4D: Overview of current work

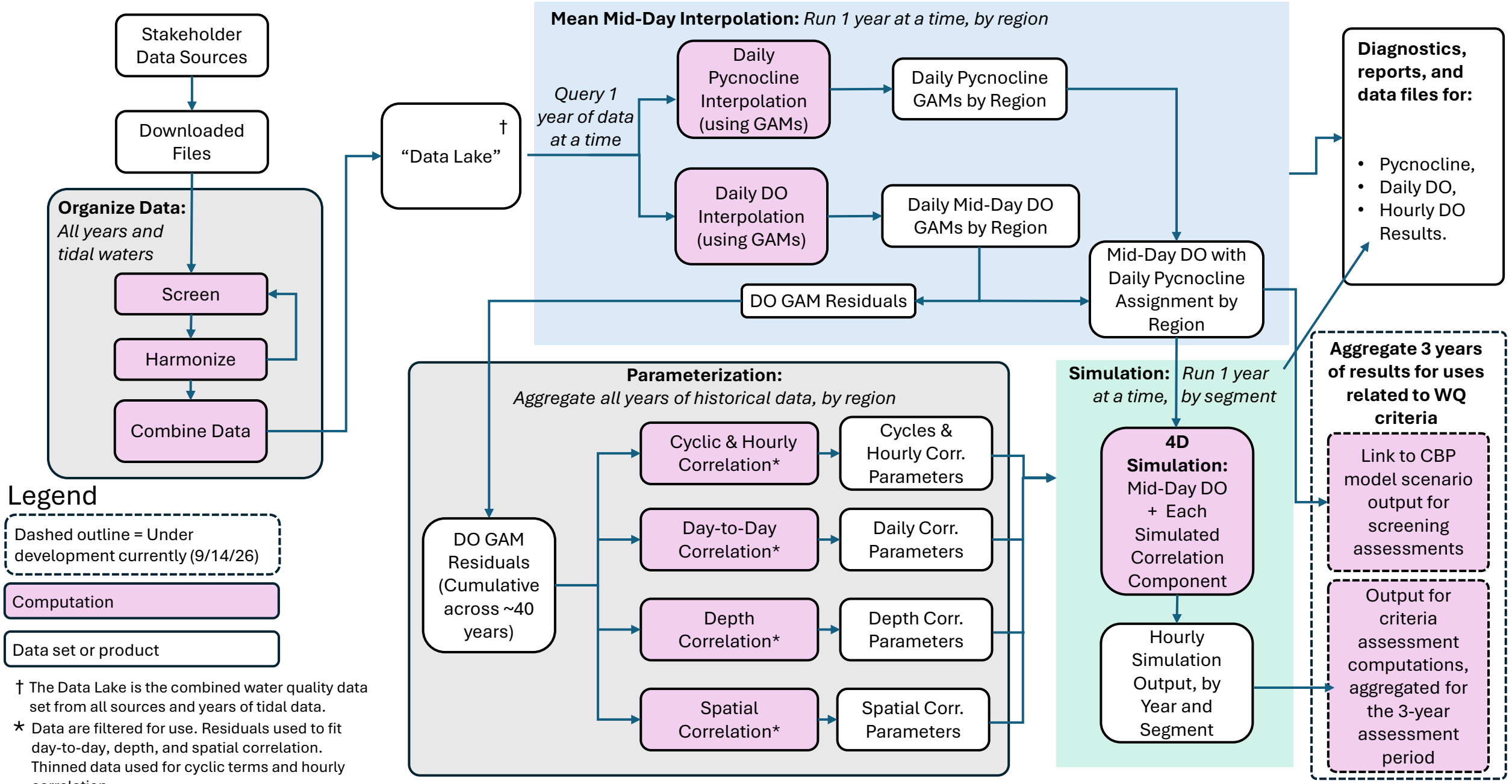
Bay Oxygen Research Group

Sept. 21, 2026

Rebecca Murphy (UMCES/CBP) for development team:

Jon Harcum (Tetra Tech), Elgin Perry (statistics consultant),
Peter Tango (USGS)

4-D Interpolator Workflow (v9-14-26)



Legend

Dashed outline = Under development currently (9/14/26)

Computation

Data set or product

† The Data Lake is the combined water quality data set from all sources and years of tidal data.

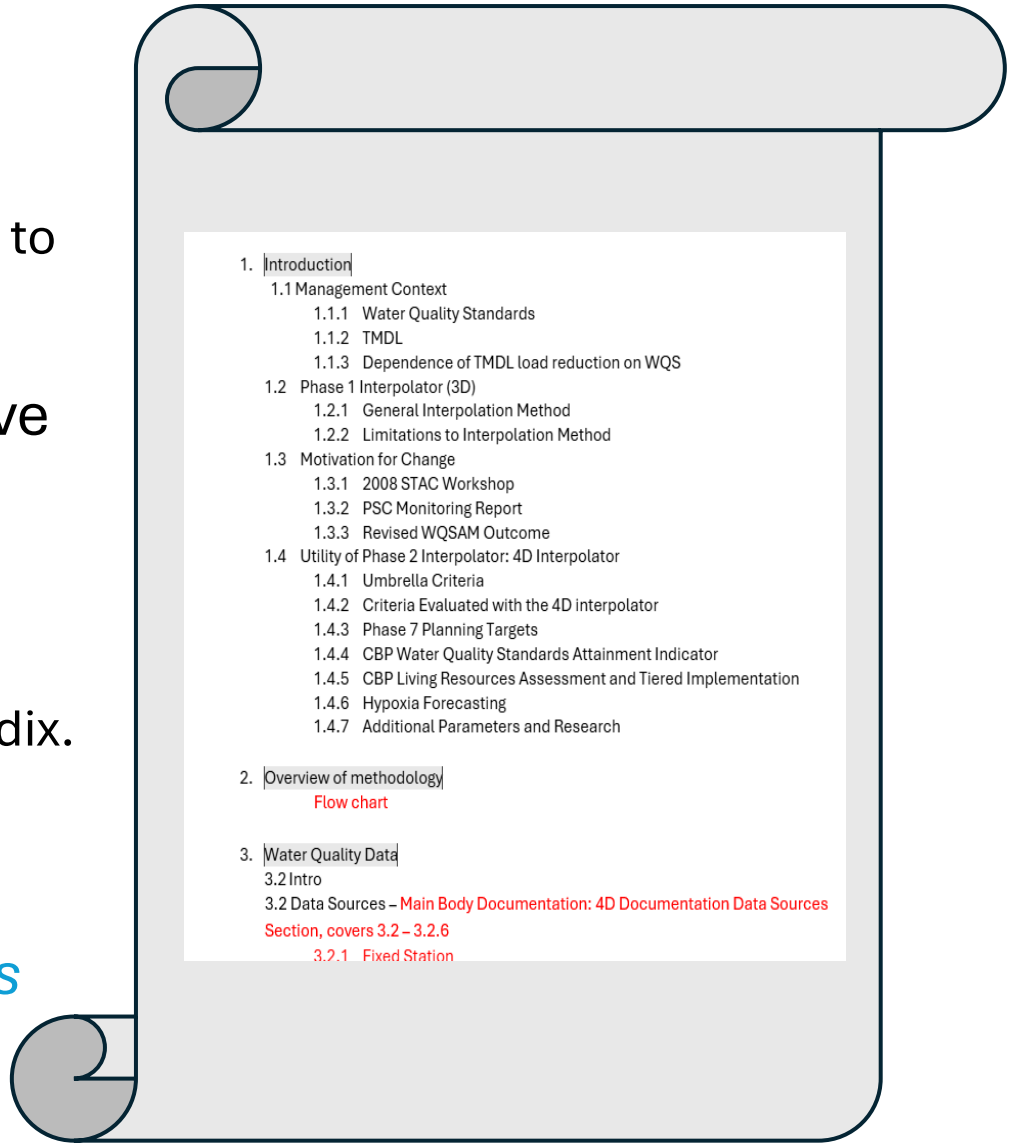
* Data are filtered for use. Residuals used to fit day-to-day, depth, and spatial correlation. Thinned data used for cyclic terms and hourly correlation.

Current work

- Documentation
- Continued review of 4D interpolation results
- Conversations with CAP leadership and module creation for CFD analysis
  - Including salinity & temperature interpolation methods
- Conversations on interface development

Documentation

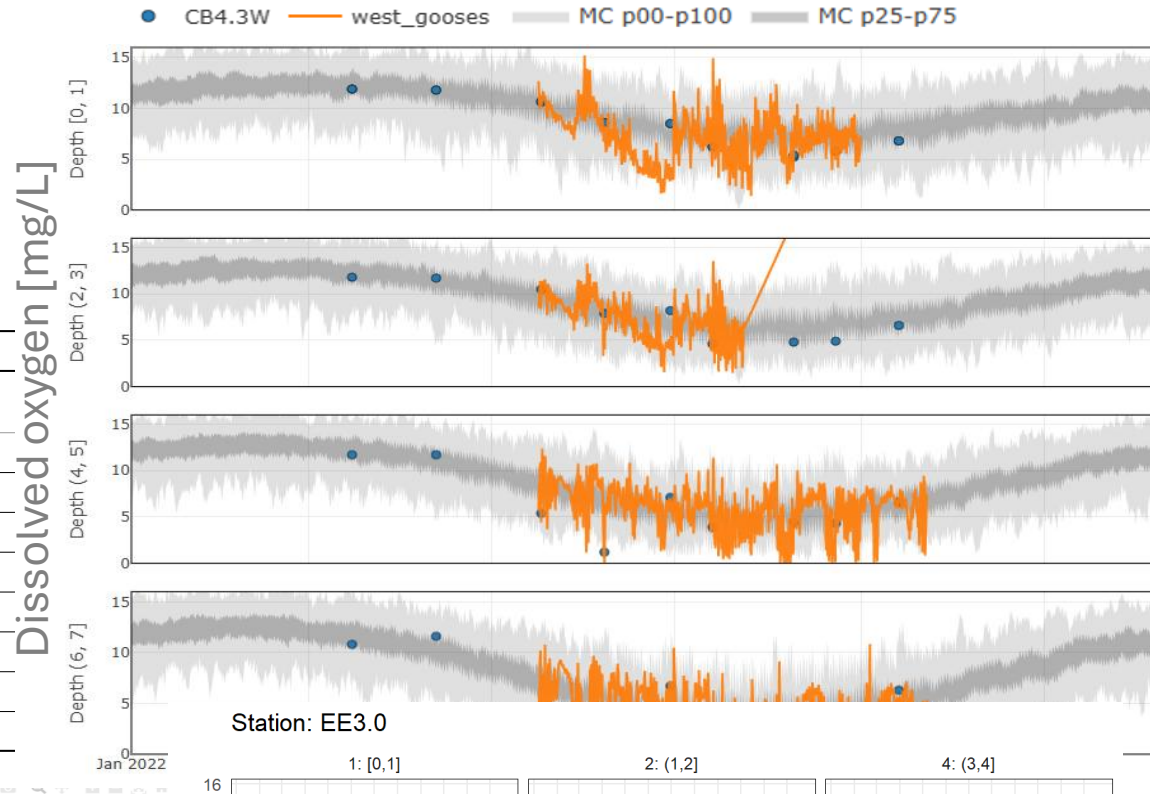
- Deadline is early Nov. for submittal to STAC.
  - A few preliminary meetings with STAC have occurred to help set up questions and review panel.
  - STAC review is scheduled for Nov.-Feb.
- Multiple sections and technical appendices have been shared with state teams.
- Newest drafts for review (as of today):
  - Revised outline,
  - Cyclic and hourly methods appendix,
  - Multi-Dimensional AR(1) Simulation methods appendix.
  - Fitting GAMs for mean mid-day appendix, and
  - Generating 4D dissolved oxygen concentrations.
- *The BORG development team needs to commit much of Oct. to writing and editing. This process allows for results review as well.*

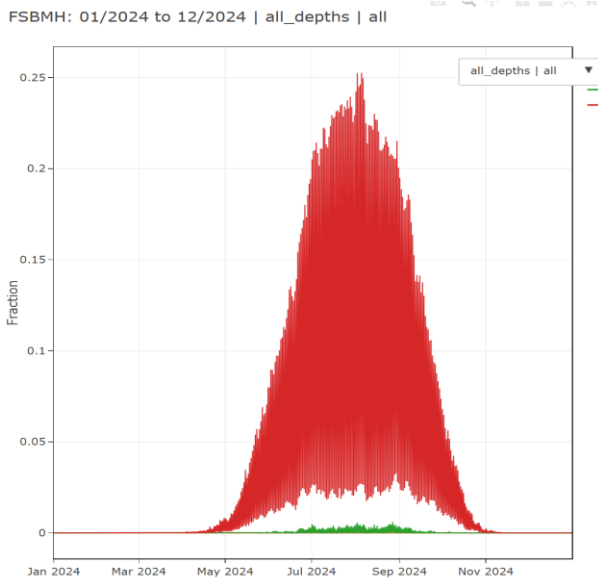


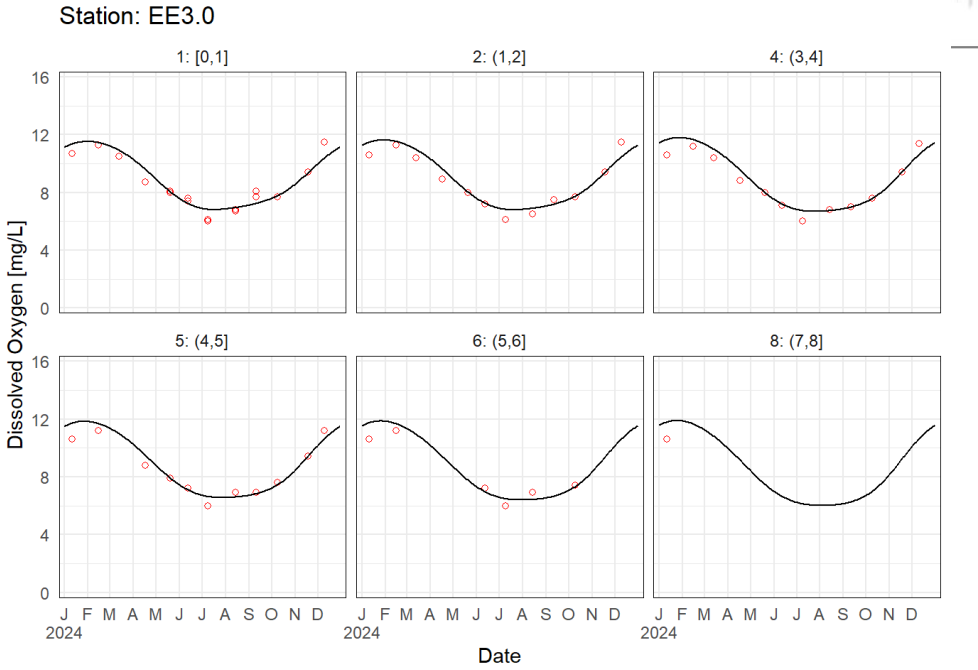
Continued review of 4D interpolation results

- As presented previously, we generate diagnostic results at multiple stages of the interpolation to compare to data.
  - Many of these will be in the documentation.
- Fishing Bay DO summary compared to data (8-17-26 meeting). Waiting for CFD module for next steps of comparing to other methods.

Period	Draft: Jun1-Sept30	
Statistic†	data: full segment	4d: full segment
Percent below 6 mg/L	65.4	62.3
Percent below 5 mg/L	47.9	49.0
Percent below 3.2 mg/L	29.9	27.7
Percent below 1.7 mg/L	19.0	13.5
Percent below 1 mg/L	16.1	7.4
Mean Conc (mg/L)	4.69	5.08
Median Conc (mg/L)	5.08	5.08
Count§	211	721,752



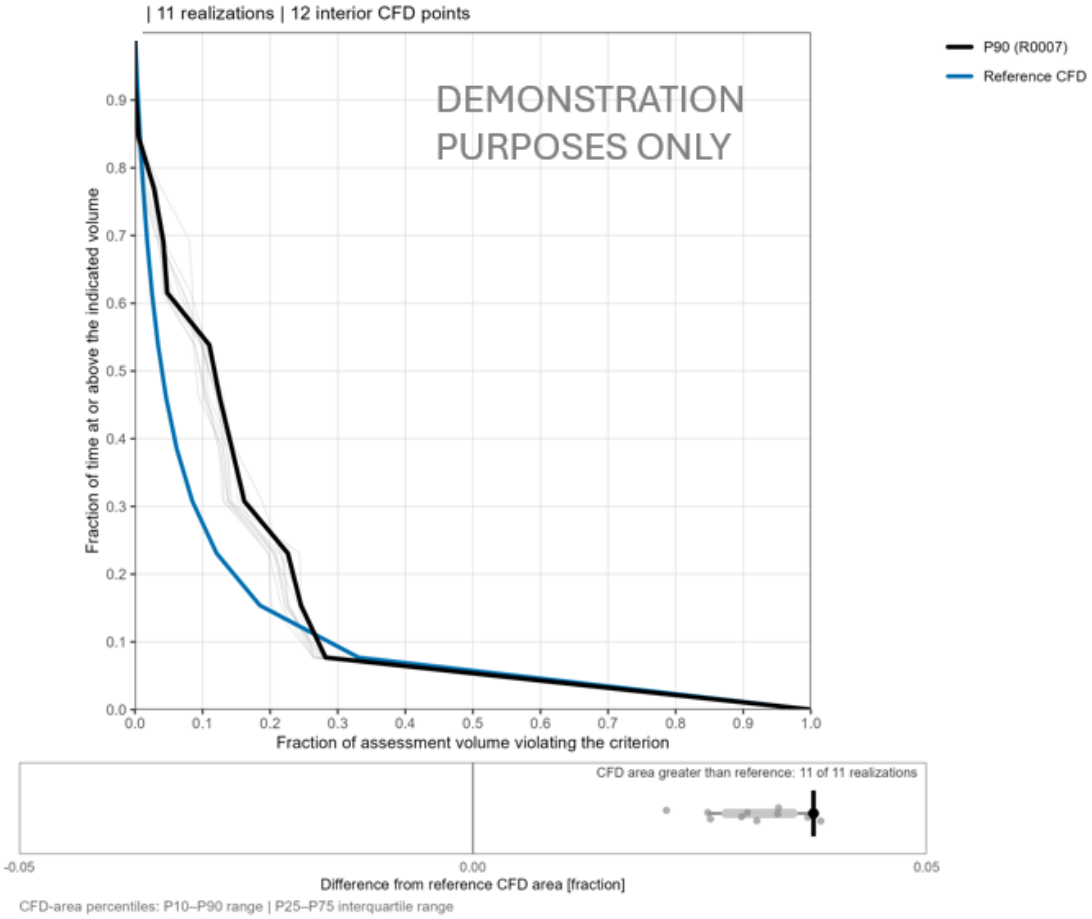




Conversations with CAP leadership and module creation for CFD analysis

- Rule set presented at CAP in July.
- Clarifications discussed between leadership teams last week.
- Draft example of a CFD with 4D simulation results created.
- Next steps:
  - Development of salinity & temperature interpolation approaches for application in some of the criteria;
  - Further consideration of salinity computation for MFSN-spring-7day;
  - Coding CFD decision rules;
  - Further examples using RPPMH and a MD segment;
  - Examine results with CAP team.

Example 11 simulations and reference CFD



Other items

- Interface development: TBD
  - Waiting to hear on funding to focus on this work through July 2027.
  - Thank you for team member's input on the workplan for this.

- Working with Phase 7 modeling team
  - Workflow development for testing model scenario-adjusted data through 4D process.