

## August 29 PSC Action & Decision #3: Narrative Overview & Purpose

- **Decision:** The partnership will **update the process for incorporating data into CAST to include additional safeguards to prevent data analysis errors and to assess reasonability of modeling results after CBP protocols are applied**. [underline added]
- **Action:** The Management Board will determine the appropriate existing GIT and/or workgroup, to develop proposed solutions including additional safeguards to prevent data analysis errors and to assess reasonability of modeling results after CBP protocols are applied **WQGIT → WTWG, STAR, STAC and other WG's as needed**
- **Broke Charge into two parts: PRE (Track 1) and POST data processing (Track 2)**
  - **Pre/Track 1:** Safeguards and protocols to prevent and protect against data input errors
  - **Post/Track 2:** A process/protocols to assess reasonability of results ("after protocols are applied" means "when we see results")

- **Divide the PSC Decision 3 Charge into 2 main objectives- Track 1 and Track 2**
- Timeline for Completion: **WTWG- June 2023** → WQGIT→MB September 2023

Track 1:	Track 2
Inventory of CBP QA/QC documentation and QA/QC processes	Identify and define key evaluative terms
Identify/assess areas of weakness in documentation for key inputs	Identify appropriate groups to develop parameters
Identify appropriate groups to address weaknesses	Develop parameters for determining validity of results
Develop additional QA/QC protocols	
Approval by WTWG- June 23→ WQGIT	Approval by WTWG- June 23→ WQGIT

# Track 1 recap and proposed actions:

**Timeline for Completion:** WTWG- June 2023 → WQGIT→MB September 2023

- **Feb-March: Track 1 discussion and QA/QC inventory**, protocols/documentation review and assessment
- **March: Menti-meter Poll Track 1**, set intention to vote on whether to pursue Track 1 at the April meeting
- **April: Held a vote (Consensus Continuum) for a Decision on Track 1 only- Phase 6 only**  
*The WTWG confirms that the existing Chesapeake Bay Program QA/QC documentation and processes for **the Phase 6 model inputs**, reviewed by the group Feb – March 2023, provide sufficient safeguards in response to PSC Decision #3. Formal recommendations to the WQGIT on additional QA/QC protocols or documentation for Phase 6 model inputs are not needed at this time.-*
- **May: Confirm decision on Track 1- Approved**  
-Consider inclusion of Track 1 review within Phase 6 CAST Update Review Process
- **June:** Send recommendations to WQGIT for consideration

**Track 1 Decision Results:**

*Comments on Track 1 Decision*

- QA/QC is constantly evolving, checks for errors/needed revisions for data inputs should be ongoing or at least periodic
- Example: frequent changes to land use data collection methods and processes should require frequent review of QA processes, protocols and documentation
- **Suggestion:** Incorporate this into our Track 2 approach- set up a check in our Phase 6 CAST Updates Review timeline to maintain confidence in our QA/QC documentation processes

Role	Name	Affiliation	Vote
Signatory Members	Alicia Ritzenthaler	DC	Endorse
	Chris Brosch	DE	Stand Aside
	Greg Sandi	MD	Agree w/ Reservations
	Cassie Davis	NY	Endorse
	Scott Heidel	PA	Endorse
	Bill Keeling	VA	Stand Aside
	Alana Hartman	WV	Endorse
	Jeff Sweeney	EPA	Endorse
At-Large Members	Norm Goulet	NVRC	Agree w/ Reservations
	Angela Jones	DoD	Stand Aside
	Jordan Baker	FTI Consulting	Nominations

## Track 2 recap and proposed actions:

- **Timeline for Completion:** WTWG- June 2023 → WQGIT → MB September 2023
- **Feb. meeting:** Defining our approach and possible steps
- **March meeting:**
  - Clarified objective Track 2
  - Discussion of steps to improve model output review process
- **April meeting:**
  - Presented a revised Draft Phase 6 CAST Updates Review timeline – reviewed & discussed the differences, need for review with consistent data and most current Progress year data
  - Discussion need to require that persisting perceived anomalies or contentions of unreasonable outputs be scientifically validated
- **May Meeting goals:**
  - Additional comments/input on the Draft Updates Diagram- prepare to approve recommendations in June
  - Additional comments/input on scientific validated of anomalies- prepare to approve recommendations in June
- **June**
  - **Final review and agreement on recommendations to provide the WQGIT**

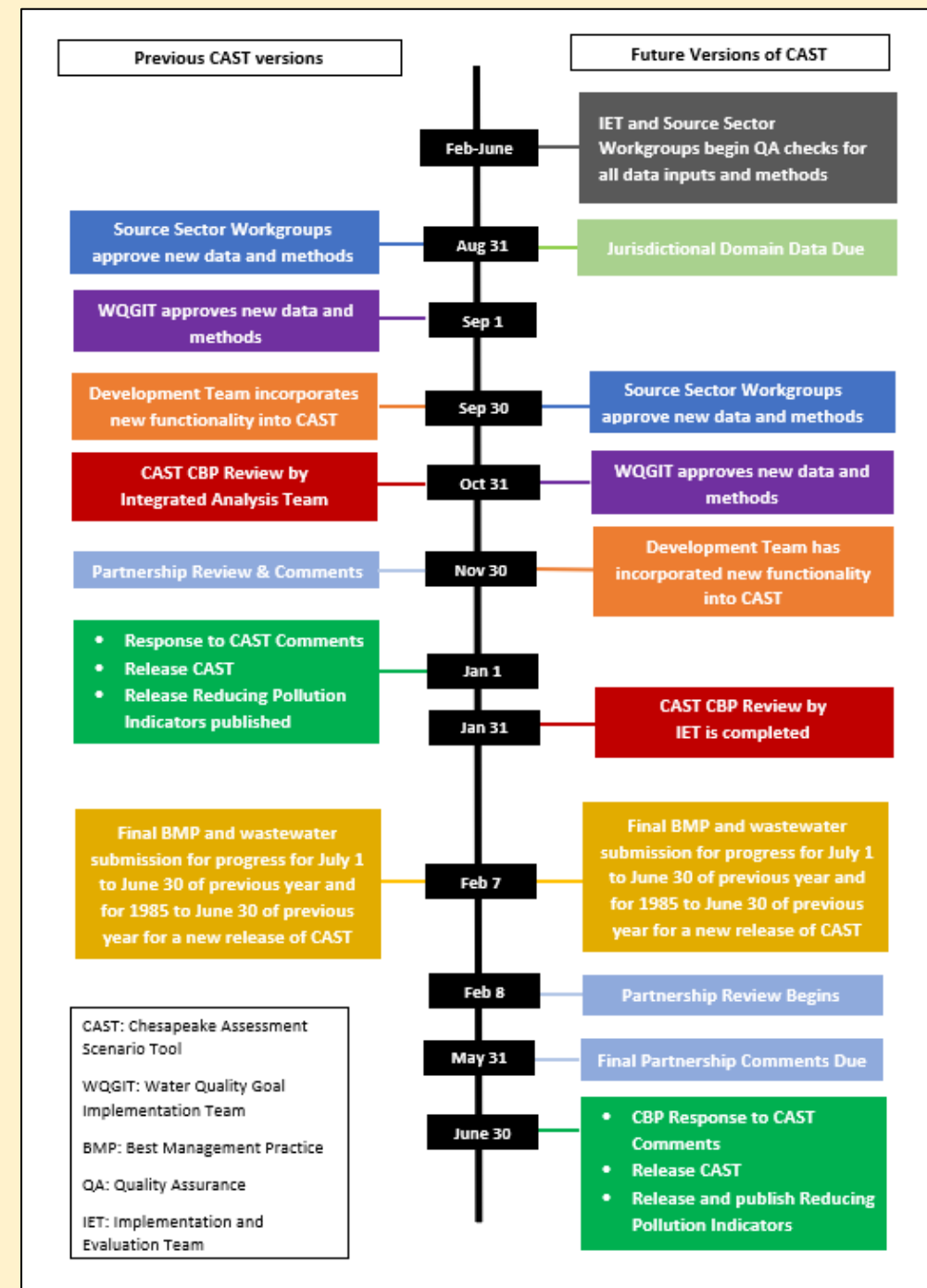
## Track 2: Draft Phase 6 CAST Review Process Diagram- outlines a QA/QC procedure that ensures resolution for Scenario 3

### Process addresses perceived anomalies in a timely and consistent fashion

- Begins with data review/quality assurance protocols
- Data incorporation and CBP review
- Jurisdictional review and informal exchanges with IET
- Final comments & response, release

### Changes:

- Emphasizes and incorporates the initial data/methods review and approval into the timeline- jurisdictions, WG's & IET
- Longer jurisdictional review period
- Adjustment to timing of the jurisdictional review



# April Comments on Review Process:

- The CBP staff now has November 1<sup>st</sup> until approximately February 1<sup>st</sup> for set up and review...If that is the case, then maybe there's some time for a CBP staff illogical review before the jurisdictional review
- There should be an “apples to apples” comparison, where a previous progress year could be looked at in the existing model versus the new model.
- During the jurisdictional review period- Feb 8<sup>th</sup> through the May 31<sup>st</sup> there is opportunity to use updated model to run newly finalized Progress year's data
- The same process of jurisdictions reaching out to the IET team with questions during their review period is still in place

## Track 2: Additional Consideration

**Continuing Discussion:** The need to require that persisting perceived anomalies or contentions of unreasonable outputs be scientifically validated.

**Example:** WV mathematically demonstrated the anomalous nature of their urban fertilizer data with comparison to historical data records



# April Discussion Summary: Scientific validation of anomalies

- Anomalies need to be scientifically supported to some degree; show that the result is not representative of real change that has occurred from the previous model version
- Contender should illustrate why results are illogical- the partnership would have to confirm/agree
- Series of steps that lead to effective, timely resolution
- Recourse if resolution does not occur-
  - For example, if error can't be fixed within a reasonable time frame; revert to previous model data and methods
- Resolution of issues/problems should not be ignored or sacrificed to meet due dates or timelines
- Continued discussion and next steps....

# STOP

- Additional Reference slides from Feb.-April meetings follow

# Reference Slides: February Meeting Input Summary:

## Track 1:

- Every model input should be held to the same standard for QA and documentation (QAPP for BMP reporting is the standard).
- Part of the JamBoard seemed like there wasn't a good understanding of what QAPP and QA/QC documents were available. Part of track 1 would be reviewing them and making them readily available on the CAST website or something so everyone is aware and can access these protocols.
- I thought Decision 3 only focused on Track 2.
- Don't think technical WGs should be reviewing this. Do we have the authority to change any of this?
- WTWG won't have an active oversight role on these things. Track 1 is more about documenting where these QA/QC efforts already exist - for example, there have already been efforts to improve these processes since November of 2021. Going through this with the WG will improve our transparency and accountability. And will clear things up so partners know where to go if they have questions.
- Will land use and land cover updates be part of the items that would be inventoried? Review process for LUWG is so extensive. Time commitment of workgroup members should be considered.

## Track 2:

- Suggestion to include a reconsideration of the timeline for CAST updates... we need a time period to incorporate the step of seeing if model results make sense.

# February Meeting Input Summary:

## **QA/QC is done by EPA and EPA contractors + partners, stakeholders, etc.**

- It is done by both in-house staff and, more importantly, review of inputs, outputs, findings, etc. by stakeholders-typically through asks for review at the workgroup level.

**For example:** the AgWG is asked to review all findings from analyses of the data from the Census of Agriculture. CBP office provides data from the Census of Agriculture to any stakeholder who asks – from raw data to processed data.

- In addition, there are formal reviews of all model data for each Phase of the model + formal reviews by STAC or other independent groups.

## Track 2: Taking a step back to define possible output scenarios

### Scenario 1: Adopted methods produce unexpected “illogical” results

- **Example:** urban phosphorus fertilizer tonnage in WV, CAST-21 update
- **Synopsis:** Adopted methods and data were shown to allow large shifts (outliers)
- **Review of 2016 input data** for WV CBW counties revealed errors in data reported to AAPFCO (several times larger than statewide average)
- **Review of process-** revealed data was being skewed by outliers, adjustment of technical methods at relevant workgroup in a timely manner to better address outliers in data for all jurisdictions
- **Needed now:** standardized sense of how to incorporate this process within CAST review timeline

## Track 2: Taking a step back to define possible scenarios

**Scenario 2:** An error is found to have impacted model results in draft and/or previous CAST version (increased trend in fertilizer use artificially low), error correction and additional years of data show continuing trend of increased fertilizer use

- **Example:** 2016 farm fertilizer data from CAST-19→CAST-21 update
- **Synopsis:** Jurisdictions contend that modelled ag fertilizer applications are inaccurately representing “real world conditions”
- **Errors** in 2015-2016 data reporting and processing methods not produced
  - Farm fertilizer data: there’s no evidence that there are errors in the 2015-2016 data reported to AAPFCO
  - Short-term Process: Jurisdictions did not substantiate their claims that results using partnership-approved methods did not accurately represent “real world conditions”
  - Long-term Process: Ag Modeling Team/Fertilizer Team investigate existence of better data sources and processing methods
- **Needed now:** standardized sense of how to address this in a reasonable timeframe

# Track 2: Taking a step back to define possible scenarios

## Example Scenario 1: Adopted methods produce unexpected “illogical” results

- Example: non-farm phosphorus in WV, CAST-21 update
- Synopsis: Data reported for WV to AAPFCO had errors, adopted methods and data were shown to be susceptible to large shifts (outliers)
- Prior solve: [in process] data correction, adjusting technical methods at the relevant workgroup in a timely manner
- Needed now: standardized sense of how to incorporate this process within CAST review timeline

## Example Scenario 2: A process error is found to have impacted model results in draft and/or previous CAST version, no data errors found, unexpected results

- Example: 2016 farm fertilizer data from CAST-19→CAST-21 update
- **Synopsis:** Error correction and additional data years show more drastic increasing fertilizer use trend
- **Errors** in 2015-2016 data reporting and processing methods not produced
- Prior solve: [in process] AMT/FT
- Needed now: standardized sense of how to address this in a reasonable timeframe

## Scenario 3: Disagreement with [x]

- Example: Disagreement with [x]
- Synopsis: Various instances where results are questioned or certain aspects/inputs/methods are questioned, usually based on anecdotal information
- Prior solve: We have previously identified methods or datasets that could be improved and formulate plans to address in future versions of CAST
- Needed now: general parameters to distinguish from other scenarios(?), particularly scenario 1 : when is something unexpected and illogical vs reasonably expected imperfect model results for [x]

## Track 2: Defining the scenario

### Scenario 3: Disagreement with [x]

- **Example:** Contention of unreasonable outputs during draft Model review
- **Synopsis:** Various instances where **results** are questioned or certain inputs/methods are questioned, may or may not be based on anecdotal information
- **Prior solve:** We have previously identified methods or datasets that could be improved and formulate plans to address in future versions of CAST
- **Needed now:** general parameters to differentiate when something is unexpected and illogical vs reasonably expected imperfect model results
- **To allow updated Model version to proceed concurrent with agreed upon future collaborative investigations for [x]**



## Track 2 Purpose:

- Address the contention of unreasonable outputs [x] during draft Model review
- Model results should be evaluated scientifically, consistently and in a timely manner for errors beyond the use of anecdotal evidence
- Need general parameters to differentiate when something is unexpected and illogical vs reasonably expected imperfect model results
- To allow updated Model version to proceed concurrent with agreed upon future collaborative investigations for [x]

## WTWG Input- March Meeting

- Need to incorporate these review protocols into the formal updated CAST model review process
- Jurisdictions need more time to review updated model version results for illogical/faulty results