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VIRGINIA DEPARTMENT OF
ENVIRONMENTAL QUALITY

Chesapeake Bay Agricultural Workgroup Meeting

Buffer Upland Crediting a Proposal for Phase 7

by Bill Keeling - Virginia Department of Environmental Quality

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2014 Buffer Expert Panel Report

Recommendations of the Expert Panel to Reassess Removal Rates for Riparian Forest and Grass Buffers Best Management Practices

Submitted by:
Ken Belt, Peter Groffman, Denis Newbold, Cully Hession, Greg Noe, Judy Okay, Mark Southerland, Gary Speiran, Ken Staver, Anne Hairston-Strang, Don Weller, Dave Wise

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Table 2. Agricultural Riparian Forest Buffer Definition and Representation

Definition:	Agricultural riparian forest buffers are linear wooded areas adjacent to a body of water and managed to reduce the impacts of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals, to supply food, cover, and thermal protection to fish and other wildlife. The recommended buffer width for riparian forest buffers (agriculture) is 100 feet, with 35 feet minimum width required.
Land use:	*conventional tillage with manure (hwm), nutrient management conventional tillage with manure (nhi), conventional tillage without manure (hom), conservation tillage with manure (lwm), hay-fertilized (hyw), alfalfa (alf), pasture (pas), nutrient management conventional tillage without manure (nho), nutrient management conservation tillage with manure (nlo), nutrient management hay (nhy), nutrient management alfalfa (nal), nutrient management pasture (npa), degraded riparian pasture (trp),* and *hay without nutrients (hyo)*
Efficiency credited:	Landuse change to *forest, woodland, and wooded (for)* and a reduction efficiency for upland areas.
Effectiveness estimate:	Varies geographically TN: 19–65% (4x acres)*; TP: 30–45% (2x acres); TSS: 40–60% (2x acres). See Table 5.

Table 3. Agricultural Riparian Grass Buffer Definition and Representation

Definition:	Agricultural riparian grass buffers are linear strips of grass or other non-woody vegetation maintained between the edge of fields and a water body that help filter nutrients, sediment and other pollutants from runoff. The recommended buffer width for riparian grass buffers (agriculture) is 100 feet, with a 35 feet minimum width required.
Land use:	*conventional tillage with manure (hwm), nutrient management conventional tillage with manure (nhi), conventional tillage without manure (hom), conservation tillage with manure (lwm), hay-fertilized (hyw), alfalfa (alf), pasture (pas), nutrient management conventional tillage without manure (nho), nutrient management conservation tillage with manure (nlo), nutrient management hay (nhy), nutrient management alfalfa (nal), and nutrient management pasture (npa)*
Efficiency credited:	Land use change to *hay without nutrients (hyo)* and a reduction efficiency for upland areas. Upland areas efficiencies are credited for four times the buffer acreage for TN reduction and two times the buffer acreage for TP and TSS reduction.
Effectiveness estimate:	Varies geographically TN: 13–46% (4x acres)*; TP: 30–45% (2x acres); TSS: 40–60% (2x acres). See Table 5.

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Attachment A

Riparian Forest Buffers:
Agricultural riparian forest buffers are linear wooded areas along rivers, streams and shorelines. Forest buffers help filter nutrients, sediments and other pollutants from runoff as well as remove nutrients from groundwater. The recommended buffer width for riparian forest buffers (agriculture) is 100 feet, with a 35 feet minimum width required.

Land uses: all agricultural land uses, except animal feeding operations

Reduction Representation: There is a land use change for the buffer area from existing land use to forest land use. A reduction efficiency is applied to upland areas. The reduction efficiency varies geographically according to the table below. For each acre of riparian buffer, the upland acres to which the efficiency applies is as follows:

- TN: 4x buffer acres
- TP: 2x buffer acres
- TSS: 2x buffer acres

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Treatment of Upslope Acreage

Riparian zones form a transition between upslope soils and streams and though they may account for only a small percentage of watershed area, they can exert a disproportionately large role in regulating the flux of N to the stream (Cirmo and McDonnell 1997; Hill 1996a). The treatment of upslope acreage was covered in depth during the 2009 review (Okay and Weammert 2009) when it was determined that a 4:1 upslope to buffer area ratio was appropriate. This Expert Panel was asked to take another look at the 4:1 ratio to ensure it was appropriate and conservative.

The Panel reasoned that since the upslope area treated is the distance from buffer to ridge. Based on an average drainage density of 2 km/km^2, the average distance from a 1^{st} order stream to ridge is 250 meters. So even for a 100 foot wide buffer on a 1^{st} order stream, the existing 4:1 ratio is conservative. For larger order streams, the entire upslope area should be considered further suggesting that the 4:1 ratio is conservative.

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Phase 6 AMT/Partnership Recommendations for Exclusion Buffers

- Fundamentally Changed how Pasture, Direct Deposition, and Exclusion Buffers were Simulated in P6 vs P5.x
- Introduced Reduction in Direct Loadings from Grazing Livestock as Method to Credit Exclusion Fencing
- P4.3 Exclusion Credited as Efficiency BMP, P5.x as LU Change BMP, P6 as a Reduction in Direct Loadings
- Direct Deposition Loadings are Reduced in the Access Area and Moved to the Adjacent Upland Pasture
- Directed the Change on Land Use Eligible for Exclusion Buffers in P6 – Silent on Other Buffers

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P5 NEIEN Appendix A

ID	BMP Name	Default Land Use	DefaultSBLandUse	Scenario Builder BMP	Status	Measur
1	Access Control	Pasture/Hay	trp	PastFence	Release	AC
2	Access Control	Pasture/Hay	trp	PastFence	Release	Acre
3	Access Control	Pasture/Hay	trp	PastFence	Release	Acres
668	Fencing	Pasture/Hay	trp	PastFence	Release	Acres
670	Fencing	Pasture/Hay	trp	PastFence	Release	Feet
672	Fencing	Pasture/Hay	trp	PastFence	Release	Length F
674	Fencing	Pasture/Hay	trp	PastFence	Release	Percent
675	Fencing	Pasture/Hay	trp	PastFence	Release	Width
1143	Stream Protection - TMDL	Agricultural	trp	PastFence	Release	Area Pro
1144	Stream Protection - TMDL	Agricultural	trp	PastFence	Release	Average
1145	Stream Protection - TMDL	Agricultural	trp	PastFence	Release	Stream E
1168	Streambank Protection (Fencing)	Agricultural	trp	PastFence	Release	Area Imp
1169	Streambank Protection (Fencing)	Agricultural	trp	PastFence	Release	Area Pro
1170	Streambank Protection (Fencing)	Agricultural	trp	PastFence	Release	Average
1171	Streambank Protection (Fencing)	Agricultural	trp	PastFence	Release	Stream E
1389	Watercourse Access Control Grass RI	Pasture/Hay	trp	PastFence	Release	Length
1390	Watercourse Access Control Grass RI	Pasture/Hay	trp	PastFence	Release	Width
1391	Watercourse Access Control Narrow Grass RI	Pasture/Hay	trp	PastFence	Release	Length
1392	Watercourse Access Control Narrow Grass RI	Pasture/Hay	trp	PastFence	Release	Width
1393	Watercourse Access Control Narrow Trees Fence RI	Pasture/Hay	trp	PastFence	Release	Length
1394	Watercourse Access Control Narrow Trees Fence RI	Pasture/Hay	trp	PastFence	Release	Width
1397	Watercourse Access Control Trees Fence RI	Pasture/Hay	trp	PastFence	Release	Length
1398	Watercourse Access Control Trees Fence RI	Pasture/Hay	trp	PastFence	Release	Width
669	Fencing	Pasture/Hay	trp	PastFence	Draft	Area Tre
671	Fencing	Pasture/Hay	trp	PastFence	Draft	FT

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Phase 6 AMT/Partnership Recommendations for Exclusion Buffers

NEIEN Appendix Example for Access Control with Grass Buffers

BMP Name	DefaultSBLandUse Group	Measurement Name	Unit Name	Scenario Builder BMP	Comments
Access Control with Grass Buffers	Pasture	Acres	ACRE	GrassBuffAccess	Assume 17.41 AU/Acre Fenced
Access Control with Grass Buffers	Pasture	Length	FEET	GrassBuffAccess	Assume 17.41 AU/Acre Fenced
Access Control with Grass Buffers	Pasture	Width	FEET	GrassBuffAccess	Assume 17.41 AU/Acre Fenced
Access Control with Grass Buffers	Pasture	Animal Unit	AU	GrassBuffAccess	Assume 17.41 AU/Acre Fenced

Circa: 2016

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Progress Year 2024 Phase 6/CAST NEIEN Appendix A

	A	B	C	D	E	F	G	H
1	StatusName	CreditDuration	CASTBmpShortName	BMPName	DefaultCASTLoadSourceGroup	MeasurementName	UnitName	Comments
728	Release	10	landretireopen	Establishment of permanent vegetative cover ((	row	acres	ACRE	
729	Release	15	forestbuffexcl	Exclusion Fence with Forest Buffer	pasture	Acres	ACRE	Assumes 22.9 AU/Acre Fence
730	Release	15	forestbuffexcl	Exclusion Fence with Forest Buffer	pasture	Length	FEET	Assumes 22.9 AU/Acre Fence
731	Release	15	forestbuffexcl	Exclusion Fence with Forest Buffer	pasture	Width	FEET	Assumes 22.9 AU/Acre Fence
732	Release	15	forestbuffexcl	Exclusion Fence with Forest Buffer	pasture	Length Fenced	FEET	Assumes 22.9 AU/Acre Fence
733	Release	15	forestbuffexcl	Exclusion Fence with Forest Buffer	pasture	Livestock	AU	Submit with dimensions if know
734	Release	10	grassbuffexcl	Exclusion Fence with Grass Buffer	pasture	Length Fenced	FEET	Assumes 22.9 AU/Acre Fence
735	Release	10	grassbuffexcl	Exclusion Fence with Grass Buffer	pasture	Livestock	AU	Submit with dimensions if know
736	Release	10	grassbuffexcl	Exclusion Fence with Grass Buffer	pasture	Acres	ACRE	Assumes 22.9 AU/Acre Fence
737	Release	10	grassbuffexcl	Exclusion Fence with Grass Buffer	pasture	Length	FEET	Assumes 22.9 AU/Acre Fence
738	Release	10	grassbuffexcl	Exclusion Fence with Grass Buffer	pasture	Width	FEET	Assumes 22.9 AU/Acre Fence
739	Release	15	forestbuffexclnar	Exclusion Fence with Narrow Forest Buffer	pasture	Acres	ACRE	Assumes 22.9 AU/Acre Fence
740	Release	15	forestbuffexclnar	Exclusion Fence with Narrow Forest Buffer	pasture	Length	FEET	Assumes 22.9 AU/Acre Fence
741	Release	15	forestbuffexclnar	Exclusion Fence with Narrow Forest Buffer	pasture	Width	FEET	Assumes 22.9 AU/Acre Fence
742	Release	15	forestbuffexclnar	Exclusion Fence with Narrow Forest Buffer	pasture	Length Fenced	FEET	Assumes 22.9 AU/Acre Fence
743	Release	15	forestbuffexclnar	Exclusion Fence with Narrow Forest Buffer	pasture	Livestock	AU	Submit with dimensions if know
744	Release	10	grassbuffexclnar	Exclusion Fence with Narrow Grass Buffer	pasture	Length	FEET	Assumes 22.9 AU/Acre Fence
745	Release	10	grassbuffexclnar	Exclusion Fence with Narrow Grass Buffer	pasture	Length Fenced	FEET	Assumes 22.9 AU/Acre Fence
746	Release	10	grassbuffexclnar	Exclusion Fence with Narrow Grass Buffer	pasture	Width	FEET	Assumes 22.9 AU/Acre Fence
747	Release	10	grassbuffexclnar	Exclusion Fence with Narrow Grass Buffer	pasture	Acres	ACRE	Assumes 22.9 AU/Acre Fence
748	Release	10	grassbuffexclnar	Exclusion Fence with Narrow Grass Buffer	pasture	Livestock	AU	Submit with dimensions if know

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Expert Recommendations

- 2014 EP Did Not Distinguish Between Exclusion and Non-Exclusion Buffers (did for forest vs grass, width, other factors)
- 2014 EP Report Lists Land Uses Buffers Can Be Applied – Does Not Specify Must Be Applied to All or Which Upland Land Uses
- 2014 EP 4X Upland Area on Average Within 250 Meters of Small Streams and is Conservative
- 2014 EP is Silent on How Upland Credit Should be Calculated
- Phase 6 AMT/Experts Fundamentally Changed how Exclusion Buffers are Credited and Specified Application to Only Pasture

Topics VA Requested WTWG/CBP Consider for P7

- Cover Crop Excess – Revisit how Cropland Rotations are Estimated - Possible Redistribution of Excess
- **Review How Buffer Upland Benefit is Calculated - Proposed Change to Assignment of Load Sources for Upland Benefit Exclusion versus Non-Exclusion Buffers**
- Animal BMP Excess Particularly Animal Waste Management Systems – Request a Review of Current Process in Model versus BMP Reporting
- Backout of Herbaceous Land Use Change BMPs – Proposed a Change to the Backout Process Used for Herbaceous Land Use Change BMPs

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Current Process Used for Buffer Upland Credit

- Exclusion Buffers (grass and forest with streamside fencing) Applied Exclusively to Pasture - Buffer Upland Credit Applied Exclusively to Pasture

- Non-Exclusion Buffers (grass and forest no streamside fencing) Applied to All* Ag Load Sources Except Pasture – Buffer Upland Credit Applied to All Ag Load Sources Including Ag Open and Pasture

- Narrow Buffers (grass and forest, exclusion and non-exclusion) Applied as land use change BMP only no upland benefit calculated.

* Forest Buffer can be applied to Ag Open, but Grass Buffers are not

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The Proposal

- Distribute the Upland Benefit from Non-Exclusion Buffers Proportionally to the Load Sources it is Applied – **Stop Providing Upland Credit to Non-Exclusion Buffers from Pasture**

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Scenarios Run

- 2023 Corrected – Progress Year 2023 Run with Transposed Measurements Removed – Current Process to Distribute Buffer Upland Credit
- 2023 Corrected No Pasture – The Above Scenario but with Proportional Distribution of Buffer Upland Credit and **Zero Acres of Paster for Non-Exclusion Buffers**

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Current Process Used for Buffer Upland Credit

Current Method (Scenario 2023 Corrected)								
BMP	Load Source	% Applied All	DE %	MD %	NY %	PA %	VA %	WV %
Non-Exclusion Buffer	Ag Open Space	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-Exclusion Buffer	Total Hay	25.57%	3.96%	9.44%	65.61%	29.04%	57.08%	55.54%
Non-Exclusion Buffer	Pasture	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-Exclusion Buffer	Cropland	74.43%	96.04%	90.56%	34.39%	70.96%	42.92%	44.46%
Non-Exclusion Buffer	All	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Non-Exclusion Buffer Upland Acres	Ag Open Space	29.36%	0.38%	2.03%	9.32%	50.22%	4.99%	1.64%
Non-Exclusion Buffer Upland Acres	Total Hay	11.96%	3.75%	7.61%	49.37%	12.17%	26.28%	28.83%
Non-Exclusion Buffer Upland Acres	Pasture	13.53%	4.13%	6.79%	15.43%	13.30%	42.60%	38.98%
Non-Exclusion Buffer Upland Acres	Cropland	45.14%	91.74%	83.57%	25.88%	24.31%	26.13%	30.55%
Non-Exclusion Buffer Upland Acres	All	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Exclusion Buffer	Pasture	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Exclusion Buffer Upland Acres	Pasture	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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Proposed Process for Buffer Upland Credit

Proportional Distribution (Scenario 2023 Corrected no pasture)								
BMP	Load Source	% Applied All	DE %	MD %	NY %	PA %	VA %	WV %
Non-Exclusion Buffer	Ag Open Space	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-Exclusion Buffer	Total Hay	25.79%	3.96%	9.44%	65.61%	29.04%	57.08%	55.54%
Non-Exclusion Buffer	Pasture	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-Exclusion Buffer	Cropland	74.21%	96.04%	90.56%	34.39%	70.96%	42.92%	44.46%
Non-Exclusion Buffer	All	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Non-Exclusion Buffer Upland Acres	Ag Open Space	2.36%	0.02%	1.19%	8.63%	2.23%	8.27%	0.33%
Non-Exclusion Buffer Upland Acres	Total Hay	21.27%	3.96%	9.23%	60.09%	23.71%	51.80%	54.89%
Non-Exclusion Buffer Upland Acres	Pasture	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Non-Exclusion Buffer Upland Acres	Cropland	76.37%	96.02%	89.58%	31.28%	74.06%	39.93%	44.78%
Non-Exclusion Buffer Upland Acres	All	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Exclusion Buffer	Pasture	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Exclusion Buffer Upland Acres	Pasture	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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Proportional vs Current Distribution of Upland Credit Loadings Impacts

	Delta TN Proportional Dist - Current	Delta TP Proportional Dist - Current	Delta TSS Proportional Dist - Current
Delaware (CBWS Only)	-1,980	96	-39,434
District of Columbia (CBWS Only)	0	0	0
Maryland (CBWS Only)	-66,876	1,298	-2,049,398
New York (CBWS Only)	-1,366	4	-48,249
Pennsylvania (CBWS Only)	-16,309	9,995	-1,897,400
Virginia (CBWS Only)	-21,765	1,815	-1,658,175
West Virginia (CBWS Only)	-2,169	41	-122,478
All	-110,464	13,250	-5,815,134

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Discussion