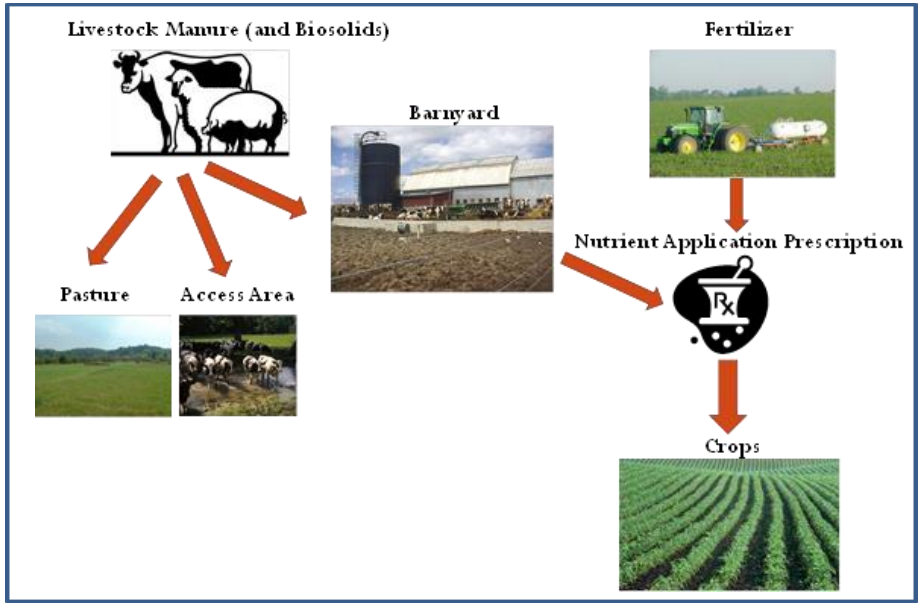
STAC Review of Nutrient Input Estimation for the CB Watershed Model



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Overview Presentation to the AgWG

Charge Questions in Brief

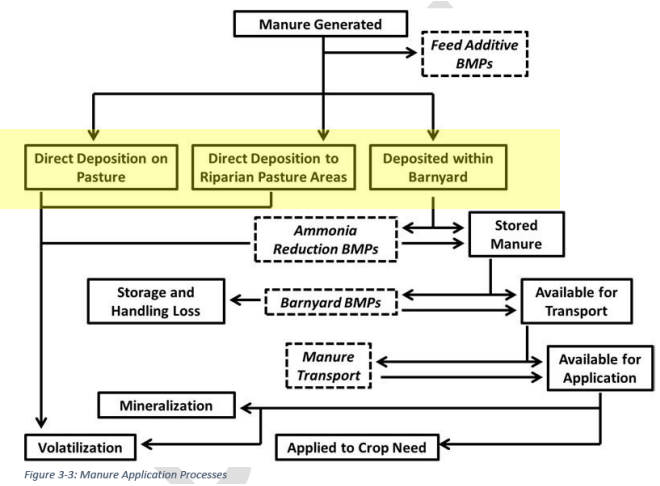
1. Methods used to estimate **total manure and fertilizer available for application** to agricultural lands
2. Methods used to **distribute applications** to crops, hay and pasture
3. Method used to estimate **double-cropped acres**
4. Method used for **agricultural forecasting**
5. Sufficiency of the documentation
6. Other comments or concerns
7. Additional data or findings to consider

Context of the Review

- Moving target
  - Decisions were being made concurrent with our review
  - Documentation was in draft form

Improve consistency in parameter evaluation across states

- Distribution of generated manure (#4)
- Crop prioritization for manure application (#10)
- Rate of allowable fertilizer application above the application goal (#11)
- RUSLE2 “c” sub-factors (#18)



RUSLE2: Average of Monthly Crop Residue % for *Pasture/Range* Land Use

state	cmz	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
DE	59	31	30	24	18	16	21	27	22	16	25	29	33	**24**
MD	4.1	55	54	53	46	39	32	30	29	28	40	50	55	**43**
	59	20	19	33	47	36	38	50	47	38	26	22	21	**33**
	65	43	44	41	42	32	34	49	48	40	37	40	42	**41**
	66	44	44	41	40	30	33	48	47	38	36	40	43	**40**
NY	4.1	56	57	56	18	1	1	1	0	0	11	25	47	**23**
PA	4.1	7	7	6	5	4	3	6	9	9	6	6	7	**6**
	65	27	27	32	36	29	27	32	29	24	22	25	26	**28**
VA	64	32	39	36	34	33	32	30	27	26	24	24	24	**30**
	66	30	37	33	31	30	28	27	25	24	22	22	22	**27**
	67	29	36	33	31	29	28	26	24	23	21	21	22	**27**
WV	62	73	72	70	58	40	42	52	63	72	76	75	74	**64**

Incorporate/update data from existing sources

- Nutritive content of manure by animal type and storage component (#1, #6)
- Use AAPFCO data to calculate fertilizer ammonia and nitrate-N (#12)

- Include references and justifications for all sets of created inputs, both hard and soft (#17)

Modify data transformations and assumptions

- Available NO3-N in animal manure (#2)
- Credit for previous years mineralization (#3)
- Calculate storage and handling losses before ammonia loss (#7)
- Modify prioritization rules on use of crop application curves (#8 and #9)

- Credit some fraction of direct deposition on pasture (#5)

1	BaseConditionName	FIPS	CountyName	StateAbbreviatic	LoadSourceShortName	Acres	NCropNeed	ManureNLbsApplied	BiosolidsNLbsApplied	FertilizerNLbsApplied	DirectDepositManureNLbsApplied	UrbanFertilizerNLbsApplied	TotalNApplication
1455	1984	51001	Accomack	VA	pas	1982.6	29,739	-	-	17,272	26,533	-	43,805
1472	1984	51003	Albemarle	VA	pas	76315.4	1,144,731	-	-	283,741	1,380,664	-	1,664,405
1486	1984	51005	Alleghany	VA	pas	10905.4	163,581	-	-	66,250	157,264	-	223,514
1501	1984	51007	Amelia	VA	pas	12615.0	189,225	-	-	118,425	402,931	-	521,356
1519	1984	51009	Amherst	VA	pas	37676.4	565,146	-	-	244,531	638,898	-	883,429
1533	1984	51011	Appomatt	VA	pas	24279.4	364,191	-	-	83,996	636,816	-	720,811
1564	1984	51015	Augusta	VA	pas	163172.4	2,447,586	-	-	530,823	3,589,829	-	4,120,652
1578	1984	51017	Bath	VA	pas	18975.8	284,637	-	-	20,386	261,045	-	281,431
1595	1984	51019	Bedford	VA	pas	80096.0	1,201,440	-	-	581,636	1,742,897	-	2,324,533
1611	1984	51023	Botetourt	VA	pas	44078.4	661,176	-	-	243,714	874,382	-	1,118,097
1626	1984	51029	Buckingha	VA	pas	21590.0	323,850	-	-	48,375	498,310	-	546,685
1642	1984	51031	Campbell	VA	pas	41146.6	617,199	-	-	126,830	878,785	-	1,005,615
1656	1984	51033	Caroline	VA	pas	5909.4	88,641	-	-	60,523	135,842	-	196,365
1672	1984	51036	Charles Ci	VA	pas	798.6	11,979	-	-	12,859	22,954	-	35,814
1689	1984	51041	Chesterfie	VA	pas	3612.2	54,183	-	-	28,334	74,799	-	103,133
1704	1984	51043	Clarke	VA	pas	39859.8	597,897	-	-	-	741,542	-	741,542
1718	1984	51045	Craig	VA	pas	20309.3	304,639	-	-	70,185	290,583	-	360,768
1733	1984	51047	Culpeper	VA	pas	50468.6	757,029	-	-	-	1,267,091	-	1,267,091
1747	1984	51049	Cumberla	VA	pas	16863.2	252,948	40,559	-	65,581	438,644	-	544,784
1764	1984	51053	Dinwiddie	VA	pas	11659.2	174,888	-	-	33,541	253,054	-	286,595
1778	1984	51057	Essex	VA	pas	1809.4	27,141	-	-	15,989	48,661	-	64,651
1795	1984	51059	Fairfax	VA	pas	5873.6	88,103	-	-	-	132,325	-	132,325
1811	1984	51061	Fauquier	VA	pas	100724.0	1,510,860	-	-	66,056	2,160,812	-	2,226,868
1826	1984	51065	Fluvanna	VA	pas	21142.6	317,139	-	-	123,114	394,845	-	517,959
1843	1984	51069	Frederick	VA	pas	47341.4	710,121	-	-	-	810,956	-	810,956
1858	1984	51071	Giles	VA	pas	35751.6	536,274	-	-	299,909	446,055	-	745,964
1875	1984	51073	Gloucester	VA	pas	1378.6	20,679	-	-	16,300	34,295	-	50,595

Data from “Beta3A-NutrientsAppliedtoLanduses” spreadsheet.

- Investigate plateauing relationships between higher levels of fertilizer and crop yields (#13)

Equation 3-9:Total Crop Application Goal for Nitrogen

Lbs of N/Year = State-Supplied Lbs of N/Application Goal Yield Unit/Year X Yield/Year X 1.1

- Refine list of “Major Field Cropland Harvested Area” crop types used to define double-cropped acreage (#14)

HA: “Major Field Cropland ~~Harvested~~ Area”
All Crop Types subject to double-cropping

i. Alfalfa hay
ii. Berries – all
iii. Cut Christmas trees
iv. Land in orchards
v. Nursery, greenhouse, floriculture, aquatic plants, mushrooms, flower seeds, vegetable seeds, and sod
vi. Other managed hay
vii. Short-rotation woody crops
viii. Small grain hay
ix. Vegetables (includes many crops)
x. Wild hay
xi. Dry edible beans, excluding limas
xii. Tobacco
xiii. Potatoes
xiv. Field and grass seed crops
xv. Sunflower seed (all varieties)
xvi. Cotton
xvii. Canola
xviii. Popcorn

MFC: “Major Field Crops”
Crop Types reporting Harvested acres

i. Barley
ii. Buckwheat
iii. Canola
iv. Corn for grain
v. Corn for silage
vi. Emmer and spelt
vii. Oats for grain
viii. Rye for grain
ix. Sorghum for Grain
x. Sorghum for Silage
xi. Soybeans for beans
xii. Triticale
xiii. Wheat for grain

MFC – HA = double-cropped area

- Include a climate change factor in the ag forecasting method (#15)
- Reevaluate the ag forecasting weighting factors based on changes in agricultural and cropland acres, rather than on changes in poultry and cattle data (#16)
- Apply buffer credit to the upland land use, rather than to all ag land uses (#19)

- Modify riparian pasture manure (DD) delivered to streams by 0.74 for TN and 0.38 for TP (#20)

	Direct Deposition			2010 No-Action DRP		
	TN	TP	TSED	TN	TP	TSED
Jurisdiction	lbs/year	lbs/year	tons/year	lbs/year	lbs/year	tons/year
DC	0	0	0	0	0	0
DE	204,997	48,722	0	0	0	0
MD	1,391,376	330,375	0	103,581	10,360	1,825
NY	3,107,746	702,585	0	843,536	123,981	16,755
PA	7,286,163	1,672,429	0	3,102,909	250,898	32,988
VA	4,733,619	1,211,210	0	6,028,494	869,766	374,307
WV	681,188	178,077	0	2,764,962	315,512	113,581
All	17,405,090	4,143,398	0	12,843,482	1,570,517	539,456
DD as %DRP	1.355	2.638				
DD modifier	0.74	0.38				

Suggested Additional Useful Data

- Mine state NM plans to better characterize local farming practices, manure/fertilizer application rates and timing, crop goals and actual yields.
- Conduct a survey of fertilizer retailers
- Update manure production figures by animal type
- Support applied research to improve nutrient and land management details, including representation of rotational land management
- Conduct a literature review to better represent non-major crop maximum yields