



Risk Assessment of Water Impairment from Animal Concentration Areas

Background

Nutrient enrichment of surface and ground water in the Chesapeake Bay Watershed and throughout Virginia is a major water quality resource concern. Animal Concentration Areas (ACA) have long been suspected to contribute to the nutrient enrichment of water. For the purpose of this technical note, an ACA is defined as an area of land which has a high concentration of livestock, large amounts of waste deposition, and an inability to maintain vegetation. Examples may include winter feeding areas in pastures, concentrated loafing areas, exercise lots, barn yards, and animal holding areas. An ACA that is in close proximity to water is at risk of causing a water quality impairment.

An ACA receives large amounts of nutrients in the form of manure and urine. The amount of nutrients within the ACA may be estimated mathematically by considering a number of variables such as number, weight and type of livestock, manure production, manure analysis, number of days in the concentrated area, size of the concentrated area, freedom of movement, and management techniques.

The risk of transport of these nutrients from the ACA area to surface and ground water is unique to each concentrated area. Transport potential is dependent on an array of site variables such as location, soil type, slope, drainage, soil leaching, proximity to a water feature, and presence of a riparian buffer.

A two-step approach is used to estimate the potential for water quality impairment from an ACA.

(1) Determine the nutrient loading rate from the concentrated area and

(2) Evaluate the on-site features that affect the potential transport of nutrients from the concentrated area to the water feature.

Purpose

A Risk Assessment worksheet has been developed to provide an evaluation tool for conservation planners to assess the risk of water quality impairment of both surface and ground water from an ACA area.

This worksheet is in a fillable Excel spreadsheet format. There are three parts: title page, manure/nutrient estimation and site information for transport potential.

The values used in this worksheet are standard and accepted values that appear in the USDA NRCS Agricultural Waste Management Field Handbook.

Completion of the Form

Step 1 – Complete Section 1 of the title page.

Step 2 – Complete input section of the “manure estimator”. Outputs will be calculated and appear automatically.

Step 3 –The output results of the manure estimator will be used to determine the loading points from Table 2. The loading points are then transferred to the scoring box.

Step 4 – Record the site information for the four site categories following the guidance in the comment section. Place the appropriate point amount in the corresponding scoring box.

Step 5 – The total score will be automatically calculated. If the total score is 120 or greater, there is a significant risk of water quality impairment for the concentrated area. Follow planning procedure to address the resource concern.

Step 6 – Complete Section 2 of the title page. Document alternatives discussed and indicate the selective alternative.

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Risk Assessment for Water Quality Impairment from Animal Concentration Areas

Section 1:

Client's Name: _____ Farm #: _____ Tract #: _____

Livestock Type: _____ No: _____ Avg. Wt.: _____

Is the cooperator currently feeding hay or other feedstuffs from a fixed location? Yes No

If yes, then describe where and how they are feeding:

If the cooperator is not feeding hay or other supplements, then do not complete this form.

Section 2:

For those who are feeding, are alternative concentrated feeding locations available? Yes No

Could relocation of the concentrated feeding area reduce the risk to the water resources? Yes No

Describe the alternatives discussed with the landowner:

Describe the selected alternative:

Note: The Landowner should be informed that if the selected alternative includes manure or wastewater handling, storage, or treatment practices, a Comprehensive Nutrient Management Plan (CNMP) must be developed and implemented for the farm prior to construction of the storage facility.

VA NRCS Concentrated/Feeding Livestock Area Manure and Nutrient Loading Estimator

1. **Manure Estimator** - Input site specific data into the table below:

Select Livestock Type from the list below in Table 1:	INPUTS								OUTPUT - Waste deposited annually in concentrated area		
	A	B	C	D	E	F	G	H	Manure (tons/ac/yr)	Total N (lbs/ac/yr)	Total P ₂ O ₅ (lbs/ac/yr)
1	100	75	250	90%	0.25	65	11	3.1	219	2,413	680

2. Guidance on inputs:

Column A, B, C, D, E, are site specific and may be adjusted according to site conditions and professional judgement.

Column D: If water is available in concentrated/feeding area, assume 60-70% drops in the area (adjust to site conditions).
If water is only available in pasture outside concentrated/feeding area, assume 40-50% drops in the area (adjust to site conditions).

Column E: The concentrated feeding area includes the feeding pad plus the total surrounding area with < 60% cover.

Columns F through H (see Table 1 below) are auto-filled with appropriate values when livestock type is selected.

TABLE 1

Livestock Type	Weight	Manure lbs./day/1,000lbs.	N/ton of manure	P ₂ O ₅ /ton of manure
1: Beef Finishing	400 - 1,000	65	11	3.1
2: Beef Cow/calf	900 - 1,400	104	7	3.5
3: Non Lact. Dairy	150 - 1,500	56	10	4
4: Lactating Dairy	1100 -1,500	119	13	5.4
5: Horse	1000-1,500	52	9.6	4.2
6: Goats/Sheep	30-200	40	22.5	8

Note: Calculation of manure weight, N, and P are associated with livestock concentrated/feeding locations. Dairy, beef, horse and sheep values are based on NRCS Agricultural Waste Management Field Handbook (AWMFH).

3. Guidance on interpreting output:

TABLE 2

Loading Rate (lbs/ac/yr) from Estimator above		Level of Concern	Water resources at risk	Loading Points
N	P2O5			
Less than 200	Less than 80	Minor	No	0
201 to 300	81-120	Moderate	Possibly	15
301 to 800	121-310	Major	Possibly	40
801 to 1000	311-390	Excessive	Possibly	75
1,001 +	390 +	Extreme	Possibly	80

Loading Points

Comments

Loading Points: From Table 2

Site Information - Receiving water feature and buffer considerations: (see exhibit 1 to determine if points are to be given in Section A below for overland flow to a vulnerable water feature or Section B below for a concentrated flow to a vulnerable water feature)

(A1) Overland Flow - Proximity to Vulnerable Water Feature:		<u>Comments</u>	
< 100 Feet: 40 points 100- 199 Feet: 25 points 200-300 Feet: 15 points >300 Feet: 0 points	<i>Distance from edge of concentrated/ feeding area to edge of a water feature which includes open sinkholes, springs, streams (perennial or intermittent), wetlands and ponds.</i>		
(A2) Buffer width adjacent to the selected water feature:			
< 35 Feet: 20 points 35 -100 Feet: 10 points >100 Feet: 0 points	<i>A buffer is a vegetative area which effectively filters overland flow to the adjoining water feature (0-34' is not an effective buffer). Source: P Index and FOTG.</i>		
Sum of A1 and A2:			0

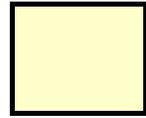
or

(B) Concentrated Flow - Does the runoff from the ACA enter a transport feature within 300 feet of the edge of the ACA?		
Yes 60 points No 0 points	<i>Transport Feature - A swale, grassed waterway, gully, or similar feature where concentrated water flow occurs. (This transport feature must flow into the vulnerable water feature in the above question)</i>	
The greater of A or B (maximum 60 points can be earned here):		0

Is the Vulnerable Water feature or Receiving Water Feature above classified as high value water?

High Value Water - A stream, lake, or estuary designated within a TMDL watershed based on the 303d Impaired Waters List, endangered species, and/or designated trout waters.

Yes = 20 points
 No = 0 points



Site Information:

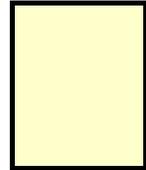
Scoring Boxes

Comments

Environmental Sensitivity Index:

High 15 points
 Medium 10 points
 Low 0 points

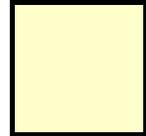
From DCRs *Virginia Nutrient Management Standards and Criteria, Revised 10/2005*, Table 1-4. Includes soils with leaching potential, shallow soils and poor drainage. (Use soil series at the existing ACA.)



Slope:

0-2 % 0 points
 2-6% 5 points
 6-15% 15 points
 15-25% 25 points

General slope of the ACA from the edge of feeding area to the vulnerable water feature.



Total Score:

0

Note: If total is 120 or greater, there is a significant risk of water resource impairment. Follow the planning process to address this concern. Consider both structural and non-structural alternatives.

Definitions:

Buffer - A permanently vegetated area with a minimum width of 35 feet.

High Value Water - A stream, lake, or estuary designated within a TMDL watershed based on the 303d Impaired Waters List, endangered species, and/or designated trout waters.

Karst features - Includes sinkholes, limestone rock outcrops, and fractured limestone that are direct conduits to ground water.

Vulnerable Water Feature - An open sinkhole, stream (perennial or intermittent), spring, wetland, or pond that is receiving overland flow.

Transport Feature - A swale, grassed waterway, gully, or similar feature where concentrated water flow occurs.

ACA - Areas which have a high concentration of livestock, large amounts of waste and the inability to sustain vegetation.

Exhibit 1

