

Progress report on Phase 7 criteria assessment

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modeling team**

Modeling Quarterly Review Meeting

Annapolis, April 4, 2024

Objective

- **Progress on method development for Phase 7.**
- **Analysis based on an early test case.**
- **WIP scenario by reducing nutrient loads by the same percent across the watershed.**
- **Too early to draw any conclusion on the model.**

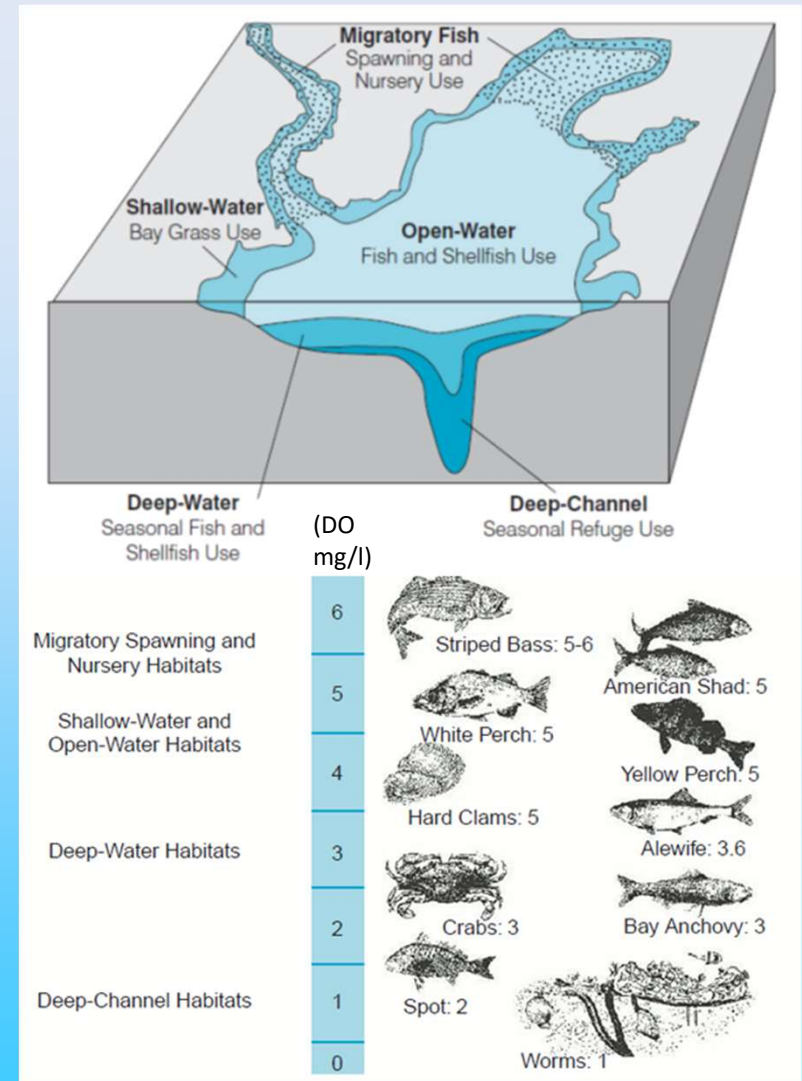
Designated Uses (DUs)

Four DO DUs:

- **DC**: deep channel,
- **DW**: deep water,
- **OW**: open water,
- **MSN**: migratory fish, spawning and nursery.

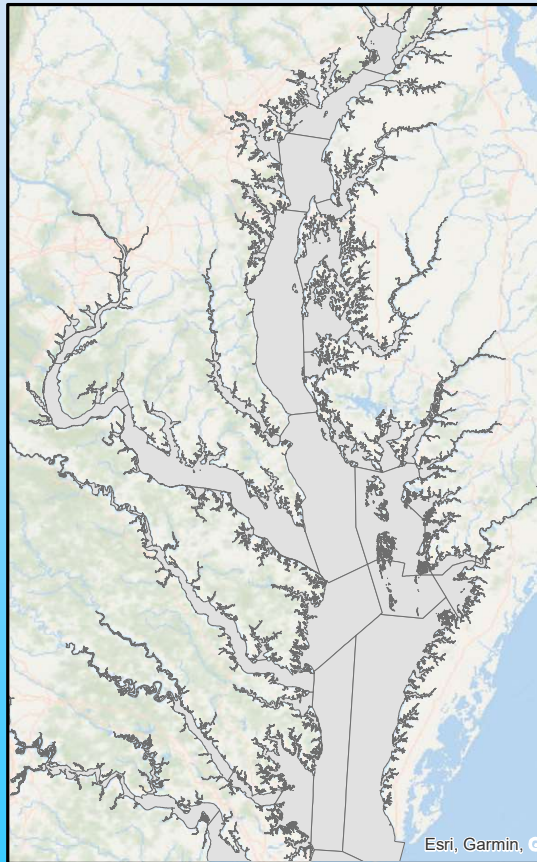
p.s.: Designated use means a use that is specified in water quality standards as a goal for a water body segment.

p.s.: Surface pycnocline: 0.1 kg/m^4 ; Bottom pycnocline: 0.2 kg/m^4

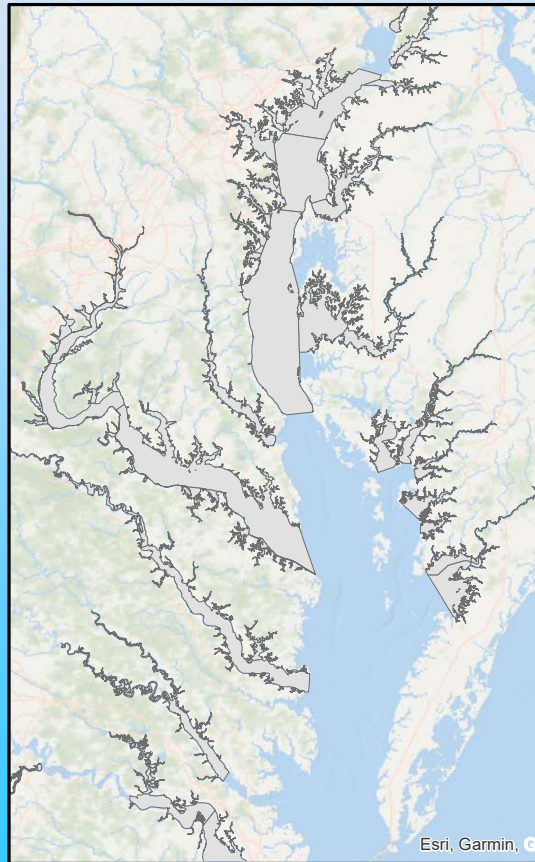


Segmentation of designated use

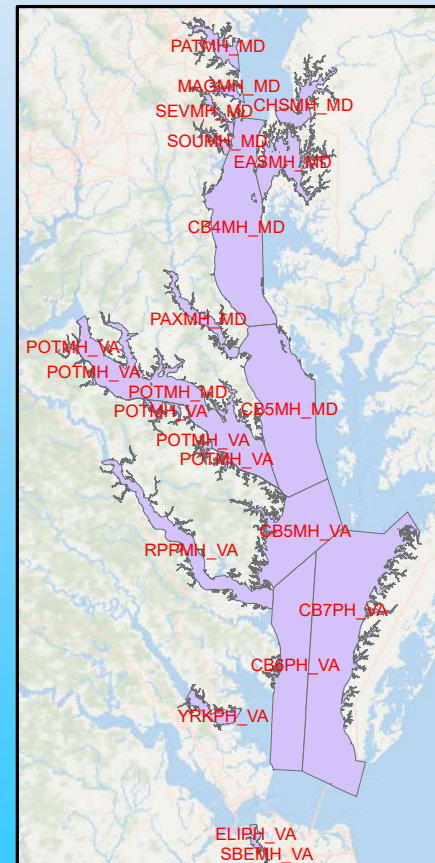
Open water (92)



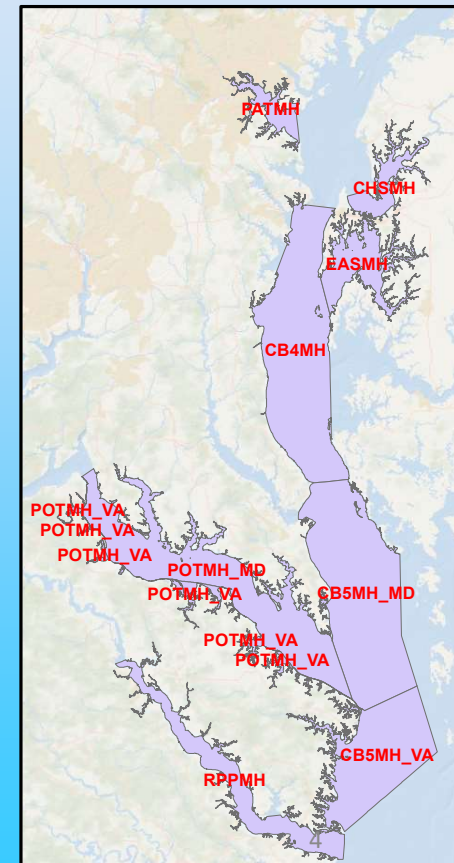
Migratory (71)



Deep water (19)

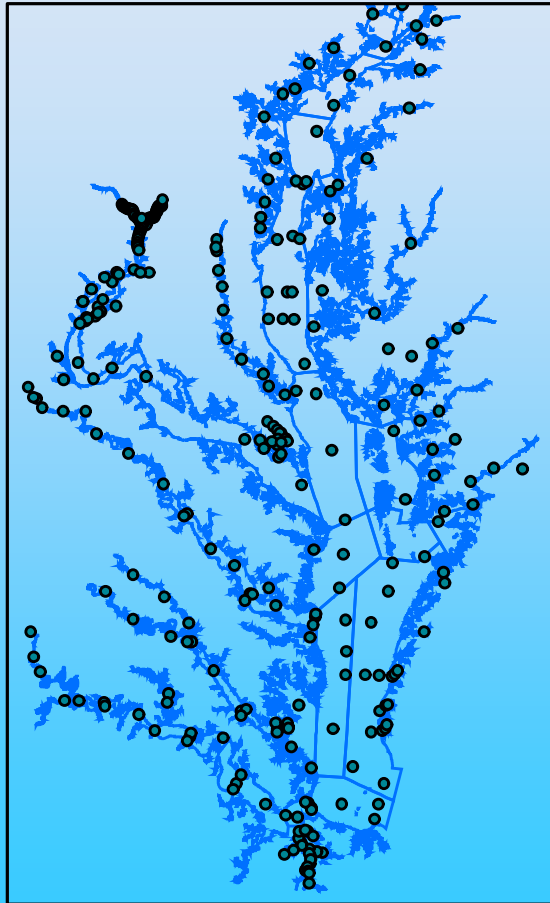


Deep Chanel (10)

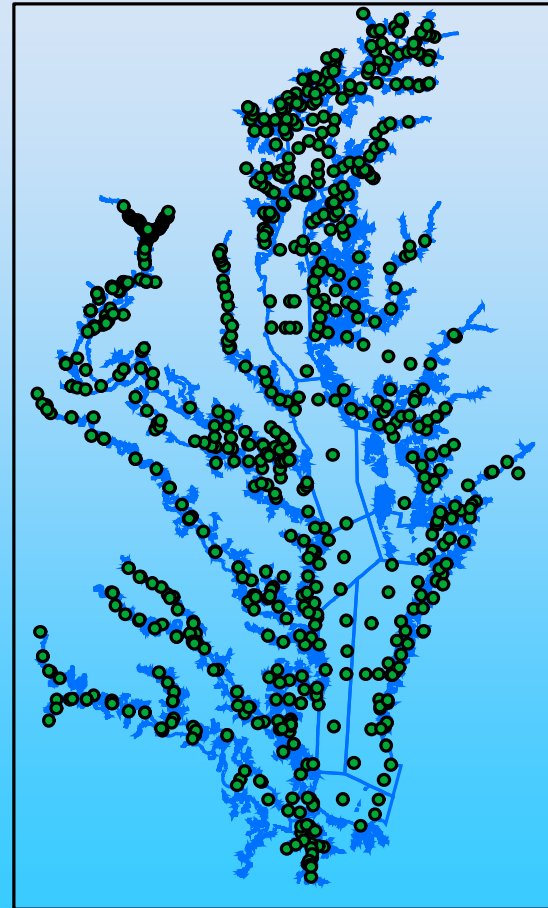


Tidal stations included in criteria assessment

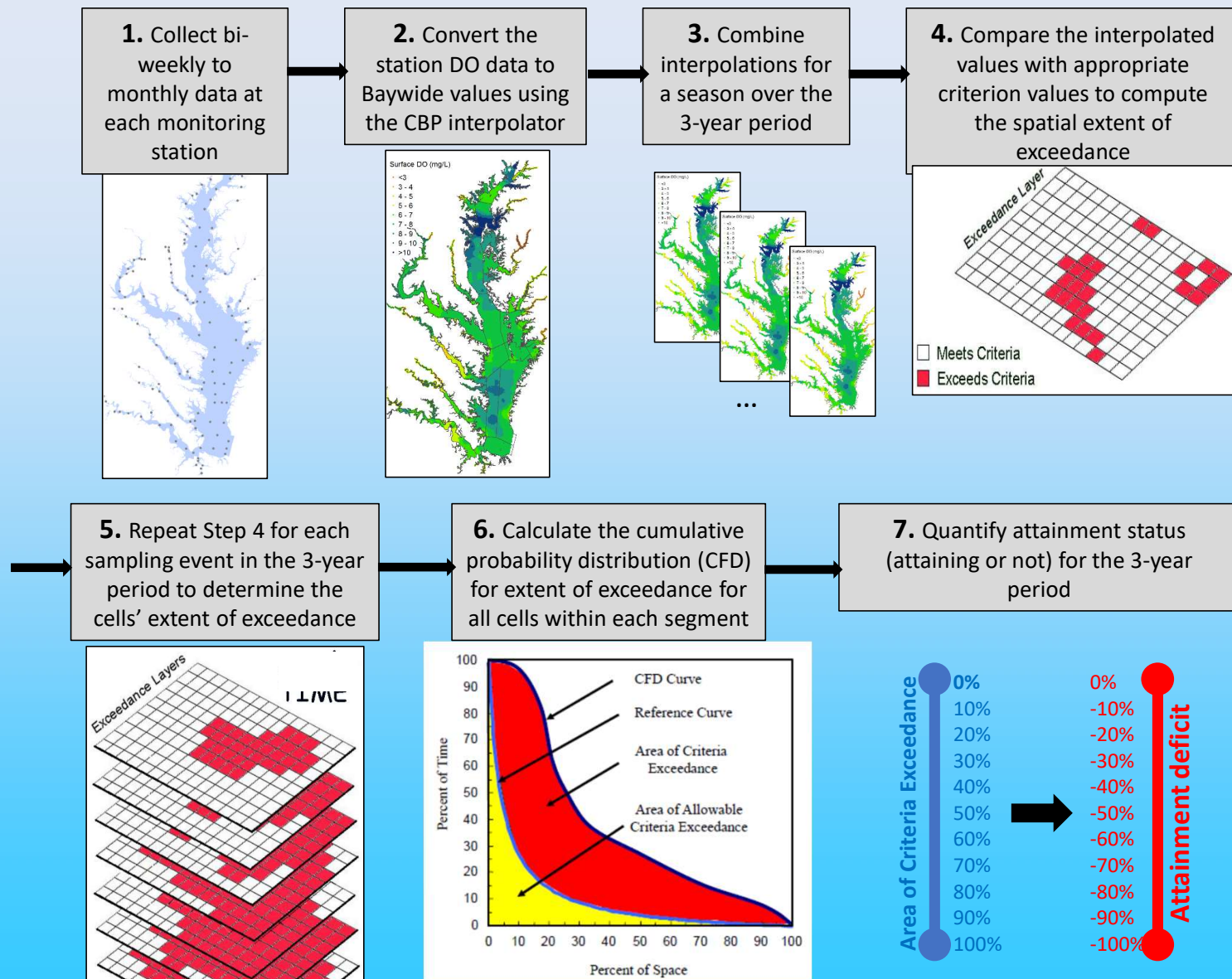
Phase 6 (304 stations)



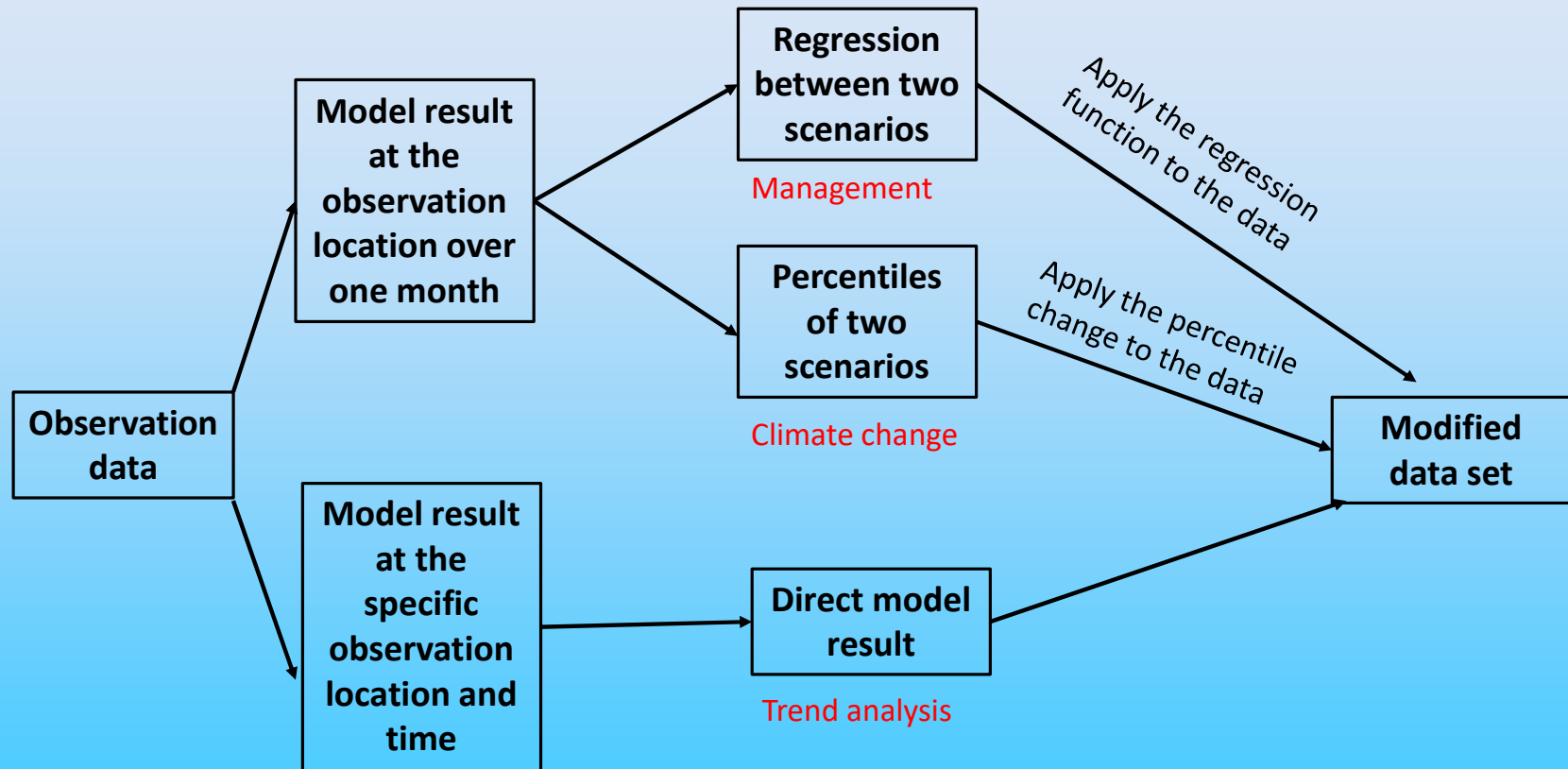
Phase 7 (763 stations)



WQS Criterion Assessment

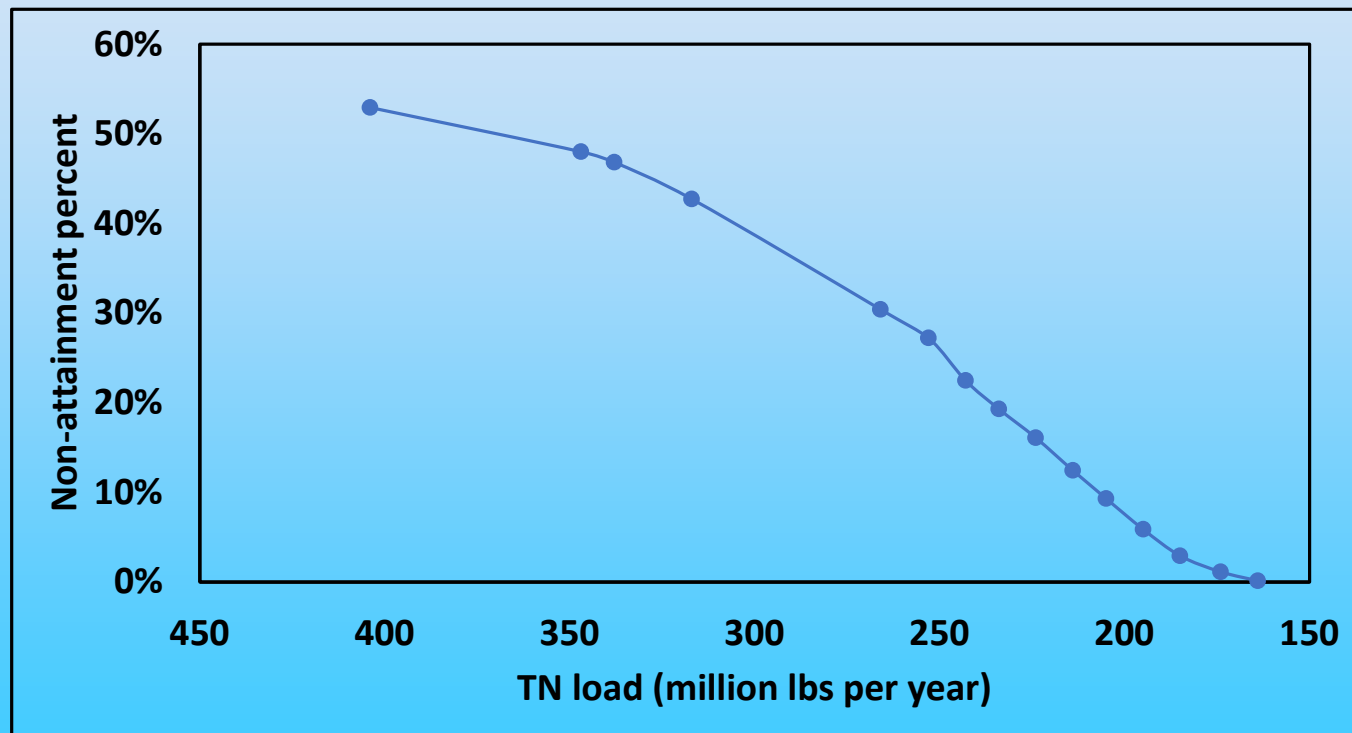


Methods to modify the data based on model scenarios



Example of Phase 6 applications

Carrying capacity determination



Example of Phase 6 applications

Deep channel No-attainment incremental under future climate change condition

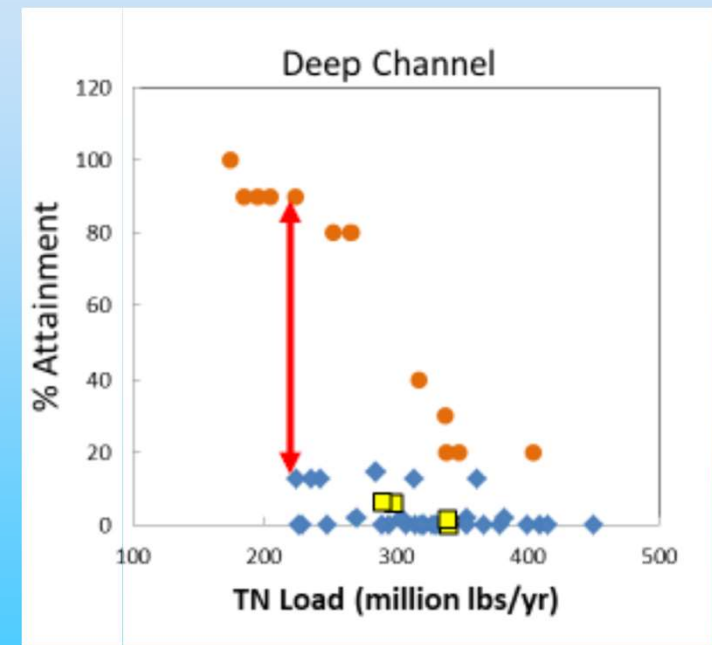
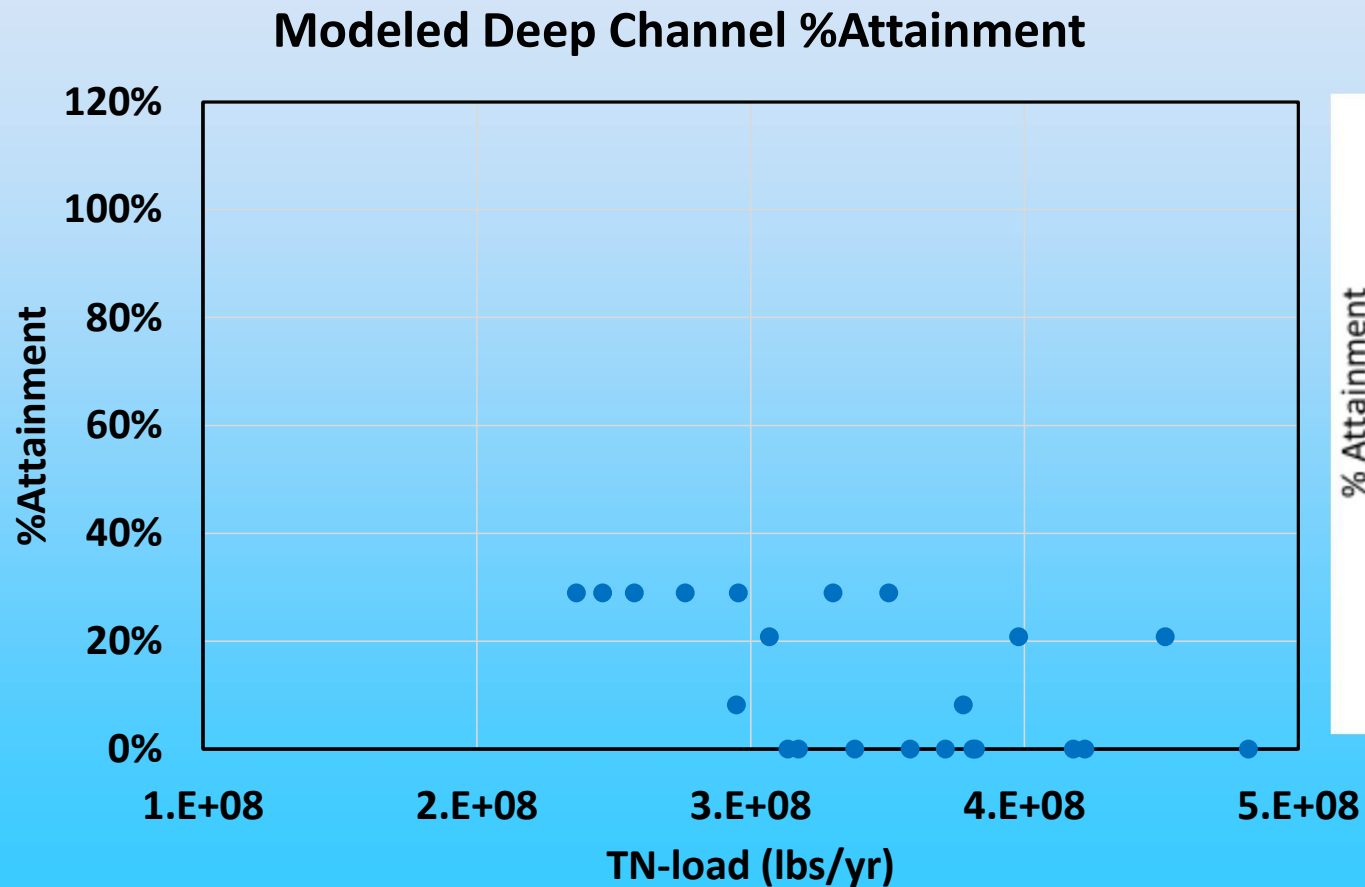
Scenario	name	PTC25L25	PTC35L25	PTC45L25	PTC55L25
Nitrogen	loading	204TN	208TN	212TN	220TN
Phosphorous	loading	14.0TP	14.6TP	15.4TP	16.7TP
SLR		0.22m	0.31m	0.42m	0.53m
Delta T _{air}		1.06°C	1.39°C	1.70°C	1.96°C
CB3MH	MD	0.00%	0.00%	0.00%	0.00%
CB4MH	MD	1.47%	3.15%	4.62%	7.31%
CB5MH_MD	MD	0.00%	0.00%	0.00%	0.00%
CB5MH_VA	VA	0.00%	0.00%	0.00%	0.00%
POTMH_MD	MD	0.00%	0.00%	0.00%	0.00%
RPPMH	VA	0.00%	0.00%	0.00%	0.00%
ELIPH	VA	0.00%	0.00%	0.00%	0.00%
CHSMH	MD	0.01%	0.92%	1.08%	2.34%
EASMH	MD	0.37%	2.03%	2.69%	3.07%

Example of Phase 6 applications-Trend analysis

Plot in **CSER** report

Orange = mode

Blue = observations



Phase 7 Deep Channel Non-attainment percent (a test case with regression method)

Cbseg	State	Calibration	CH3D_WIP	SCHISM_WIP	Direct_model
CB3MH	MD	7.17%	0.00%	0.00%	0.00%
CB4MH	MD	44.95%	5.02%	0.00%	0.00%
CB5MH_MD	MD	20.72%	0.00%	0.00%	0.00%
CB5MH_VA	VA	4.06%	0.00%	0.00%	0.00%
POTMH_MD	MD	15.66%	0.00%	0.00%	0.00%
RPPMH	VA	13.37%	0.00%	0.00%	0.00%
CHSMH	MD	16.38%	0.00%	0.00%	0.00%
EASMH	MD	18.03%	5.62%	0.00%	0.00%
PATMH	MD	22.03%	0.00%	0.00%	0.00%

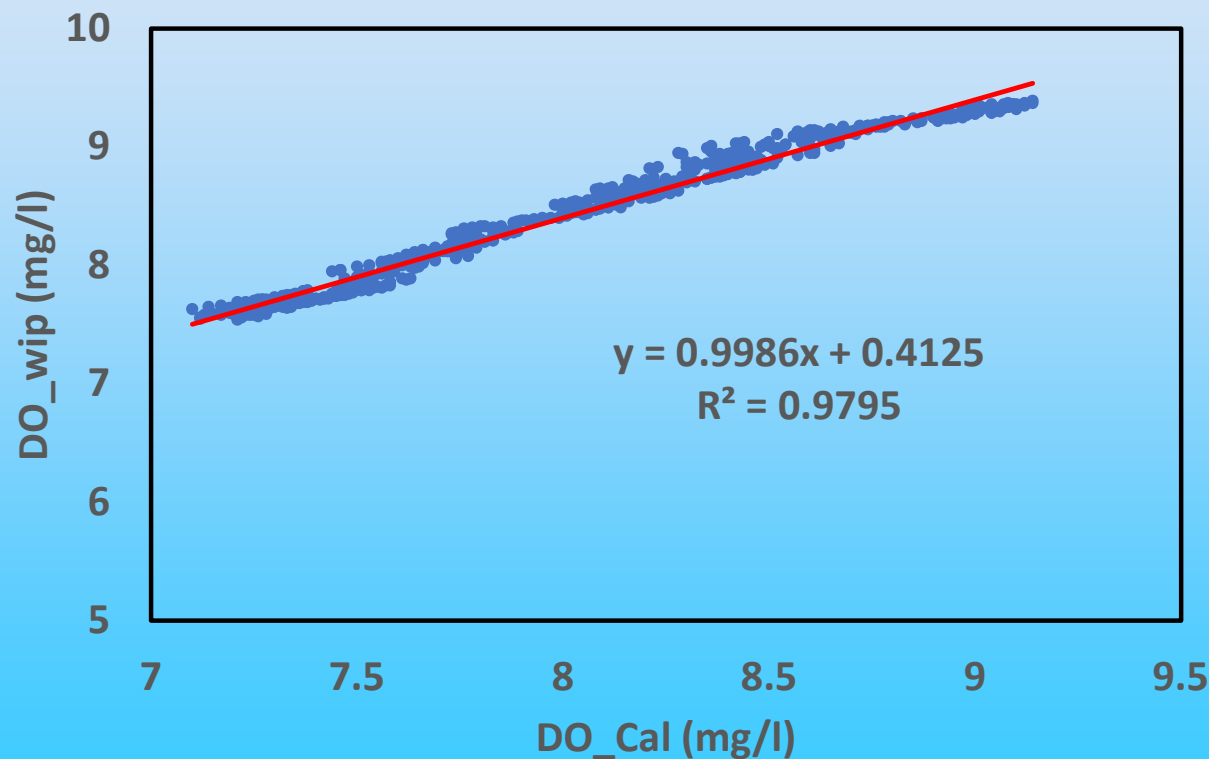
Phase 7 Deep Water Non-attainment percent (a test case with regression method)

Cbseg	State	Calibration	CH3D_WIP	SCHISM_WIP	Direct_model
CB3MH	MD	2.37%	0.05%	0.35%	0.00%
CB4MH	MD	23.96%	4.82%	7.22%	0.00%
CB5MH_	MD	10.13%	0.67%	0.70%	0.00%
CB5MH_	VA	0.66%	0.00%	0.00%	0.00%
CB6PH	VA	1.27%	0.00%	0.51%	0.00%
CB7PH	VA	0.06%	0.00%	0.00%	0.00%
PATMH	MD	9.00%	0.43%	0.00%	0.00%
MAGMH	MD	55.63%	0.00%	27.63%	0.00%
SOUMH	MD	23.68%	0.00%	14.58%	0.00%
SEVMH	MD	7.93%	0.00%	0.00%	0.00%
PAXMH	MD	12.79%	0.00%	0.00%	0.00%
POTMH_	MD	6.77%	0.00%	0.00%	0.00%
RPPMH	VA	10.57%	0.00%	0.00%	0.00%
YRKPH	VA	0.00%	0.00%	0.00%	0.00%
SBEMH	VA	0.70%	0.00%	0.00%	0.00%
CHSMH	MD	6.14%	0.00%	0.00%	0.00%
EASMH	MD	3.35%	0.45%	0.02%	0.00%

Phase 7 Open Water Non-attainment percent (a test case with regression method)

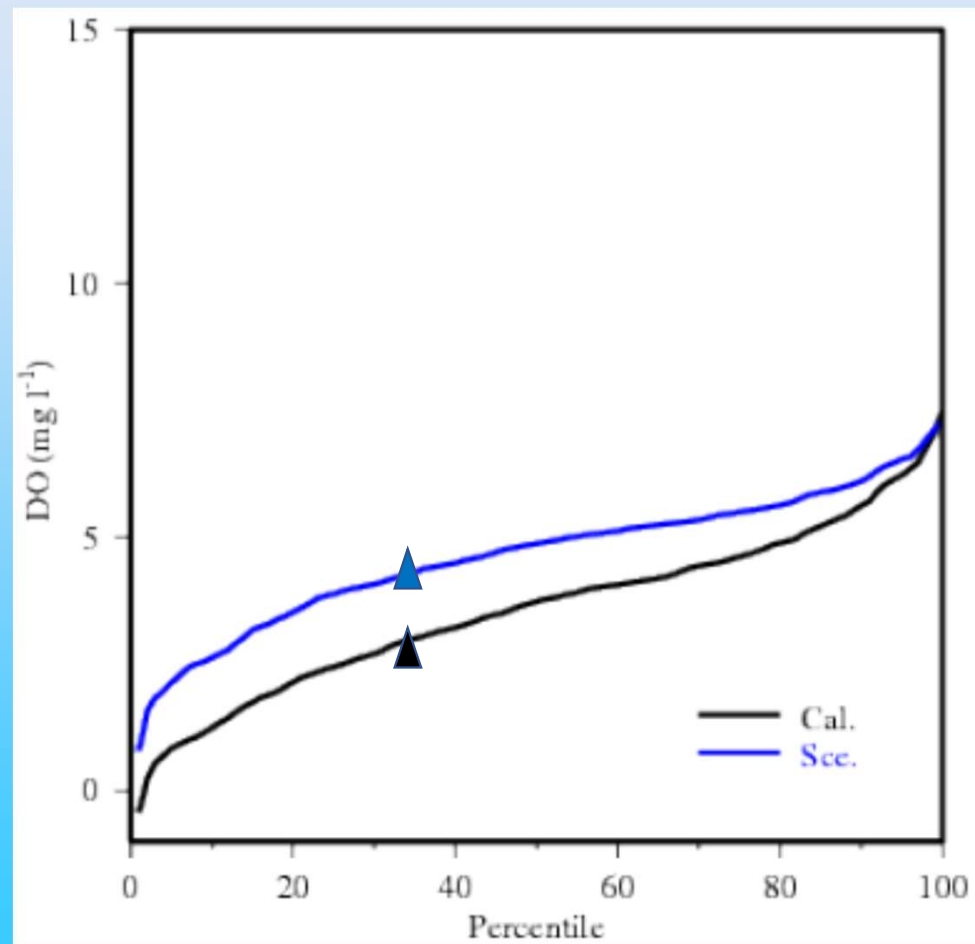
Cbseg	State	Calibration	CH3D_WIP	SCHISM_WIP	Direct_model
CB6PH	VA	2.40%	0.01%	0.89%	0.00%
CB7PH	VA	5.46%	0.23%	1.88%	0.00%
GUNOH	MD	4.59%	4.59%	4.59%	0.00%
BACOH	MD	0.00%	0.00%	0.00%	4.59%
PATMH	MD	0.00%	0.00%	0.00%	2.20%
WSTMH	MD	2.85%	0.00%	0.01%	0.00%
PAXTF	MD	9.11%	7.76%	0.00%	0.00%
WBRTF	MD	4.59%	4.59%	4.59%	0.00%
PAXOH	MD	20.65%	0.00%	0.00%	0.00%
PAXMH	MD	2.04%	0.00%	0.00%	0.00%
ANATF_DC	DC	18.00%	0.00%	1.91%	1.36%
ANATF_MD	MD	27.95%	1.81%	11.68%	0.00%
PISTF	MD	4.42%	0.63%	0.00%	0.00%
RPPOH	VA	0.00%	0.00%	0.00%	0.00%
CRRMH	VA	24.53%	5.75%	17.92%	0.00%
PMKTF	VA	11.01%	8.62%	6.90%	0.00%
PMKOH	VA	1.03%	0.85%	0.00%	0.00%
YRKMH	VA	23.91%	0.67%	0.00%	0.00%
JMSTFL	VA	0.00%	0.00%	0.00%	44.54%
WICMH	MD	11.21%	4.96%	0.00%	4.59%
POCTF	MD	0.85%	0.00%	0.00%	17.88%
POCOH_MD	MD	0.18%	0.00%	0.00%	17.88%
POCOH_VA	VA	0.00%	0.00%	0.00%	17.88%
POCMH_MD	MD	0.00%	0.00%	0.00%	11.01%
POCMH_VA	VA	0.00%	0.00%	0.00%	10.71%

Regression example between the scenario and the calibration (CB4.2C 06/1993 surface)

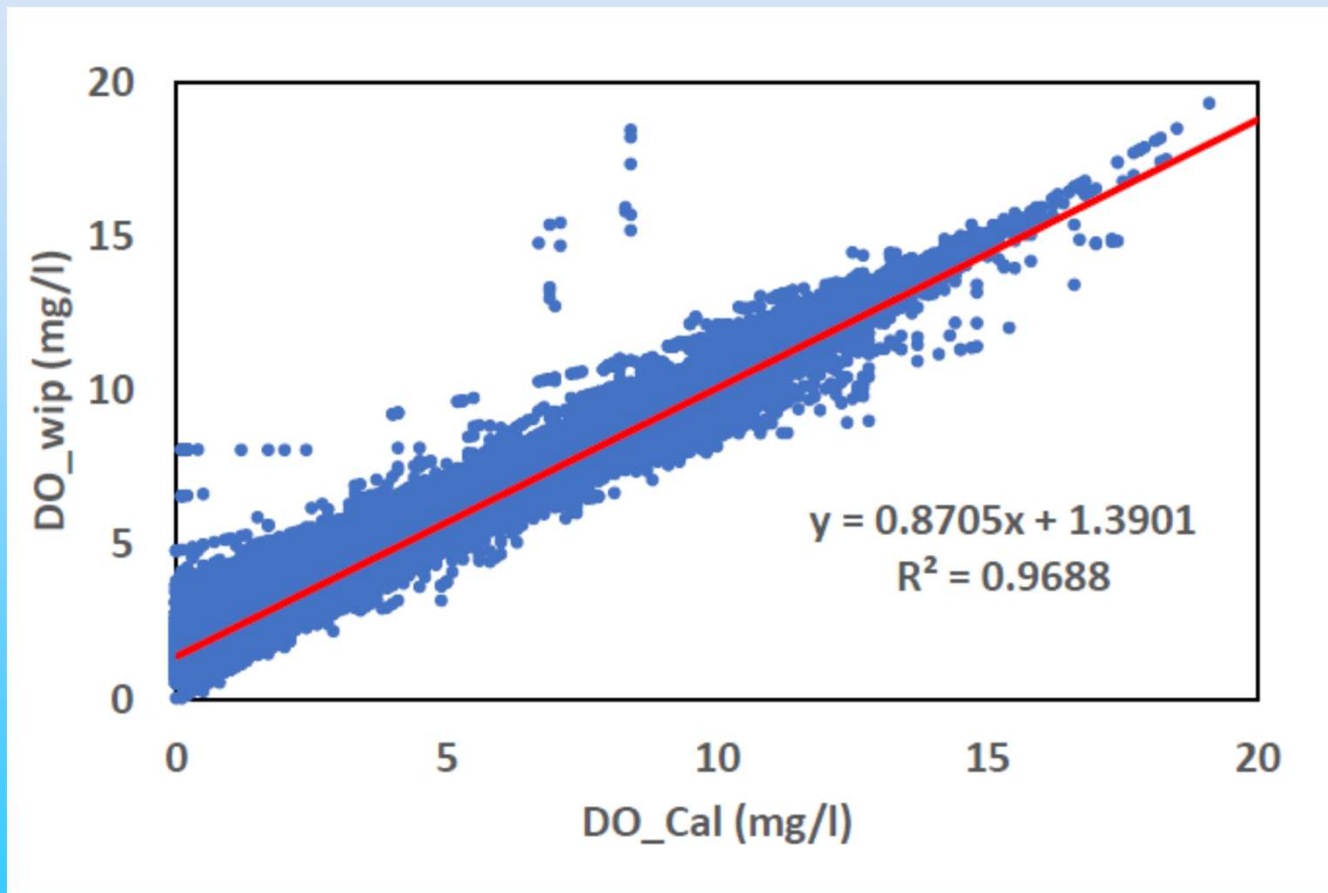


Average correlation coefficients	
Schism	0.97
CH3D	0.94

Percentile method



Modified (scenarioed) versus original data set based on regression (110k observations)



Next steps

- **Complete DO assessment.**
- **Chlorophyll.**
- **Water clarity.**
- **SAV.**
- **4D interpolator.**