DO Water Quality Standard Stoplight Analysis For Lower Susquehanna River Watershed Assessment

Modeling Workgroup Quarterly Review

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WQSTM Scenarios Used in Analysis*

- 2010 No Action N-Based
- 1985 Scenario
- Base Case – Calibration
- 2007 Progress
- 2009 Progress
- 2010 Progress
- 2010 Progress w/ simulated deposition and scour of the Conowingo reservoir removed from WSM loads.
- TMDL (Level of Effort)
- TMDL (LoE) w/ simulated deposition and scour of the Conowingo reservoir removed from WSM loads.
- 2010 E3 N-Based
- All Forest

* All scenarios are based on Phase 5.3.2 loads.

DO Stoplight Decision Rules:

- Applied standard Phase I & II Allocation decision rules of rounding to the nearest whole number of nonattainment and allowing 1% nonattainment for uncertainties in overall analysis procedure.
- A CB4MH and PATMH Deep Water variance of 7%.
- A CB4MH and EASMH Deep Channel variance of 2%.
- A CHSMH Deep Chanel variance of 16%.

DO Deep Channel

Cbseg	Scenario → Year → State	2010 No Action N-Based Scenario 371 TN, 37.6 TP, 10630TSS '93-'95 DO Deep Channel	1985 Scenario 352 TN, 24.6 TP, 10100 TSS '93-'95 DO Deep Channel	'91 -'00 Base Scenario 318 TN, 20.3 TP, 9440 TSS '93-'95 DO Deep Channel	2007 Scenario 269 TN, 19.5 TP, 8770 TSS '93-'95 DO Deep Channel	2009 Scenario 262TN, 18.8 TP, 8510 TSS '93-'95 DO Deep Channel	2010 Scenario '93-'95 DO Deep Channel	2010 Scenario Step 1 - No Conowingo Present in WSM '93-'95 DO Deep Channel	TMDL Scenario '93-'95 DO Deep Channel	TMDL Scenario Step 1 - No Conowingo Present in WSM '93-'95 DO Deep Channel	E3 2010 N-Based Scenario 135 TN, 10.4 TP, 4850 TSS '93-'95 DO Deep Channel	All Forest Scenario 54 TN, 2.6 TP, 1340 TSS '93-'95 DO Deep Channel
CB3MH	MD	22%	17%	14%	12%	11%	5%	7%	0%	0%	0%	0%
CB4MH	MD	53%	49%	46%	40%	38%	22%	26%	1.49%	2.65%	0%	0%
CB5MH	both	22%	17%	15%	10%	9%	0%	0%	0%	0%	0%	0%
CHSMH	MD	45%	39%	39%	36%	36%	28%	34%	15.01%	15.66%	2%	0%
EASMH	MD	38%	29%	27%	24%	24%	14%	15%	1.09%	2.49%	0%	0%
MD5MH	MD	30%	25%	24%	19%	17%	2%	3%	0%	0%	0%	0%
PATMH	MD	45%	42%	28%	25%	25%	18%	24%	0%	0%	0%	0%
POMMH	MD	24%	20%	20%	13%	10%	0%	0%	0%	0%	0%	0%
POTMH	both	24%	20%	20%	13%	10%	0%	0%	0%	0%	0%	0%
RPPMH	VA	27%	23%	19%	6%	4%	0%	0%	0%	0%	0%	0%
VA5MH	VA	12%	7%	4%	1%	0%	0%	0%	0%	0%	0%	0%

Initial DO Findings – Deep Channel:

- Applied standard Phase I Allocation decision rules of rounding to the nearest whole number of nonattainment and allowing 1% nonattainment for uncertainties in overall analysis procedure.
- Complete attainment of the Deep Channel water quality standard (WQS) is estimated at the TMDL Level of Effort Scenario.
- With variances and application of the standard stoplight analysis decision rules there is still estimated complete attainment of the Deep Channel WQS with the simulated Conowingo Pool absent, but attainment levels are decreased by about 1% in CB4MH and EASMH.

DO Deep Water

Cbseg	Scenario → Year → State	2010 No Action N-Based Scenario 371 TN, 37.6 TP, 10630TSS '93-'95 DO Deep Water	1985 Scenario 352 TN, 24.6 TP, 10100 TSS '93-'95 DO Deep Water	'91 -'00 Base Scenario 318 TN, 20.3 TP, 9440 TSS '93-'95 DO Deep Water	2007 Scenario 269 TN, 19.5 TP, 8770 TSS '93-'95 DO Deep Water	2009 Scenario 262TN, 18.8 TP, 8510 TSS '93-'95 DO Deep Water	2010 Scenario '93-'95 DO Deep Channel	2010 Scenario Step 1 - No Conowingo Present in WSM '93-'95 DO Deep Channel	TMDL Scenario '93-'95 DO Deep Channel	TMDL Scenario Step 1 - No Conowingo Present in WSM '93-'95 DO Deep Channel	E3 2010 N-Based Scenario 135 TN, 10.4 TP, 4850 TSS '93-'95 DO Deep Water	All Forest Scenario 54 TN, 2.6 TP, 1340 TSS '93-'95 DO Deep Water
CB3MH	MD	4%	2%	2%	2%	2%	1%	1%	0%	0%	0%	0%
CB4MH	MD	27%	22%	20%	17%	16%	14%	15%	7.00%	7.65%	2%	0%
CB5MH	both	6%	4%	4%	3%	3%	2%	3%	1%	1%	0%	0%
CB6PH	VA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHSMH	MD	34%	24%	26%	21%	19%	2%	3%	0%	0%	0%	0%
EASMH	MD	34%	14%	6%	4%	4%	3%	4%	1.60%	2.09%	0%	0%
MAGMH	MD	51%	51%	51%	51%	43%					7%	0%
MD5MH	MD	12%	9%	9%	7%	7%	6%	7%	2.20%	2.44%	0%	0%
PATMH	MD	26%	13%	13%	11%	11%	6%	9%	0%	0%	0%	0%
PAXMH	MD	23%	12%	7%	4%	3%	3%	5%	0%	0%	0%	0%
POMMH	MD	8%	5%	4%	2%	2%	1%	1%	0%	0%	0%	0%
POTMH	both	8%	5%	4%	2%	2%	1%	1%	0%	0%	0%	0%
RPPMH	VA	13%	8%	6%	3%	1%	2%	2%	0%	0%	0%	0%
SBEMH	VA	5%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SEVMH	MD	19%	6%	6%	6%	6%					0%	0%
SOUMH	MD	36%	23%	19%	19%	19%					0%	0%
VA5MH	VA	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
YRKPH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Initial DO Findings – Deep Water:

- Applied standard Phase I Allocation decision rules of rounding to the nearest whole number of nonattainment and allowing 1% nonattainment for uncertainties in overall analysis procedure.
- There is widespread attainment of the Deep Water standard at the TMDL (LoE) and an equivalent level of attainment with the TMDL - No Conowingo Scenario. The No Conowingo scenario increases nonattainment by about 0.5%

Open Water

Cbseg	Scenario → Year → State	2010 No Action N-Based Scenario 371 TN, 37.6 TP, 10630TSS '93-'95 DO Open Water	1985 Scenario 352 TN, 24.6 TP, 10100 TSS '93-'95 DO Open Water	'91 -'00 Base Scenario 318 TN, 20.3 TP, 9440 TSS '93-'95 DO Open Water	2007 Scenario 269 TN, 19.5 TP, 8770 TSS '93-'95 DO Open Water	2009 Scenario 262TN, 18.8 TP, 8510 TSS '93-'95 DO Open Water	2010 Scenario '93-'95 DO Open Water	2010 Scenario Step 1 - No Conowingo Present in WSM '93-'95 DO Open Water	TMDL Scenario '93-'95 DO Open Water	TMDL Scenario Step 1 - No Conowingo Present in WSM '93-'95 DO Open Water	E3 2010 N-Based Scenario 135 TN, 10.4 TP, 4850 TSS '93-'95 DO Open Water	All Forest Scenario 54 TN, 2.6 TP, 1340 TSS '93-'95 DO Open Water
APPTF	VA	11%	11%	0%	0%	0%	5%	5%	0%	0%	0%	0%
BACOH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BIGMH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
BOHOH	MD	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
BSHOH	MD	20%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
CB1TF	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB2OH	MD	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB3MH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB4MH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB5MH	both	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CB6PH	VA	4%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%
CB7PH	VA	9%	7%	6%	4%	4%	0%	0%	0%	0%	0%	0%
CB8PH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHKOH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHOMH1	MD	4%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%
CHOMH2	MD	20%	11%	4%	0%	0%	0%	0%	0%	0%	0%	0%
CHOOH	MD	20%	5%	1%	0%	0%	0%	0%	0%	0%	0%	0%
CHOTF	MD	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHSMH	MD	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHSOH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CHSTF	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CNDOH	MD	8%	0%	0%	0%	0%	1%	6%	0%	0%	0%	0%
CRRMH	VA	32%	29%	25%	10%	8%	1%	1%	0%	0%	0%	0%
DCATF	DC	33%	22%	18%	15%	14%	2%	2%	0%	0%	0%	0%
DCPTF	DC	13%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
DENTF	DE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
EASMH	MD	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
EBEMH	VA	25%	25%	23%	23%	23%	20%	20%	0%	0%	0%	0%
ELIPH	VA	6%	6%	4%	2%	2%	1%	1%	0%	0%	0%	0%
ELKOH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
FSBMH	MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%
GUNOH	MD	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	0%
JMSMH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
JMSOH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
JMSPH	VA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
JMSTF	VA	12%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%
JMSTFL	VA	15%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%
JMSTFU	VA	6%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Initial DO Findings – Open Water:

- Applied standard Phase I Allocation decision rules of rounding to the nearest whole number of nonattainment and allowing 1% nonattainment for uncertainties in overall analysis procedure.
- Estimating similar DO response and attainment levels for Open Water as our previous 2010 analysis with little change estimated in attainment levels with the elimination of the Conowingo Pool except for the C&D Canal for the 2010 Progress Scenario.

Conclusions:

- These are preliminary findings and much work needs to be done to complete the 2017 assessment of the influence of Conowingo infill on the Chesapeake TMDL.
- Early estimates are that attainment of the DO criteria in some Deep Water and Deep Channel designated uses could decrease by about 0.5 to 1% with simulated conditions of no Conowingo Pool (Step 1 type scenario).