## An Early Look at Draft Phase 6 Key Scenarios

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Chesapeake Bay Program
Science, Restoration, Partnership

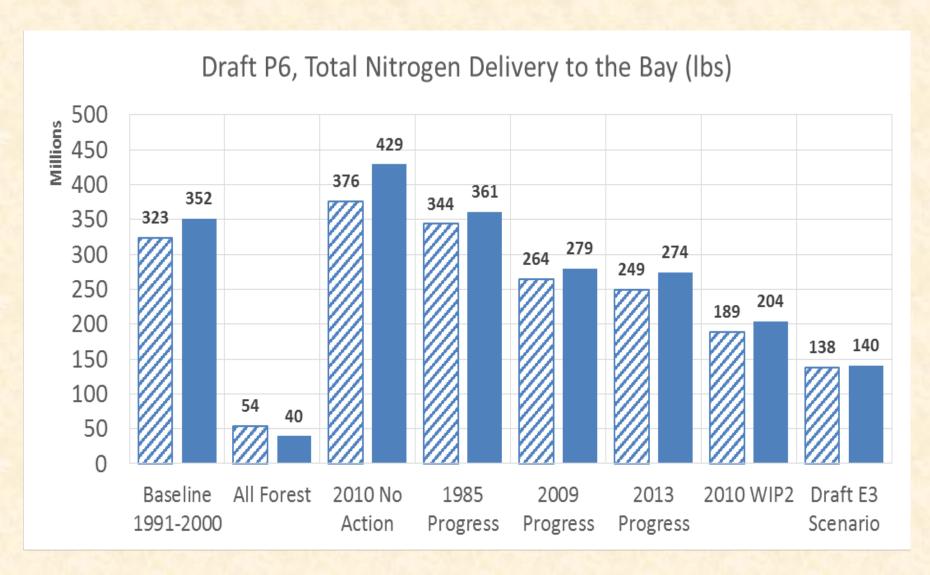


### Overview:

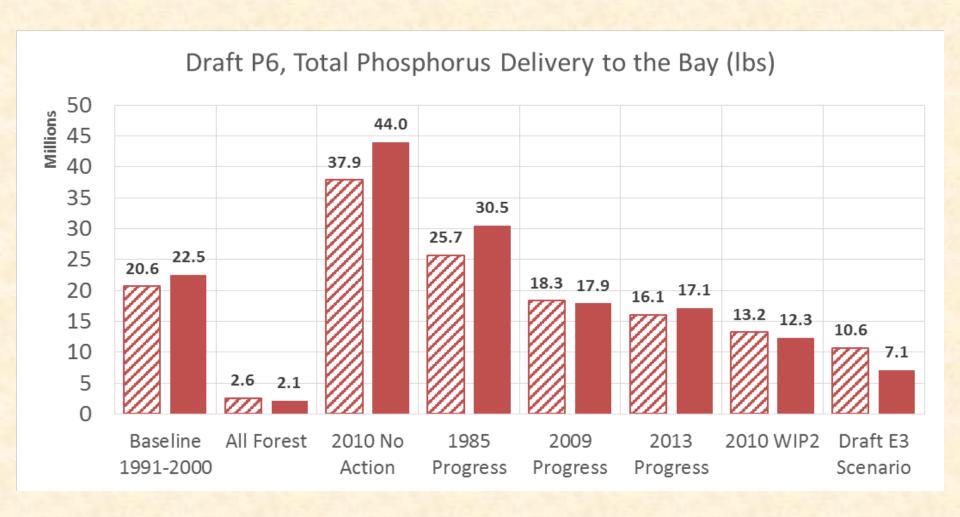
• Early review of key Phase 6 draft scenarios of No Action, 1985 Progress, 2009 Progress, 2013 Progress, WIP2 Level of Effort, E3, and All Forest.

#### • Errata:

- The 2025 atmo. dep. used for tidal water for 1985 Progress, 2009 Progress, 2013 Progress, E3, and No Action. The Base, WIP2, and All Forest atmo. dep. to tidal water are correct.
- Correction of atmo dep to coastal water exchange needed for all scenarios other than Base.
- E3 Scenario needs to be finalized.
- Historical BMPs need to be added to Progress Scenarios.
- All scenarios to be run on final Phase 6 WSM and WQSTM.



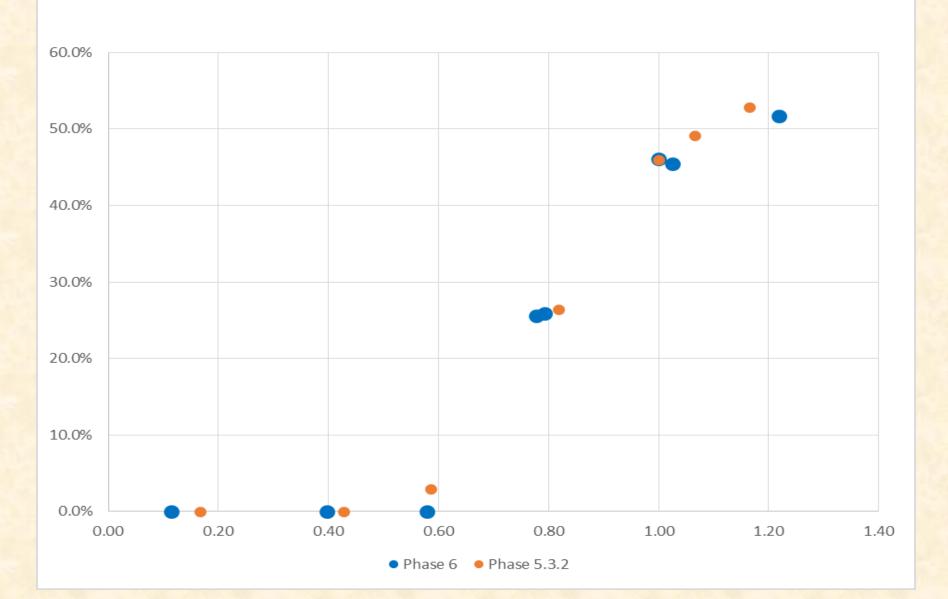
2017 Draft Phase 6 in solid blue bars. Phase 5.3.2 in stippled bars. Units in millions of pounds.



2017 Draft Phase 6 in solid red bars. Phase 5.3.2 in stippled bars. Units in millions of pounds.

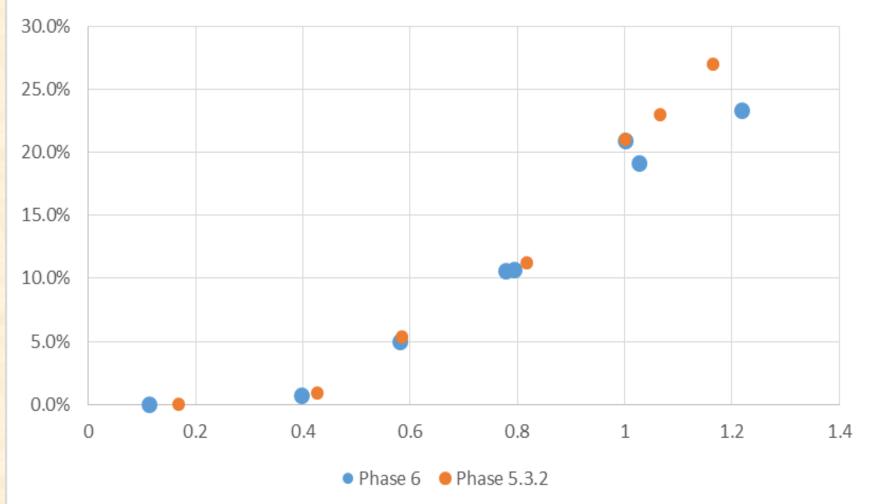
		Base	No Action	1985 Progress	2009 Progress	2013 Progress	WIP2	E3	All Forest
Phase 6		352TN	429TN	361TN	279TN	274TN	204TN	140TN	40TN
8/9/17	<b>9/17</b> 22.5TP		44.0TP	30.5TP	17.9TP	17.1TP	12.3TP	7.1TP	2.1TP
		1993-1995	1993-1995	1993-1995	1993-1995	1993-1995	1993-1995	1993-1995	1993-1995
Cbseg	State	Deep Channel	Deep Channel	Deep Channel	Deep Channel				
СВЗМН	MD	16.0%	10.9%	7.7%	0.6%	0.6%	0.0%	0.0%	0.0%
СВ4МН	MD	46.0%	51.6%	45.4%	25.9%	25.6%	0.0%	0.0%	0.0%
СВ5МН	MD/VA	14.2%	18.5%	13.5%	0.9%	0.8%	0.0%	0.0%	0.0%
CHSMH	MD MD	37.4%	25.4%	17.7%	5.6%	5.1%	0.0%	0.0%	0.0%
POTMH	MD/VA	20.2%	20.4%	14.2%	0.0%	0.0%	0.0%	0.0%	0.0%
	MD MD	20.2%	20.4%		0.0%	0.0%		0.0%	0.0%
POMMH				14.3%			0.0%		
RPPMH	VA	19.0%	23.9%	13.2%	0.0%	0.0%	0.0%	0.0%	0.0%
EASMH	MD	25.4%	26.0%	18.8%	12.3%	12.2%	0.6%	0.0%	0.0%
MD5MH	MD	21.7%	25.3%	20.6%	4.3%	4.2%	0.0%	0.0%	0.0%
VA5MH	VA	4.5%	9.6%	3.7%	0.0%	0.0%	0.0%	0.0%	0.0%
PATMH	MD	24.8%	28.5%	26.6%	1.6%	1.0%	0.0%	0.0%	0.0%
						1985	2009		
		Base	All Fore	est No Ad	ction Pr	ogress F	Progress	WIP2	E3
		323TN	53.6T	N 376	TN 3	44TN	264TN	189TN	138TN
Phase 5.3.2		<b>2</b> 20.6TP	2.6TF	37.9	PTP 2	25.7P	18.3TP	13.2TP	10.6TP
		1993-199	95 1993-19	995 1993-	1995 199	3-1995 19	993-1995 1	.993-1995	1993-1995
Cbseg	State	Deep Char	nnel Deep Cha	nnel Deep C	hannel Deep	Channel De	ep Channel De	ep Channel D	eep Channel
СВЗМН	MD	16.0%	0.0%			9.2%	7.3%	0.2%	0.0%
СВ4МН	MD	46.0%	0.0%			9.1%	26.4%	2.9%	0.0%
СВ5МН	MD/\		0.0%			6.7%	0.6%	0.0%	0.0%
CHSMH	MD	37.4%	0.0%			7.4%	35.6%	16.6%	2.3%
POTMH	MD/\		0.0%			2.7%	0.0%	0.0%	0.0%
POMMH			0.0%			2.8%	0.0%	0.0%	0.0%
RPPMH	VA	19.0%	0.0%			5.1%	0.0%	0.0%	0.0%
EASMH MD5MH	MD	25.4% 21.7%	0.0%			7.5% 3.8%	14.0%	0.0%	0.0%
VA5MH	VA VA	4.5%	0.0%			7.4%	3.9% 0.0%	0.0%	0.0%
PATMH	MD	24.8%	0.0%			8.2%	11.5%	0.0%	0.0%
PATIVIT	IVID	24.070	0.0%	49	1/0 3	0.2/0	11.5/0	0.076	0.070

## Response of 2010 and 2017 WQSTM Deep Channel DO to TN Load Reductions as a Percent of Phase 6 and Phase 5.3.2 Base in CB4MH



		_			85	2009		2013					
		Base	No Actio	_	gress	Progre		Progre		WIP2	E3	All Fores	st
Phase 6		352TN	429TN		1TN	279TI		274TI		204TN	140TN	40TN	
8/9/17		22.5TP	44.0TP		5TP	17.9T		17.1T		12.3TP		2.1TP	
		1993-1995	1993-199		-1995	1993-19		1993-19		1993-199			
Cbseg	State											ter Deep Wat	ter
СВЗМН	MD	2.1%	2.2%		3%	0.4%		0.4%		0.1%	0.0%	0.0%	
СВ4МН	MD	21.0%	23.3%		.2%	10.79	%	10.79		5.0%	0.7%	0.0%	
СВ5МН	MD/VA	4.2%	4.4%	3.:	1%	1.4%	6	1.4%	5	0.1%	0.0%	0.0%	
СВ6РН	VA	0.0%	0.3%	0.	0%	0.0%	6	0.0%	5	0.0%	0.0%	0.0%	
СВ7РН	VA	0.0%	0.0%	0.0	0%	0.0%	6	0.0%	5	0.0%	0.0%	0.0%	
CHSMH	MD	25.7%	8.5%	3.:	2%	0.3%	6	0.3%	5	0.0%	0.0%	0.0%	
EASMH	MD	5.9%	18.9%	2.:	2%	0.3%	6	0.2%	5	0.0%	0.0%	0.0%	
PAXMH	MD	6.3%	15.4%	8.0	0%	0.1%	6	0.2%	5	0.0%	0.0%	0.0%	
POTMH	MD/VA	4.1%	6.4%	4.0	0%	0.5%	6	0.4%	ó	0.0%	0.0%	0.0%	
РОММН	MD	4.1%	6.4%	4.:	1%	0.5%	6	0.5%	5	0.0%	0.0%	0.0%	
RPPMH	VA	5.9%	9.4%	5.4	4%	1.6%	6	1.5%	5	0.0%	0.0%	0.0%	
SBEMH	VA	0.0%	4.4%	0.0	0%	0.0%	6	0.0%	5	0.0%	0.0%	0.0%	
YRKPH	VA	0.0%	0.0%	0.0	0%	0.0%	6	0.0%	5	0.0%	0.0%	0.0%	
MD5MH	MD	8.5%	8.4%	6.0	6%	3.1%	6	3.1%	5	0.6%	0.0%	0.0%	
VA5MH	VA	0.5%	0.6%	0.3	3%	0.0%	6	0.0%	5	0.0%	0.0%	0.0%	
PATMH	MD	12.4%	5.8%	6.4	4%	0.5%	6	0.5%	5	0.0%	0.0%	0.0%	
MAGMH	MD	51.0%	51.0%	51.	.0%	27.39	%	23.29	%	0.4%	0.3%	0.0%	
SOUMH	MD	18.6%	24.3%	18.	.6%	11.29		13.89	%	3.0%	0.0%	0.0%	
SEVMH	MD	6.1%	19.2%		1%	0.0%	6	0.0%	5	0.0%	0.0%	0.0%	
	-												
		_		_				985		2009			
		Bas		Forest		Action	Pro	gress	Pro	ogress	WIP2	E3	
Phase	E 2 1	323T	N 53	3.6TN	37	6TN	Pro 34	ogress 14TN	Pro 20	ogress 64TN	189TN	138TN	Ī
Phase	5.3.2	323T 20.6	TP 2	3.6TN .6TP	37 37	6TN .9TP	Pro 34 2!	ogress 14TN 5.7P	Pro 20 18	ogress 64TN 8.3TP	189TN 13.2TP	138TN 10.6TP	
		323T <b>2</b> 20.6 <sup>-</sup> 1993-1	N 53 TP 2 .995 199	3.6TN .6TP 3-1995	37 37 1993	6TN .9TP 3-1995	Pro 34 2! 199:	ogress 14TN 5.7P 3-1995	Pro 20 18 199	ogress 64TN 8.3TP 03-1995	189TN 13.2TP 1993-1995	138TN 10.6TP 1993-1995	1
Cbseg	State	323T <b>2</b> 20.6 <sup>-</sup> 1993-1 Deep W	TN 53 TP 2 .995 199 /ater Dee	3.6TN .6TP 3-1995 o Water	37 37 1993 Deep	6TN .9TP 3-1995 Water	Pro 34 2! 199: Deep	ogress 14TN 5.7P 3-1995 o Water	Pro 26 18 199 Dee	ogress 64TN 8.3TP 93-1995 p Water	189TN 13.2TP 1993-1995 Deep Water	138TN 10.6TP 1993-1995 Deep Wate	1
Cbseg CB3MH	State MD	323T 2 20.6 <sup>-1</sup> 1993-1 Deep W 2.19	TN 53 TP 2 .995 199 /ater Dee	3.6TN .6TP 3-1995 o Water 0.0%	37 37 1993 Deep <mark>3</mark> .	6TN .9TP 8-1995 Water 4%	Pro 34 2! 199: Deep 2	ogress 14TN 5.7P 3-1995 o Water 2.3%	Pro 20 18 199 Dee	ogress 64TN 8.3TP 03-1995 p Water 0.7%	189TN 13.2TP 1993-1995 Deep Water <mark>0.1%</mark>	138TN 10.6TP 1993-1995 Deep Wate 0.0%	1
Cbseg CB3MH CB4MH	State MD MD	323T 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0	TN 53 TP 2 .995 199 /ater Dee // (% (**)	3.6TN .6TP 3-1995 o Water 0.0%	37 37 1993 Deep 3.	6TN .9TP 8-1995 Water 4%	Pro 34 2: 199: Deep 2	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0%	Pro 20 18 199 Dee 0	ogress 64TN 8.3TP 03-1995 p Water 0.7% 1.2%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9%	1
Cbseg CB3MH CB4MH CB5MH	State MD MD MD/V	323T 2 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0 /A 4.29	TN 53 TP 2 1995 199 Vater Dee % (%) (%	3.6TN .6TP 3-1995 o Water ).0% ).0%	37 37 1993 Deep 3. 27	6TN .9TP 8-1995 Water 4% .0%	Pro 34 2! 199: Deep 2	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0%	Pro 20 18 199 Dee 0	ogress 64TN 8.3TP 93-1995 p Water 9.7% 1.2%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9% 0.0%	1
Cbseg CB3MH CB4MH CB5MH CB6PH	State MD MD MD/\	323T 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0 /A 4.29	TN 53 TP 2 1.995 199 Vater Dee % () % () % () % ()	3.6TN .6TP 3-1995 0 Water 0.0% 0.0% 0.0%	37 37 1993 Deep 3. 27 5.	6TN .9TP 8-1995 Water 4% .0% 9%	Pro 34 2: 199: Deep 2 23 4	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9%	Pro 20 18 199 Dee 0 1	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9% 0.0%	1
Cbseg CB3MH CB4MH CB5MH	State MD MD MD/V	323T 2 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0 /A 4.29	TN 53 TP 2 1.995 199 Vater Dee % () % () % () % () % ()	3.6TN .6TP 3-1995 o Water ).0% ).0%	37 37 1993 Deep 3. 27 5.	6TN .9TP 8-1995 Water 4% .0%	Pro 34 2! 199: Deep 2 2: 4 0	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0%	Pro 26 18 199 Dee ( 1	ogress 64TN 8.3TP 93-1995 p Water 9.7% 1.2%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9% 0.0%	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH	State MD MD MD/V VA VA	323T 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0 /A 4.29 0.09	TN 53 TP 2 1995 199 Vater Dee % (%) % (%) % (%) % (%) % (%)	3.6TN .6TP 3-1995 Water 0.0% 0.0% 0.0% 0.0%	37 37 1993 Deep 3. 27 5. 0.	6TN .9TP 8-1995 Water 4% .0% .9% .8%	Pro 34 2! 199: Deep 2 23 4 0	ogress 14TN 5.7P 3-1995 5 Water 2.3% 3.0% 4.9% 0.3%	Pro 20 18 199 Dee 0 1 1 (0	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9% 0.0% 0.0%	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH	State MD MD MD/V VA VA MD	323T 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0 (A 4.29 0.09 0.09 25.7	TN 53 TP 2 995 199 /ater Dee // // // // // // // // // // // // /	3.6TN .6TP 3-1995 5 Water 0.0% 0.0% 0.0% 0.0%	37 37 1993 Deep 3. 27 5. 0.	6TN .9TP .9TP .1995 Water .4% .0% .9% .8%	Pro 34 2! 199: Deek 2 23 4 0 0	ogress 14TN 5.7P 3-1995 5 Water 2.3% 3.0% 1.9% 0.3% 0.0%	Pro 20 18 199 Deep ( 1 1 ( ) ( ) ( ) ( ) 1 1 1 1 1 1 1 1 1	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 0.0% 2.6%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9% 0.0% 0.0% 0.0%	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH	State MD MD/V VA VA MD MD	323T 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0 (A 4.29 0.09 0.09 25.7 5.99 6.39	TN 53 TP 2 995 199 /ater Dee // // // // // // // // // // // // /	3.6TN .6TP 3-1995 5 Water 0.0% 0.0% 0.0% 0.0% 0.0%	37 37 1993 Deep 3. 27 5. 0. 35 31	6TN .9TP 3-1995 Water 4% .0% .9% .8% .0%	Pro 34 2: 199: Deep 2: 4 0 0 3: 13	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 0.3% 0.0% 1.1% 3.9%	Pro 20 18 199 Dee (	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 0.0% 2.6%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9% 0.8%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9% 0.0% 0.0% 0.0%	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH	State MD MD/V VA VA MD MD MD MD MD MD MD MD	323T 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0 (A 4.29 0.09 0.09 25.7 5.99 6.39	TN 53 TP 2 995 199 /ater Dee // // // // // // // // // // // // /	3.6TN .6TP 3-1995 5 Water 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%	37 37 1993 Deep 3. 27 5. 0. 35 31 21	6TN .9TP 3-1995 Water .4% .0% .9% .8% .0% 8% 1%	Pro 34 2: 199: Deep 2: 4 0 0 3: 1: 5	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 0.3% 0.0% 1.1% 1.1% 1.6%	Pro 20 18 199 Deep (	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 0.0% 2.6% 2.0%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9% 0.8% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9% 0.0% 0.0% 0.0% 0.0% 0.0%	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH POTMH	State MD MD/\ MD/\ VA VA MD MD MD MD MD MD MD MD	323T 20.6 <sup>-1</sup> 1993-1 Deep W 2.19 21.0 (A 4.29 0.09 0.09 25.7 5.99 6.39 (A 4.19	TN 53 TP 2 995 199 /ater Dee // // // // // // // // // // // // /	3.6TN .6TP 3-1995 5 Water 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%	37 37 1993 Deep 3. 27 5. 0. 35 31 21	6TN .9TP 3-1995 Water .4% .0% .9% .8% .1% .5% .0% .1% .1% .1% .1%	Pro 34 2: 199: Deep 2: 4 0 0 3: 1:3 5 5	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 1.3% 1.6% 1.1% 1.6% 1.6% 1.6% 1.1% 1.6% 1.1% 1.6%	Pro 20 18 199 Deep (	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 0.0% 2.6% 2.0% 0.6%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9% 0.8% 0.0% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH POTMH	State MD MD/\ MD/\ VA VA MD	323T 20.6° 1993-1 Deep W 2.19 21.0 (A 4.29 0.09 0.09 25.7 5.99 (A 4.19 4.19	TN 53 TP 2 995 199 /ater Dee // // // // // // // // // // // // /	3.6TN .6TP 3-1995 5 Water 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	37 37 1993 Deep 3. 27 5. 0. 35 31 21	6TN .9TP 3-1995 Water .4% .0% .9% .8% .0% 8% 1% 5%	Pro 34 2: 199: Deep 2: 4 0 0 3: 1:3 5 5	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 1.3% 1.3% 1.6% 1.1% 1.6% 1.6% 1.1%	Pro 20 18 199 Deep (	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 0.0% 2.6% 0.6% 0.6% 0.4%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9% 0.8% 0.0% 0.0% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.9% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH POTMH POMMH RPPMH	State MD MD/\ MD/\ VA VA MD MD MD MD MD MD MD MD VA	323T 20.6° 1993-1 Deep W 2.19 21.0 /A 4.29 0.09 0.09 25.7 5.99 (A 4.19 4.19 5.99 0.09	TN 53 TP 2 1995 199 /ater Dee /// /// /// /// /// /// /// /// ///	3.6TN .6TP 3-1995 5 Water 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	37 37 1993 Deep 3. 27 5. 0. 35 31 21 9. 9.	6TN .9TP 3-1995 Water .4% .0% .9% .8% .1% .5% .0% .1% .5% .0% .1% .0%	Pro 34 2: 199: Deep 2: 4 0 0 3: 1: 5 8 3 0	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 1.3% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1% 1.1% 1.3%	Pro	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 2.6% 2.0% 0.6% 0.4% 0.4% 0.1% 0.0%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.0% 0.0% 2.9% 0.8% 0.0% 0.0% 0.0% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH POTMH POMMH RPPMH SBEMH YRKPH MD5MH	State MD MD/N VA VA MD MD MD MD MD VA VA VA MD MD MD MD VA VA VA VA MD	323T 20.6° 1993-1 Deep W 2.19 21.0 /A 4.29 0.09 0.09 25.7 5.99 6.39 /A 4.19 5.99 0.09	TN 53 TP 2 1995 199 /ater Dee /// /// /// /// /// /// /// /// ///	3.6TN .6TP 3-1995 5 Water 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	37 37 1993 Deep 3. 27 5. 0. 35 31 21 9. 9.	6TN .9TP 3-1995 Water .4% .0% .9% .8% .1% .5% .0% .1% .3% .0% .3%	Pro 34 2: 199: Deep 2: 4 0 0 3: 1: 5 8 3 0 9	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 1.3% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1% 1.1% 1.0%	Pro	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 2.6% 2.0% 0.6% 0.4% 0.4% 0.1% 0.0%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9% 0.8% 0.0% 0.0% 0.0% 0.0% 0.0% 1.3%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH POTMH POMMH RPPMH SBEMH YRKPH MD5MH VA5MH	State MD MD/N VA VA MD MD MD MD VA	323T 20.6° 1993-1 Deep W 2.19 21.0 /A 4.29 0.09 25.7 5.99 6.39 /A 4.19 5.99 0.09 0.09	TN 53 TP 2 1995 199 /ater Dee /// /// /// /// /// /// /// /// ///	3.6TN .6TP 3-1995 5 Water 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	37 37 1993 Deep 3. 27 5. 0. 35 31 21 9. 9. 11 5. 0.	6TN .9TP 3-1995 Water .4% .0% .9% .8% .1% .5% .0% .1% .3% .0% .3% .0% .3% .0%	Pro 34 2: 199: Deep 2: 4 0 0 3:: 55 8 3 0 9	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 1.3% 1.6% 1.1% 1.6% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1% 1.6% 1.1%	Pro 20 18 199 Dee   (	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 2.6% 2.6% 0.6% 0.4% 0.4% 0.4% 0.1% 0.0% 1.4% 0.0% 0.0% 0.0%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.0% 0.0% 0.0% 2.9% 0.8% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH POTMH POMMH RPPMH SBEMH YRKPH MD5MH VA5MH PATMH	State MD MD/N VA VA MD MD MD MD VA MD VA VA MD VA	323T 20.6° 1993-1 Deep W 2.19 21.0 /A 4.29 0.09 0.09 25.7 5.99 6.39 /A 4.19 5.99 0.09 8.59 0.59	TN 53 TP 2 1995 199 /ater Dee /// /// /// /// /// /// /// /// ///	3.6TN .6TP 3-1995 5 Water 5.0% 5.0% 5.0% 5.0% 5.0% 5.0% 5.0% 5.0%	37 37 1993 Deep 3. 27 5. 0. 35 31 21 9. 9. 11 5. 0.	6TN .9TP 3-1995 Water .4% .0% .9% .8% .1% .5% .0% .1% .3% .0% .3% .0% .3% .8% 9%	Pro 34 2: 199: Deep 2: 4 0 0 3: 1: 5 8 3 0 9 0 15	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 1.3% 1.6% 1.1% 1.6% 1.6% 1.6% 1.6% 1.6% 1.6% 1.7% 1.7% 1.7% 1.7% 1.7% 1.7%	Pro 20 18 199 Dee   (	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 0.0% 2.6% 0.6% 0.4% 0.4% 0.4% 0.1% 0.0% 4.1% 0.0%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9% 0.8% 0.0% 0.0% 0.0% 0.0% 1.3% 0.0% 0.0% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH POTMH POMMH RPPMH SBEMH YRKPH MD5MH VA5MH PATMH MAGMH	State MD MD/N VA VA MD MD/N MD MD/N VA VA VA VA VA VA VA MD VA VA MD VA MD VA MD ND MD ND	323T 20.6° 1993-1 Deep W 2.19 21.0 /A 4.29 0.09 0.09 25.7 5.99 6.39 /A 4.19 5.99 0.09 8.59 0.59	TN 53 TP 2 1995 199 /ater Dee /// /// /// /// /// /// /// /// ///	3.6TN .6TP 3-1995 5 Water 5.0% 5.0% 5.0% 6.0%	37 37 1993 Deep 3. 27 5. 0. 35 31 21 9. 9. 11 5. 0. 31	6TN .9TP 3-1995 Water .4% .0% .9% .8% .1% .5% .0% .1% .3% .0% .3% .0% .3% .0%	Pro 34 2: 199: Deep 2: 4 0 0 3: 1: 5 8 3 0 9 0 15:	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 1.3% 1.6% 1.1% 1.6% 1.6% 1.1% 1.6% 1.6% 1.7% 1.7% 1.7% 1.7% 1.7% 1.7% 1.7% 1.7%	Pro	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 2.6% 2.6% 0.4% 0.4% 0.4% 0.4% 0.1% 0.0% 1.1% 1.1	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9% 0.8% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	1
Cbseg CB3MH CB4MH CB5MH CB6PH CB7PH CHSMH EASMH PAXMH POTMH POMMH RPPMH SBEMH YRKPH MD5MH VA5MH PATMH	State MD MD/N VA VA MD MD MD MD VA MD VA VA MD VA	323T 20.6° 1993-1 Deep W 2.19 21.0 /A 4.29 0.09 0.09 25.7 5.99 6.39 /A 4.19 5.99 0.09 8.59 0.59	TN 53 TP 2 1995 199 /ater Dee /// /// /// /// /// /// /// /// ///	3.6TN .6TP 3-1995 5 Water 5.0% 5.0% 5.0% 5.0% 5.0% 5.0% 5.0% 5.0%	37 37 1993 Deep 3. 27 5. 0. 35 31 21 9. 9. 11 5. 0. 31 57	6TN .9TP 3-1995 Water .4% .0% .9% .8% .1% .5% .0% .1% .3% .0% .3% .0% .3% .8% 9%	Pro 34 2: 199: Deep 2: 4 0 0 3: 1: 5 8 3 0 9 0 1: 5: 22	ogress 14TN 5.7P 3-1995 o Water 1.3% 3.0% 1.9% 1.3% 1.6% 1.1% 1.6% 1.6% 1.6% 1.6% 1.6% 1.6% 1.7% 1.7% 1.7% 1.7% 1.7% 1.7%	Pro 20 18 199 Dee   (	ogress 64TN 8.3TP 93-1995 p Water 0.7% 1.2% 1.8% 0.0% 0.0% 2.6% 0.6% 0.4% 0.4% 0.4% 0.1% 0.0% 4.1% 0.0%	189TN 13.2TP 1993-1995 Deep Water 0.1% 5.4% 0.4% 0.0% 0.0% 2.9% 0.8% 0.0% 0.0% 0.0% 0.0% 1.3% 0.0% 0.0% 0.0%	138TN 10.6TP 1993-1995 Deep Wate 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0	1

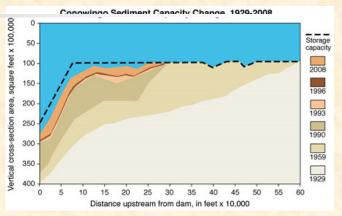
# Response of 2010 and 2017 WQSTM Deep Water DO to TN Load Reductions as a Percent of Phase 6 and Phase 5.3.2 Base in CB4MH





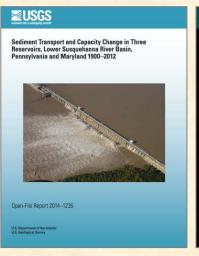
### **Brief Review of Conowingo Infill**

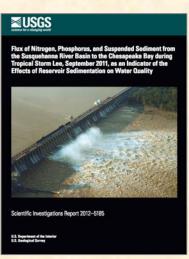
 Conowingo is nearing dynamic equilibrium, which has reduced its ability to trap sediment and nutrients.



Source: Graph, Michael Langland, U.S. Geological

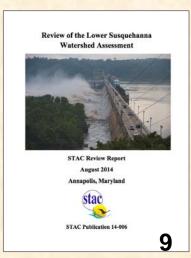
Several research articles have documented it, and they provide an analysis of changes in transport, which are incorporated in this analysis.













## JEQ Estimated Deep Channel Nonattainment under Conowingo Infill Conditions

Table 1. Model-estimated level of time and space nonattainment of deep-channel dissolved oxygen (DO) in all Chesapeake Bay segments that have a deep-channel designated use. The first four scenarios (columns 2–5) are key milestone scenarios and are ordered from the highest to the lowest nutrient and sediment loads for the entire Chesapeake watershed. The nutrient and sediment scenario loads are under the scenario title and have units of millions of kilograms for total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS). The last four columns (columns 6–9) are different Conowingo infill scenarios. Deep-channel variances of 2% are applied in the central mainstem (CB4MH) and Eastern Bay (EASMH) and 16% in the lower Chester River (CHSMH). (A variance is an allowable exceedance of an established water quality standard based on the best available data on achievable water quality conditions.) The estimated degree of nonattainment of the deep-channel DO water quality standard is shown in bold type for each deep-water segment of the Chesapeake. Once attainment is estimated to be achieved, the value is shown in italic type.

Scenario	1985 Scenario 160 TN 11.2 TP 5480 TSS	2010 Scenario 119 TN 8.8 TP 3790 TSS	TMDL WIP† Scenario 87 TN 6.8 TP 3030 TSS	All Forest Scenario 24 TN 1.2 TP 610 TSS	Increase of nonattainment under Conowingo scour conditions in January storm	Increase of nonattainment under January storm conditions compared with No Storm Scenario	Increase of nonattainment under June storm conditions compared with No Storm Scenario	Increase of nonattainment under Moderate High Flow conditions
CB segment								
					—— % ——			
CB3MH	17	5	0	0	0	1	1	0
CB4MH	49	23	1	0	1	1	4	2
CB5MH	17	0	0	0	0	0	0	0
CHSMH	39	28	15	0	1	2	8	1
EASMH	29	14	1	0	1	2	3	3
PATMH	42	18	0	0	0	0	0	0
POTMH	20	0	0	0	0	0	0	0
RPPMH	23	0	0	0	0	0	0	0

<sup>†</sup> Total maximum daily load Watershed Implementation Plan.



### Initial, Preliminary Conclusions:

- The 2017 CBP Models have findings consistent with the 2010 CBP Models.
- The current best estimates of the increase in net transport of phosphorus loads to the Chesapeake due to Conowingo infill is about 1.7 million pounds which results in an estimated 1-3% increase in nonattainment of the Deep Channel DO water quality standard under WIP levels of nutrient loads.
- The current best estimate of the increase in nitrogen and phosphorus loads to the Chesapeake due to estimated 2025 climate induced changes to hydrology is 1% or less watershed wide for both nutrients. The detrimental influence of increased nutrient loads will be offset in 2025 by sea level rise (0.17m) and a Bay more open to the ocean.



### Next Steps:

- Finalize both Phase 6 WSM & WQSTM. Assess if recalibration is needed after all input changes are applied in August.
- Begin geo runs now with current WQSTM calibration using a combination of NESC, ERDC, and cloud supercomputers to do about 200 geo runs.
- Finalize E3 and No Action Scenarios. Redo all key scenarios.
- Complete initial 2010 targets, 2010 targets + Conowingo infill, and 2010 targets + Conowingo infill + climate change for WQGIT 9/25-26 F2F.
- In addition, complete initial 2025 targets (and targets based on 2013, 2017, and 2025 land use variants to the extent possible).