E. coli Bacterial TMDL Development for

Fontaine Creek

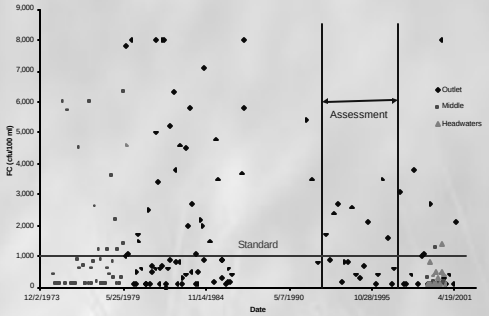
Final Public Meeting

June 28, 2010

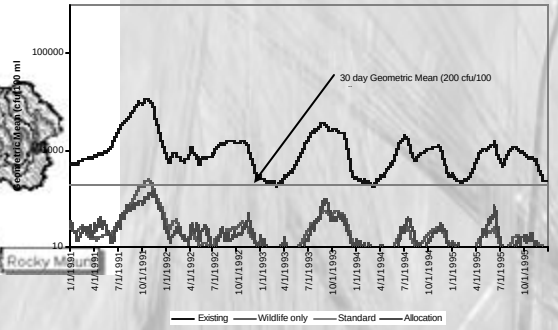
Purpose of this meeting

- To discuss *E.coli* TMDL for Fontaine Creek
  - Total Maximum Daily Load is how much pollutant can enter the stream and have the stream meet the water quality standards

Major Components of the TMDL Report Development



- Source Assessment
- Modeling
  - Hydrology
  - Water Quality
  - Load Allocation
- Public Participation



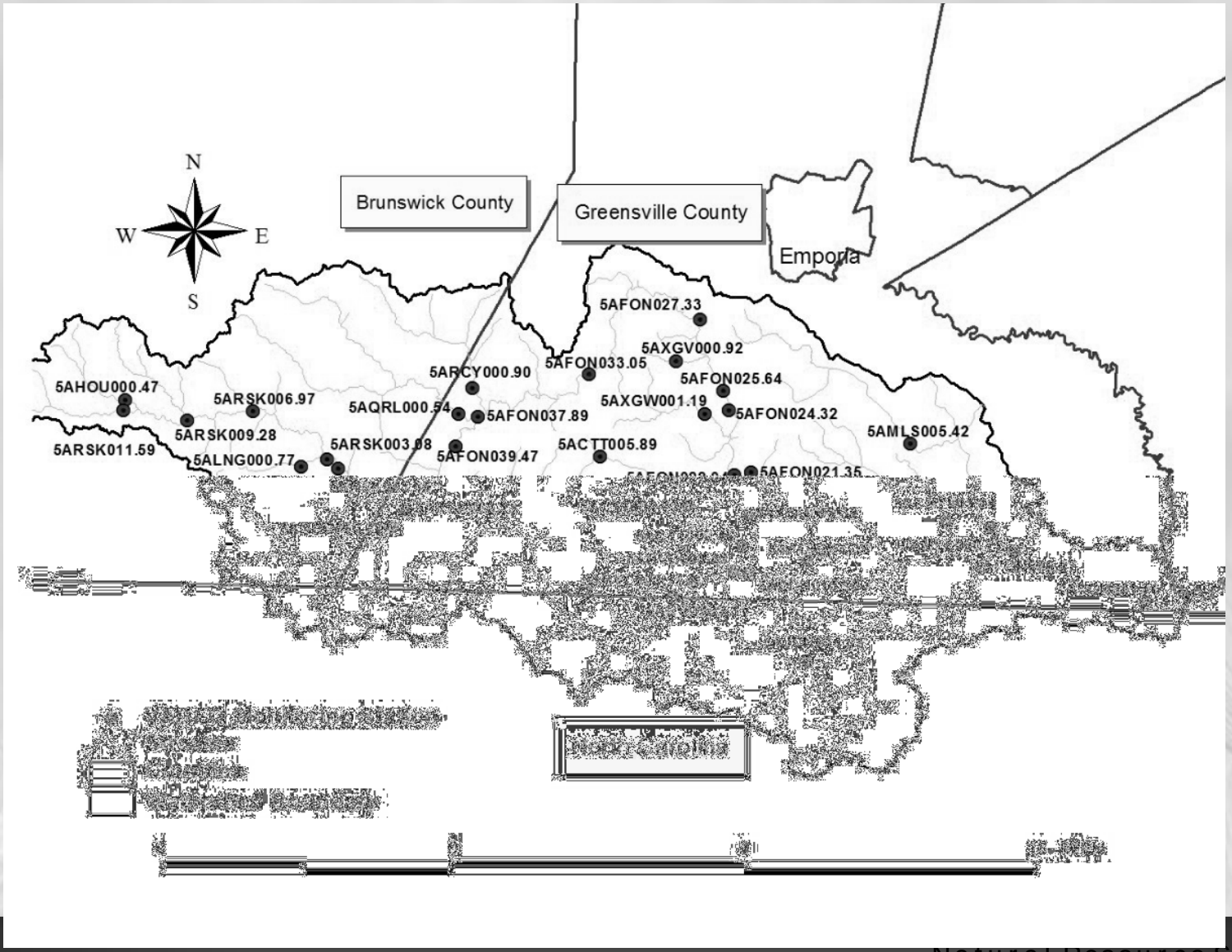
Endpoint Determination

E. coli bacteria

Two standards

- 126 cfu/100 ml geometric mean
  - Used in modeling to determine TMDL
  - 0% violation rate
- 235 cfu/100 ml instantaneous sample
  - Used in monitoring to list and de-list
  - 10.5% violation rate (ie out of 12 samples, one may exceed the 235 and not cause an impairment)

Monitoring Stations



Fecal Coliform Data

Fecal Coliform primary contact use single sample standard = 400 cfu/100mL

Station	Dates	Count	Minimum	Maximum	Mean	Median	Standard Deviation	Violation %
5ABVC003.15	06/2001 - 04/2010	14	100	400	129	100	83	0%
5ACTT002.73	03/1998 - 08/2002	17	18	700	209	110	210	29%
5ACTT005.89	12/1997 - 08/2002	19	18	790	217	120	257	21%
5AFON037.89	05/2001 - 06/2003	13	100	600	177	100	188	15%
5AFON027.33	12/1997 - 08/2002	20	18	16000	1164	112	3587	15%
5AFON025.64	12/1997 - 08/2002	24	18	3500	472	120	927	21%
5AFON024.32	04/2003 - 04/2003	1	25	25	25	25	NA	0%
5AFON022.04	08/1990 - 03/2000	44	18	1400	188	100	285	9%
5AFON016.90	03/2007 - 03/2007	1	25	25	25	25	NA	0%
5AFON006.07	08/1994 - 03/2001	34	20	1400	369	165	456	24%
5ARSK003.08	08/1994 - 11/2006	45	18	3500	320	78	750	13%

E.coli Data

E. coli primary contact use single sample standard = 235 cfu/100mL

Station	Dates	Count	Minimum	Maximum	Mean	Median	Standard Deviation	Violation %
5ABDD000.69	01/2007 - 12/2007	11	2	100	30	15	36	0%
5ABVC000.48	01/2007 - 12/2007	12	1	300	48	21	84	8%
5ABVC002.31	01/2007 - 11/2007	11	4	1,200	176	100	342	9%
5ACNY001.08	01/2007 - 04/2010	10	4	450	85	34	133	10%
5ACTT000.46	01/2007 - 12/2007	12	3	100	28	12	36	0%
5ACTT002.73	01/2007 - 11/2008	12	29	600	190	100	179	17%
5AFON039.47	01/2007 - 12/2007	9	31	210	108	100	59	0%
5AFON033.05	01/2007 - 12/2007	12	3	300	50	15	86	8%
5AFON027.33	01/2007 - 12/2007	12	2	250	55	29	69	8%
5AFON025.64	01/2007 - 12/2007	12	1	570	77	21	159	8%
5AFON022.04	01/2007 - 12/2007	12	8	800	103	32	222	8%
5AFON021.35	01/2007 - 12/2007	12	1	140	45	29	45	0%
5AFON016.90	03/2007 - 03/2007	1	10	10	10	10	NA	0%
5AFON014.38	06/2005 - 12/2007	22	1	600	88	25	148	14%

E.coli Data

E. coli primary contact use single sample standard = 235 cfu/100mL

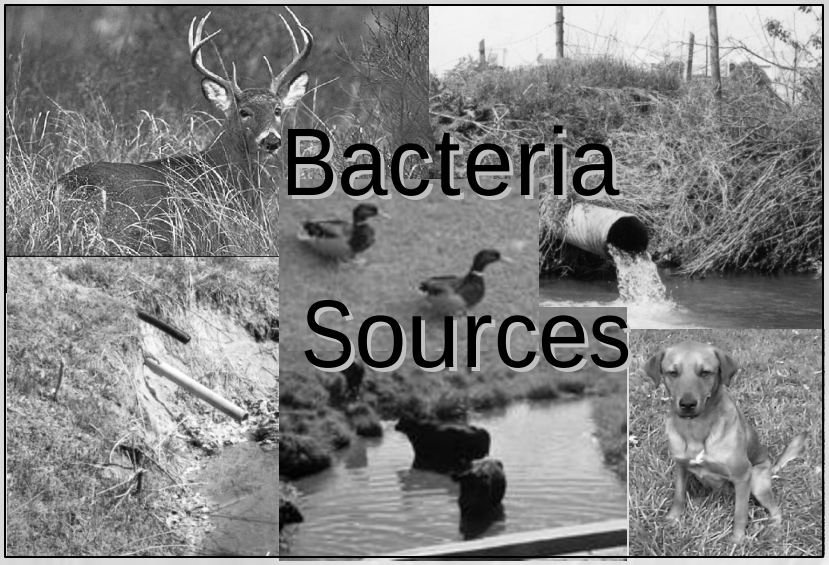
Station	Dates	Count	Minimum	Maximum	Mean	Median	Standard Deviation	Violation %
5AFON006.07	07/2003 - 12/2007	23	7	1,100	165	53	268	17%
5AFON001.46	01/2007 - 06/2007	6	22	600	128	34	231	17%
5AHOU000.47	01/2007 - 08/2007	8	6	100	30	16	33	0%
5AJCK004.81	02/2009 - 05/2010	9	25	500	153	100	174	22%
5ALNG000.77	01/2007 - 12/2007	12	1	220	72	41	75	0%
5AMLS005.42	01/2007 - 11/2008	12	9	500	125	100	127	8%
5AMLS000.77	01/2007 - 12/2007	12	1	100	19	3	38	0%
5AQRL000.54	01/2007 - 12/2007	11	4	130	55	36	46	0%
5ARCY000.90	01/2007 - 12/2007	11	1	230	45	8	72	0%
5ARSK011.59	01/2007 - 12/2007	10	12	4,500	487	28	1410	10%
5ARSK009.28	01/2007 - 12/2007	12	8	200	65	43	60	0%
5ARSK006.97	01/2007 - 12/2007	12	5	100	50	40	37	0%
5ARSK003.66	04/2004 - 04/2004	1	20	20	20	20	NA	0%
5ARSK003.08	05/2005 - 12/2007	22	7	1,400	126	25	313	9%
5ARSK000.23	01/2007 - 12/2007	10	16	400	81	25	122	10%
5AXGU000.35	01/2007 - 12/2007	12	1	100	31	18	36	0%
5AXGV000.92	01/2007 - 11/2007	7	1	280	69	36	98	14%
5AXGW001.19	01/2007 - 12/2007	9	10	330	91	17	114	11%

What are the Sources of Bacteria?

- Permitted Discharges
- Human
  - Failing Septics
  - Straight Pipes
  - Biosolids
- Pets
- Livestock
- Wildlife

Modeling

How Do We Determine the Bacteria TMDLs?



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Watershed data

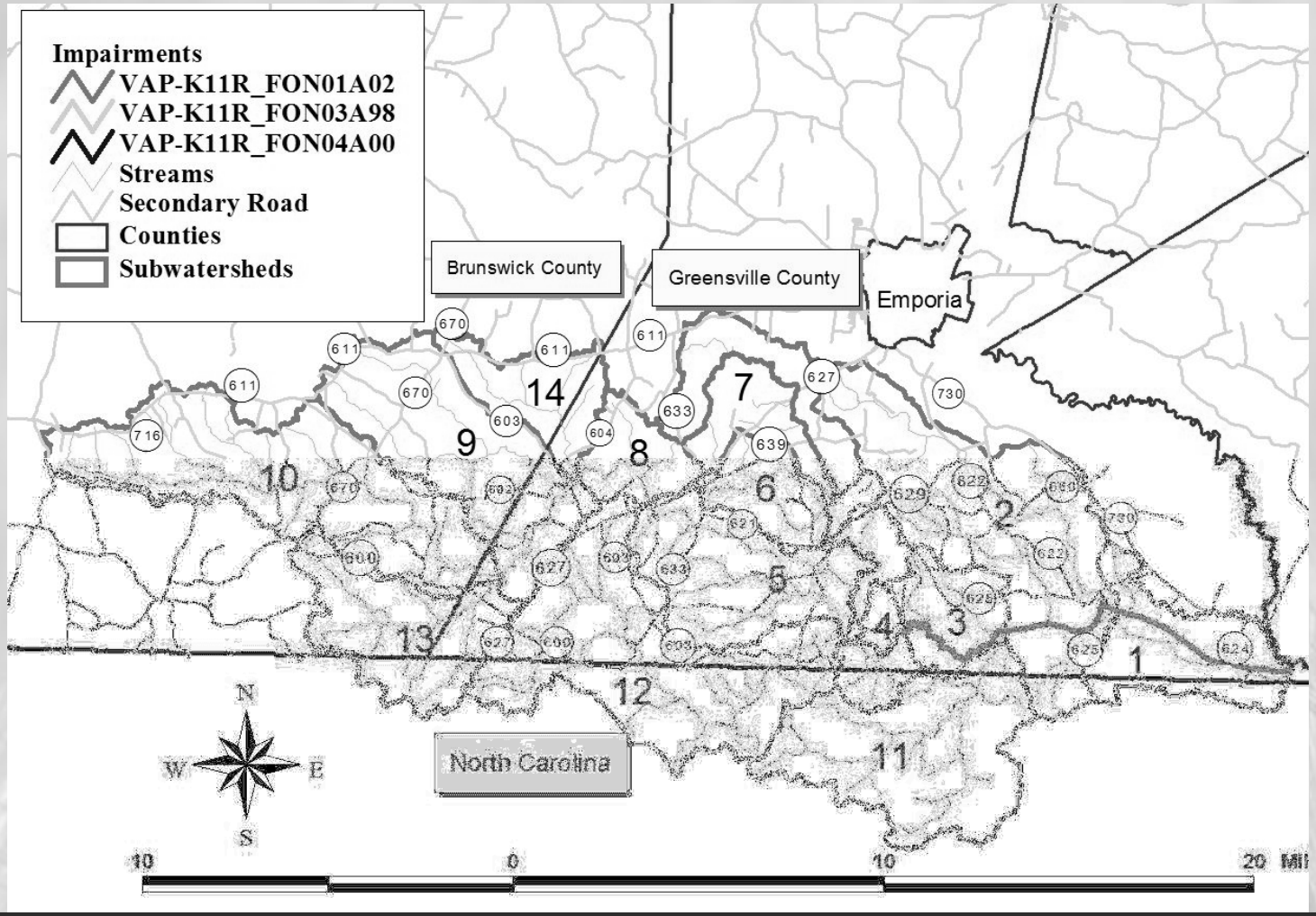
TMDL

E. coli Load Reduction Scenarios

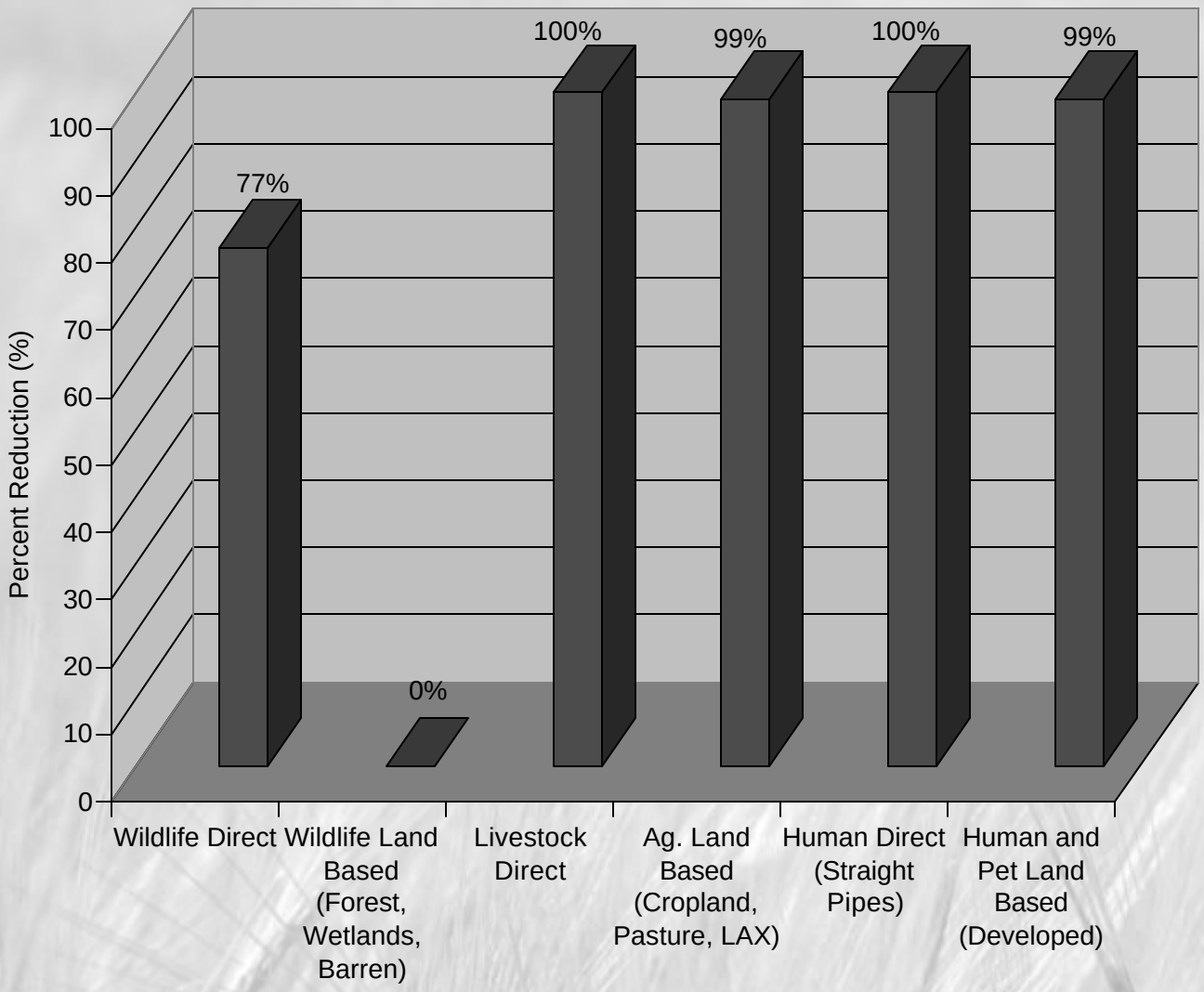
Percent Reductions to Existing Bacteria Loads													
	Wildlife Land Based			Ag. Land Based	Human Direct	Human and Pet Land Based	VADEQ *E. coli* Standard percent violations (> 126 GM)						
Scenario	**Wildlife Direct**	**Forest, Wetlands, Barren**	**Livestock Direct**	**Cropland, Pasture, LAX**	**Straight Pipes**	**Developed**	**Sub7 (%)**	**Sub6 (%)**	**Sub5 (%)**	**Sub4 (%)**	**Sub3 (%)**	**Sub2 (%)**	**Sub1 (%)**
1	0	0	0	0	0	0	22.7	17.4	16.2	13	0.1	5.1	6.0
2	0	0	0	0	100	0	16.4	5.6	12.5	9.8	0.0	0.0	0.0
3	0	0	100	0	100	0	8.9	0.0	9.0	6.5	0.0	0.0	0.0
4	0	0	100	50	100	0	8.8	0.0	8.9	6.5	0.0	0.0	0.0
5	0	0	100	50	100	50	6.8	0.0	6.9	6.2	0.0	0.0	0.0
6	0	0	100	99	100	99	2.6	0.0	6.2	5.9	0.0	0.0	0.0
7	50	0	100	99	100	99	0.0	0.0	1.9	2.5	0.0	0.0	0.0
8	65	0	100	99	100	99	0.0	0.0	0.1	0.3	0.0	0.0	0.0
9[1]	77	0	100	99	100	99	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1]*Scenario 9 is final TMDL Scenario*

Subwatersheds



E. coli Load Reductions



Overall Reduction Approximately 70%

E. coli Annual TMDL Table

WLA + LA + MOS = TMDL

Impairment	WLA	LA	MOS	TMDL
VAP-K11R_FON04A00	3.77E+12	1.80E+14		1.83E+14
VA0028916	*6.27E+11*		*Implicit*	
VAG404256	*1.74E+09*			
VPG100033	*0.0*			
Future Load[1]	*3.14E+12*			

= 3.77E+12

[1]Skippers Wastewater Treatment Facility
[2]Private Residence; UT to Fontaine Creek
[3]Smithfield Carrolls Farm

WLA = Waste Load Allocation; Total load of all point sources plus a reserve for future growth

LA = Load Allocation; Total load of all non-point sources

MOS= Margin of Safety; implicit means there is no set number, conservative methods used in development of TMDL

Thank You

- Department of Environmental Quality
- Department of Conservation and Recreation
- Soil and Water Conservation Districts
- Virginia Department of Health
- Natural Resources Conservation Service
- Watershed stakeholders

Contact

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