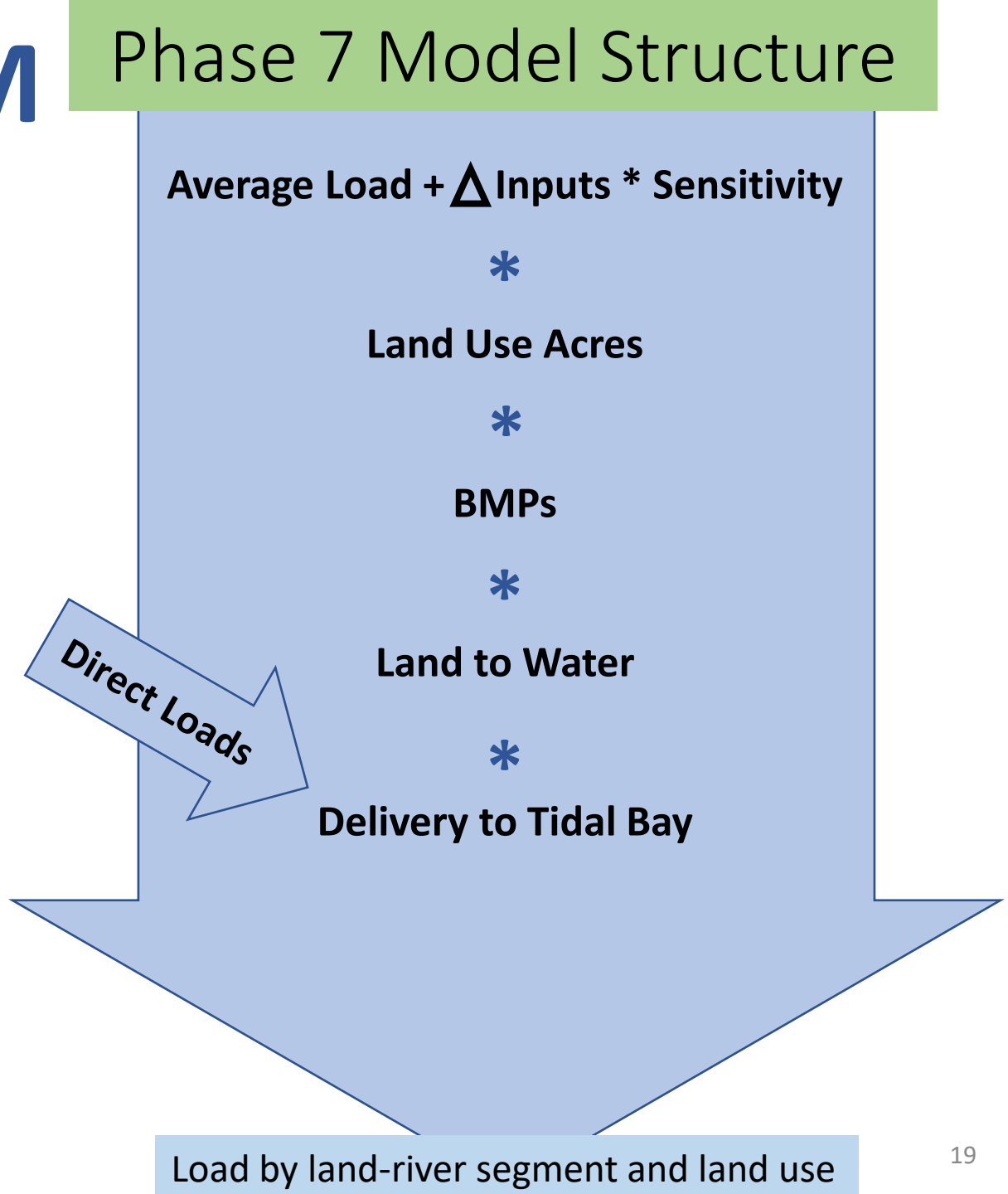
- P6 documentation being updated to P7
- Expect rolling releases as we complete sections



Cast/CalCast/DM

Phase 7
CAST

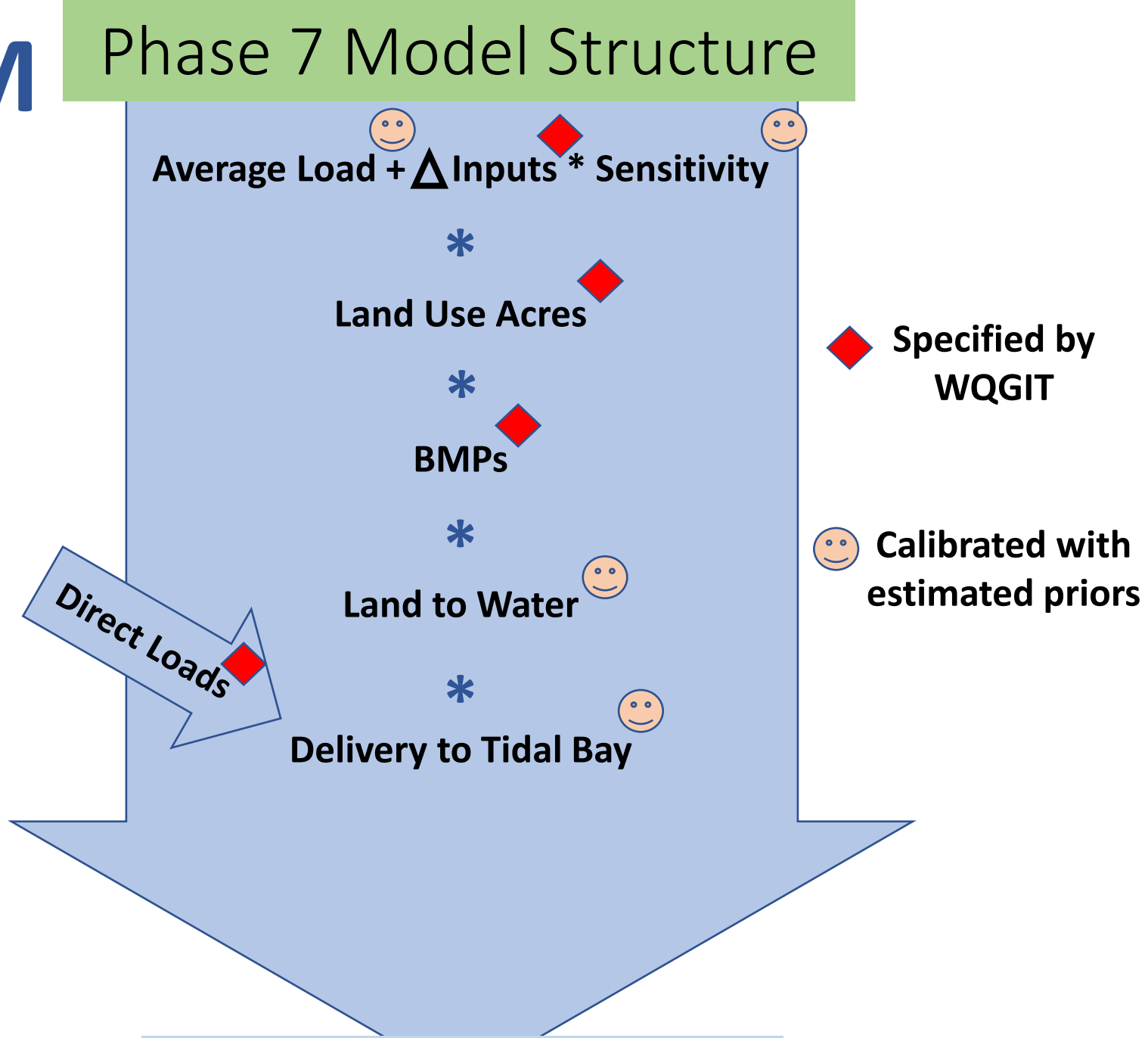
Deterministic
Scenario Tool:
1 set of loads for 1
set of inputs



Cast/CalCast/DM

Phase 7
CalCAST

Tool for finding parameters that best match observations

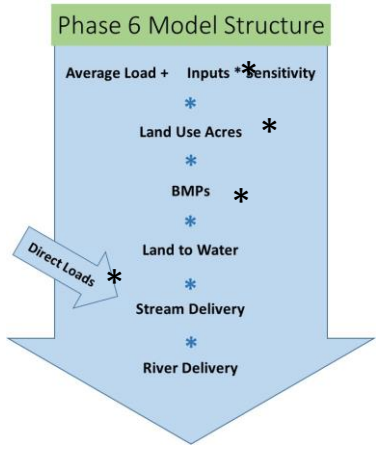


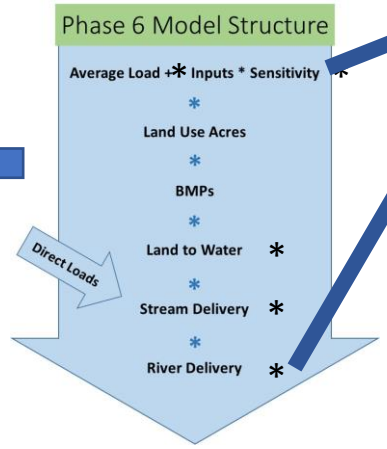
CBP **Phase 7** Model – Calibration Mode

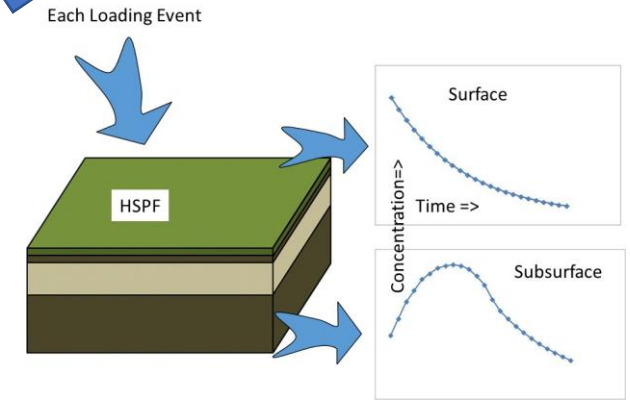
CAST7

CalCAST7

Dynamic Model7



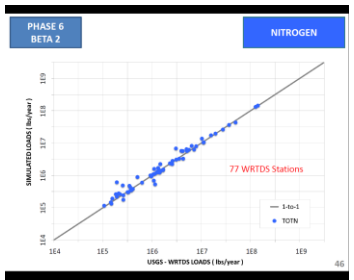




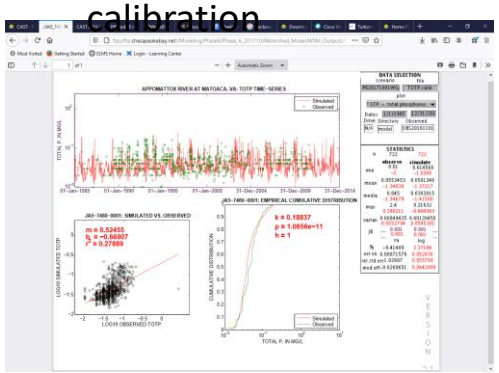
CAST determines CBP official scenario loads

Calibration of meta-parameters to spatial loads

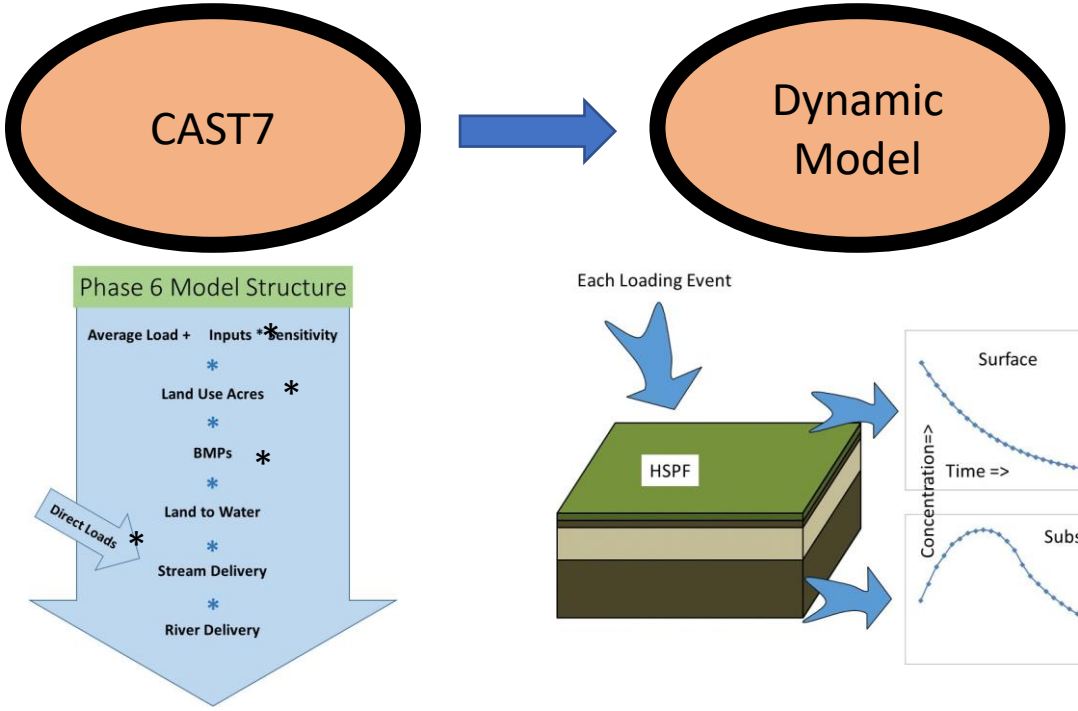
Temporal calibration



Potential feedback



CBP **Phase 7** Model – Scenario Mode



CAST determines CBP official scenario loads

CAST loads are temporally disaggregated for estuarine model

Summary and next steps

- Expect updates on development of the structure this year
- Expect improvements in inputs and calibration through 2025
- Expect documentation as tasks are complete

10:40 Progress in Phase 7 WSM Development – Gopal Bhatt, Penn State
Gopal will describe progress in development of the Phase 7 Dynamic Model and Phase 7 CAST models.

11:00 Discussion of Phase 7 WSM Development Progress

11:10 Structure and Development of CalCAST – Isabella Bertani, UMCES
Isabella will describe the role and overall structure of the CalCAST simulation and the progress being made in its development. CalCAST is a relatively parsimonious modeling tool that is being developed to test predictors and spatially calibrate parameters that will ultimately inform prediction of flow and loads at monitoring stations throughout the watershed. Isabella will provide an overview of initial steps taken to implement CalCAST in a Bayesian calibration framework and get feedback on potential next steps, including initial thoughts on future GIS and land-use data needs.

11:30 Discussion of CalCAST development