Activity 1 Team

May 13, 2020

Overview of all CAST scenarios, including geographic extent ("Geography"), BMP categories ("BMPs"), the total nitrogen reduction ("Total N Reduction (lbs/year)"), the total annualized cost ("Total Annualized Cost"), the cost effectiveness for nitrogen removal ("Cost Effectiveness ($/lbs)"), the name and affiliation of the person who ran the scenario ("Developer"), and additional notes for context and clarification ("Description & Notes").

Scenario	Attributes						
	Geography	**BMPs**	**Total N Reduction (lbs/year)**	**Total Annualized Cost ($/Year)**	**Cost Effectiveness ($/lbs)**	**Developer**	**Description & Notes**
1	Conowingo Shell > All counties in PA & MD > Drains to Chesapeake Bay > Excluded Phase I jurisdictions*	Agricultural + Urban	6.0 Million	$369 Million	$61	CWP	This is the only scenario that is aggregated by county; everything else is by land-river segment (LRS). This scenario uses the WIP3 baseline.
2	Susquehanna watershed > Added Q1 N-effective[1] LRS outside of the Susquehanna	Agricultural + Urban	6.1 Million	$236 Million	$39	CWP	This scenario uses the WIP3 baseline.
3	Only Q1 N-Effective[2] LRS within Bay Watershed	Agricultural	6.4 Million	$51 Million	$8	EPA CBP	Uses modified WIP 3 baseline; Scenario 10 is a modification of this scenario that uses the same BMPs, with a different focus geography
4	Only Q2 N-effective LRS within the Susquehanna watershed[3]	Agricultural	6.6 Million	$51 Million	$8	EPA CBP	
5	Only Q2 N-effective LRS within the Susquehanna watershed	Agricultural + Urban	6.6 Million	$51 Million	$8	CWP	The BMPs in this scenario are the same as Scenario 4, but it also includes urban forestry and urban buffer practices.
6	Conowingo Shell	Agricultural + Urban	6.2 Million	$124 Million	$20	CWP	Cost-Effective Ag Practices plus Urban Forestry and Bioswales

Overview of all CAST scenarios, including geographic extent ("Geography"), BMP categories ("BMPs"), the total nitrogen reduction ("Total N Reduction (lbs/year)"), the total annualized cost ("Total Annualized Cost"), the cost effectiveness for nitrogen removal ("Cost Effectiveness ($/lbs)"), the name and affiliation of the person who ran the scenario ("Developer"), and additional notes for context and clarification ("Description & Notes").

Scenario	Attributes						
	Geography	BMPs	Total N Reduction (lbs/year)	Total Annualized Cost ($/Year)	Cost Effectiveness ($/lbs)	Developer	Description & Notes
6.1	Conowingo Shell	Agricultural + Urban	6.2 Million	$90 Million	$14	CWP	This is a modification to Scenario 6 that incorporates BMP implementation levels and Urban BMPS (bioswale and infiltration) consistent with other final scenarios.
7	Conowingo Shell	Agricultural	6.0 Million	$67 Million	$11	CWP	Same as Scenario 6.1, but without urban BMPs
8	Only Q2 N-effective LRS within the Conowingo Shell	Agricultural + Urban	6.3 Million	$96 Million	$15	EPA CBP	Uses the same BMPs as Scenario 6.1 but focuses on the upper quartile LRSs. Uses modified WIP3 Baseline.
9	Only Q2 N-effective LRS within the Conowingo Shell	Agricultural	6.0 Million	$50 Million	$8	EPA CBP	Same BMPs as Scenario 8, but without urban BMPs
10	Susquehanna watershed > Added Q1 N-effective[1] Bay-Wide LRS outside of the Susquehanna	Agricultural + Urban	6.2 Million	$82 Million	$14	CWP	Same BMPs as Scenarios 6.1 and 8
11	Susquehanna watershed > Added Q1 N-effective[1] Bay-Wide LRS outside of the Susquehanna	Agricultural	6.1 Million	$66 Million	$11	CWP	Same as Scenario 10 but without Urban BMPs

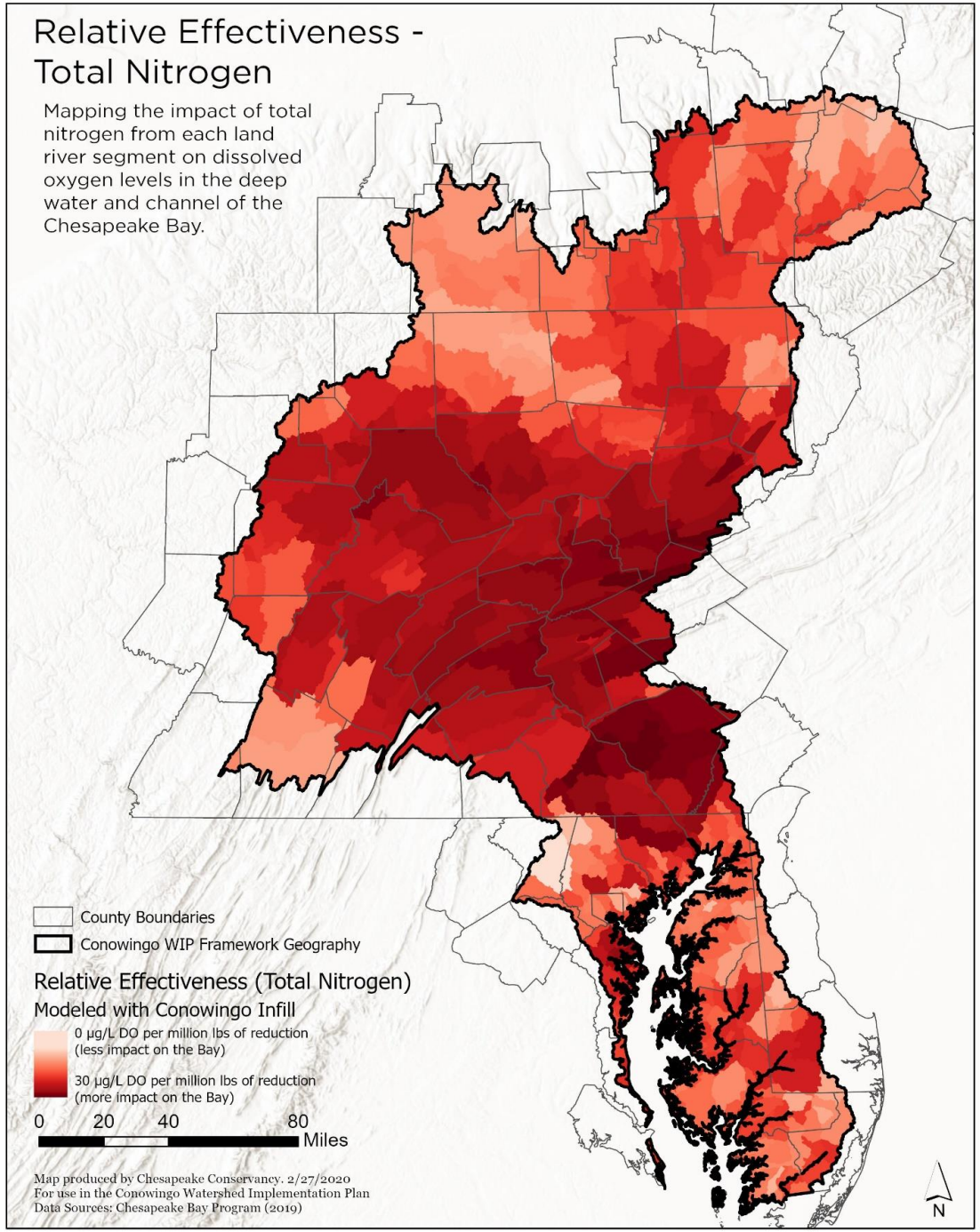
* If a county drains to the Chesapeake Bay and is partially within the Conowingo shell, then the whole county was included in the scenario output. Then, Phase I jurisdictions were removed (already heavily regulated and in less effective areas).
[1]Q1 Nitrogen (N)-Effective: Most effective land-river segments (LRS) for nitrogen reduction delineated by the upper quartile.
[2]Q2 Nitrogen (N)-Effective: Most effective land-river segments (LRS) for nitrogen reduction delineated by the median.
[3]This scenario uses 1995 CAST data.
Red Font Indicates Scenarios recommended to present to the PSC. Includes three geographies and Urban/Ag or Ag BMP options.

Rules for BMP Implementation

- BMP Implementation was confined to the scenario geography.
- The maximum implementation level for any BMP is the highest percentage implemented in any segment in that state for the land use targeted (e.g., highest percent implementation of conservation tillage on cropland).
- If the loads were too high after setting implementation to the maximum levels, wetland restoration levels were reduced to preserve ag land.
- In scenarios 6-7 and 10-11, BMPs were not implemented on segments that had zero implementation of that practice in the WIP3 plan.

Scenario 6.1

Scenario 6.1: Conowingo Geography, Agriculture + Urban	
Geographic Extent	Entire Conowingo geography
Primary BMPs	Cost-Effective Agricultural BMPs + Urban BMPs (Infiltration and Bioswales)
States Included	Maryland, New York, Pennsylvania
N Reduction	6.2 million pounds/year
Total Annualized Cost	$90 million
Cost Per Pound	$14


Relative Effectiveness - Total Nitrogen
Mapping the impact of total nitrogen from each land river segment on dissolved oxygen levels in the deep water and channel of the Chesapeake Bay.
County Boundaries
Conowingo WIP Framework Geography
Relative Effectiveness (Total Nitrogen)
Modeled with Conowingo Infill
0 µg/L DO per million lbs of reduction (less impact on the Bay)
30 µg/L DO per million lbs of reduction (more impact on the Bay)
0 20 40 80
Miles
Map produced by Chesapeake Conservancy. 2/27/2020
For use in the Conowingo Watershed Implementation Plan
Data Sources: Chesapeake Bay Program (2019)
N

BMPs Implemented in Scenario 6: Conowingo Geography, Agriculture + Urban						
Practice	**Duration**	**Unit**	**MD**	**NY**	**PA**	**Total**
Agricultural Practices						
Nutrient Application Management Core Nitrogen	annual	Acres	30,242	22,174	373,437	425,854
Nutrient Application Management Rate Nitrogen	annual	Acres	31,025	22,174	913,312	966,511
Nutrient Application Management Placement Nitrogen	annual	Acres	8,645	22,174	298,619	329,438
Nutrient Application Management Timing Nitrogen	annual	Acres	8,864	22,174	868,420	899,458
Conservation Tillage	annual	Acres	101,738	72,747	203,809	378,294
High Residue Tillage	annual	Acres	-21,516*	23,731	110,095	112,310
Low Residue Tillage	annual	Acres	--	20,401	-236*	20,165
Prescribed Grazing	cumulative	Acres	27,894	65,535	138,762	232,190
Wetland Restoration	cumulative	Acres	24,264	--	1,400	25,664
Grass Buffers	cumulative	Acres in Buffers	32,577	1,160	32,823	66,560
Soil and Water Conservation Plan	cumulative	Acres	129,605	524,166	279,875	933,646
Manure Incorporation	annual	Acres	72,647	--	14,720	87,367
Barnyard Runoff Control + Loafing Lot Management	cumulative	Acres	670	391	1,051	2,112
Urban Practices						
Infiltration Practices	cumulative	Acres	1,300	10,302	92	11,694
Bioswale	cumulative	Acres	6,415	--	1,011	7,426
* Negative values indicate a loss in acreage in a BMP. This is typically due to shifting to another category (e.g., high residue tillage shifting to conservation tillage).						

NITROGEN LOADS (MILLIONS OF POUNDS) FOR SCENARIO 6: CONOWINGO GEOGRAPHY AGRICULTURE PUS URBAN				
STATE	**Sector**	**Baseline**	**Scenario 6**	**N Reduction**
MD	Agriculture	13.88	12.25	1.62
	Developed	7.57	7.54	0.03
	Natural	6.20	6.15	0.05
	MD Total	**27.65**	**25.94**	**1.71**
NY	Agriculture	5.94	5.49	0.45
	Developed	1.40	1.35	0.05
	Natural	2.92	2.88	0.04
	NY Total	**10.26**	**9.73**	**0.54**
PA	Agriculture	39.43	35.66	3.77
	Developed	14.87	14.87	0.01
	Natural	17.46	17.29	0.17
	PA Total	**71.76**	**67.82**	**3.94**
	TOTAL	***109.68***	***103.49***	***6.19***

Annualized Costs by State and Sector for Scenario 6. Conowingo Geography Agriculture + Urban				
	Agriculture	**Developed**	**Natural**	**Total**
MD	$11,471,478	$7,969,215	--	**$19,440,693**
NY	$4,144,222	$12,866,150	--	**$17,010,373**
PA	$52,117,345	$1,115,020	--	**$53,232,366**
Total	***$67,733,046***	***$21,950,386***	**--**	***$89,683,431***

Scenario 7

Scenario 7. Conowingo Geography, Agriculture Only	
Geographic Extent	Conowingo Geography
Primary BMPs	Cost-Effective Agricultural BMPs
States Included	Maryland, New York, Pennsylvania
N Reduction	6.0 million pounds/year
Total Annualized Cost	$68 million
Cost Per Pound	$11

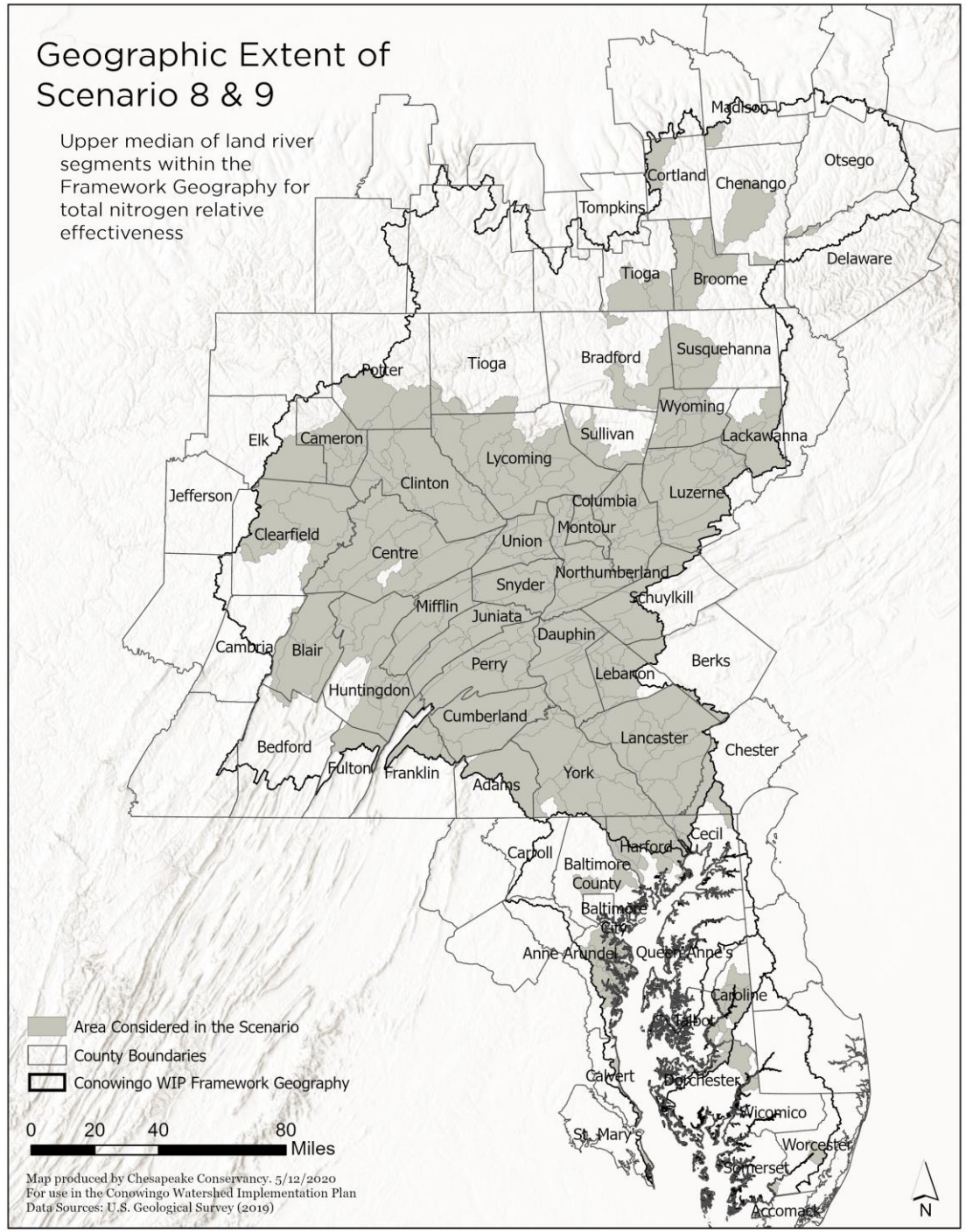
BMPs Implemented in Scenario 7: Conowingo Geography, Agriculture Only						
Practice	**Duration**	**Unit**	**MD**	**NY**	**PA**	**Total**
Agricultural Practices						
Nutrient Application Management Core Nitrogen	annual	Acres	30,242	22,174	373,437	425,854
Nutrient Application Management Rate Nitrogen	annual	Acres	31,025	22,174	913,312	966,511
Nutrient Application Management Placement Nitrogen	annual	Acres	8,645	22,174	298,619	329,438
Nutrient Application Management Timing Nitrogen	annual	Acres	8,864	22,174	868,420	899,458
Conservation Tillage	annual	Acres	101,738	72,747	203,809	378,294
High Residue Tillage	annual	Acres	-21,516*	23,731	110,095	112,310
Low Residue Tillage	annual	Acres	--	20,401	-236*	20,165
Prescribed Grazing	cumulative	Acres	27,894	65,535	138,762	232,190
Wetland Restoration	cumulative	Acres	24,264	--	1,400	25,664
Grass Buffers	cumulative	Acres in Buffers	32,577	1,160	32,823	66,560
Soil and Water Conservation Plan	cumulative	Acres	129,605	524,166	279,875	933,646
Manure Incorporation	annual	Acres	72,647	--	14,720	87,367
Barnyard Runoff Control + Loafing Lot Management	cumulative	Acres	670	391	1,051	2,112
* Negative values indicate a loss in acreage in a BMP. This is typically due to shifting to another category (e.g., high residue tillage shifting to conservation tillage).						

NITROGEN LOADS (MILLIONS OF POUNDS) FOR SCENARIO 7: CONOWINGO GEOGRAPHY, AGRICULTURE ONLY				
STATE	**Sector**	**Baseline**	**Scenario 7**	**N Reduction**
MD	Agriculture	13.88	12.25	1.62
	Developed	7.57	7.57	--
	Natural	6.20	6.16	0.05
	MD Total	**27.65**	**25.98**	**1.67**
NY	Agriculture	5.94	5.49	0.45
	Developed	1.40	1.40	--
	Natural	2.92	2.89	0.03
	NY Total	**10.26**	**9.78**	**0.48**
PA	Agriculture	39.43	35.66	3.77
	Developed	14.87	14.87	--
	Natural	17.46	17.29	0.17
	PA Total	**71.76**	**67.83**	**3.93**
TOTAL		***109.68***	***103.59***	***6.09***

Annualized Costs by State and Sector for Scenario 7. Conowingo Geography, Agriculture Only				
	Agriculture	**Developed**	**Natural**	**Total**
MD	$11,471,478	--	--	**$11,471,478**
NY	$4,144,223	--	--	**$4,144,223**
PA	$52,117,345	--	--	**$52,117,345**
Total	***$67,733,046***	**--**	**--**	***$67,733,046***

Scenario 8

Scenario 8. Conowingo, Cost-Effective LRSs, Agriculture + Urban	
Geographic Extent	Upper Median Segments in the Conowingo Geography
Primary BMPs	Cost-Effective Agricultural BMPs plus Infiltration and Bioswales
States Included	Maryland, New York, Pennsylvania
N Reduction	$6.3 million pounds/year
Total Annualized Cost	$96 million/year
Cost Per Pound	$15/pound


Geographic Extent of Scenario 8 & 9
Upper median of land river segments within the Framework Geography for total nitrogen relative effectiveness
Madison
Otsego
Cortland
Chenango
Tompkins
Delaware
Tioga
Broome
Susquehanna
Bradford
Potter
Tioga
Wyoming
Sullivan
Lackawanna
Elk
Cameron
Lycoming
Clinton
Jefferson
Columbia
Luzerne
Montour
Clearfield
Union
Centre
Northumberland
Snyder
Schuylkill
Mifflin
Juniata
Dauphin
Cambria
Blair
Perry
Berks
Lebanon
Huntingdon
Cumberland
Lancaster
Chester
Bedford
Fulton
Franklin
Adams
York
Cecil
Harford
Carroll
Baltimore County
Baltimore City
Anne Arundel
Queen Anne's
Caroline
Talbot
Calvert
Dorchester
Wicomico
St. Mary's
Worcester
Somerset
Accomack
Area Considered in the Scenario
County Boundaries
Conowingo WIP Framework Geography
0 20 40 80
Miles
N
Map produced by Chesapeake Conservancy. 5/12/2020
For use in the Conowingo Watershed Implementation Plan
Data Sources: U.S. Geological Survey (2019)

BMPs Implemented in Scenario 8: Conowingo, Cost-Effective LRSs, Agriculture + Urban						
Practice	**Duration**	**Unit**	**MD**	**NY**	**PA**	**Total**
Agricultural Practices						
Nutrient Application Management Core Nitrogen	annual	Acres	-105*	2,479	414,788	417,161
Nutrient Application Management Rate Nitrogen	annual	Acres	4,634	2,479	687,206	694,319
Nutrient Application Management Placement Nitrogen	annual	Acres	-30*	2,479	275,790	278,239
Nutrient Application Management Timing Nitrogen	annual	Acres	1,324	2,479	682,045	685,847
Conservation Tillage	annual	Acres	17,775	12,791	146,485	177,052
High Residue Tillage	annual	Acres	-13,397*	12,508	56,479	55,590
Low Residue Tillage	annual	Acres	--	5,970	93,685	99,655
Prescribed Grazing	cumulative	Acres	8,358	4,942	100,484	113,784
Forest Buffers	cumulative	Acres in Buffers	1,571	1,042	20,362	22,974
Wetland Restoration	cumulative	Acres	3,063	--	3,560	6,623
Grass Buffers	cumulative	Acres in Buffers	7,376	385	24,081	31,843
Soil and Water Conservation Plan	cumulative	Acres	30,139	55,609	295,182	380,931
Manure Incorporation	annual	Acres	12,842	--	123,234	136,076
Barnyard Runoff Control + Loafing Lot Management	cumulative	Acres	169	47	972	1,187
Urban Practices						
Infiltration Practices	cumulative	Acres	8,976	3,673	1,037	13,686
Bioswale	cumulative	Acres	9,911	--	20,006	29,916
* Negative values indicate a loss in acreage in a BMP. This is typically due to shifting to another category (e.g., high residue tillage shifting to conservation tillage).						

NITROGEN LOADS (MILLIONS OF POUNDS) FOR SCENARIO 8: CONOWINGO, COST-EFFECTIVE LRSS, AGRICULTURE + URBAN				
STATE	**Sector**	**Baseline**	**Scenario 8**	**N Reduction**
MD	Agriculture	14.31	13.74	0.57
	Developed	7.62	7.50	0.13
	Natural	6.23	6.20	0.03
	MD Total	**28.16**	**27.44**	**0.72**
NY	Agriculture	5.98	5.87	0.11
	Developed	1.41	1.39	0.02
	Natural	2.92	2.92	0.01
	NY Total	**10.31**	**10.17**	**0.14**
PA	Agriculture	42.34	37.22	5.12
	Developed	14.88	14.73	0.15
	Natural	17.58	17.39	0.18
	PA Total	**74.79**	**69.34**	**5.45**
TOTAL		***113.26***	***106.96***	***6.31***

Annualized Costs by State and Sector for Scenario 8. Conowingo, Cost-Effective LRSs, Agriculture + Urban				
	Agriculture	**Developed**	**Natural**	**Total**
MD	$1,787,421	$21,010,811	--	**$22,798,232**
NY	$529,289	$4,586,840	--	**$5,116,128**
PA	$47,219,212	$21,084,433	--	**$68,303,645**
Total	***$49,535,921***	***$46,682,085***	**--**	***$96,218,005***

Scenario 9

Scenario 9. Susquehanna + Chesapeake, Effective LRSs, Agriculture	
Geographic Extent	Upper Median Segments in the Conowingo Geography
Primary BMPs	Cost-Effective Agricultural BMPs
States Included	Maryland, New York, Pennsylvania
N Reduction	6.0 million pounds/year
Total Annualized Cost	$50 million
Cost Per Pound	$8

BMPs Implemented in Scenario 9: Susquehanna + Chesapeake, Effective LRSs, Agriculture + Urban						
Practice	**Duration**	**Unit**	**MD**	**NY**	**PA**	**Total**
Agricultural Practices						
Nutrient Application Management Core Nitrogen	annual	Acres	-105*	2,479	414,788	417,161
Nutrient Application Management Rate Nitrogen	annual	Acres	4,634	2,479	687,206	694,319
Nutrient Application Management Placement Nitrogen	annual	Acres	-30*	2,479	275,790	278,239
Nutrient Application Management Timing Nitrogen	annual	Acres	1,324	2,479	682,045	685,847
Conservation Tillage	annual	Acres	17,775	12,791	146,485	177,052
High Residue Tillage	annual	Acres	-13,397*	12,508	56,479	55,590
Low Residue Tillage	annual	Acres	--	5,970	93,685	99,655
Prescribed Grazing	cumulative	Acres	8,358	4,942	100,484	113,784
Forest Buffers	cumulative	Acres in Buffers	1,571	1,042	20,362	22,974
Wetland Restoration	cumulative	Acres	3,063	--	3,560	6,623
Grass Buffers	cumulative	Acres in Buffers	7,376	385	24,081	31,843
Soil and Water Conservation Plan	cumulative	Acres	30,139	55,609	295,182	380,931
Manure Incorporation	annual	Acres	12,842	--	123,234	136,076
Barnyard Runoff Control + Loafing Lot Management	cumulative	Acres	169	47	972	1,187
* Negative values indicate a loss in acreage in a BMP. This is typically due to shifting to another category (e.g., high residue tillage shifting to conservation tillage).						

Annualized Costs by State and Sector for Scenario 9. Susquehanna + Chesapeake, Effective LRSs, Agriculture + Urban				
	Agriculture	**Developed**	**Natural**	**Total**
MD	$1,787,421	--	--	**$1,787,421**
NY	$529,289	--	--	**$529,289**
PA	$47,219,212	--	--	**$47,219,212**
Total	***$49,535,921***	**--**	**--**	***$49,535,921***

Scenario 10

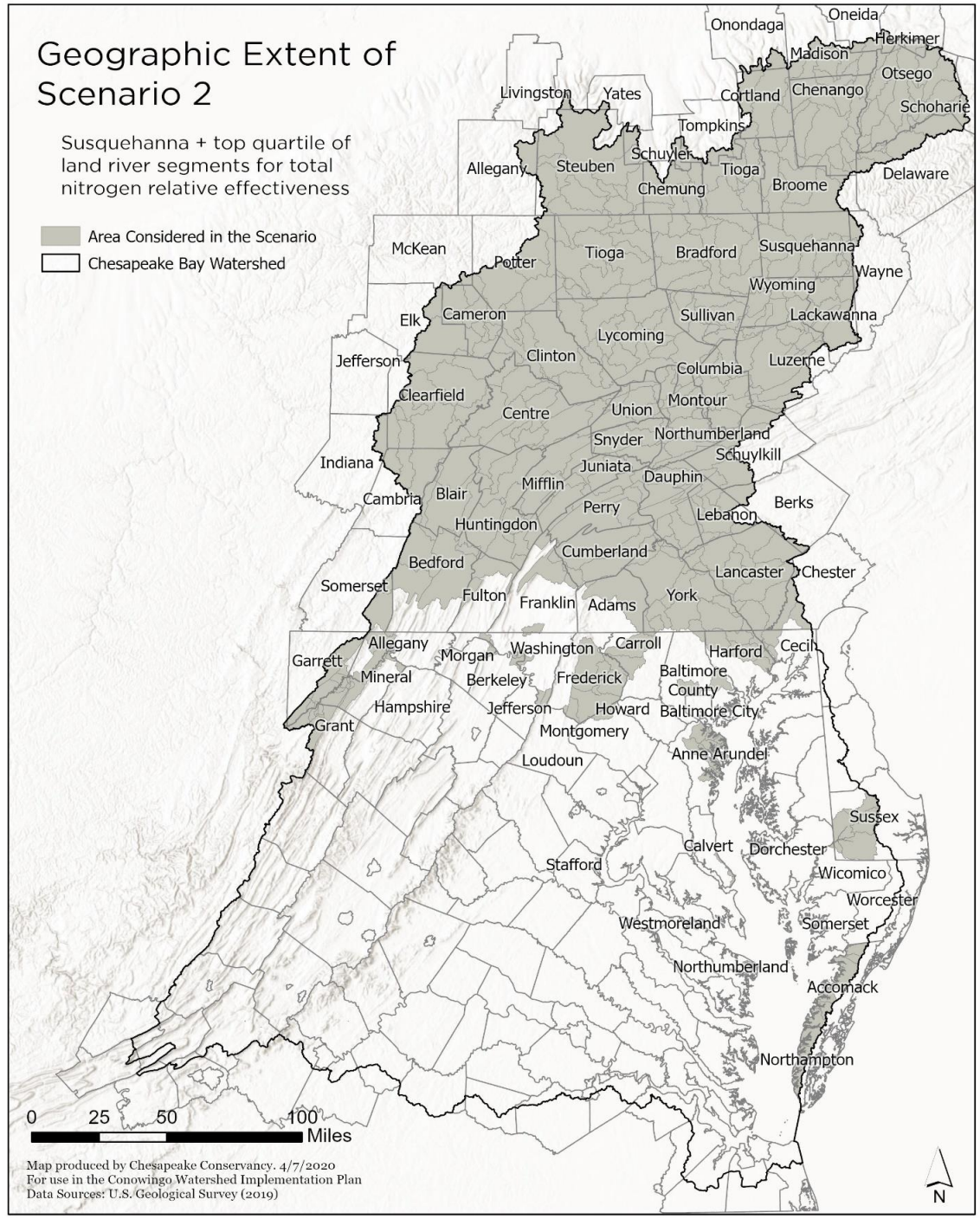
Scenario 10. Susquehanna, Cost-Effective LRSs, Agriculture + Urban	
Geographic Extent	Susquehanna Watershed, plus Additional LRSs in the upper Quartile of the Chesapeake Watershed
Primary BMPs	Cost-Effective Agriculture plus Urban BMPs
States Included	Maryland, New York, Pennsylvania, Virginia, West Virginia
N Reduction	6.2 million pounds/year
Total Annualized Cost	$82 million
Cost Per Pound	$13

Geographic Extent of Scenario 2

Susquehanna + top quartile of land river segments for total nitrogen relative effectiveness

Area Considered in the Scenario

Chesapeake Bay Watershed



Map produced by Chesapeake Conservancy. 4/7/2020
For use in the Conowingo Watershed Implementation Plan
Data Sources: U.S. Geological Survey (2019)

BMPs Implemented in Scenario 10: Susquehanna, Cost-Effective LRSs, Agriculture + Urban								
Practice	**Duration**	**Unit**	**MD**	**NY**	**PA**	**VA**	**WV**	**Total**
Agricultural Practices								
Nutrient Application Management Core Nitrogen	annual	Acres	22,936	22,174	371,547	710	1,175	416,657
Nutrient Application Management Rate Nitrogen	annual	Acres	30,086	22,174	918,015	568	--	970,276
Nutrient Application Management Placement Nitrogen	annual	Acres	6,599	22,174	301,246	900	--	330,019
Nutrient Application Management Timing Nitrogen	annual	Acres	8,596	22,174	873,365	900	--	904,135
Conservation Tillage	annual	Acres	18,325	72,747	202,770	2,343	48	293,843
High Residue Tillage	annual	Acres	2,592	23,731	108,625	74	--	134,949
Low Residue Tillage	annual	Acres	--	20,401	-297*	--	--	20,105
Prescribed Grazing	cumulative	Acres	20,305	69,806	153,505	436	3,298	243,616
Wetland Restoration	cumulative	Acres	20,591	--	6,597	163	0	27,188
Grass Buffers	cumulative	Acres in Buffers	16,274	1,160	33,160	1,373	22	50,594
Soil and Water Conservation Plan	cumulative	Acres	63,696	566,544	315,725	2,599	3	945,965
Manure Incorporation	annual	Acres	39,148	--	14,673	--	--	53,821
Barnyard Runoff Control + Loafing Lot Management	cumulative	Acres	12	416	1,269	19	5	1,698
Urban Practices								
Infiltration Practices	cumulative	Acres Treated	794	10,302	92	63	43	11,187
Bioswale	cumulative	Acres Treated	699	--	1,011	3	--	1,710
* Negative values indicate a loss in acreage in a BMP. This is typically due to shifting to another category (e.g., high residue tillage shifting to conservation tillage).								

NITROGEN LOADS (MILLIONS OF POUNDS) FOR SCENARIO 10: SUSQUEHANNA, COST-EFFECTIVE LRS, AGRICULTURE + URBAN				
STATE	**Sector**	**Baseline**	**Scenario 10**	**N Reduction**
MD	Agriculture	13.88	12.53	1.35
	Developed	7.57	7.56	0.01
	Natural	6.20	6.17	0.04
	MD Total	**27.65**	**26.26**	**1.39**
NY	Agriculture	5.94	5.47	0.47
	Developed	1.40	1.35	0.05
	Natural	2.92	2.88	0.04
	NY Total	**10.26**	**9.70**	**0.56**
PA	Agriculture	39.43	35.44	3.99
	Developed	14.87	14.87	0.01
	Natural	17.46	17.29	0.17
	PA Total	**71.76**	**67.60**	**4.17**
VA	Agriculture	7.32	7.25	0.06
	Developed	4.26	4.26	0.00
	Natural	4.97	4.97	0.00
	VA Total	**16.55**	**16.48**	**0.07**
WV	Agriculture	2.39	2.39	0.00
	Developed	1.01	1.01	0.00
	Natural	2.17	2.17	0.00
	WV Total	**5.57**	**5.57**	**0.00**
	TOTAL	***131.80***	***125.61***	***6.19***

Annualized Costs by State and Sector for Scenario 10. Susquehanna, Cost-Effective LRSs, Agriculture + Urban				
	Agriculture	**Developed**	**Natural**	**Total**
MD	$8,538,540	$1,682,443	--	**$10,220,983**
NY	$4,320,831	$12,866,150	--	**$17,186,981**
PA	$53,290,516	$1,115,020	--	**$54,405,536**
VA	$32,923	$81,318	--	**$114,241**
WV	$85,035	$53,223	--	**$138,257**
Total	***$66,267,844***	***$15,798,155***	**--**	***$81,927,742***

Scenario 11

Scenario 11. Susquehanna, Cost-Effective LRSs, Agricultural Only	
Geographic Extent	Entire Susquehanna Watershed, plus upper quartile LRSs within the entire Chesapeake Bay.
Primary BMPs	Cost-Effective Agricultural BMPs
States Included	Maryland, New York, Pennsylvania, Virginia, West Virginia
N Reduction	6.1 million pounds/year
Total Annualized Cost	$66 million
Cost Per Pound	$11

BMPs Implemented in Scenario 11: Susquehanna, Cost-Effective LRSs, Agricultural Only								
Practice	**Duration**	**Unit**	**MD**	**NY**	**PA**	**VA**	**WV**	**Total**
Agricultural Practices								
Nutrient Application Management Core Nitrogen	annual	Acres	22,936	22,174	371,547	710	1,175	418,542
Nutrient Application Management Rate Nitrogen	annual	Acres	30,086	22,174	918,015	568	--	970,844
Nutrient Application Management Placement Nitrogen	annual	Acres	6,599	22,174	301,246	900	--	330,919
Nutrient Application Management Timing Nitrogen	annual	Acres	8,596	22,174	873,365	900	--	905,035
Conservation Tillage	annual	Acres	18,325	72,747	202,770	2,343	48	296,234
High Residue Tillage	annual	Acres	2,592	23,731	108,625	74	--	135,022
Low Residue Tillage	annual	Acres	--	20,401	-297*	--	--	20,105
Prescribed Grazing	cumulative	Acres	20,305	69,806	153,505	436	3,298	247,350
Wetland Restoration	cumulative	Acres	20,591	--	6,597	163	--	27,352
Grass Buffers	cumulative	Acres in Buffers	16,274	1,160	33,160	1,373	22	51,989
Soil and Water Conservation Plan	cumulative	Acres	63,696	566,544	315,725	2,599	3	948,568
Manure Incorporation	annual	Acres	39,148	--	14,673	--	--	53,821
Barnyard Runoff Control + Loafing Lot Management	cumulative	Acres	12	416	1,269	19	5	1,721
* Negative values indicate a loss in acreage in a BMP. This is typically due to shifting to another category (e.g., high residue tillage shifting to conservation tillage).								

NITROGEN LOADS (MILLIONS OF POUNDS) FOR SCENARIO 11: SUSQUEHANNA, COST-EFFECTIVE LRSS, AGRICULTURAL ONLY				
STATE	**Sector**	**Baseline**	**Scenario 11**	**N Reduction**
MD	Agriculture	13.88	12.53	1.35
	Developed	7.57	7.57	0.00
	Natural	6.20	6.17	0.04
	MD Total	**27.65**	**26.27**	**1.38**
NY	Agriculture	5.94	5.47	0.47
	Developed	1.40	1.40	0.00
	Natural	2.92	2.88	0.04
	NY Total	**10.26**	**9.75**	**0.51**
PA	Agriculture	39.43	35.44	3.99
	Developed	14.87	14.87	0.00
	Natural	17.46	17.29	0.17
	PA Total	**71.76**	**67.60**	**4.16**
VA	Agriculture	7.32	7.25	0.06
	Developed	4.26	4.26	0.00
	Natural	4.97	4.97	0.00
	VA Total	**16.55**	**16.48**	**0.07**
WV	Agriculture	2.39	2.39	0.00
	Developed	1.01	1.01	0.00
	Natural	2.17	2.17	0.00
	WV Total	**5.57**	**5.57**	**0.00**
	TOTAL	***131.80***	***125.68***	***6.12***

Annualized Costs by State and Sector for Scenario 11. Susquehanna, Cost-Effective LRSs, Agricultural Only				
	Agriculture	**Developed**	**Natural**	**Total**
MD	$8,538,540	--	--	**$8,538,540**
NY	$4,320,831	--	--	**$4,320,831**
PA	$53,290,516	--	--	**$53,290,516**
VA	$32,923	--	--	**$32,923**
WV	$85,035	--	--	**$85,035**
Total	***$66,267,844***	**--**	**--**	***$66,267,844***