

Progress report on SAV/Water Clarity and DO criteria assessment for P7 estuarine model scenarios

Richard Tian and modeling team

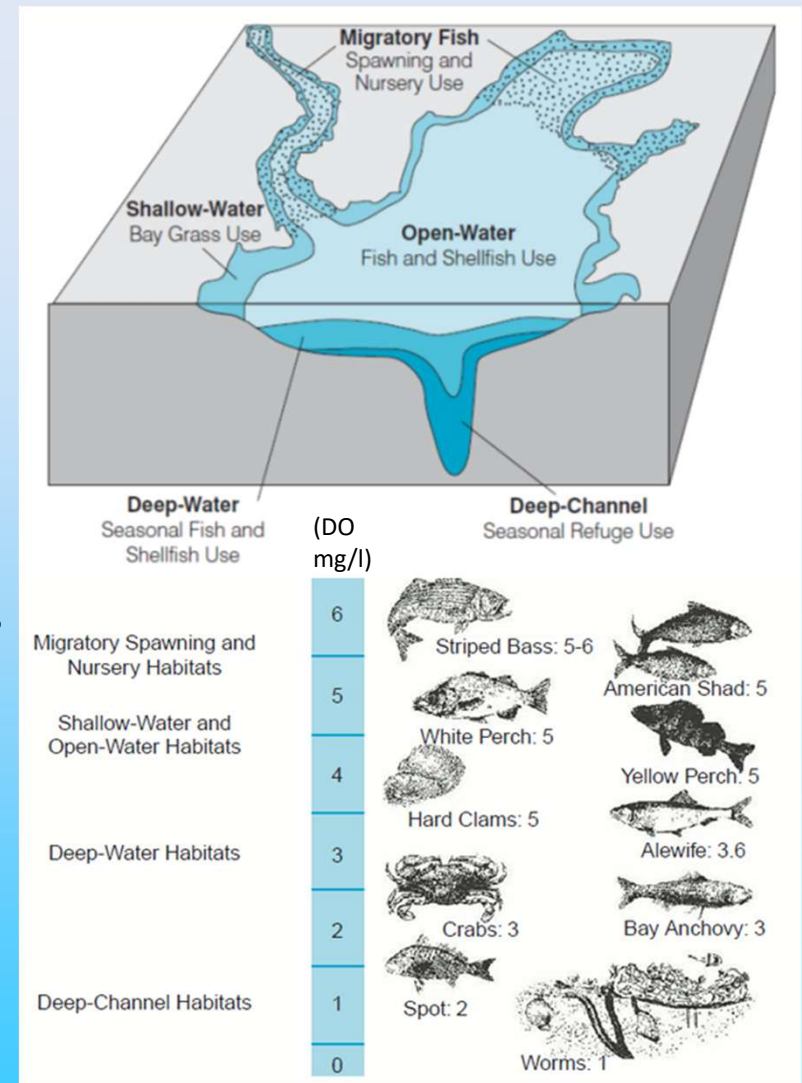
Modeling Quarterly Review Meeting

Annapolis, Oct. 28, 2026

Designated Uses (DUs)

Six DUs:

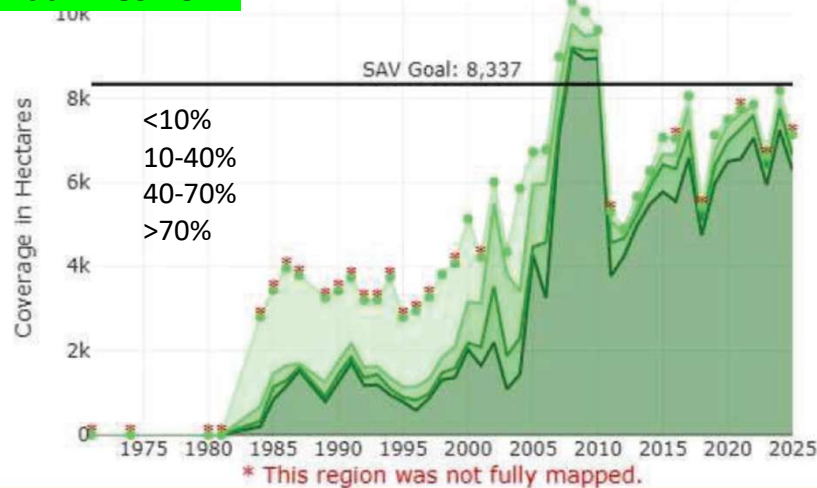
- **DO DC:** deep channel.
- **DO DW:** deep water.
- **DO OW:** open water.
- **DO MSN:** migratory fish spawning and nursery.
- **Chlorophyll:** James and Anacostia rivers.
- **SAV and Water clarity:** Shallow waters.



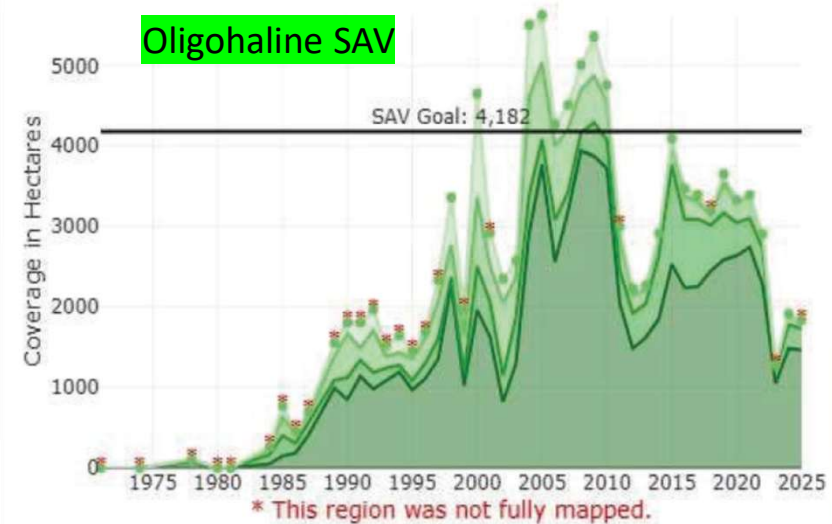
SAV trend

(slide provided by Lewis Linker from VIMS webpage)

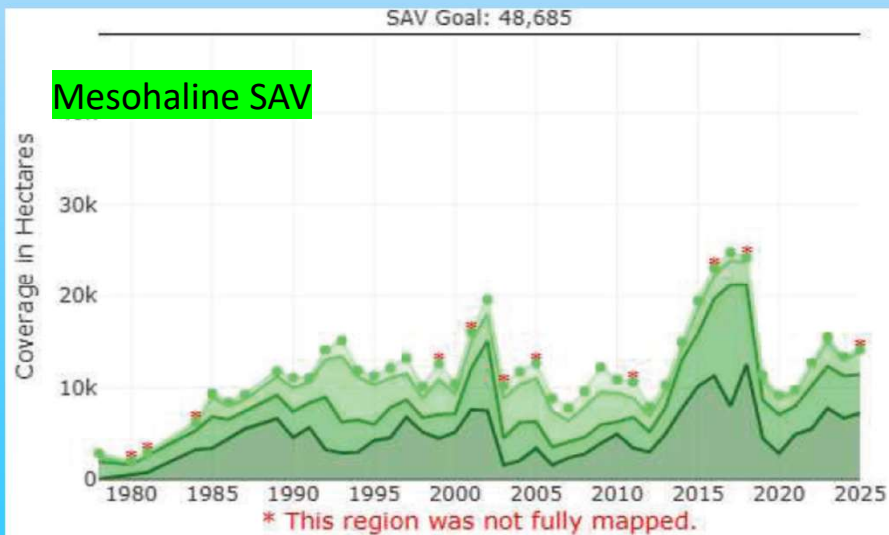
Tidal Fresh SAV



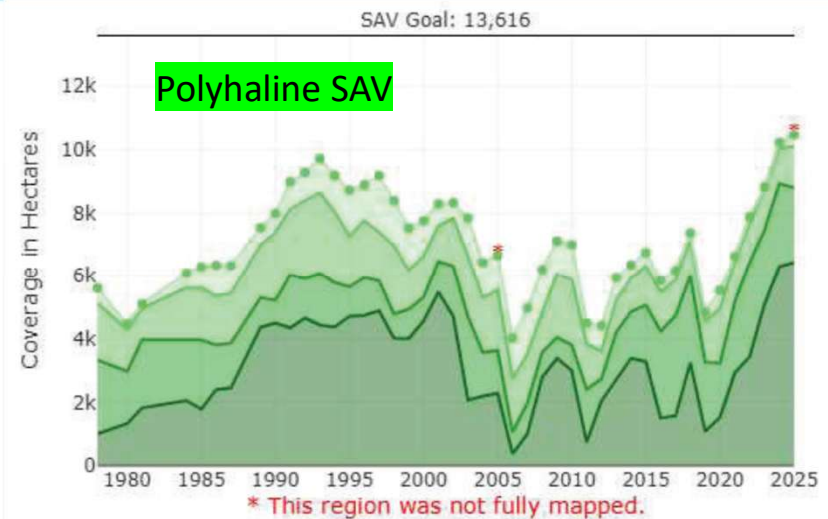
Oligohaline SAV



Mesohaline SAV



Polyhaline SAV



SAV density in1995

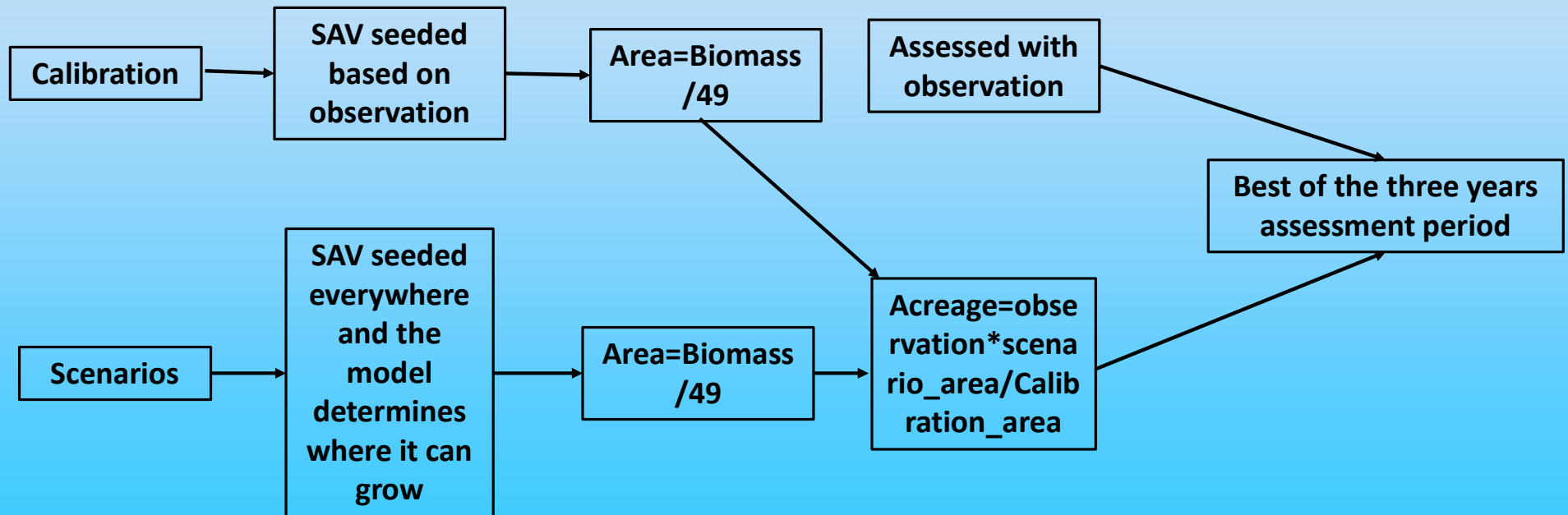
Category	Class1		Class2		Class3		Class4		Percent
Density range	<10%		10-40%		40-70%		70-100%		
Segment	Acreage	Percent	Acreage	Percent	Acreage	Percent	Acreage	Percent	
CB1TF1	0.79	1	68	47	18.42	13	56.53	39	
CB1TF2	1,642.75	84	103.81	5	21.27	1	185.06	9	
LKOH1	31.76	26	81.1	66	8.28	7	1.65	1	
CB2OH	0	0	4.67	48	1.38	14	3.65	38	
SASOH1	44.3	26	92.53	54	33.96	20	0	0	
SASOH2	0	0	8.99	100	0	0	0	0	
GUNOH1	2.73	6	19.16	41	22.25	48	2.14	5	
POTOH1	5.75	1	37.26	4	14.44	2	787.3	93	
POTOH2	0	0	5.37	9	6.36	10	50.64	81	
POTOH3	0	0	2.72	2	5.71	5	107.96	93	
B3MH	20.61	6	9.94	3	14.74	4	300.61	87	
MAGMH	0.62	2	10.66	34	15.24	48	5.15	16	
CHSMH	7.07	2	124.42	28	76.92	17	235.8	53	
EASMH	173.1	13	700.04	52	263.29	20	210.62	16	
CHOMH1	108.92	7	497.73	34	453.88	31	419.22	28	
SEVMH	4.93	10	16.93	33	8.31	16	20.79	41	
CB5MH	204.15	29	403.96	57	37.04	5	57.65	8	
HNGMH	75.08	8	316.45	35	142.77	16	361.37	40	
FSBMH	0	0	6.74	62	0	0	4.08	38	
TANMH1	199.96	4	1,861.32	40	378.93	8	2,180.88	47	
B6PH	80	19	92.95	22	52.42	12	205.92	48	
CB7PH	1,076.76	30	755.01	21	483.71	14	1,244.58	35	
MOBPH	265.74	6	715.42	16	376.78	9	3,030.97	69	
YRKPH	12.34	4	46.11	15	16.69	6	227.19	75	

Acreage-weighted average SAV density 1993-1995 is 49%

SAV assessment methods for model scenarios

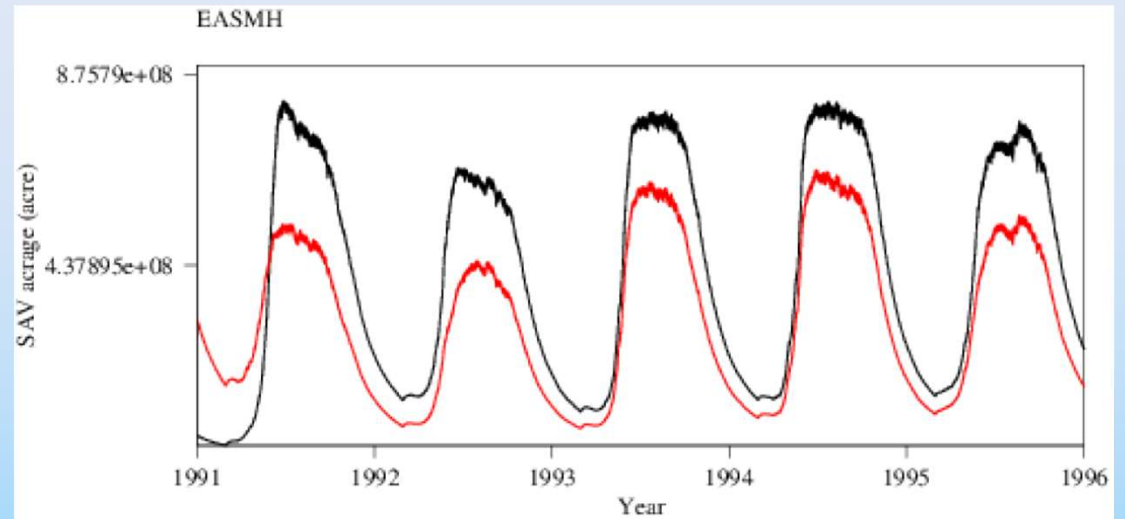
86g/m² at peak density (85%) (Moore et al., 2000); 49% SAV density with biomass of 49g/m²

$$GP = GPM \cdot f(T) \cdot \min[f(I), f(N)f(P)] \cdot C_1^Z \longrightarrow GP = GPM \cdot f(T) \cdot f(I) \cdot C_1^Z$$

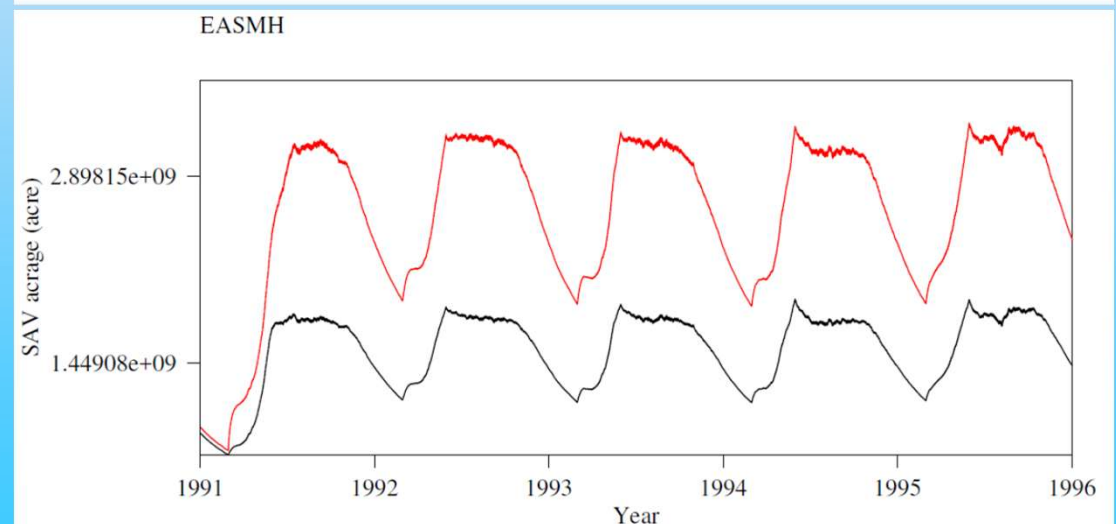


**Example of
simulated time-
series of SAV
acreage for each
segment: EASMH
(Blak: Calibration
Red: WIP)**

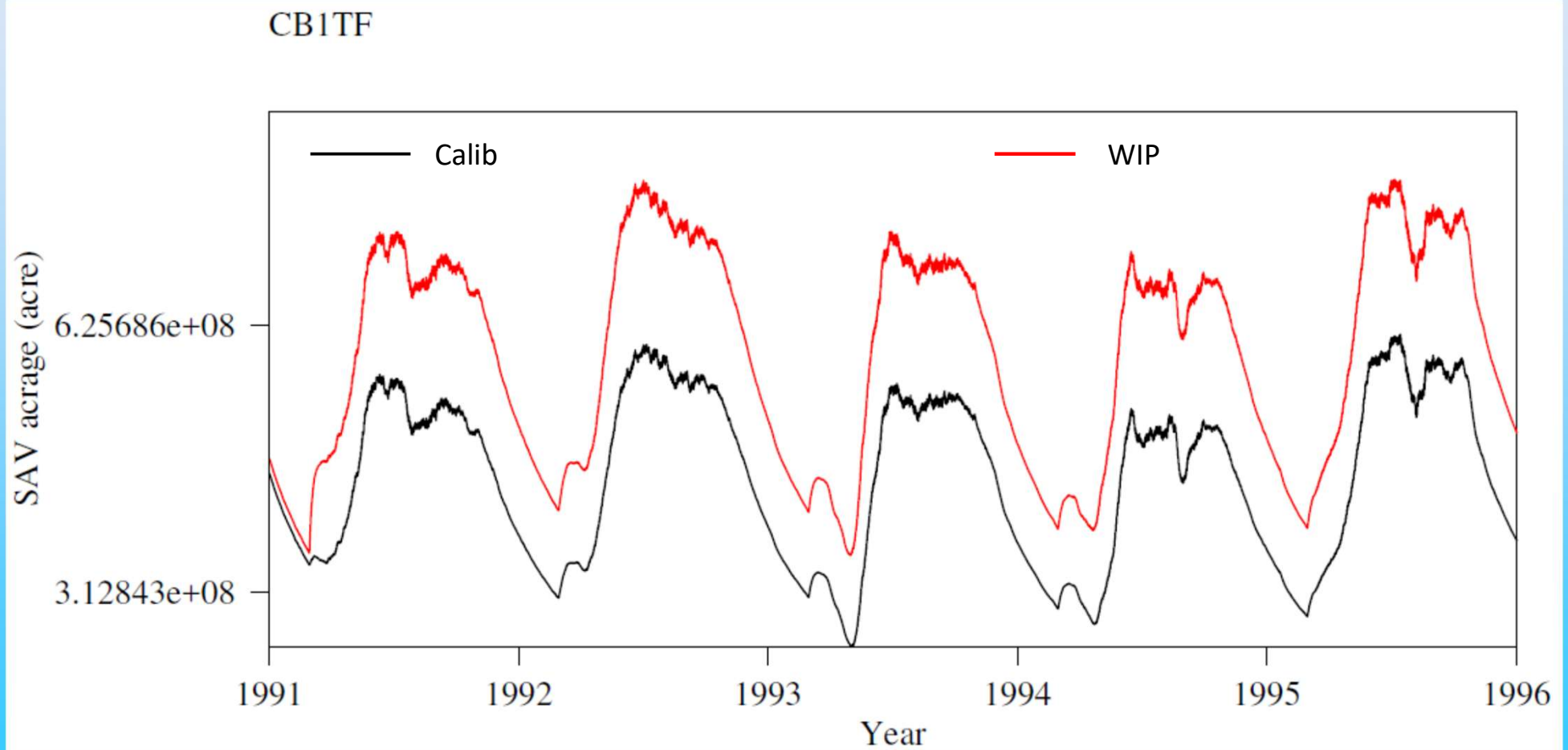
**With
nutrient
limitation**



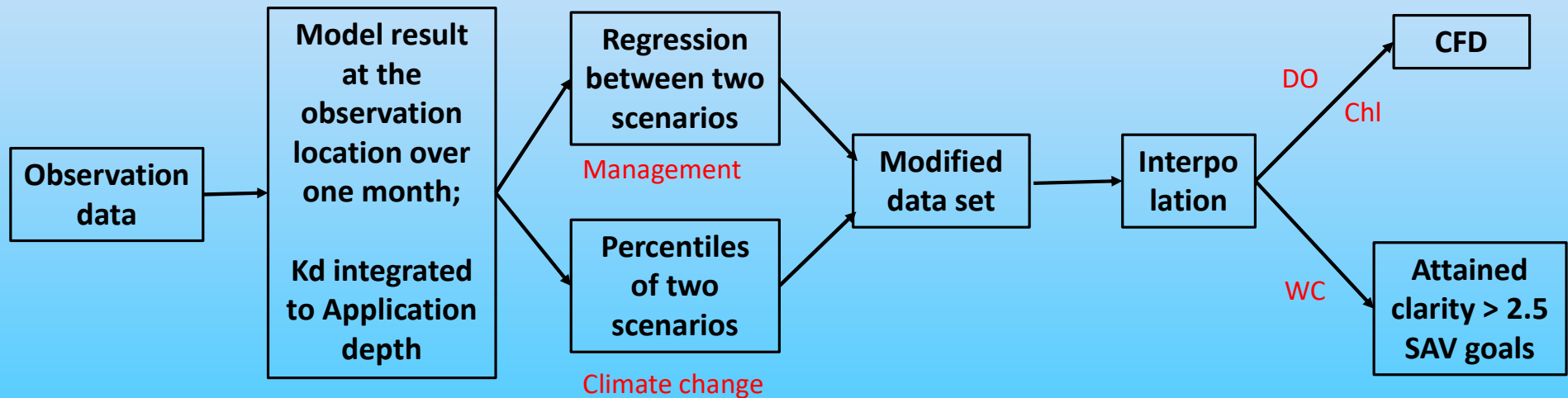
**Without
nutrient
limitation**



Simulated time-series of SAV acreage for CB1TF

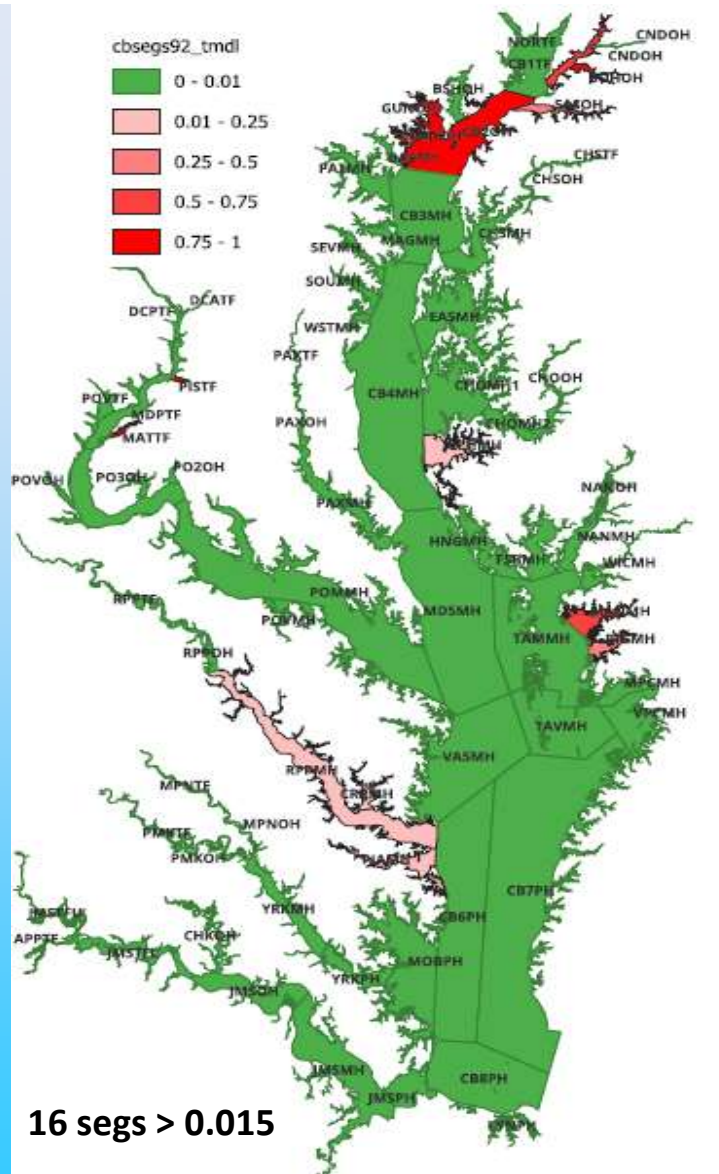
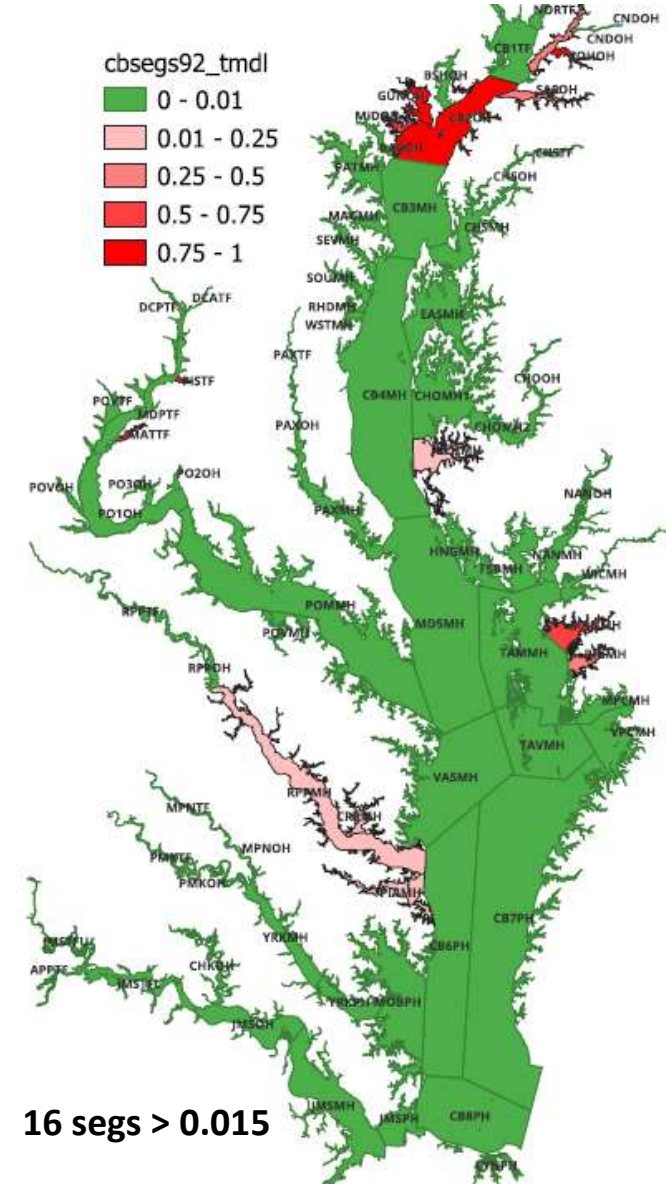


DO, Chlorophyll and Water clarity (WC) assessment methods for model scenarios

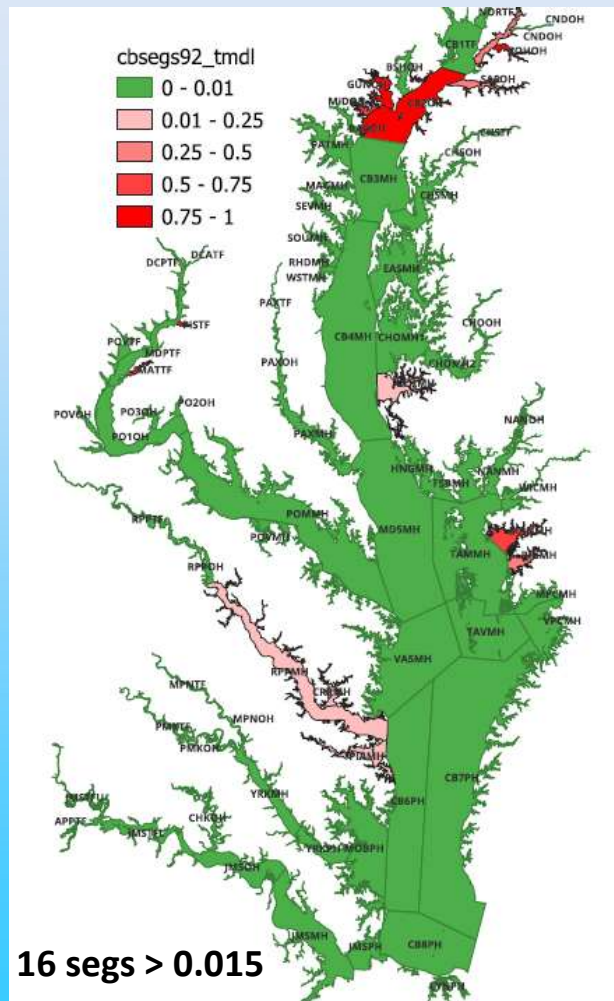


Combined acreage = WC_acreage + 2.5 SAV acreage

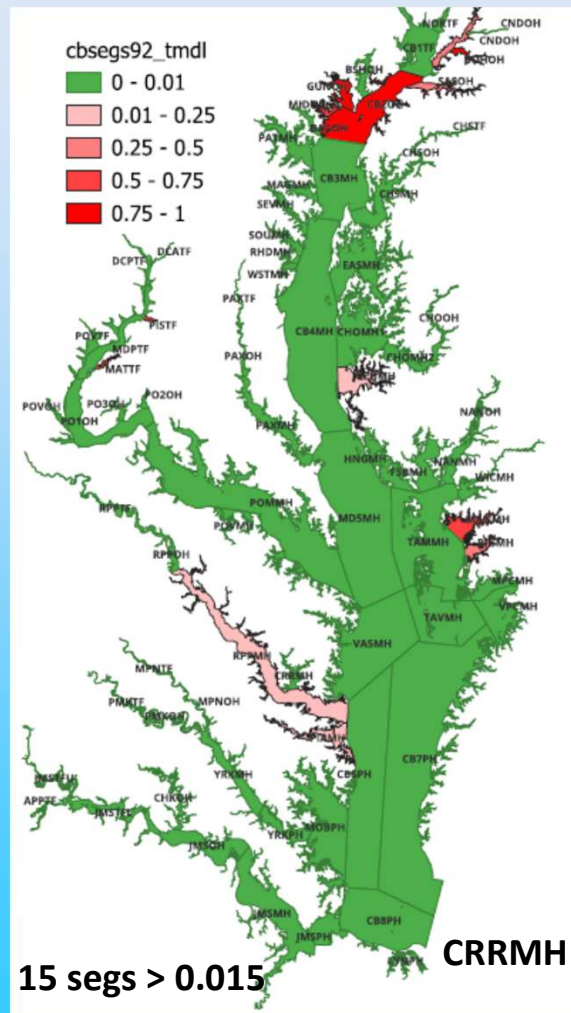
Run14v_WIP (left) and RUN14v_E3 (right)



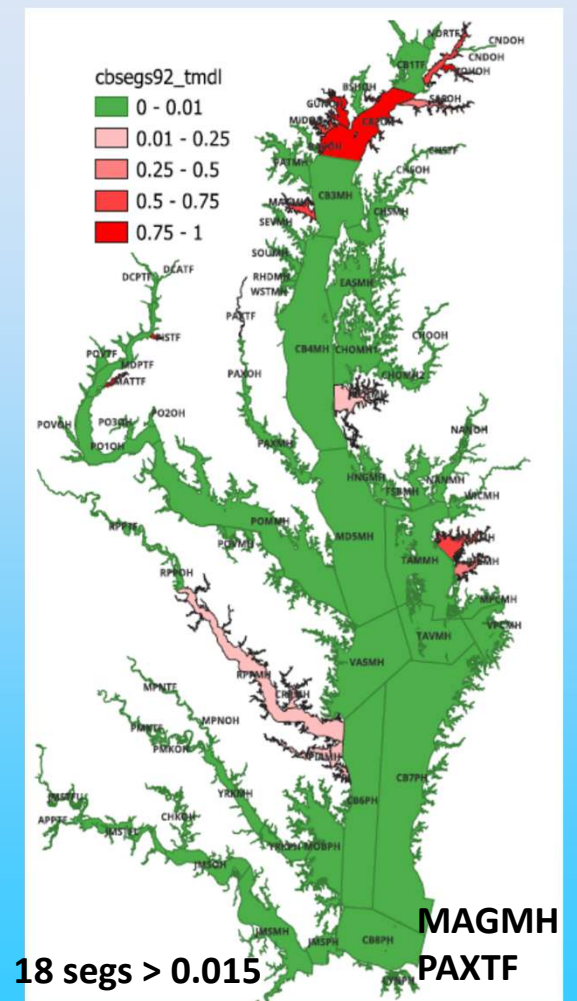
Run14v_E3



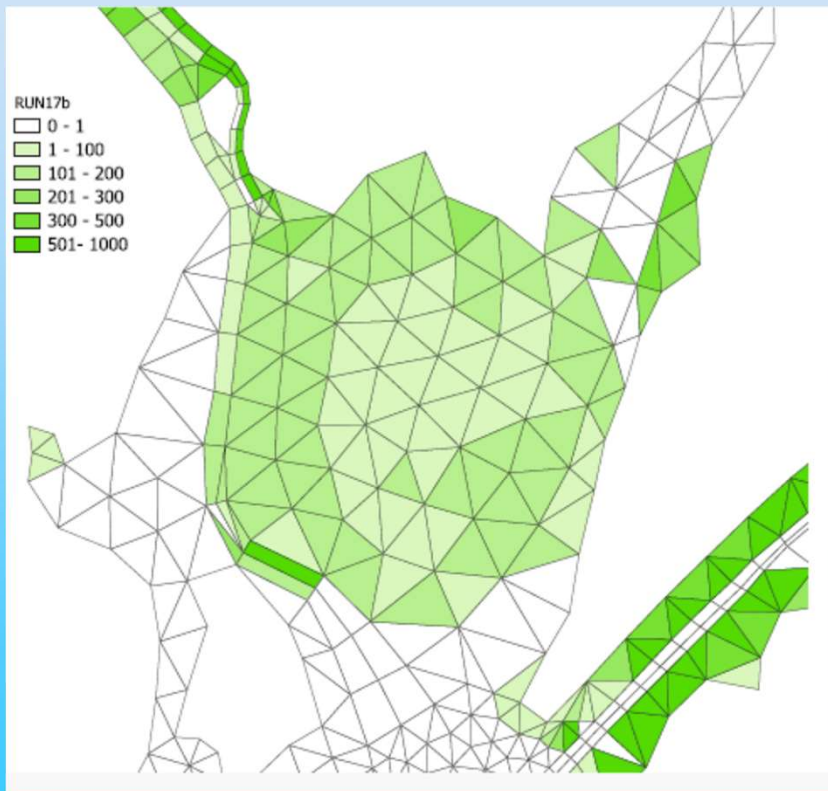
Run14v_AllF



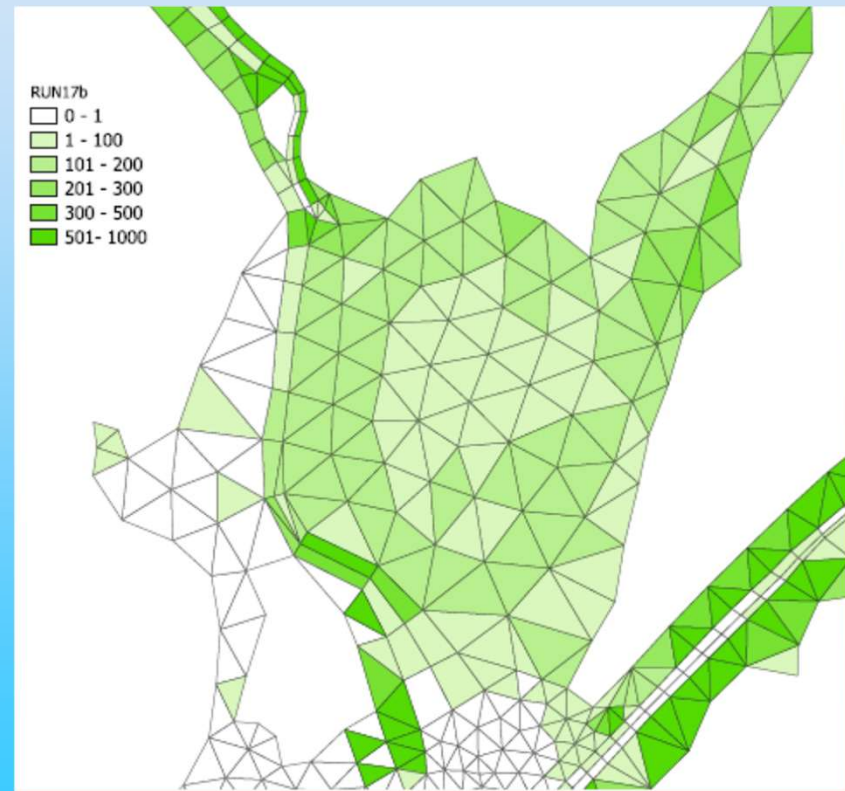
Run14v_NoAct



Calibration

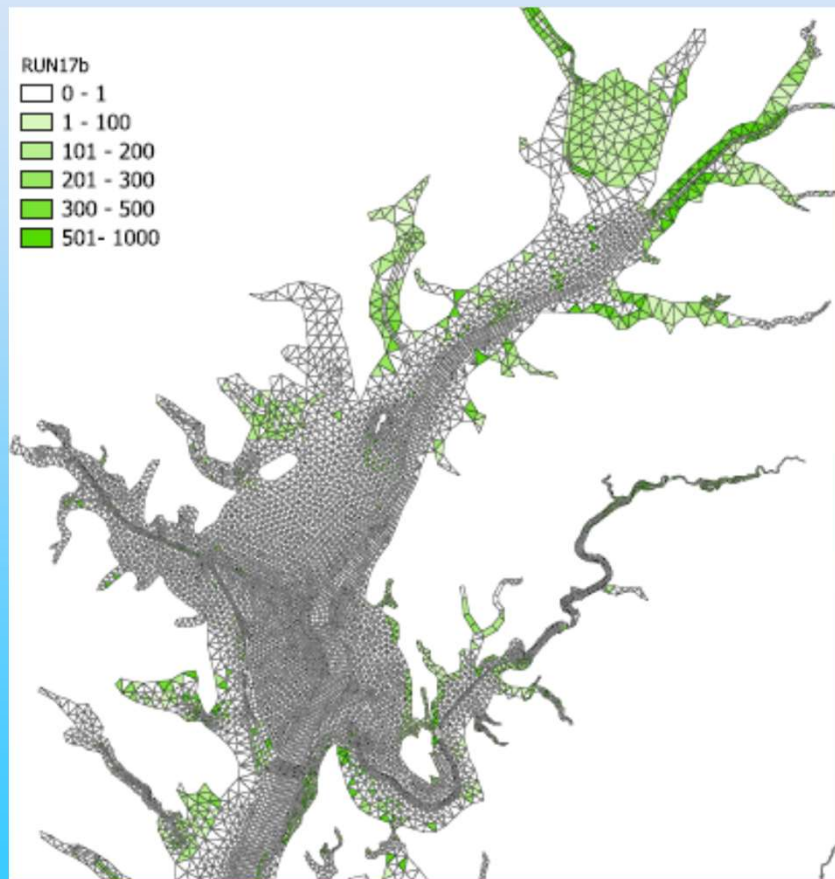


WIP

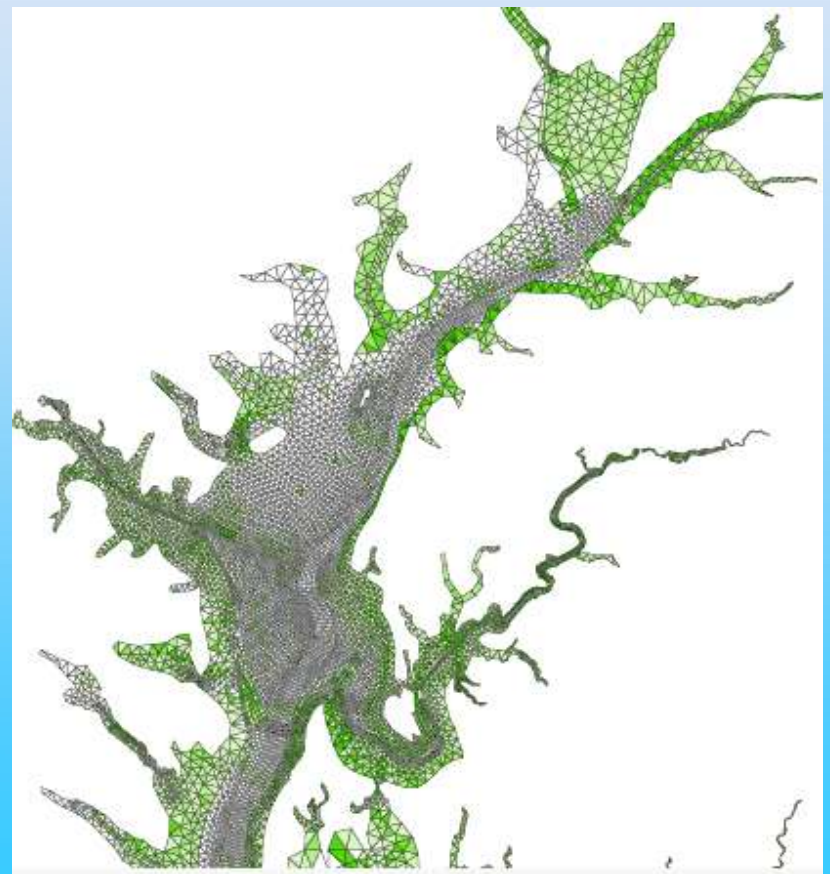


Upper Bay

Calibration

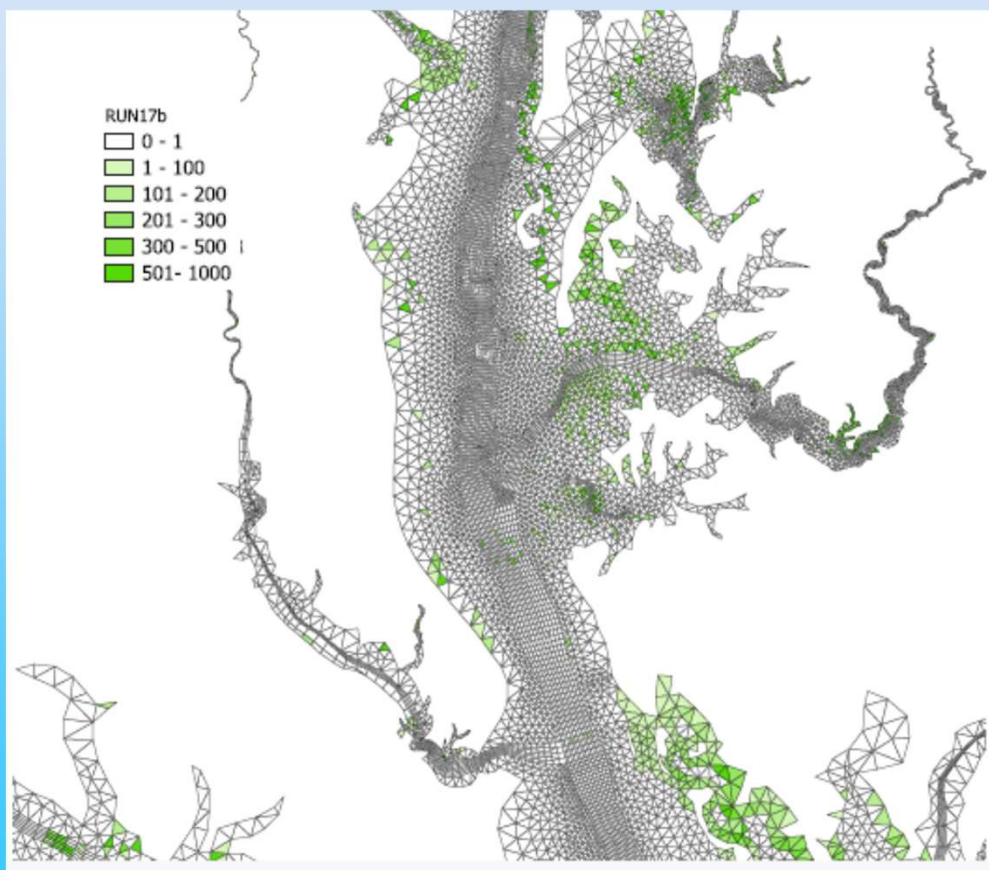


WIP

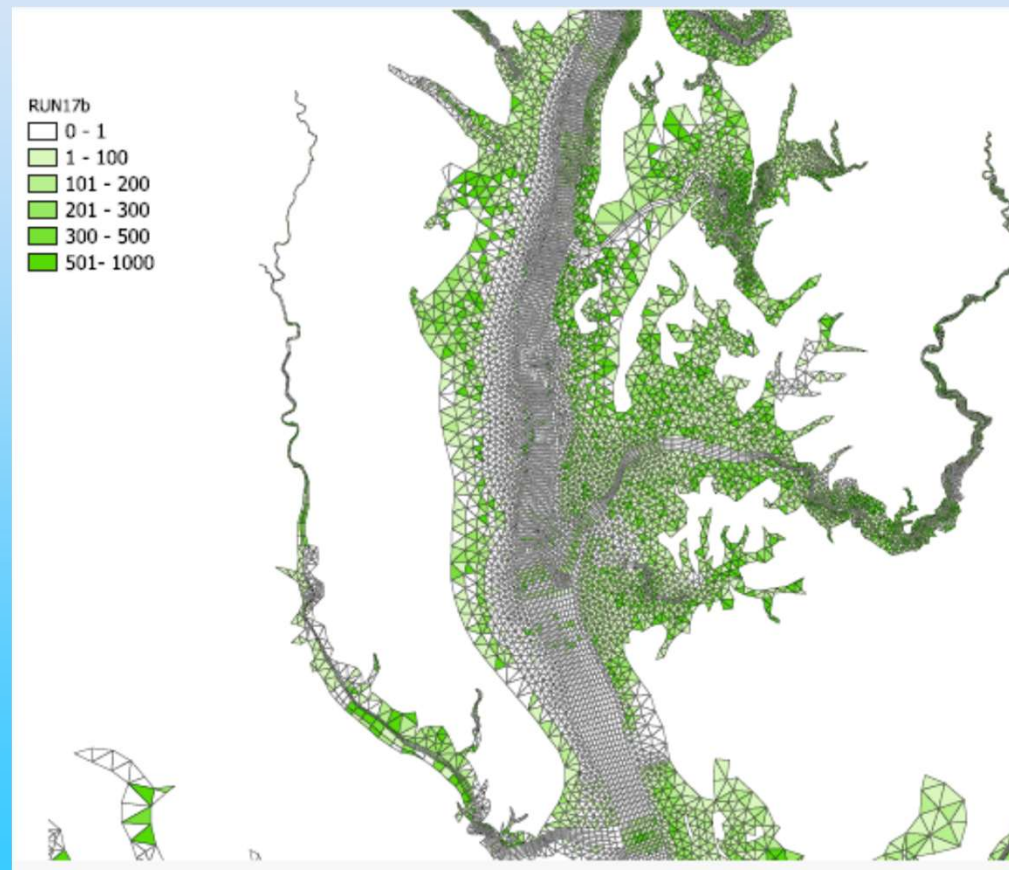


Mid Bay

Calibration

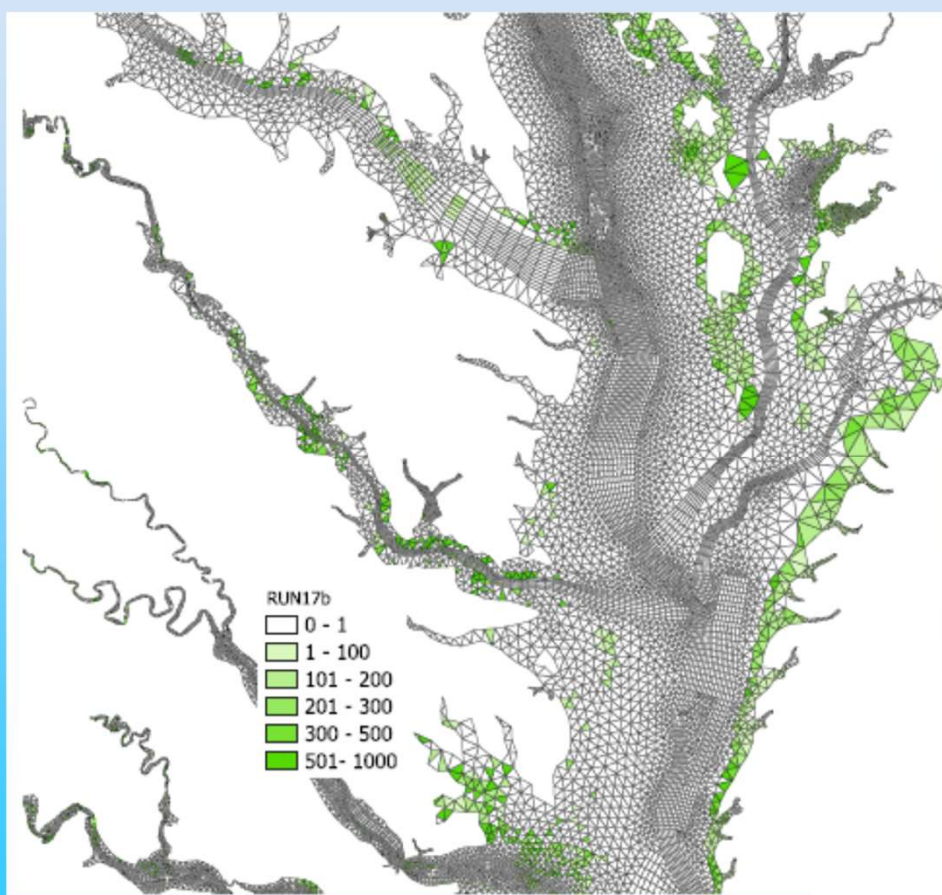


WIP

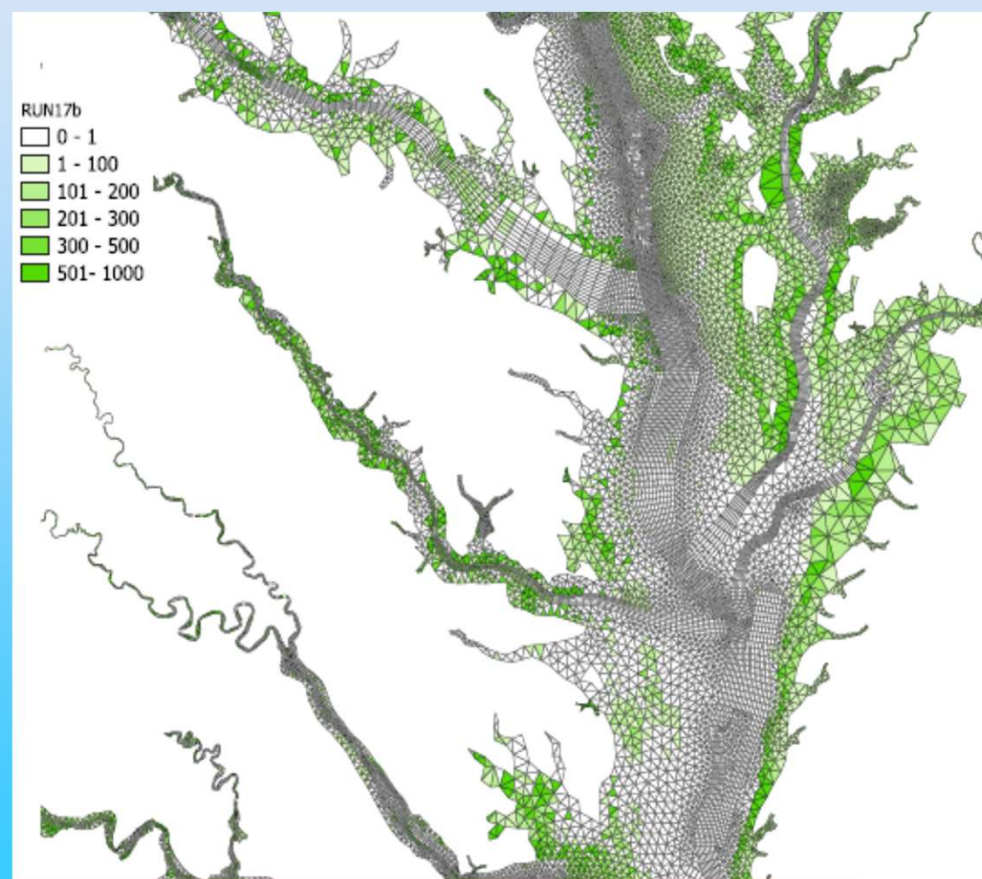


Lower Bay

Calibration



WIP



Deep Channel DO attainment

	NoAction_		NoAction_				AllForest_		AllForest_	
Scenario	Cal	P6	P7	WIP_P6	WIP_P7	E3_P6	E3_P7	P6	P7	
Nitrogen	325	404	404	195	195	133	133	40	40	
Phosphor	21.9	41.7	41.7	13.7	13.7	8.6	8.6	3.9	3.9	
ous										
CB3MH	7.22%	12.65%	9.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
CB4MH	45.61%	52.96%	48.56%	5.87%	10.01%	0.00%	0.00%	0.00%	0.00%	
CB5MH_MI	24.08%	26.51%	24.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
CB5MH_VA	3.75%	10.33%	3.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
POTMH_MI	19.10%	21.25%	21.43%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
RPPMH	14.21%	25.41%	10.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
CHSMH	16.92%	25.97%	19.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
EASMH	18.26%	27.28%	20.23%	6.24%	0.61%	0.00%	0.00%	0.00%	0.00%	
PATMH	22.41%	40.34%	35.68%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	

Deep water DO attainment

Scenario	NoAction_ NoAction_						AllForest_ AllForest_		
	Cal	P6	P7	WIP_P6	WIP_P7	E3_P6	E3_P7	P6	P7
Nitrogen	325	404	404	195	195	133	133	40	40
Phosphorous	21.9	41.7	41.7	13.7	13.7	8.6	8.6	3.9	3.9
CB3MH	2.41%	2.69%	3.35%	0.05%	0.40%	0.00%	0.01%	0.00%	0.00%
CB4MH	23.99%	25.19%	27.77%	5.00%	5.66%	1.09%	0.10%	0.00%	0.00%
CB5MH_MD	10.73%	9.30%	11.95%	0.94%	0.24%	0.00%	0.00%	0.00%	0.00%
CB5MH_VA	0.66%	0.66%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CB6PH	1.70%	0.39%	1.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CB7PH	0.19%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
PATMH	9.00%	17.35%	21.61%	0.67%	0.20%	0.00%	0.00%	0.00%	0.00%
MAGMH	55.63%	56.14%	44.52%	1.21%	45.51%	0.34%	6.77%	0.00%	0.00%
SOUMH	23.68%	27.97%	25.55%	2.96%	19.97%	0.00%	13.43%	0.00%	0.00%
SEVMH	8.03%	7.79%	8.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
PAXMH	12.95%	17.09%	19.39%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
POTMH_MD	8.41%	7.07%	11.42%	0.00%	0.16%	0.00%	0.00%	0.00%	0.00%
RPPMH	13.38%	10.73%	13.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
YRKPH	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
SBEMH	0.77%	3.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CHSMH	6.14%	11.31%	10.41%	0.00%	0.97%	0.00%	0.00%	0.00%	0.00%
EASMH	3.35%	25.44%	7.44%	0.45%	0.02%	0.35%	0.00%	0.00%	0.00%

Open water DO attainment

Scenario	Cal	NoActio	NoActio	WIP_P6	WIP_P7	E3_P6	E3_P7	AllForest_	AllForest_
		n_P6	n_P7					P6	P7
Nitrogen	325	404	404	195	195	133	133	40	40
Phosphorus	21.9	41.7	41.7	13.7	13.7	8.6	8.6	3.9	3.9
GUNOH	4.59%	4.59%	4.59%	4.59%	4.59%	0.00%	0.00%	0.00%	0.00%
PAXTF	9.11%	9.44%	9.24%	7.77%	7.04%	0.00%	0.00%	0.00%	0.00%
WBRTF	4.59%	4.59%	4.59%	4.59%	4.59%	0.00%	4.59%	17.88%	0.00%
PAXOH	20.70%	33.05%	20.64%	0.00%	7.05%	0.00%	1.47%	0.00%	0.00%
ANATF_DC	18.12%	25.42%	22.20%	0.03%	9.99%	0.00%	0.66%	0.00%	0.00%
ANATF_MD	28.06%	18.13%	30.06%	0.00%	25.67%	0.00%	25.67%	0.00%	25.05%
PISTF	4.42%	4.63%	4.54%	0.77%	4.40%	0.00%	3.02%	0.00%	0.00%
CRRMH	24.53%	26.41%	21.16%	5.21%	0.12%	1.76%	0.00%	0.00%	0.00%
PMKTF	11.01%	15.64%	11.01%	8.62%	3.14%	4.59%	0.00%	0.00%	0.00%
YRKMH	24.53%	30.58%	25.78%	0.77%	5.03%	0.00%	0.05%	0.00%	0.00%
WBEMH	15.29%	15.29%	7.80%	7.80%	1.04%	3.29%	0.00%	0.00%	0.00%
SBEMH	34.77%	37.10%	24.22%	17.76%	15.64%	12.38%	8.59%	4.45%	4.67%
EBEMH	22.74%	25.66%	21.46%	8.20%	6.59%	0.00%	0.00%	0.00%	0.00%
WICMH	11.22%	11.21%	11.49%	4.96%	11.09%	4.65%	7.29%	0.65%	0.00%

Simulation of long-term shoreline erosion is in progress

We have:

1991-2014

We need:

1985-2024

We can't do:

1985-1990

+

1991-2014

+

2014-2024

We need to do:

1985

40 years calibration and simulation

2024