

Appendix F. Development of State-Basin Targets, Countywide-Sector Goals and Impaired Bay Segment Targeting

State-Basin Targets

On July 9, 2018, the CBP PSC agreed on nutrient planning targets for the Phase III WIP at the State-basin scale. Maryland received 10 planning targets—a nitrogen and phosphorus load target for each of its five Chesapeake Bay basins. These planning targets were calculated using a methodology similar to that used in the Chesapeake Bay TMDL and the Phase II WIP. The approach, described in detail in Section 6.3 of the Chesapeake Bay TMDL report, relied on three key principles:

- Water quality and resource goals should be achieved in all 92 Bay segments
- Basins that contribute the most should reduce the most
- All previous reductions in nutrient loads should receive credit

The State-basin planning targets served as a starting point for states to establish their Phase III WIP state-basin targets. Rather than requiring states to meet a fixed loading target, EPA's Phase III WIP expectations document defines a process whereby the states are required to meet a defined water quality improvement. This is achieved through basin exchange factors, which define the impact that a load reduction from the basin would have on dissolved oxygen in the Bay, specifically in terms of micrograms per liter of dissolved oxygen per million pounds of nutrient reduction. For example, a one-million-pound reduction of nitrogen in the Western Shore basin would be expected to increase dissolved oxygen in the Bay by over 14 micrograms per liter, whereas the same reduction in the Eastern Shore basin would only raise dissolved oxygen by around 11 micrograms per liter. In setting State-basin targets, exchange factors ensure equivalency of water quality impact between basin reductions, so that a 14-pound reduction from the Eastern Shore basin would be equivalent to an 11-pound reduction from the Western Shore basin.

The expectations document defines three mechanisms by which the planning targets can be adjusted through exchange factors: nitrogen-to-phosphorus (N2P) exchanges, phosphorus-to-nitrogen (P2N) exchanges and basin-to-basin (B2B) exchanges. The N2P and P2N exchanges involves reducing the target load of nitrogen or phosphorus in a basin, and raising its counterpart based on a specific ratio. Maryland did not employ either N2P or P2N exchanges. The N2P exchange was not necessary since the State was able to meet its phosphorus goals, and the P2N exchanges were not pursued since the exchange ratio would not provide a meaningful increase in the nitrogen targets.

Maryland did rely on B2B exchanges of nitrogen to meet its targets. For B2B nitrogen exchanges, each minor basin had an associated exchange factor, and a target load could be shifted from one basin to another by multiplying the transferred load by the factor from the contributing basin and dividing it by the

factor from the receiving basin. Maryland was able to achieve reductions beyond the nitrogen planning target in the Western Shore basin by over 1.5 million pounds per year, and from this, target loads were transferred to the Eastern Shore, Potomac and Susquehanna basins. These final State-basin targets were increased by 0.4, 0.5 and 0.4 million pounds of nitrogen per year, respectively, over the planning targets. The State-basin planning targets and final targets are shown in Table F-1.

Maryland is providing two sets of loads per basin, a final State-basin target, which meets the water quality response of the planning targets, and a Phase III WIP, which specifies reductions beyond the final target. The Phase III WIP is based off of projected implementation to 2025 based on feasibility, and incorporating county-level implementation commitments. The load difference between the Phase III WIP and the final targets represents a margin of safety and load reductions beyond the targets would potentially be used to meet the State’s additional climate change reduction commitments.

Table F-1: Phase III WIP State-Basin Planning Targets and Final Targets.

Maryland Basin	Nitrogen (M Pounds per Year)			Approximate Exchange Factor*	Phosphorus (M Pounds per Year)			Approximate Exchange Factor*
	Planning Target	State-Basin Target	Phase III WIP Plan		Planning Target	State-Basin Target	Phase III WIP Plan	
Eastern Shore	15.2	15.6	15.6	10.6	1.29	1.29	1.23	33.4
Patuxent	3.2	3.1	3.1	12.2	0.30	0.30	0.27	31.6
Potomac	15.3	15.8	15.8	13.6	1.09	1.09	0.87	22.2
Susquehanna	1.2	1.6	1.6	16.3	0.05	0.05	0.05	38.5
Western Shore	10.9	9.6	9.0	14.1	0.95	0.95	0.96	35.3
Statewide	45.8	45.8	45.2	-	3.68	3.68	3.38	-

* The Approximate Exchange Factor is expressed in units of micrograms of dissolved oxygen per liter for one million pounds of nutrients reduced. The values shown here are approximated based on the average of minor basins within the state basin.

Countywide Goals

EPA’s June 9, 2018, Expectations for the Phase III Watershed Implementation Plans required goals to be established at a scale finer than the State-basin level

... EPA expects the jurisdictions to work with their local and regional partners, stakeholders, and federal and State facilities to establish measurable local planning goals at a geographic scale below the State-major river basin and implement them through their Phase III WIPs ...

EPA Expectations for the Phase III WIPs

As part of the Phase III WIP, Maryland is establishing countywide sector goals. These are presented in Appendix C, and are derived from Maryland’s Phase III WIP CAST scenario, meaning that they are consistent with the Phase III WIP Plan loads.

Targeting of Impaired Bay Segments

Appendix A. of EPA’s Expectations for the Phase III WIPs requires tidal states to use greater targeting in Bay segments that are significantly out of attainment.

EPA expects the four tidal jurisdictions—Delaware, District of Columbia, Maryland and Virginia—to use the information from these geographic isolation runs, as well as explanations of observed long term trends in watershed and tidal water quality and biological resource

monitoring data, to develop Phase III WIPs that demonstrate a greater level of targeting towards those Bay segments significantly out of attainment (based on monitoring assessments) with their Chesapeake Bay water quality standards.

EPA Expectations for the Phase III WIPs

An analysis of dissolved oxygen (DO) concentrations measured in the Bay between 2014 and 2016 was used to develop Maryland's 2018 Integrated Report of Surface Water Quality. This analysis showed 17 of 57 segments with exceedances above one percent for summer, open water dissolved oxygen criteria. These segments are shown in Table F-2.

Table F- 2: Water quality and nitrogen reductions in Bay segments with summer dissolved oxygen exceedances above one percent.

Bay Segment	Segment ID	Basin	Summer Open Water DO Exceedances	Nitrogen reduction from 2017 to WIP3
Pocomoke Tidal Fresh	POCTF	Eastern Shore	85%	15%
Pocomoke Oligohaline (Maryland)	POCOH_MD	Eastern Shore	50%	34%
Anacostia Tidal Fresh (Maryland)	ANATF_MD	Potomac	35%	4%
Pocomoke Oligohaline (Virginia)	POCOH_VA	Eastern Shore	30%	7%
Anacostia Tidal Fresh (Washington, DC)	ANATF_DC	Potomac	22%	3%
Wicomico Mesohaline	WICMH	Eastern Shore	21%	39%
Patuxent Tidal Fresh	PAXTF	Patuxent	12%	-11%
Chester Tidal Fresh	CHSTF	Eastern Shore	11%	19%
Patuxent Oligohaline	PAXOH	Patuxent	10%	10%
Chester Oligohaline	CHSOH	Eastern Shore	7.7%	18%
Patapsco Mesohaline	PATMH	Western Shore	4.9%	52%
Choptank Tidal Fresh	CHOTF	Eastern Shore	4.8%	19%
Rhode Mesohaline	RHDMH	Western Shore	4.8%	36%
Nanticoke Tidal Fresh (Delaware)	NANTF_DE	Eastern Shore	4.6%	17%
Nanticoke Tidal Fresh (Maryland)	NANTF_MD	Eastern Shore	4.6%	15%
Sassafras Oligohaline	SASOH	Eastern Shore	2.2%	14%
Chester Mesohaline	CHSMH	Eastern Shore	1.1%	15%
State (average)				17%
State (average w/o BACOH and PATMH)				9%

Maryland's Phase III WIP specifies reductions of 17 percent for statewide watershed loads from 2017 to 2025, but these largely occur in two Bay segments—the Patapsco Mesohaline and the Back River Oligohaline—where large wastewater treatment plants are being upgraded to include ENR processes. In the other 55 segments, average planned nitrogen reductions is nine percent. Table 7-2 also shows the planned reductions in the 17 segments with DO exceedances above 1 percent. All but four of these, Anacostia Tidal Fresh (Maryland), Anacostia Tidal Fresh (Washington, D.C.), Patuxent Tidal Fresh and Pocomoke Oligohaline (Virginia), have reductions at or above the nine percent mark. Eleven of the segments have reductions of more than 50 percent higher than that.

One segment below 9 percent, the Pocomoke Oligohaline Segment (Virginia), is a very small watershed on the lower Eastern Shore and when viewed together with Pocomoke Oligohaline Segment (Maryland), planned reductions to 2025 are 25 percent.

Of the three other segments below nine percent, additional near-term reductions are challenging due to the limited amount of wastewater and agricultural reduction opportunities in the watersheds. Furthermore, for the two Anacostia segments, water quality is anticipated to improve with the recent construction of the Anacostia River Tunnel System. The tunnel system, completed in 2018, handles combined sewer overflows that would historically be discharged into the river. It will be several years before Maryland has a three-year dataset for water quality in the river post-construction, however the State is committed to reassessing these segments and looking for additional opportunities where they can be found.

For the Patuxent Tidal Fresh segment, there are nine wastewater treatment plants, which discharged about 55 million gallons per day of wastewater in 2017. All of these have already been upgraded to ENR treatment, and their average concentration in 2017 was below two milligrams per liter, leaving little potential for additional reductions. Because the Phase III WIP projects future concentrations of 3.25 milligrams per liter at all of its significant municipal treatment plants, the WIP anticipates a load increase here, however if current discharge concentrations are maintained, the loads will be reduced by around five percent.

Conclusion

For all of these segments, while near-term reductions may be challenging, long term reductions from the stormwater and septic sectors should be possible. The Patuxent and Anacostia segment sheds are all wholly located in Phase I MS4 jurisdictions, so absent a full improvement of water quality, future permits will need to require additional implementation. This is consistent with the strategy laid out in the stormwater section of this document.