WVCA
Team Greenbrier
319 Programs

Where we are at?

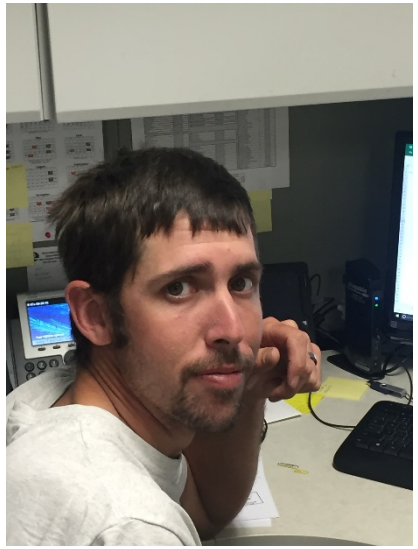
Where we are going?

How we plan to get there?

Our Team

Dennis Burns

- B.S. Environmental Science
- Certified Professional in Erosion and Sediment Control
- Licensed Pesticide Applicator
- Agricultural Producer



Matt Morgan

- B.S. Agriculture Business Management
- Former Agricultural Commodity Logistics Specialists
- Agricultural Producer

John Nelson

- B.S. Agriculture
- Rosgen Trained Stream Specialists
- Agricultural Producer

Jacob Lavender

- Intern
- Wildlife & Fisheries Major at WVU

Our Partners

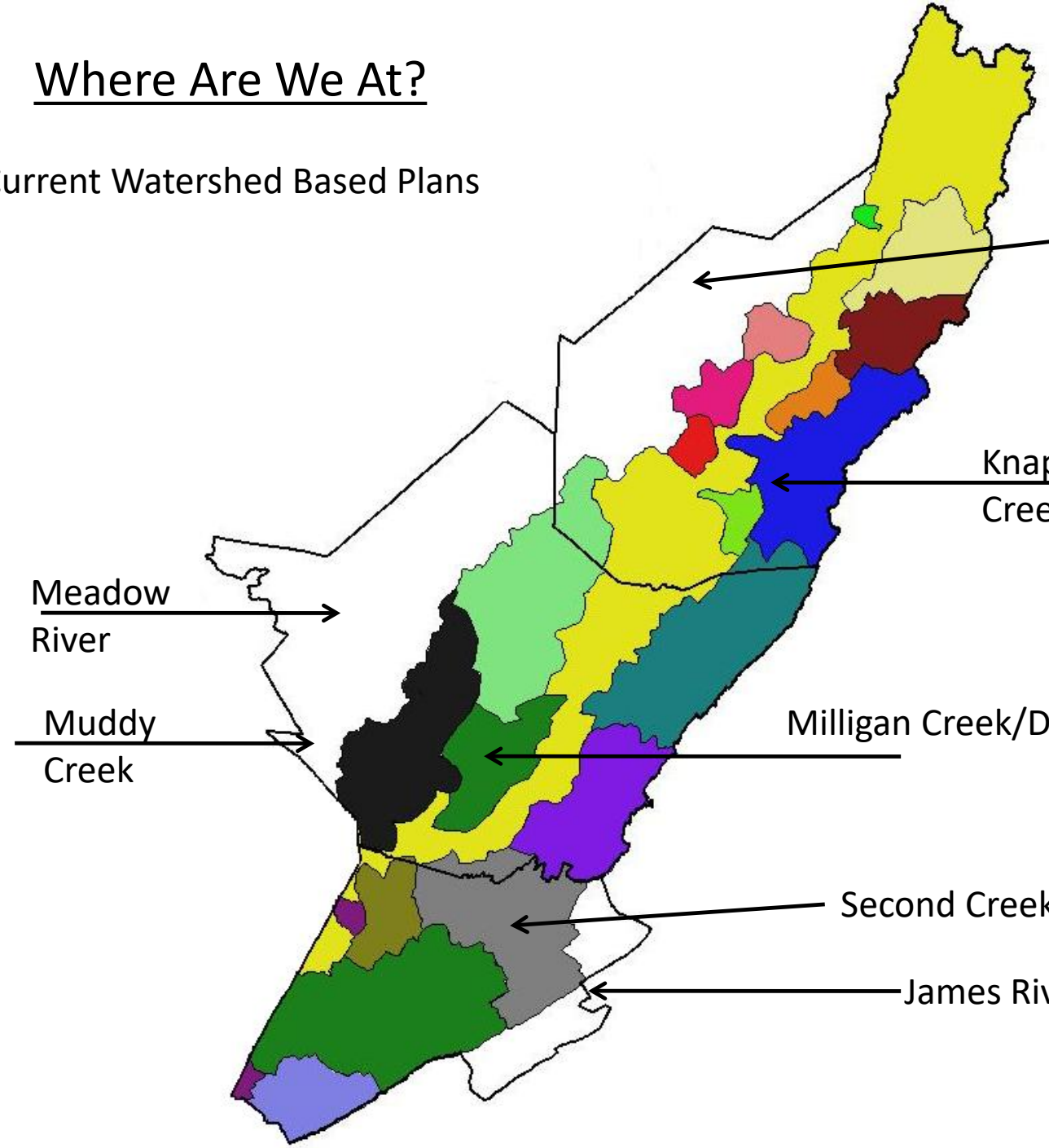
Barry Level

Greenbrier Valley Conservation District

- B.S. Agriculture
- M.S. Strategic Leadership
- Former U.S. Army Strategist

Where Are We At?

Current Watershed Based Plans



Elk River Headwaters Protection Plan

Knapps Creek

Meadow River

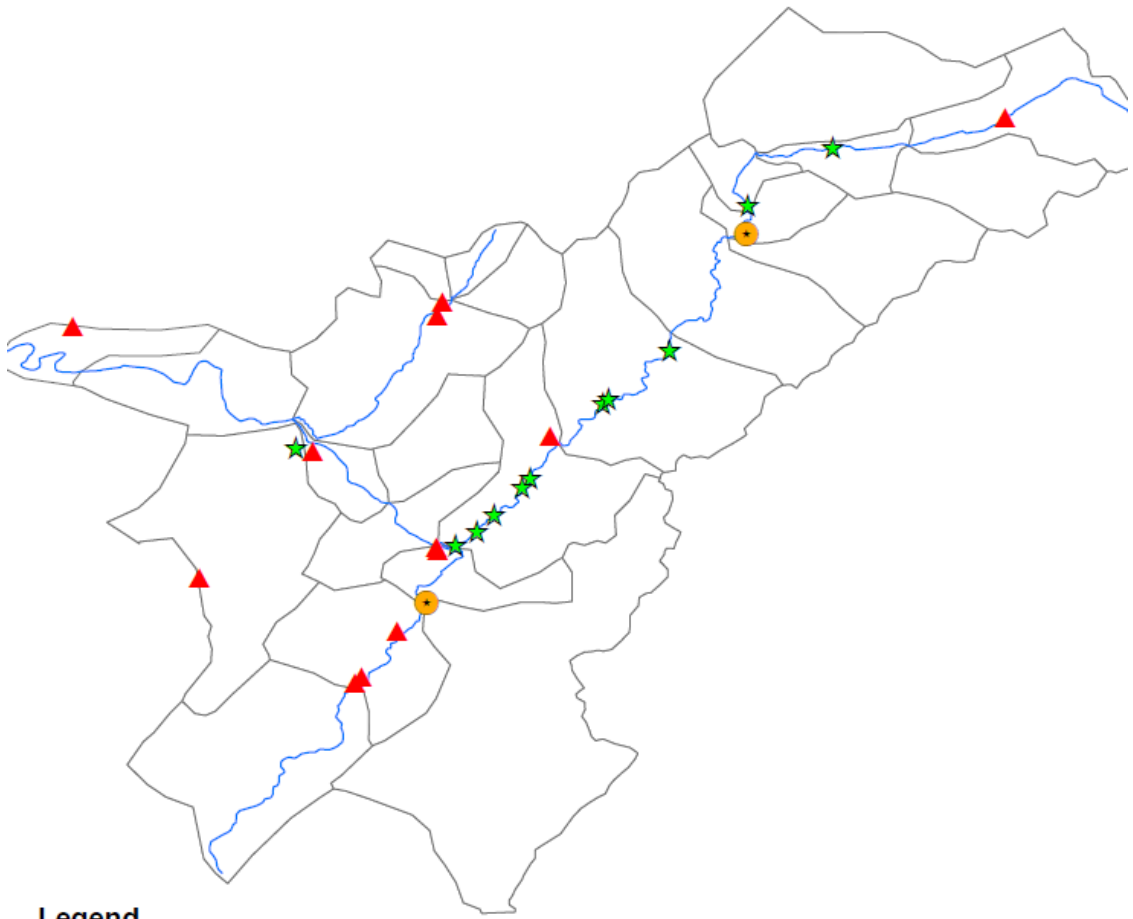
Muddy Creek

Milligan Creek/Davis Spring

Second Creek

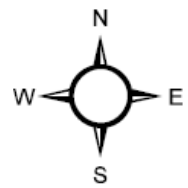
James River (Potts Creek & Sweet Springs)

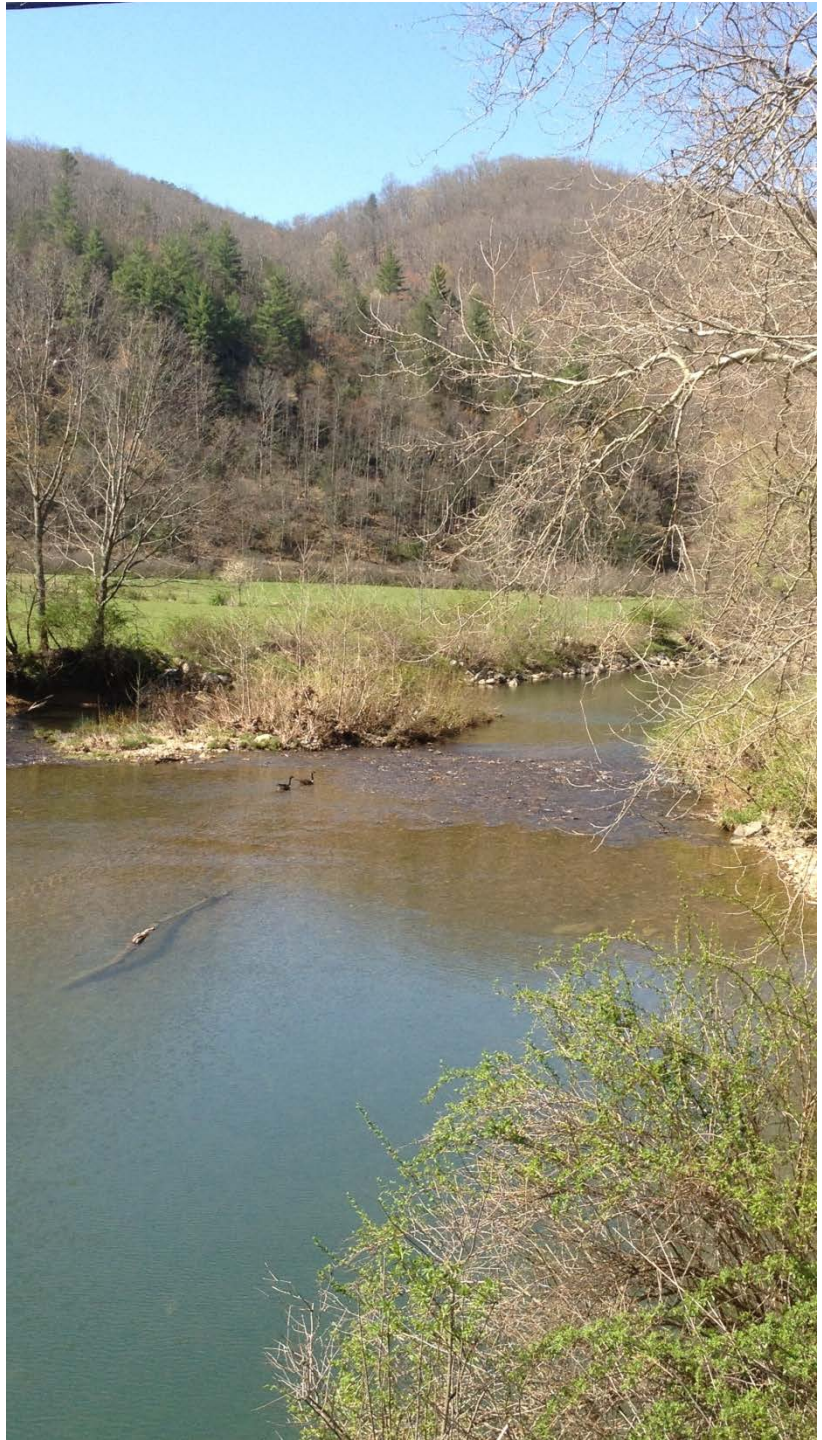
Knapp Creek NWQI Project Sites



Legend

- Buffer Development
- Stream Restoration Points
- Septic Projects 10_1_2015
- Impared Reaches
- Sub-Watersheds
- Knapps Creek Watershed Outline





Knapp Creek Project Timeline

1999 – 2000 Development of natural streambank restoration plan for Upper Knapp Creek. First such plan developed in WV.

2004 First streambank restoration project installed

2006 Knapp and 2 tributaries (Browns and Douthat) placed on 303(d) list for fecal coliform

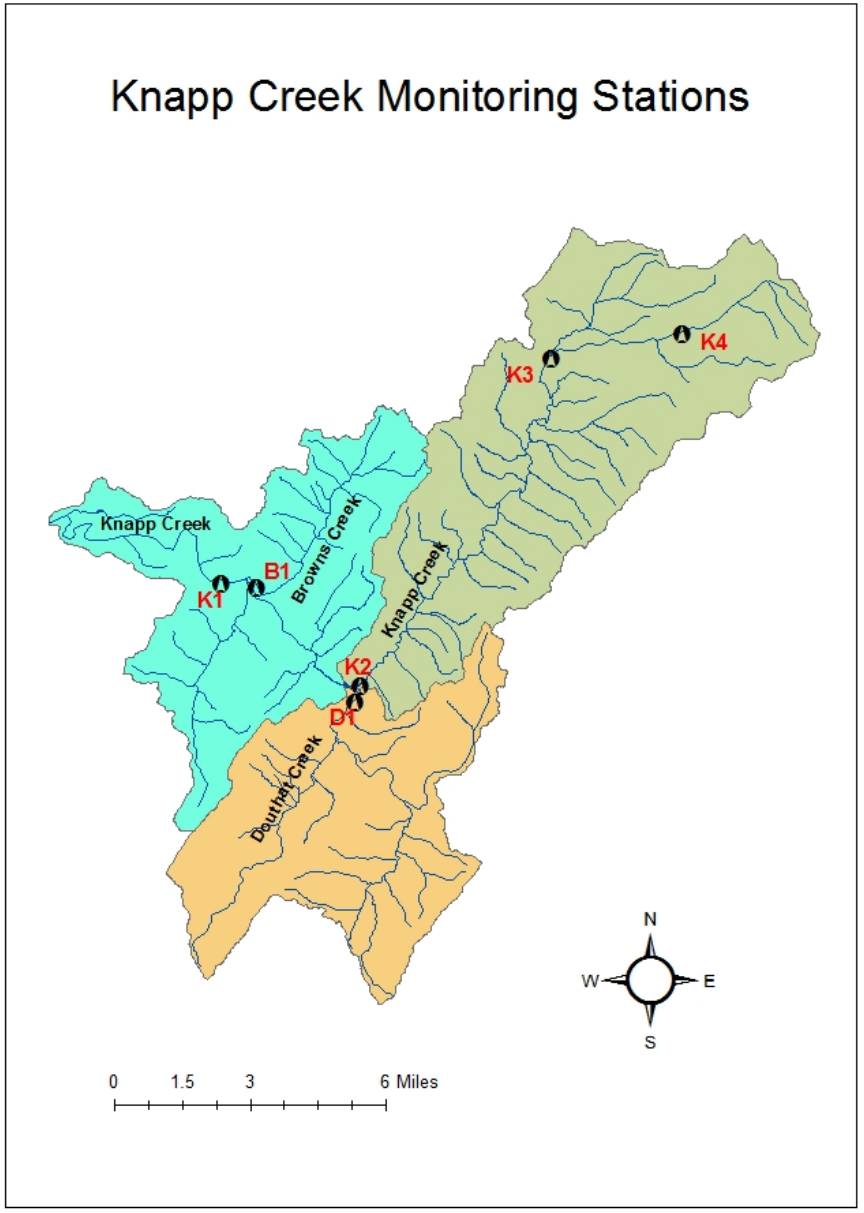
2008 Included in Greenbrier TMDL

2012 Development of the watershed based plan

2013 Selected as NWQI stream and first application for a 319 grant

2014 Development of QAPP and the start of baseline monitoring

2015 Completion of baseline monitoring and first 319 funded projects.



Monitoring Strategy

Station K1: below all anticipated projects and measure overall success

Station K2: is at the lowest point of the upper Knapp Creek subwatershed where most of the BMP installations will occur

Station K3: below an area of concern where BMP projects are expected

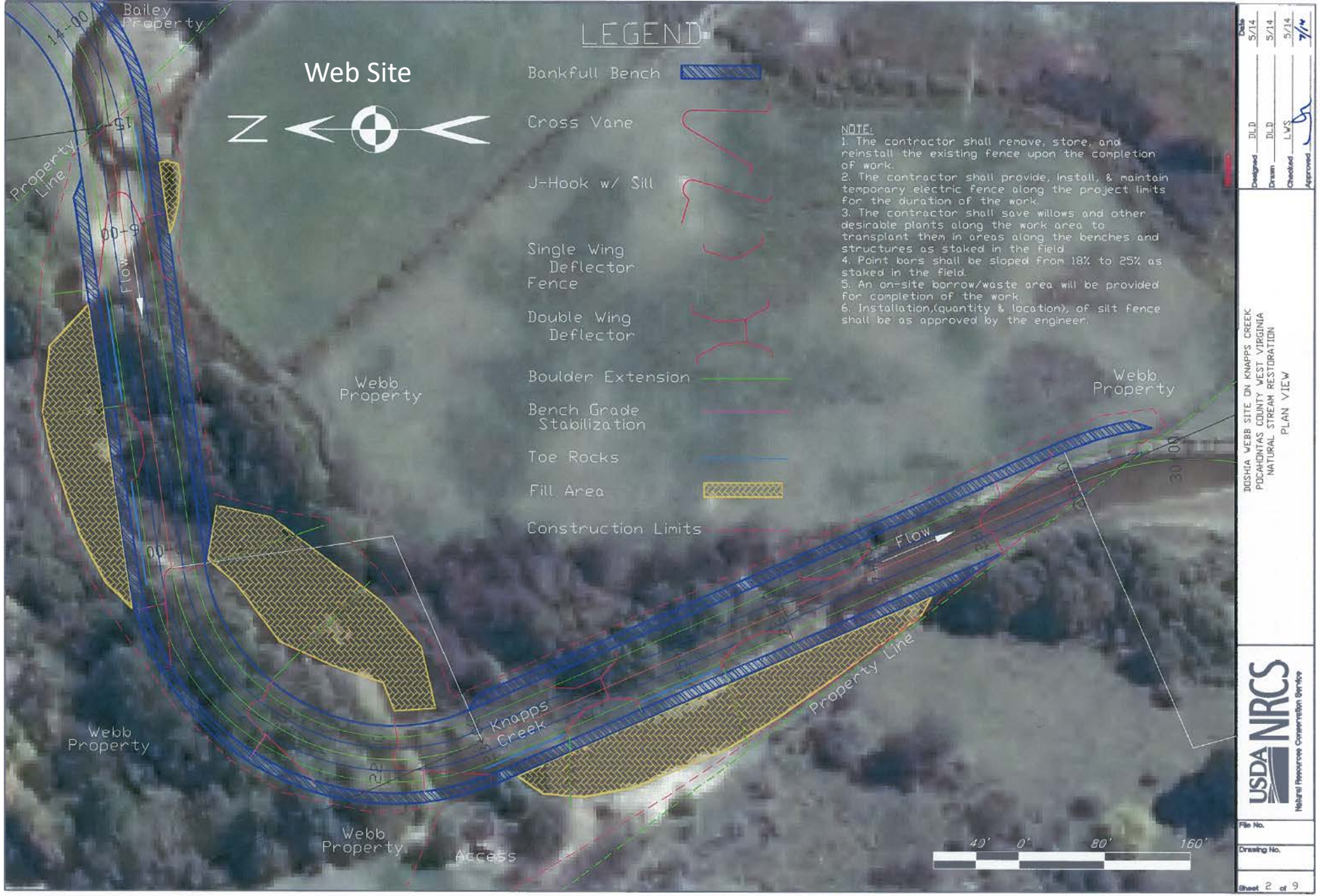
Station K4: above most impairments should represent an unimpaired reference

Stations D1 & B1: are located at the mouths of Douthat and Browns Creeks respectively and will measure overall compliance of those tributaries

General Results of Baseline Monitoring

- Fecal coliform levels are higher in warmer months
- DNA testing was inconclusive and probably not worth the expense
- K4 (reference site) violated standards twice indicating sources from inadequate sewage treatment from residences and camps upstream
- Douthat Creek had significant agricultural sources, TMDL listed no reductions necessary from agriculture

Davis Site


Web Site
LEGEND
Bankfull Bench
Cross Vane
J-Hook w/ Sill
Single Wing Deflector Fence
Double Wing Deflector
Boulder Extension
Bench Grade Stabilization
Toe Rocks
Fill Area
Construction Limits
NOTE:
1. The contractor shall remove, store, and reinstall the existing fence upon the completion of work.
2. The contractor shall provide, install, & maintain temporary electric fence along the project limits for the duration of the work.
3. The contractor shall save willows and other desirable plants along the work area to transplant them in areas along the benches and structures as staked in the field.
4. Point bars shall be sloped from 18% to 25% as staked in the field.
5. An on-site borrow/waste area will be provided for completion of the work.
6. Installation,(quantity & location), of silt fence shall be as approved by the engineer.
Bailey Property
Property Line
Flow
Webb Property
Webb Property
Webb Property
Webb Property
Knapps Creek
Property Line
Flow
Access
40' 0' 80' 160'
DOSHIA WEBB SITE ON KNAPPS CREEK
POCAHONTAS COUNTY WEST VIRGINIA
NATURAL STREAM RESTORATION
PLAN VIEW
Designed DLD 5/14
Drawn DLD 5/14
Checked LVS 5/14
Approved 7/14
USDA NRCS
Natural Resources Conservation Service
File No.
Drawing No.
Sheet 2 of 9

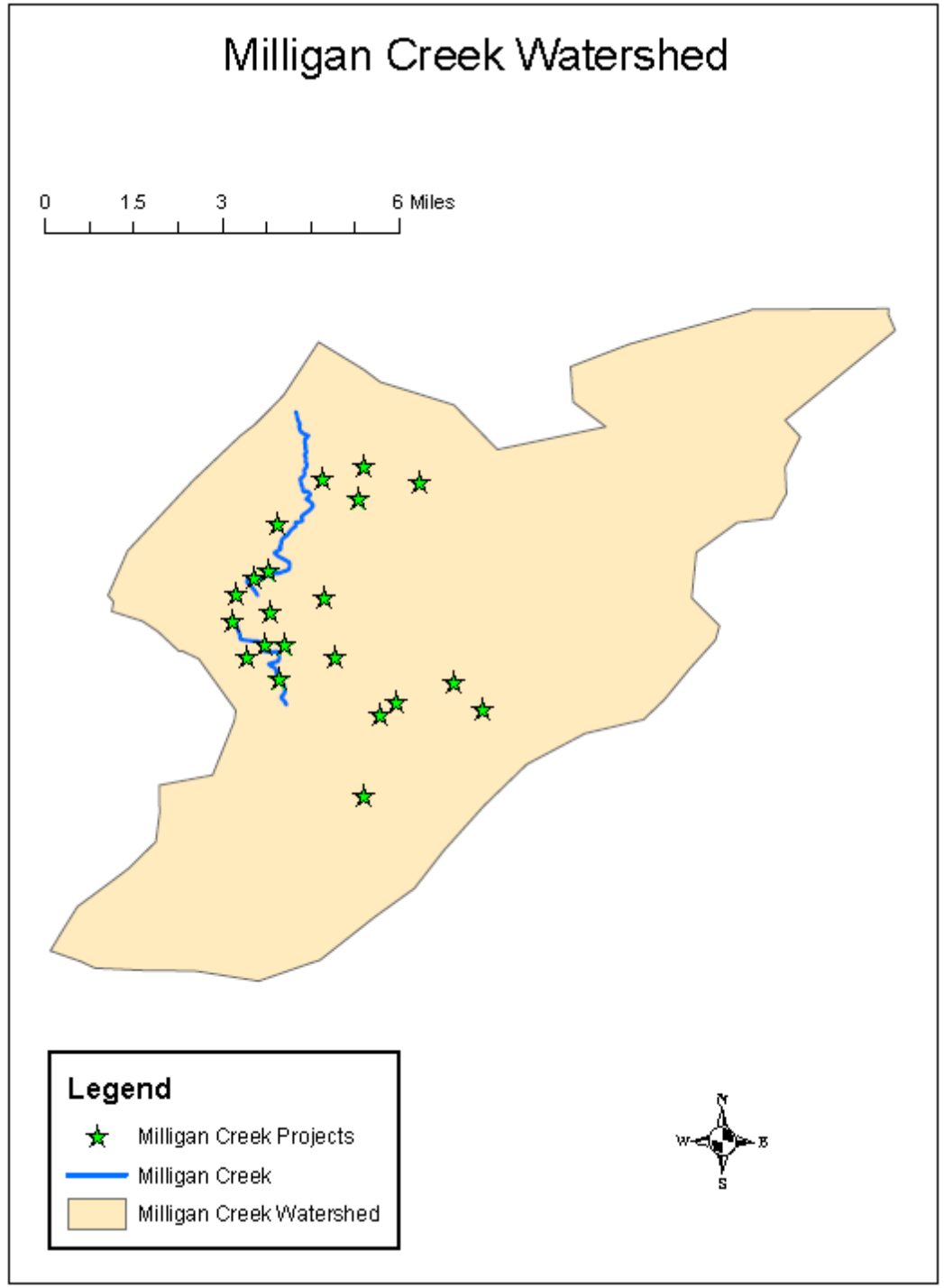
Web Site


Web Site


Web Site

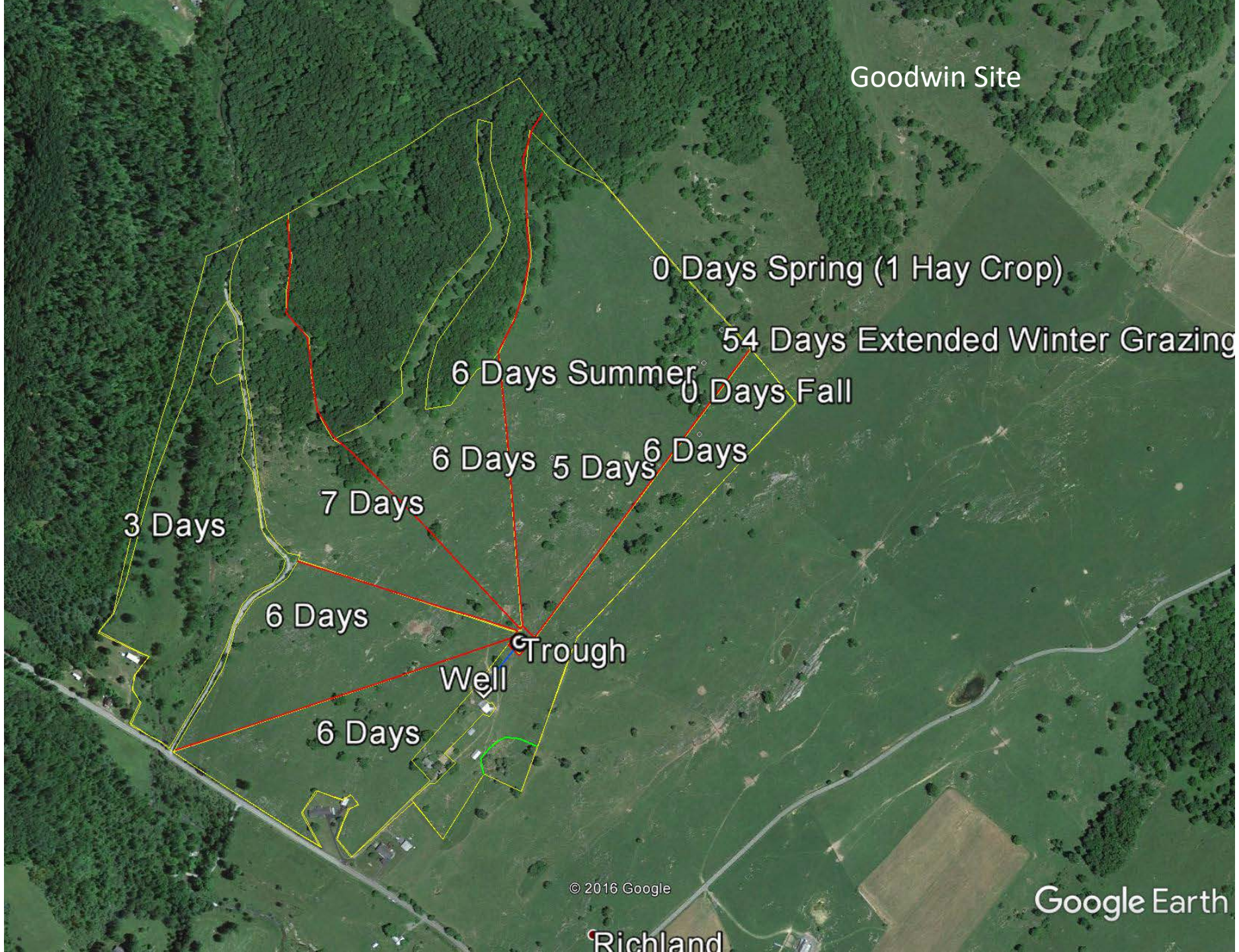

Bailey Site

Milligan Creek Watershed




M. Tuckwiller
Swift Level
& Kesner Sites
Morlunda
© 2016 Google
Google Earth

Protection of Karst window before and after, Johnson Site


Goodwin Site
0 Days Spring (1 Hay Crop)
54 Days Extended Winter Grazing
6 Days Summer
0 Days Fall
6 Days
6 Days
5 Days
7 Days
3 Days
6 Days
Trough
Well
6 Days
© 2016 Google
Google Earth
Richland


Tuckwiller Brothers Site
© 2016 Google
Google Earth

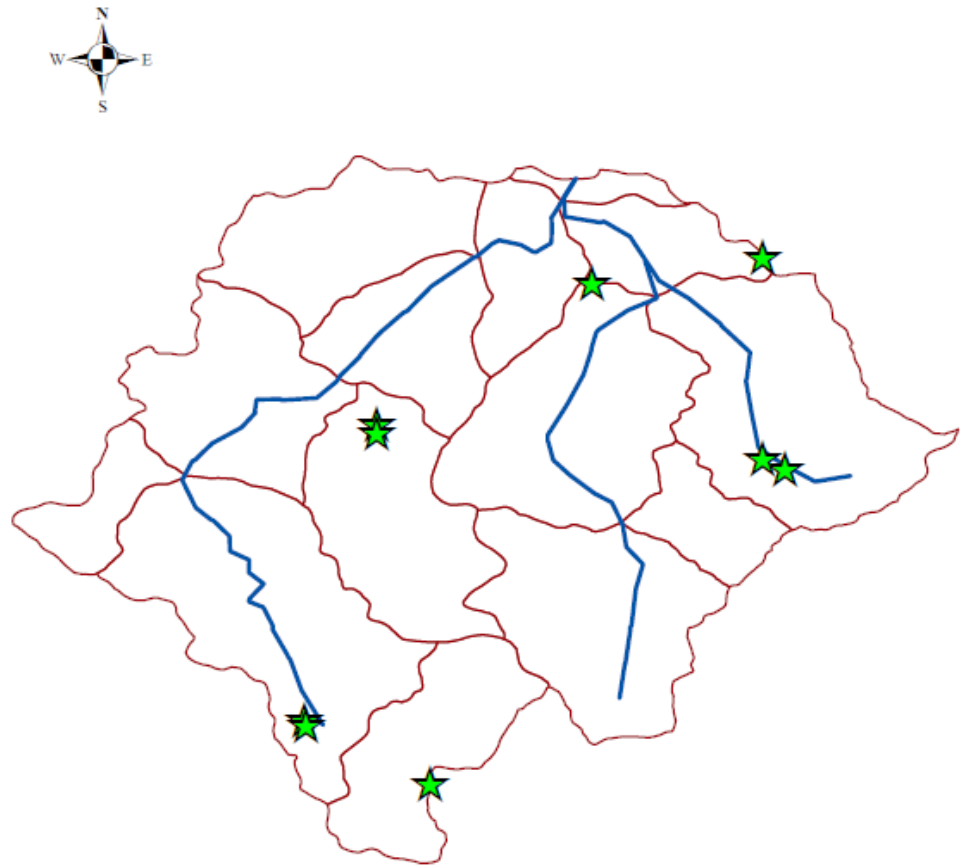
S. Tuckwiller Site


M. Tuckwiller Site
© 2016 Google
Google Earth


Kesner Site
© 2016 Google
Google Earth


Mann Site

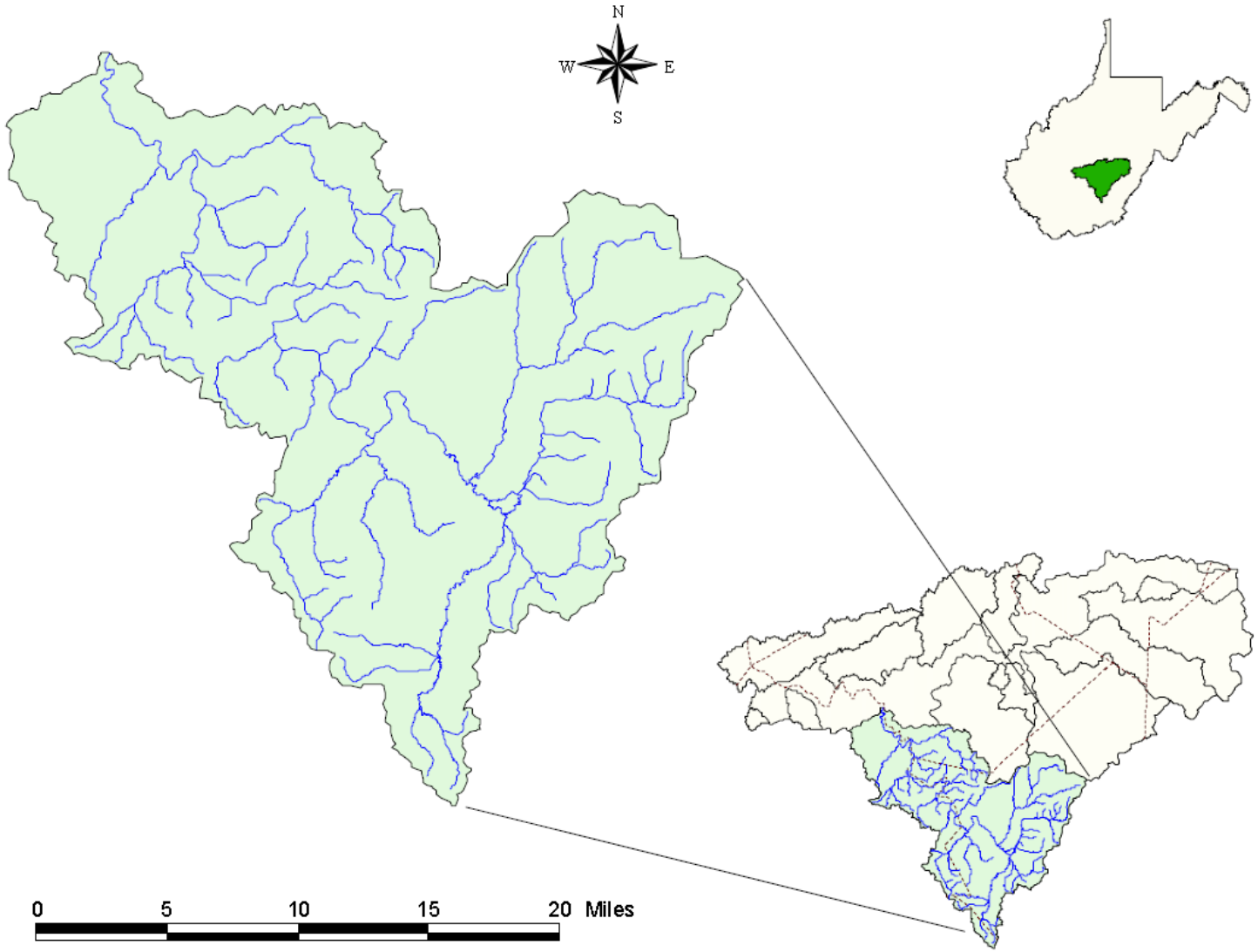
Sewell Creek Septic Projects



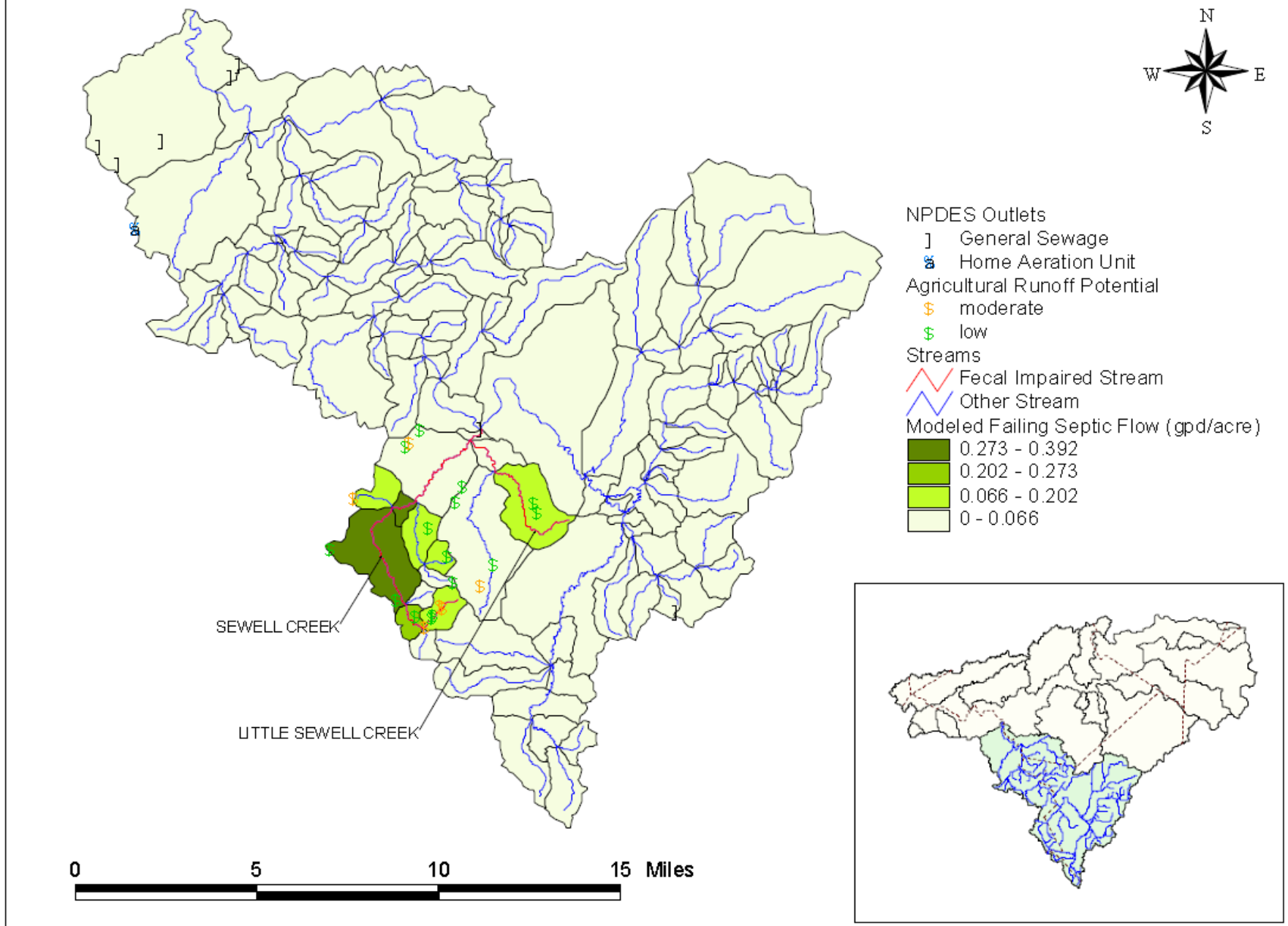
Legend

- Septic Projects
- Creek
- Watershed

0 1.25 2.5 5 Miles


N
W
E
S
0
5
10
15
20 Miles

TMDL	Impairment					
Stream Name	**Fe**	**Al**	**pH**	**Se**	**FC**	**BIO**
Sewell Creek	x				x	
Little Sewell Creek	x				x	
Boggs Creek	x					
Briery Creek		x	x			
Little Clear Creek	x		x			
Beaver Creek	x					
Stoney Run	x					
Rader Run	x					
UNT/Little Clear Creek RM 7.5	x					
Cutlip Branch	x					
Laurel Creek	x		x			
Kuhn Branch	x					
Joe Knob Branch	x					



NOTE: Some mapped features in close proximity to each other may plot as one location on the map.

A-8.6 TMDL Tables: Metals and pH

Table A-8-2. Iron TMDLs for the Meadow River watershed

Major Watershed	Stream Code	Stream Name	Metal	Load Allocation (lbs/day)	Wasteload Allocation (lbs/day)	Margin of Safety (lbs/day	TMDL (lbs/day)
Meadow River	WVKG-19-Q	Sewell Creek	Iron	173.9	4.3	9.4	187.5
Meadow River	WVKG-19-Q-1	Little Sewell Creek	Iron	80.6	2.5	4.4	87.5
Meadow River	WVKG-19-Q-1-A	Boggs Creek	Iron	45.2	1.2	2.4	48.9
Meadow River	WVKG-19-V	Little Clear Creek	Iron	269.6	27.4	15.6	312.6
Meadow River	WVKG-19-V-1	Beaver Creek	Iron	50.8	11.5	3.3	65.6
Meadow River	WVKG-19-V-2	Stoney Run	Iron	9.5	0.7	0.5	10.8
Meadow River	WVKG-19-V-3	Rader Run	Iron	7.8	5.2	0.7	13.7
Meadow River	WVKG-19-V-3.8	UNT/Little Clear Creek RM 7.5	Iron	3.9	NA	0.2	4.1
Meadow River	WVKG-19-V-4	Cutlip Branch	Iron	5.8	0.1	0.3	6.3
Meadow River	WVKG-19-V-5	Laurel Creek	Iron	39.5	1.3	2.1	42.9
Meadow River	WVKG-19-V-7	Kuhn Branch	Iron	20.5	2.5	1.2	24.2
Meadow River	WVKG-19-V-7-A	Joe Knob Branch	Iron	8.5	0.2	0.5	9.2
UNT = unnamed tributary; RM = river mile; NA = not applicable							

Table A-8-3. Aluminum TMDLs for the Meadow River watershed

Major Watershed	Stream Code	Stream Name	Metal	Load Allocation (lbs/day)	Wasteload Allocation (lbs/day)	Margin of Safety (lbs/day)	TMDL (lbs/day)
Meadow River	WVKG-19-U-2-A	Briery Creek	Aluminum	14.1	NA	0.7	14.9

Table A-8-4. pH TMDLs for the Meadow River watershed

Major Watershed	Stream Code	Stream Name	Parameter	pH* (Under TMDL conditions)
Meadow River	WVKG-19-U-2-A	Briery Creek	pH	7.87

UNT = unnamed tributary; RM = river mile
*Predicted pH assumes that all metals (aluminum, iron) meet TMDL endpoints.

Table A-8-5. Acid deposition TMDLs for the Meadow River watershed

Major Watershed	Stream Name	Stream Code	Baseline Average Annual Net Acidity Load (ton/yr)	Allocated Average Annual Net Acidity Load (ton/yr)
Meadow River	Laurel Creek	WVKG-19-V-5	3.49	2.39
Meadow River	Little Clear Creek upstream of Kuhn Branch	WVKG-19-V	3.33	1.99

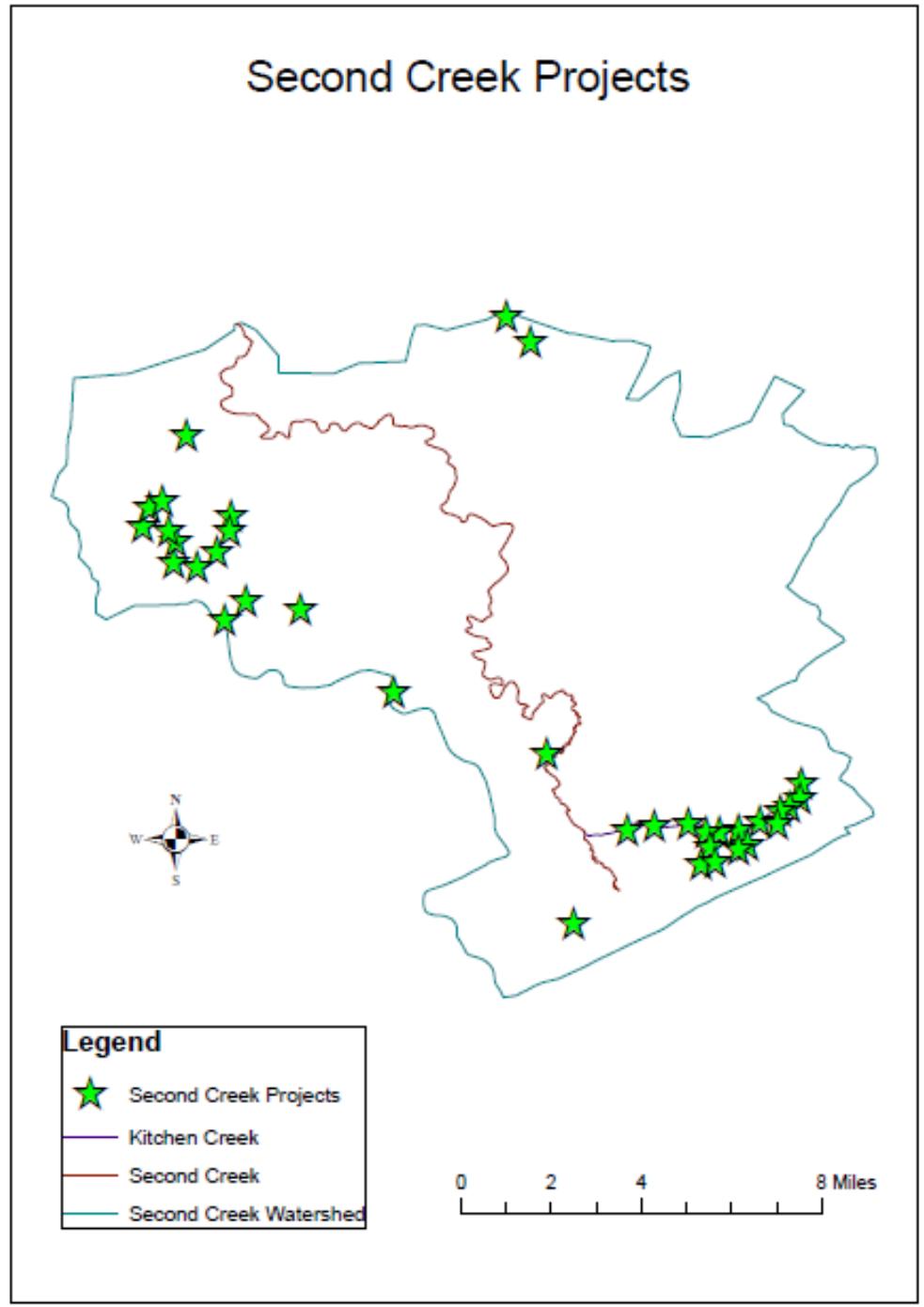
A-8.5 TMDL Tables: Fecal Coliform Bacteria

Table A-8-6. Fecal coliform bacteria TMDLs for the Meadow River watershed

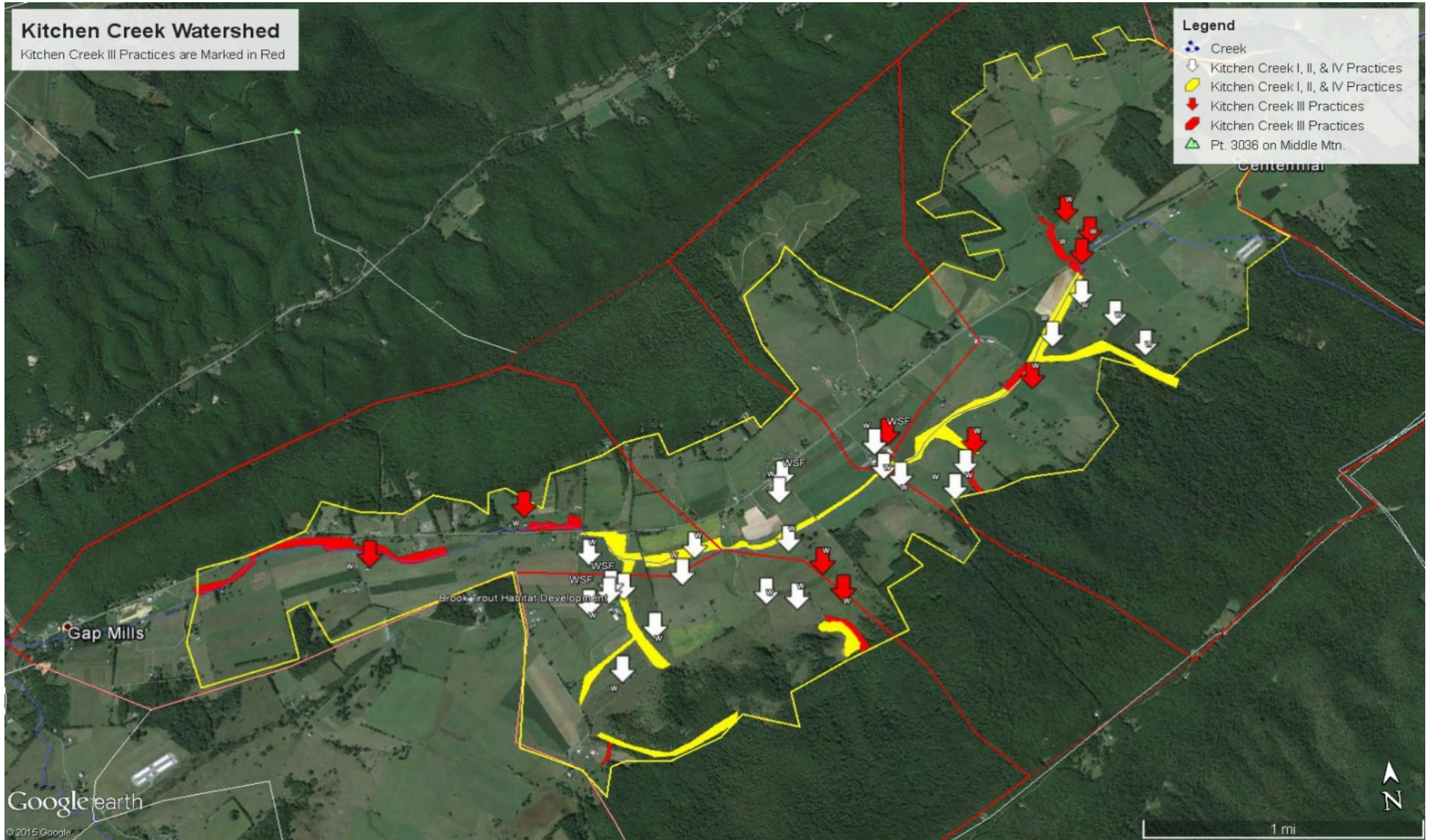
Major Watershed	Stream Code	Stream Name	Parameter	Load Allocation (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Meadow River	WVKG-19-Q	Sewell Creek	Fecal coliform	1.06E+11	2.95E+10	7.14E+09	1.43E+11
Meadow River	WVKG-19-Q-1	Little Sewell Creek	Fecal coliform	3.79E+10	NA	2.00E+09	3.99E+10

Hunter Site


Google Earth

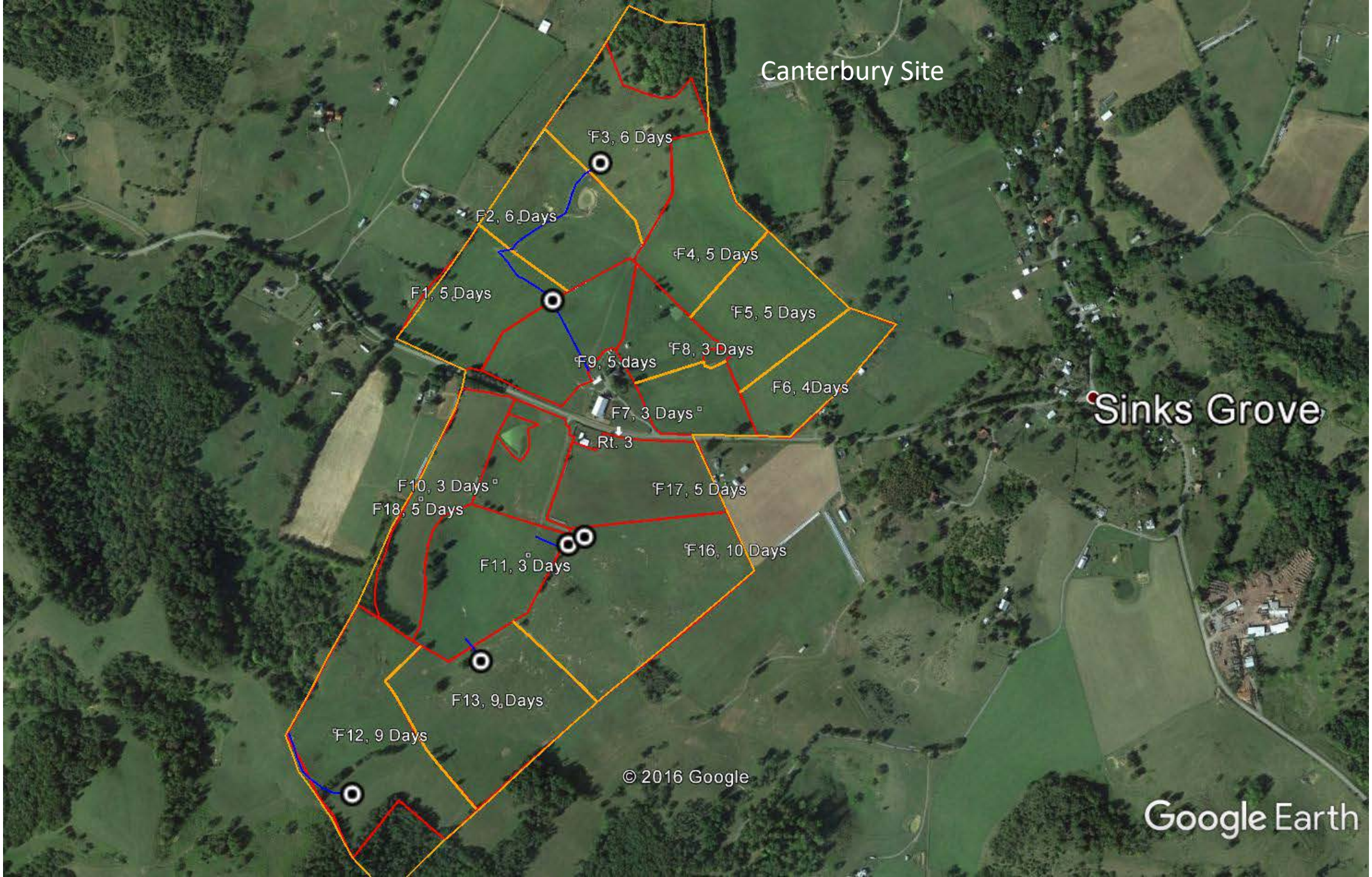

Second Creek Projects
N
W
E
S
Legend
Second Creek Projects
Kitchen Creek
Second Creek
Second Creek Watershed
0
2
4
8 Miles

Second/kitchen map

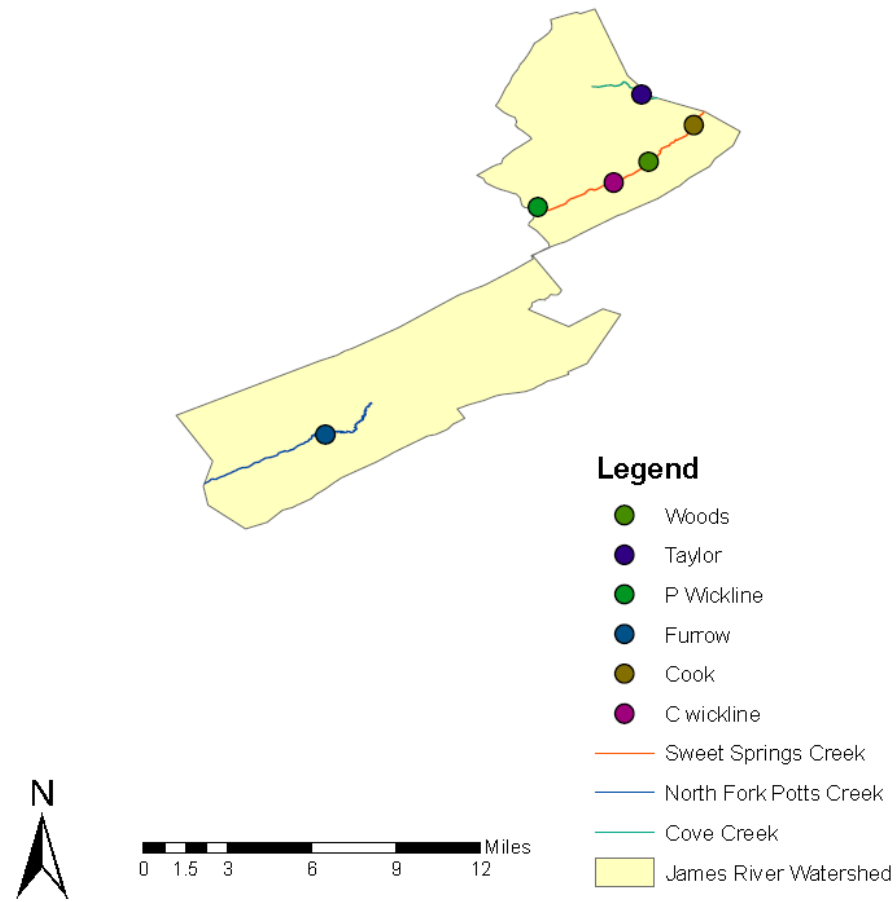


Waste Storage Facilities on Kitchen Creek


Masters Site
© 2016 Google
Google Earth

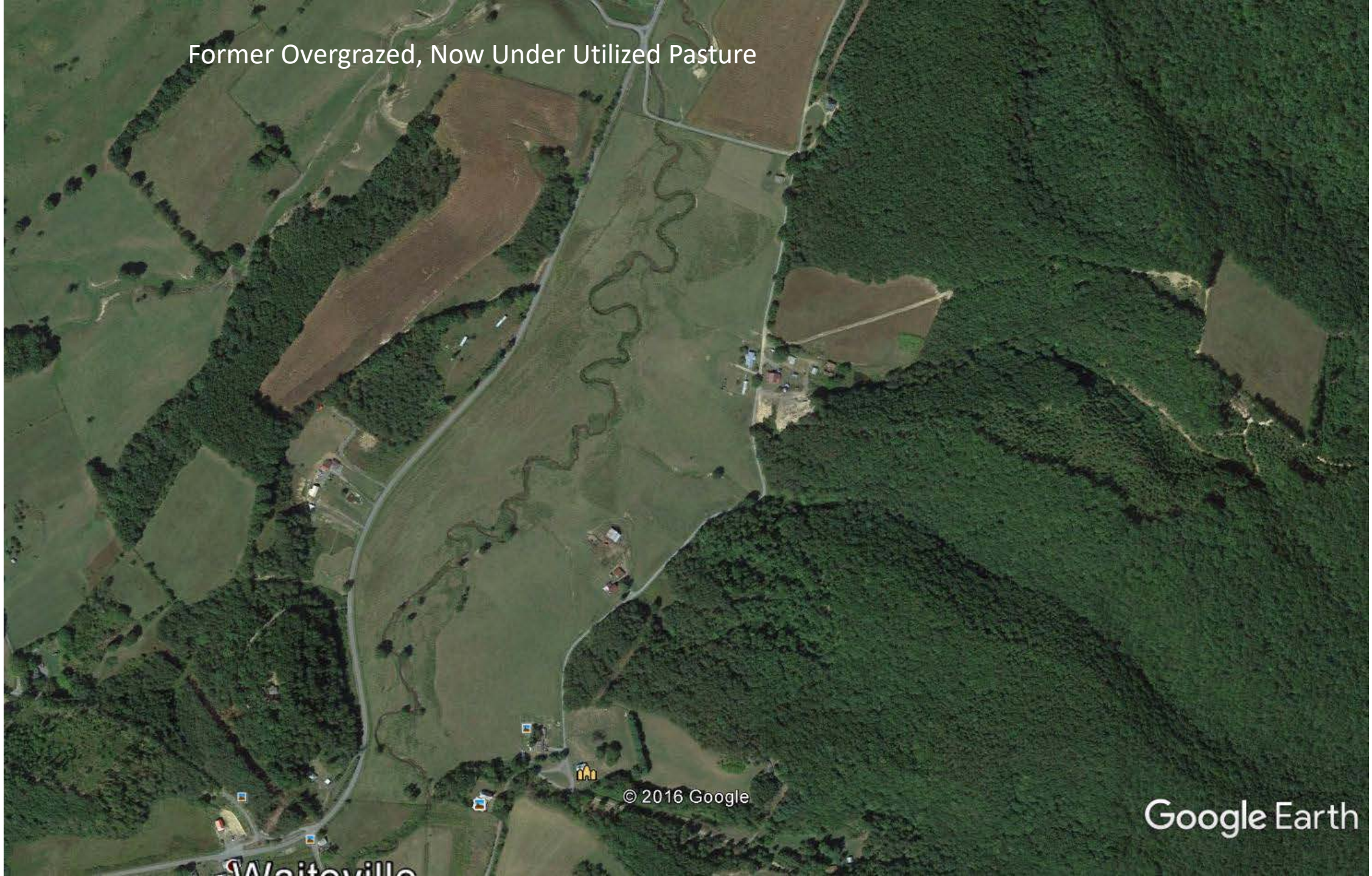

Canterbury Site
F3, 6 Days
F2, 6 Days
F4, 5 Days
F1, 5 Days
F5, 5 Days
F8, 3 Days
F9, 5 days
F6, 4Days
F7, 3 Days
Rt. 3
Sinks Grove
F10, 3 Days
F17, 5 Days
F18, 5 Days
F16, 10 Days
F11, 3 Days
F13, 9 Days
F12, 9 Days
© 2016 Google
Google Earth

Project Site Map
James River Watershed 319 Project




Furrow Site
© 2016 Google
Google Earth


Former Pasture Converted to Cornfield
Waiteville
© 2016 Google
Google Earth


Former Overgrazed, Now Under Utilized Pasture
© 2016 Google
Google Earth

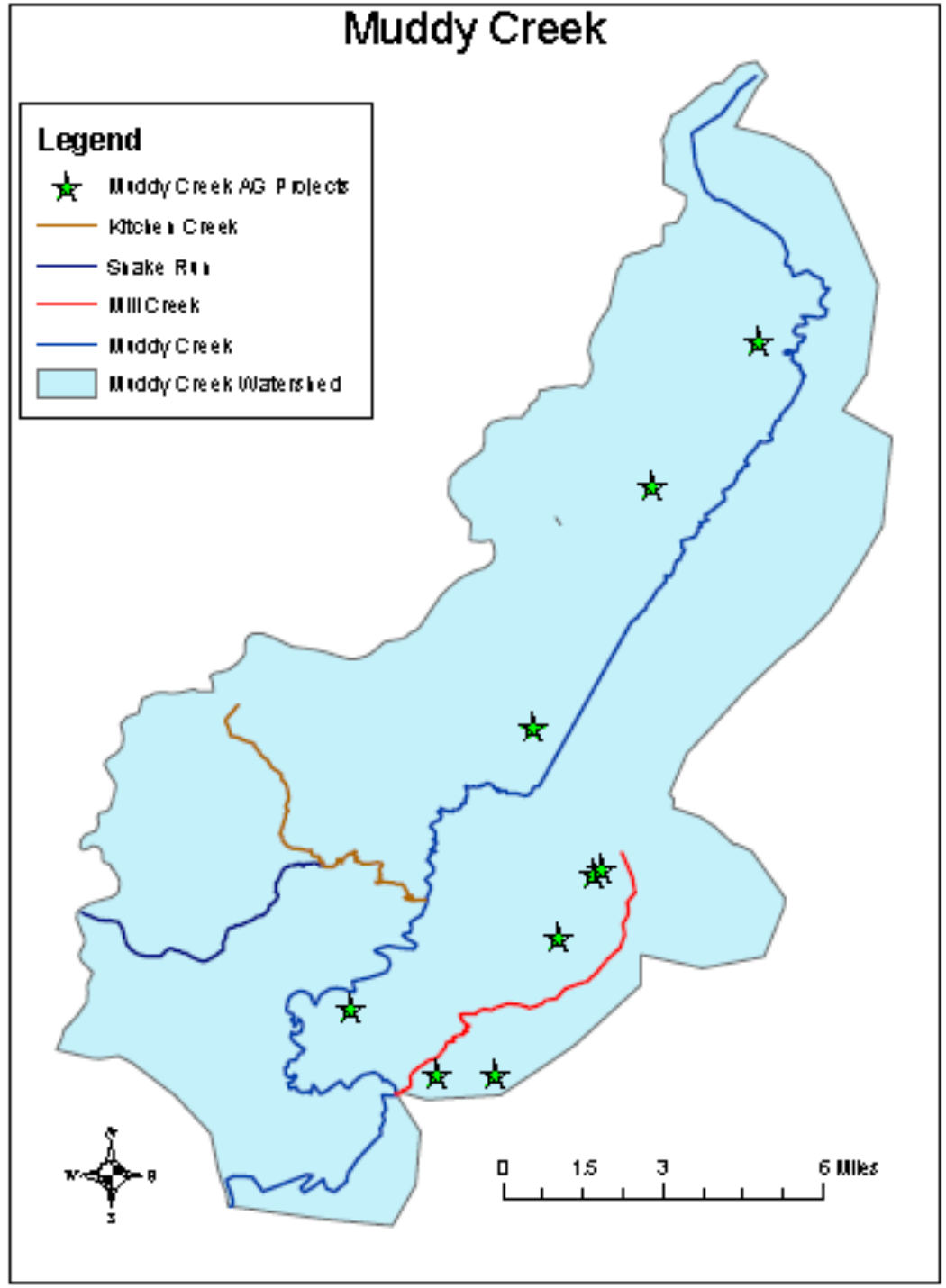

Hull Site, Pasture Converted to Cropland and Lightly Grazed Riparian Area
© 2016 Google
Google Earth


P. Wickline Site
© 2016 Google
Google Earth


C. Wickline Site
© 2016 Google
Google Earth


Woods Site
© 2016 Google
Google Earth


Cook Site
© 2016 Google
Google Earth


Muddy Creek
Legend
Muddy Creek AG Projects
Kitchen Creek
Snake Run
Mill Creek
Muddy Creek
Muddy Creek Watershed
N
W
E
S
0
1.5
3
6 Miles


Nichols Site
© 2016 Google
Google Earth

Griffith Site


Snyder Site
© 2016 Google
Google Earth


McClung Site
© 2016 Google
Google Earth


E. Tuckwiller Site
© 2016 Google
Google Earth


Willey Site
© 2016 Google
Google Earth


Hedrick Site
© 2016 Google
Google Earth

Kirk Site

Anthony Creek ARVS Demonstration

White Sulphur Springs National Fish Hatchery

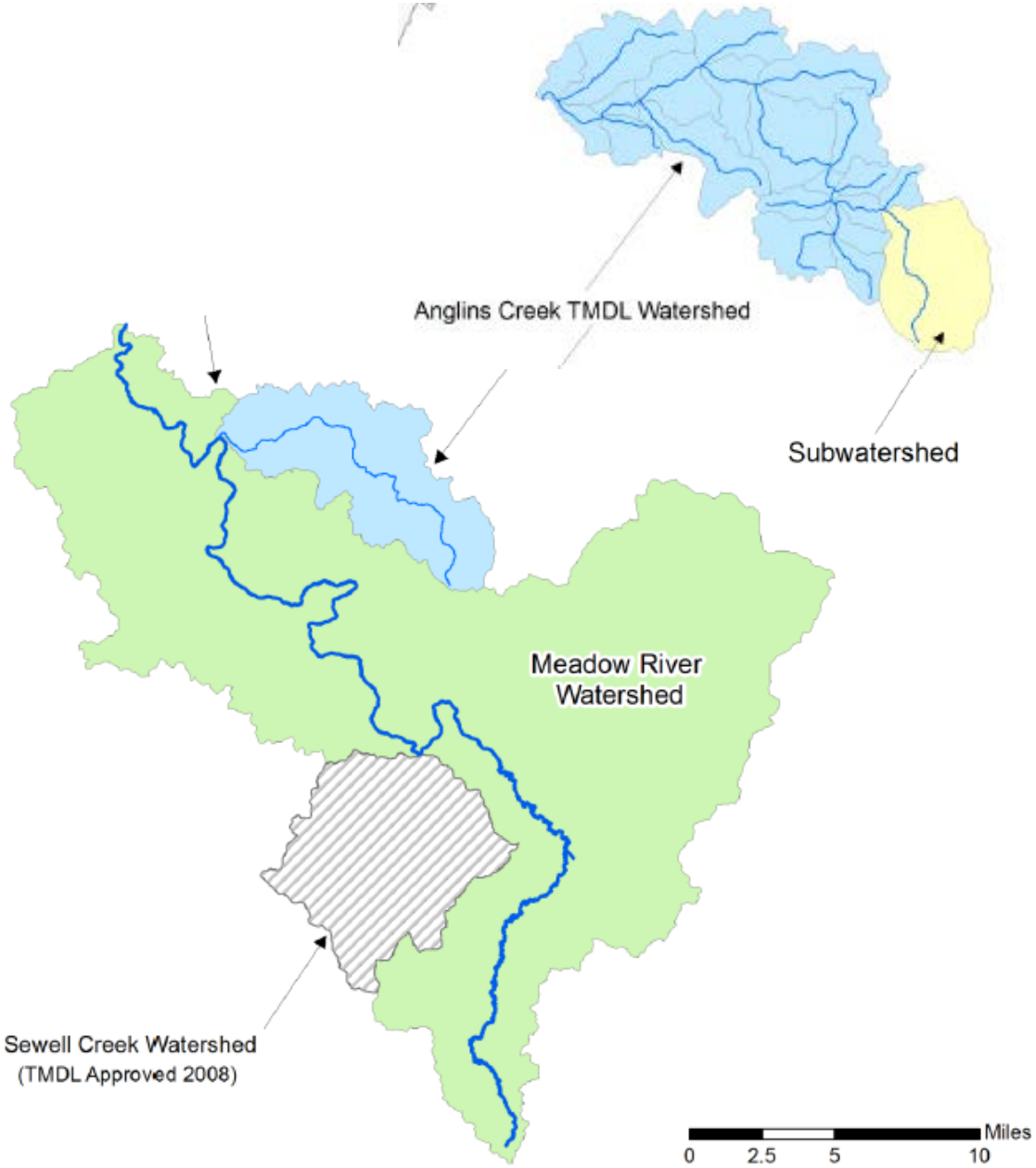

Google earth

Outreach

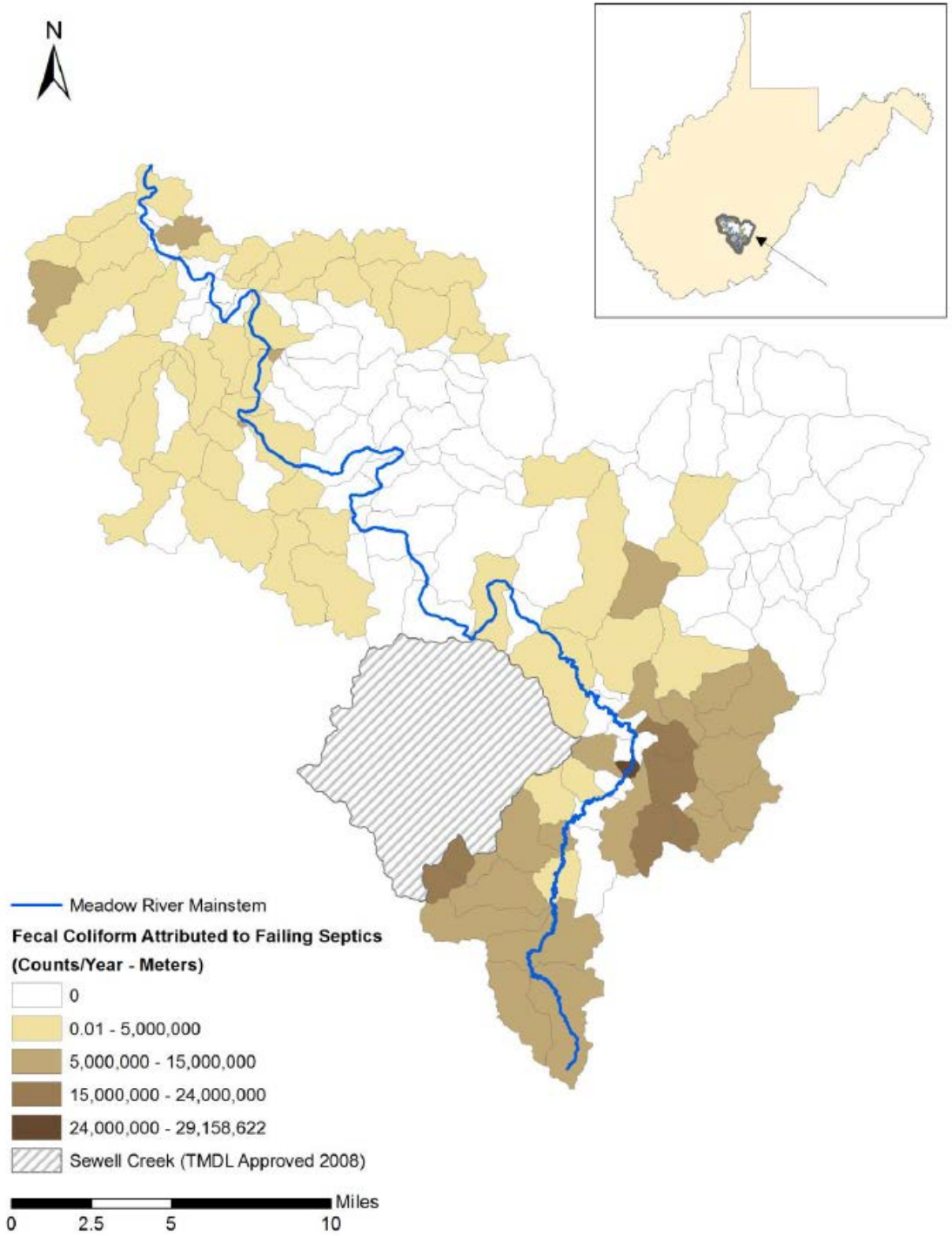
Where Are We Going?

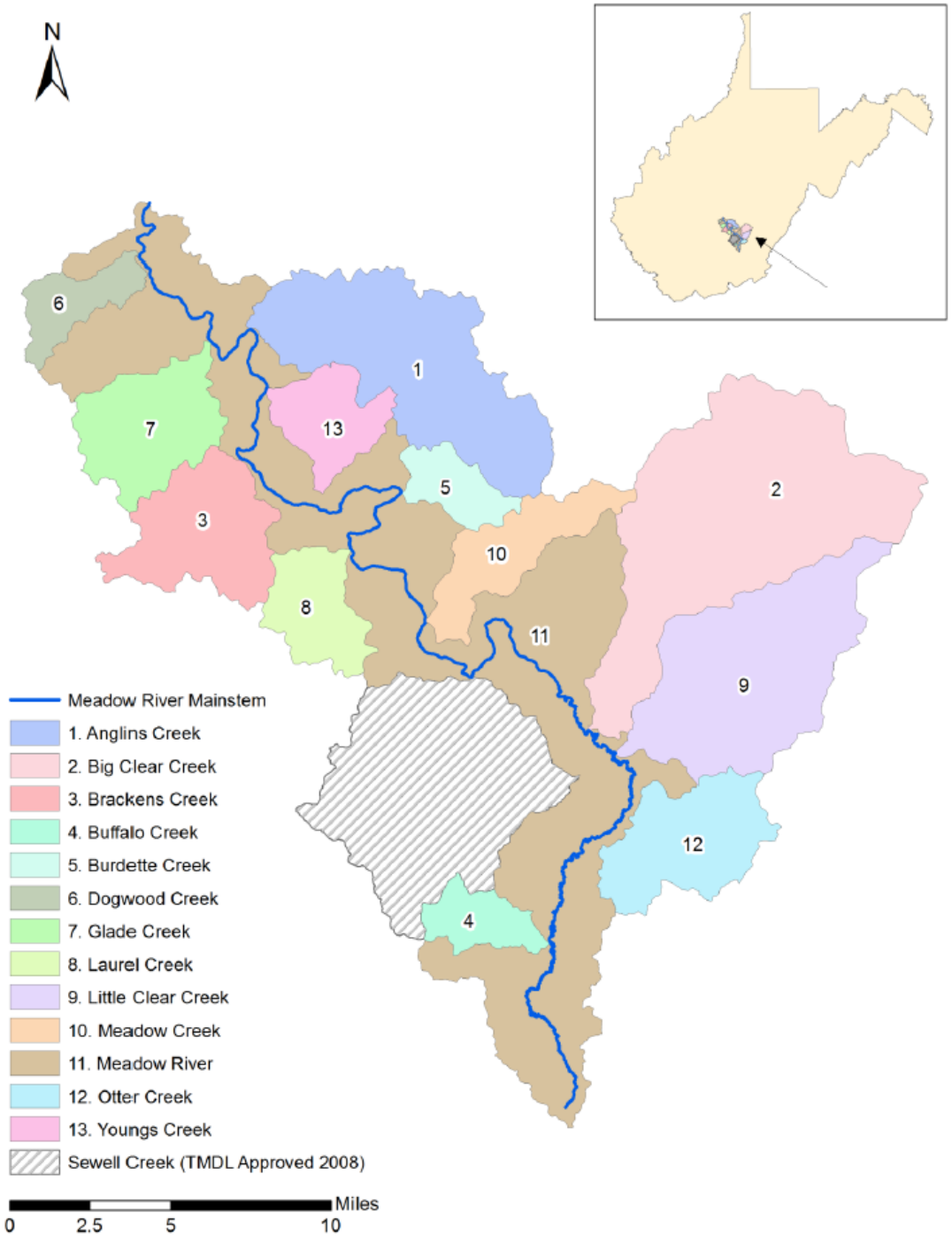
Watershed Based Plans
In Development

Meadow River




N
W
E
S
Nicholas
Quinwood
Fayette
Rainelle
Rupert
Greenbrier
Summers
19
60
64
29
Towns and Cities
Major Roads
Meadow River
Streams
Counties
TMDL Project Area
Miles
0
2.5
5
10


N
Meadow River Mainstem
Fecal Coliform Attributed to Failing Septics
(Counts/Year - Meters)
0
0.01 - 5,000,000
5,000,000 - 15,000,000
15,000,000 - 24,000,000
24,000,000 - 29,158,622
Sewell Creek (TMDL Approved 2008)
Miles
0
2.5
5
10


N
1
2
3
4
5
6
7
8
9
10
11
12
13
Meadow River Mainstem
1. Anglins Creek
2. Big Clear Creek
3. Brackens Creek
4. Buffalo Creek
5. Burdette Creek
6. Dogwood Creek
7. Glade Creek
8. Laurel Creek
9. Little Clear Creek
10. Meadow Creek
11. Meadow River
12. Otter Creek
13. Youngs Creek
Sewell Creek (TMDL Approved 2008)
Miles
0
2.5
5
10

Landuse Type	Area of Watershed		
	Acres	Square Miles	Percentage
Barren	2,717.4	4.2	1.3
Cropland	1,095.1	1.7	0.5
Forest	179,073.1	279.8	86.2
Grassland	9,006.8	14.1	4.3
Pasture	5,764.2	9.0	2.8
Paved Road	1,516.6	2.4	0.7
Urban/Residential	4,358.7	6.8	2.1
Riparian Pasture	233.2	0.4	0.1
Water	981.0	1.5	0.5
Wetland	2,890.5	4.5	1.4
Total	**207,636.6**	**324.4**	**100.0**

Subwatershed	Stream Name	NHD Code	pH	FC
Meadow River	Meadow River	WV-KG-55		X
Burdette Creek	Piney Creek	WV-KG-55-AF-1	X	
Meadow River	Toms Creek	WV-KG-55-AG	X	
Meadow River	Kates Creek	WV-KG-55-AM	X	
Meadow River	Surbaugh Creek	WV-KG-55-AT	X	
Meadow Creek	Meadow Creek	WV-KG-55-AU		X
Big Clear Creek	Big Clear Creek	WV-KG-55-BS		X
Big Clear Creek	Old Field Branch	WV-KG-55-BS-16-G	X	
Little Clear Creek	Little Clear Creek	WV-KG-55-CA		X
Little Clear Creek	Beaver Creek	WV-KG-55-CA-3		X
Otter Creek	Otter Creek	WV-KG-55-CH		X
Otter Creek	UNT/Otter Creek RM 2.81	WV-KG-55-CH-10		X
Otter Creek	UNT/Otter Creek RM 4.03	WV-KG-55-CH-11		X
Otter Creek	Methodist Branch	WV-KG-55-CH-4		X
Otter Creek	Smoot Branch	WV-KG-55-CH-8		X
Meadow River	Callahan Branch	WV-KG-55-CM		X
Buffalo Creek	Buffalo Creek	WV-KG-55-CU		X
Meadow River	Morris Fork	WV-KG-55-CV		X
Meadow River	Arrowwood Creek	WV-KG-55-G	X	
Anglins Creek	Sugargrove Creek	WV-KG-55-N-6	X	

7.0 TMDL RESULTS

Table 7-1. pH TMDLs

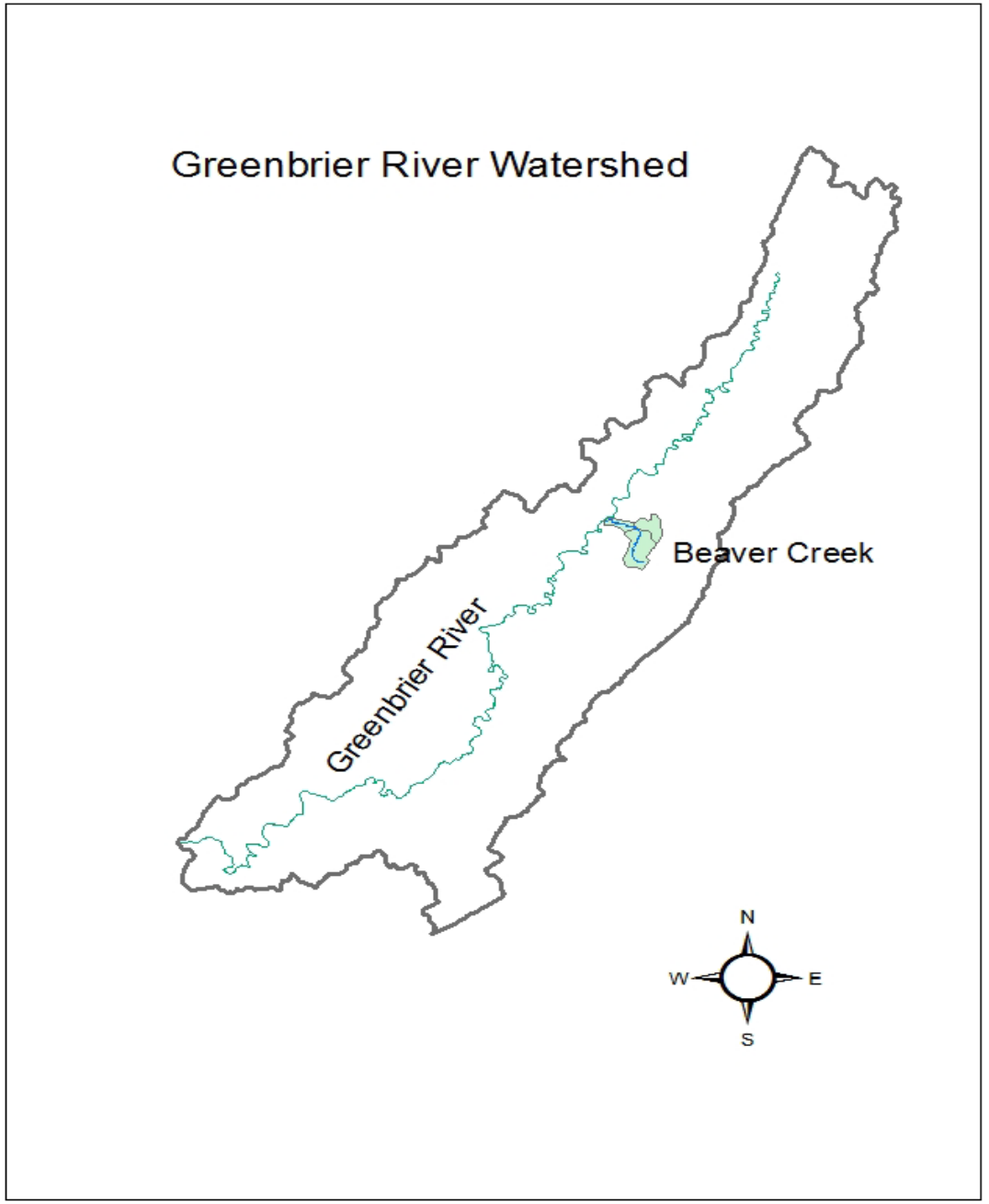
TMDL Watershed	Stream Code	Stream Name	LA Average Daily Net Acidity Load (lbs as CaCO3/day)	WLA Average Daily Net Acidity Load (lbs as CaCO3/day)	MOS Average Daily Net Acidity Load (lbs as CaCO3/day)	TMDL Average Daily Net Acidity Load (lbs as CaCO3/day)
Meadow River	WV-KG-55-G	Arrowwood Creek	-78.90	0.00	-4.15	-83.06
Anglins Creek	WV-KG-55-N-6	Sugargrove Creek	-47.67	0.00	-2.51	-50.18
Burdette Creek	WV-KG-55-AF-1	Piney Creek	-61.37	0.00	-3.23	-64.60
Meadow River	WV-KG-55-AG	Toms Creek	-43.84	0.00	-2.31	-46.14
Meadow River	WV-KG-55-AM	Kates Creek	-36.16	0.00	-1.90	-38.07
Meadow River	WV-KG-55-AT	Surbaugh Creek	-82.19	0.00	-4.33	-86.52
Big Clear Creek	WV-KG-55-BS-16-G	Old Field Branch	-114.52	0.00	-6.03	-120.55

Table 7-2. Fecal Coliform Bacteria TMDLs

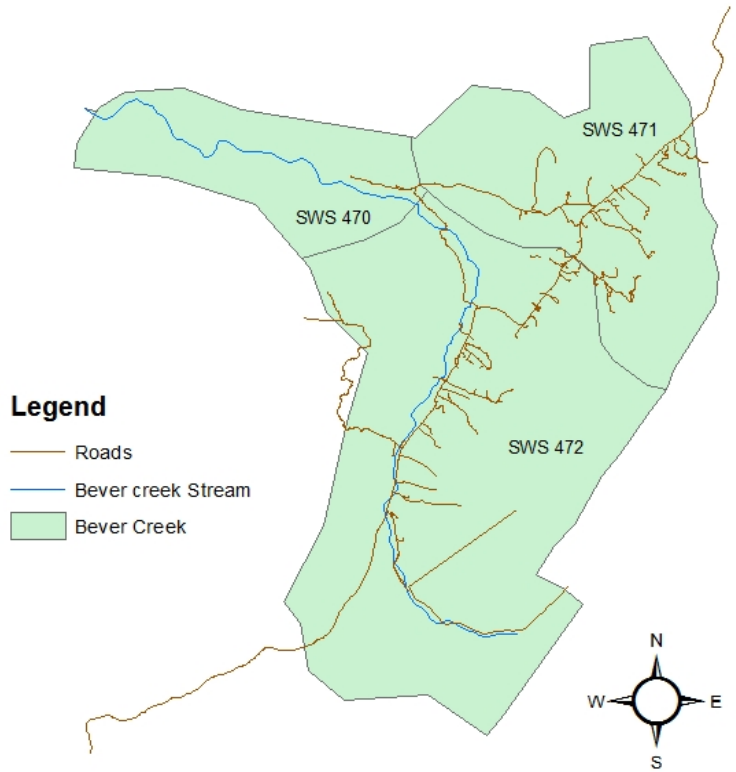
TMDL Watershed	Stream Code	Stream Name	Load Allocations (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Meadow River	WV-KG-55	Meadow River	1.04E+12	2.99E+10	5.64E+10	1.13E+12
Meadow Creek	WV-KG-55-AU	Meadow Creek	3.03E+10	0.00E+00	1.60E+09	3.19E+10
Big Clear Creek	WV-KG-55-BS	Big Clear Creek	1.26E+11	3.18E+07	6.62E+09	1.32E+11
Little Clear Creek	WV-KG-55-CA	Little Clear Creek	7.79E+10	0.00E+00	4.10E+09	8.20E+10
Little Clear Creek	WV-KG-55-CA-3	Beaver Creek	2.11E+10	0.00E+00	1.11E+09	2.22E+10
Otter Creek	WV-KG-55-CH	Otter Creek	5.00E+10	1.14E+07	2.63E+09	5.27E+10
Otter Creek	WV-KG-55-CH-4	Methodist Branch	8.93E+09	0.00E+00	4.70E+08	9.40E+09
Otter Creek	WV-KG-55-CH-8	Smoot Branch	7.56E+09	0.00E+00	3.98E+08	7.96E+09
Otter Creek	WV-KG-55-CH-10	UNT/Otter Creek RM 2.81	5.58E+09	0.00E+00	2.94E+08	5.88E+09

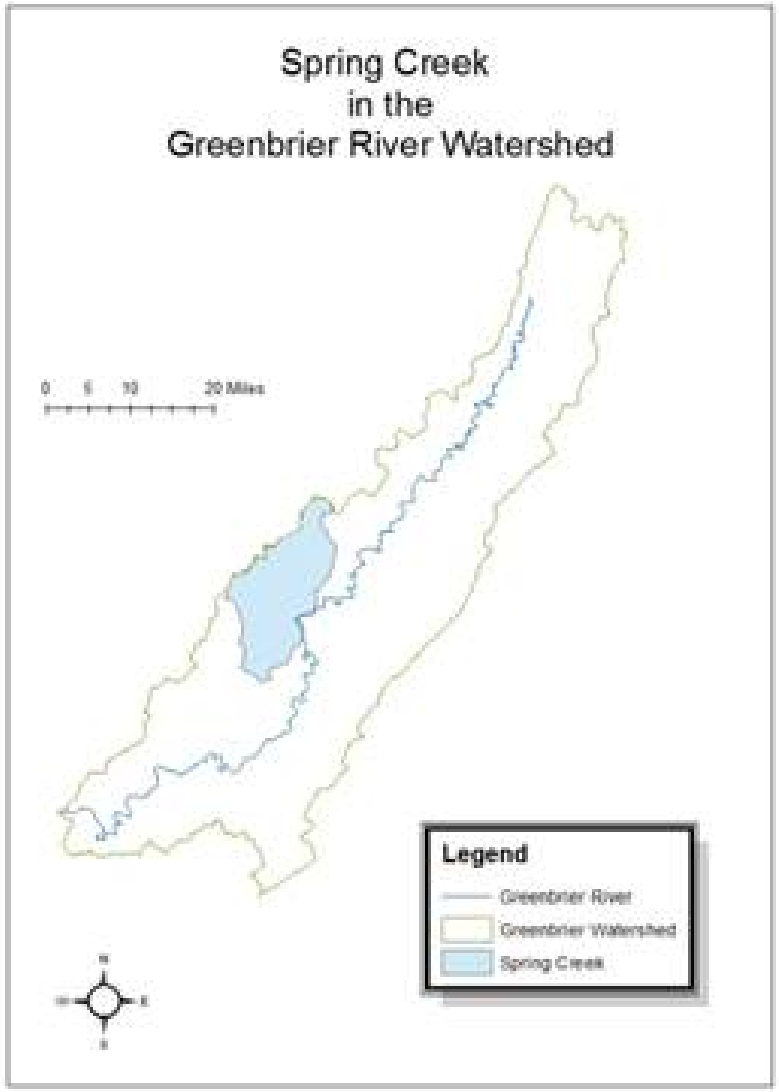
TMDL Watershed	Stream Code	Stream Name	Load Allocations (counts/day)	Wasteload Allocation (counts/day)	Margin of Safety (counts/day)	TMDL (counts/day)
Otter Creek	WV-KG-55-CH-11	UNT/Otter Creek RM 4.03	7.60E+09	0.00E+00	4.00E+08	8.00E+09
Meadow River	WV-KG-55-CM	Callahan Branch	1.20E+10	0.00E+00	6.30E+08	1.26E+10
Buffalo Creek	WV-KG-55-CU	Buffalo Creek	1.42E+10	0.00E+00	7.46E+08	1.49E+10
Meadow River	WV-KG-55-CV	Morris Fork	1.29E+10	0.00E+00	6.80E+08	1.36E+10

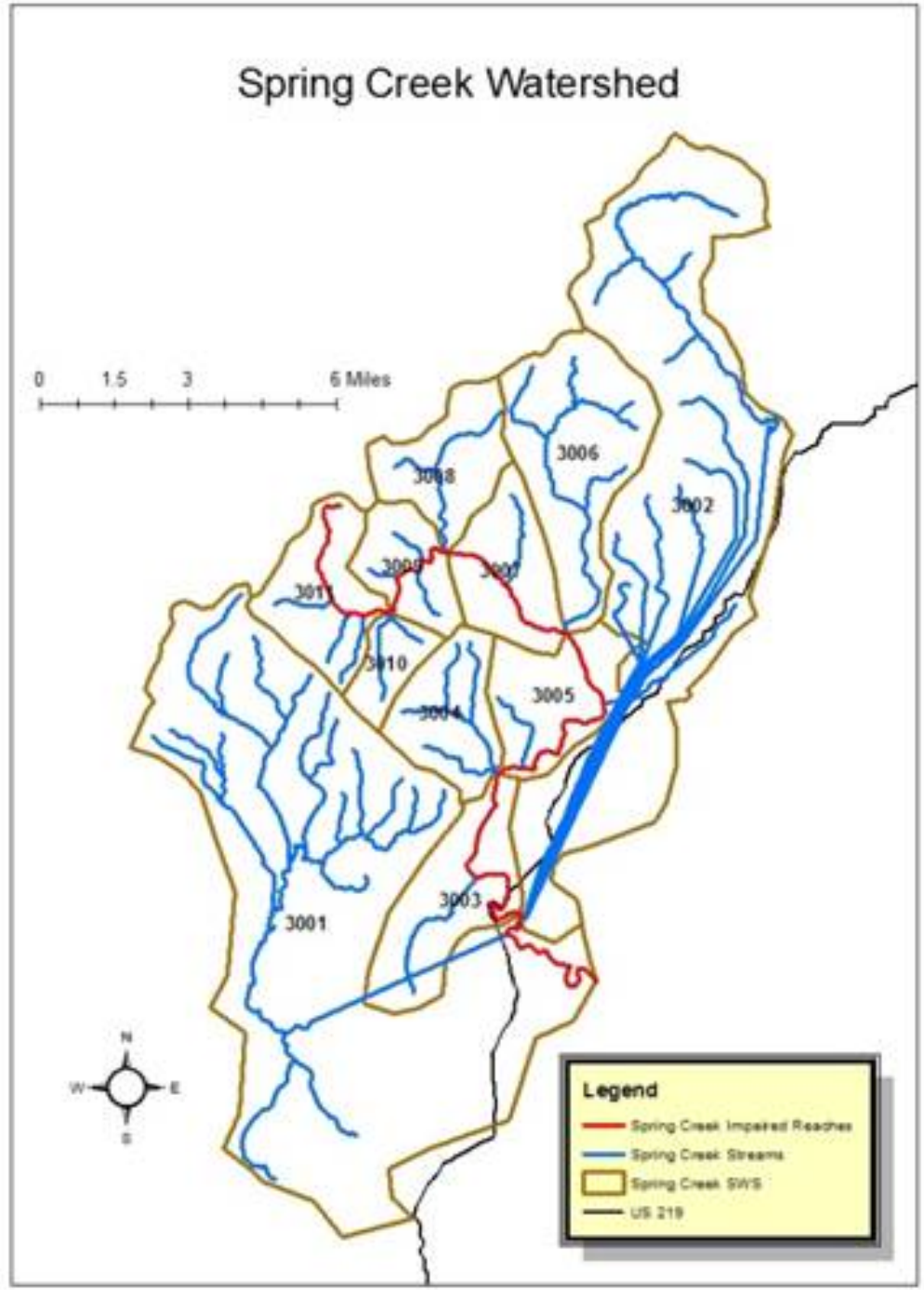
Beaver Creek



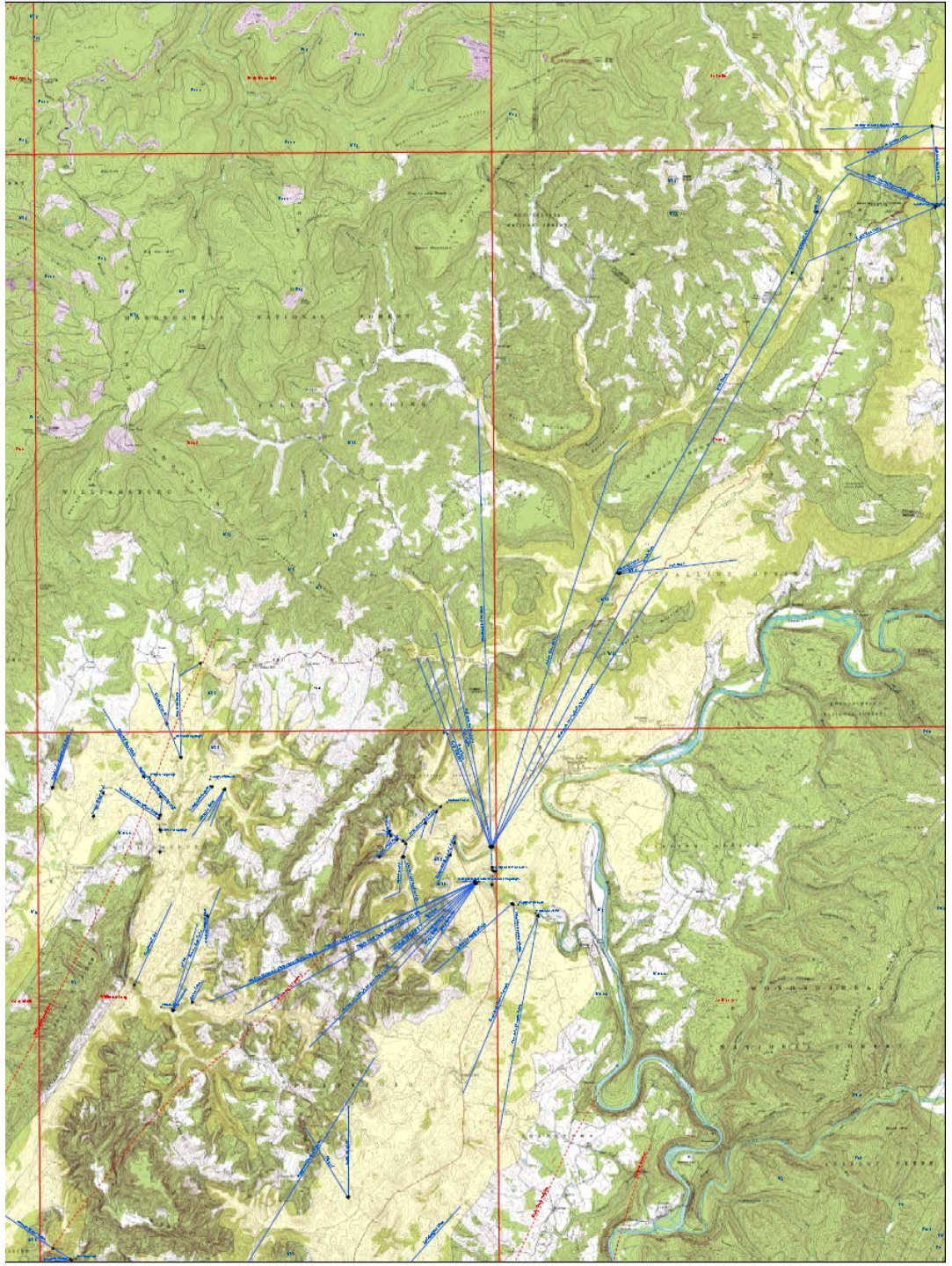
Beaver Creek



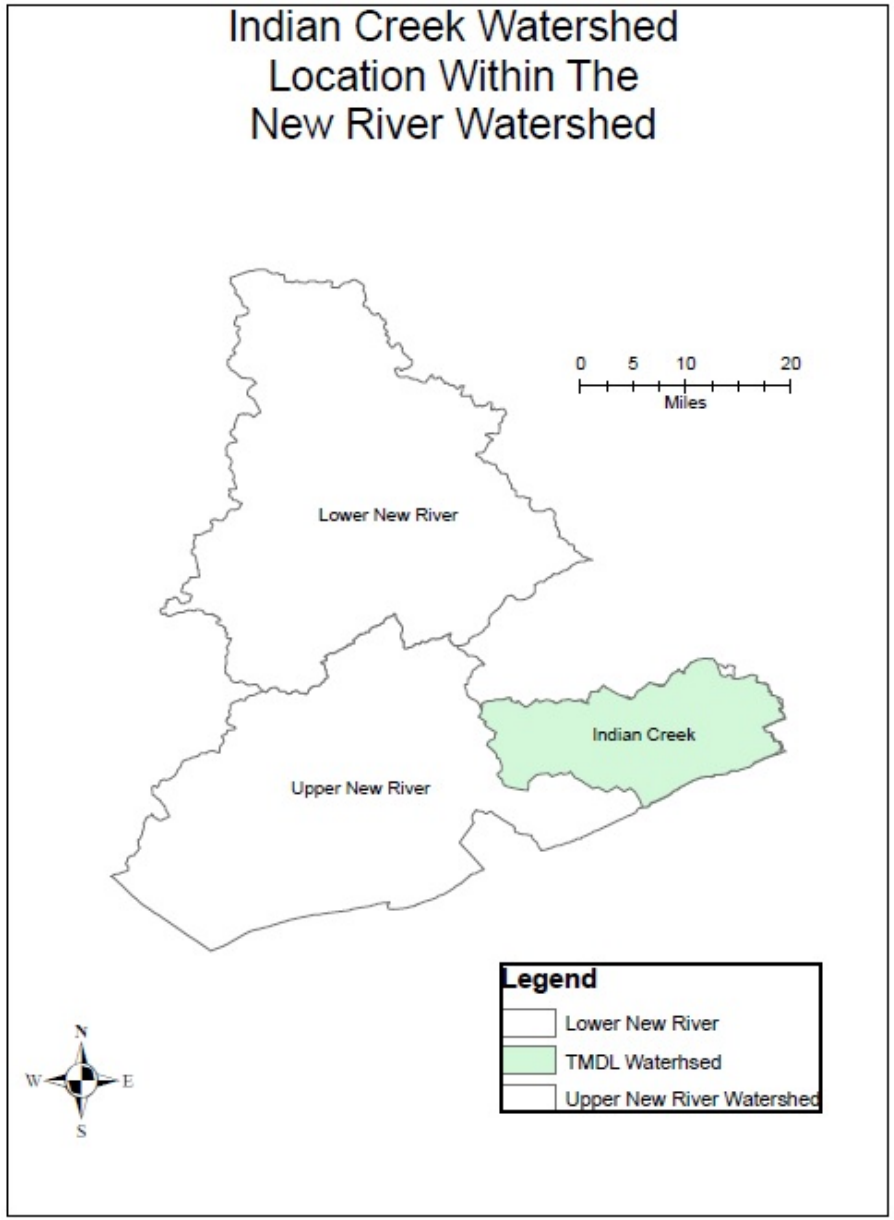

Spring Creek
in the
Greenbrier River Watershed
0 5 10 20 Miles
Legend
Greenbrier River
Greenbrier Watershed
Spring Creek

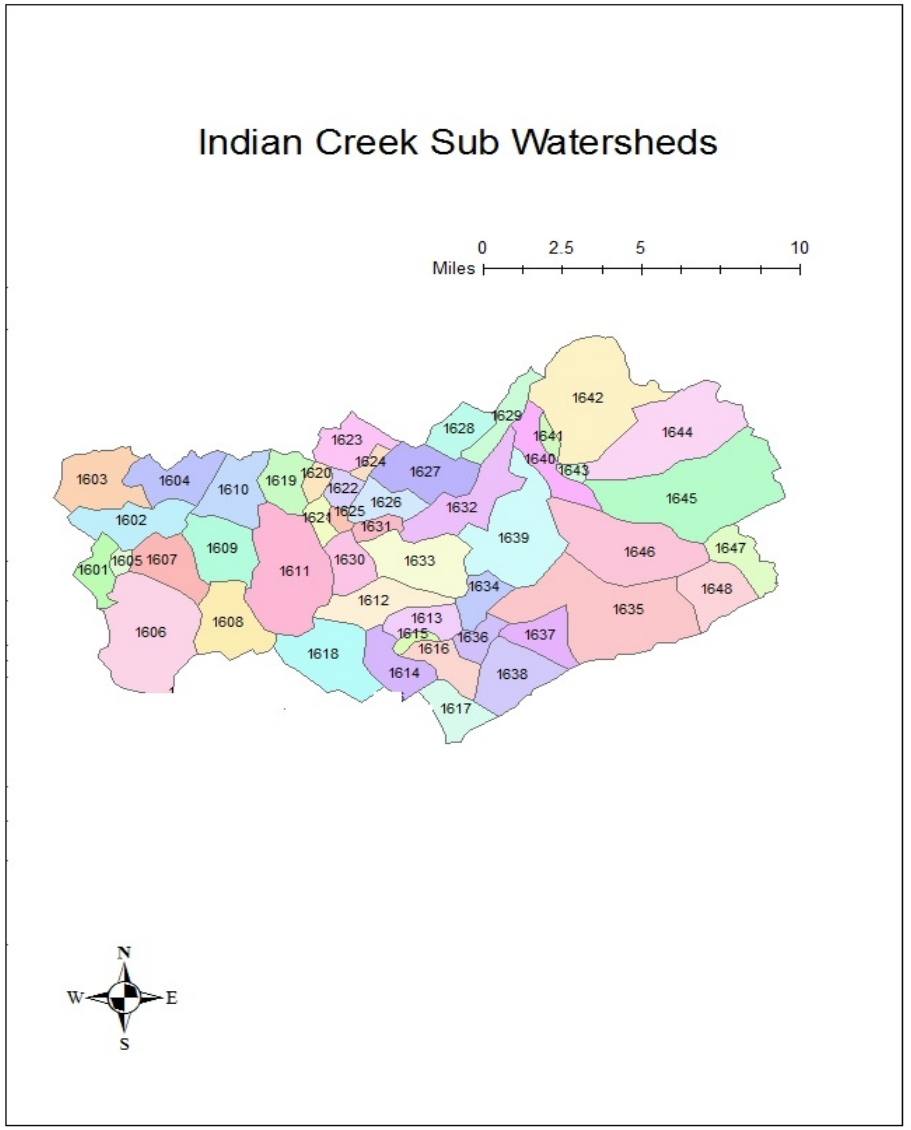

Spring Creek Watershed
0
1.5
3
6 Miles
3006
3008
3002
3009
3007
3011
3010
3005
3004
3003
3001
N
W
E
S
Legend
Spring Creek Impaired Reaches
Spring Creek Streams
Spring Creek SWS
US 219

Spring Creek Die Trace Map



Indian Creek





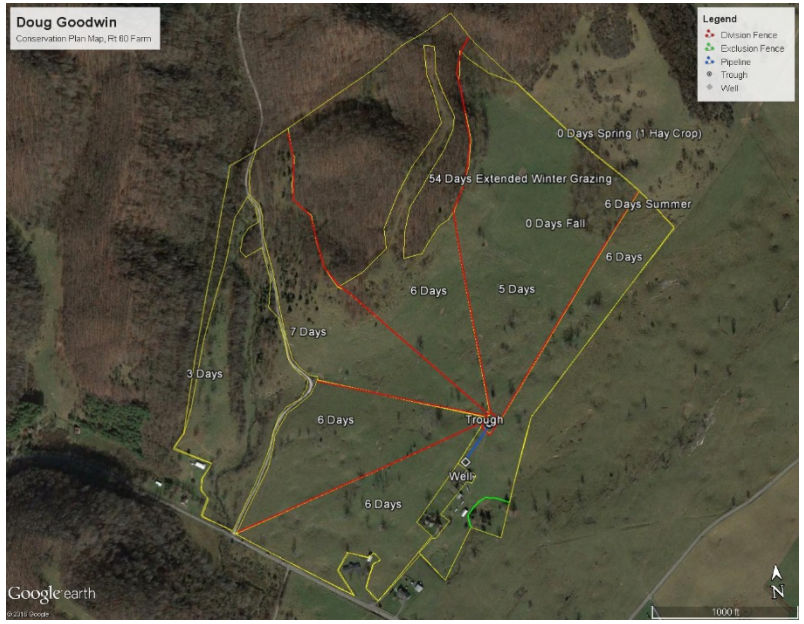
How Are We Going To Get There?

- Outreach, Outreach, Outreach
- Focus on Quality Instillation of BMP's
- Technology

Nutrient Management Planning

Grazing Plan Development

- Our Pastures Yield on Average 300 lbs. forage per acre/inch
- Utilization Rates Will Very Depending on Frequency of Rotation
- Livestock Must Consume 2-4% of their Body Weight Per Day of Forage.
- 2-4 Inches of Ground Cover are Required to Maintain a Healthy Forage Stand to Prevent Runoff



- Example:

200 head @1010lb consuming 3% require 6060 lbs. forage per day

If rotating every 7 days the livestock will utilize 55% of the available forage

@300 lbs. per acre in and a turn height of 8 inches then there would be approximately 2400 lbs. forage per acre.

2400 lbs. forage X %55 = 1320 lbs. Available Forage Per Acre

Giving consideration for drought, we require 40 days of forage regrowth before grazing again.

40 days regrowth/7 days per rotation = 6.71 grazing units

6060 lbs. forage required per day X 7 days per rotation

1320 lbs. Available Forage Per Acre = 32.14 acres per Grazing Unit

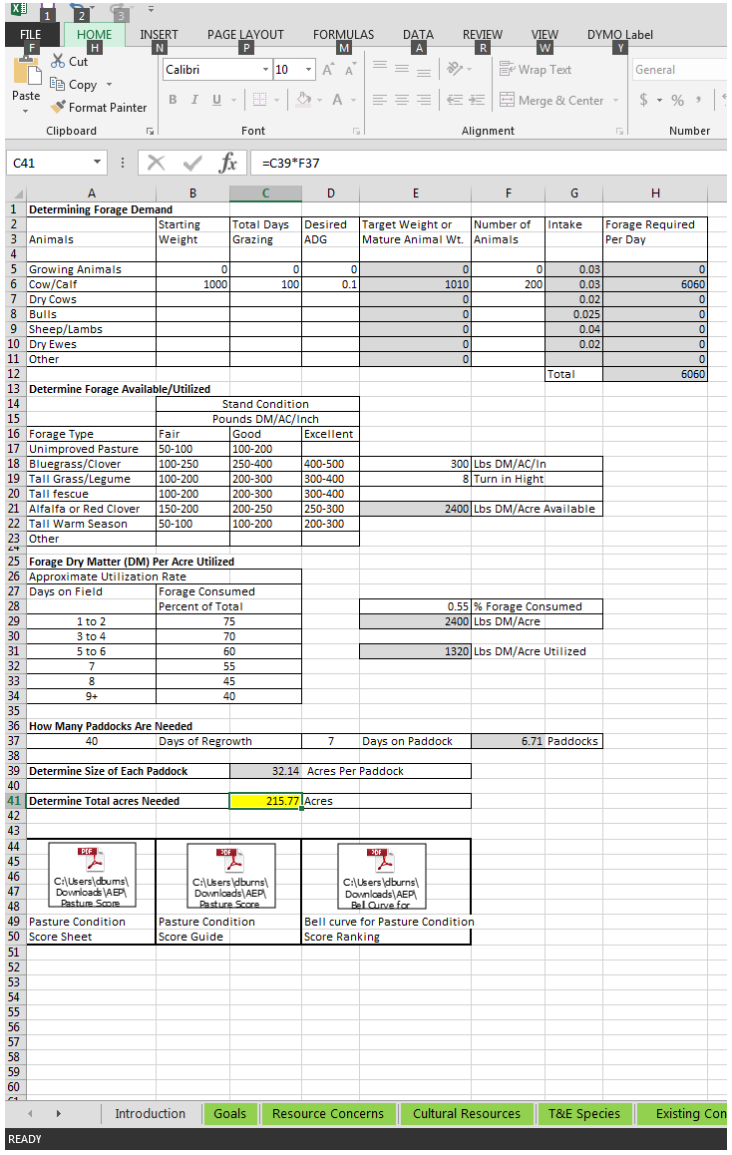
32.14 acres per GU X 6.71 GU's = 215.77 acres total required

*Note: The farm in this example could only support 130 Animal Units in a Continuous Grazing Situation

Economics of Conservation Management

Number of Animal Units	Days of Winter Feeding	Number of Bales Needed 25 AU per Bale	Hay Cost $30/Bale 25 AU per Bale	Number of Calves to Sell With 5% Death	2016 Revenue from calf sale AVG $575/hd	2016 Gross Income After Feed Costs	2014 Revenue from calf sale AVG $1150/hd	2014 Gross Income After Feed Costs
130	150	750	$22,500	123	$70,725	$48,225	$141,450	$118,950
130	90	450	$12,500	123	$70,725	$57,225	$141,450	$127,950
165	126	882	$26,460	156	$89,700	$63,240	$179,400	$152,940
200	150	1200	$36,000	190	$109,250	$73,250	$218,500	$182,500

Grazing Spreadsheets



Determining Forage Demand

Animals	Starting Weight	Total Days Grazing	Desired ADG	Target Weight or Mature Animal Wt.	Number of Animals	Intake	Forage Required Per Day
Growing Animals	0	0	0	0	0	0.03	0
Cow/Calf	1000	100	0.1	1010	200	0.03	6060
Dry Cows				0		0.02	0
Bulls				0		0.025	0
Sheep/Lambs				0		0.04	0
Dry Ewes				0		0.02	0
Other				0			0
						Total	6060

Determine Forage Available/Utilized

Forage Type	Stand Condition: Pounds DM/AC/Inch: Fair	Good	Excellent		
Unimproved Pasture	50-100	100-200			
Bluegrass/Clover	100-250	250-400	400-500	300	Lbs DM/AC/In
Tall Grass/Legume	100-200	200-300	300-400	8	Turn in Hight
Tall fescue	100-200	200-300	300-400		
Alfalfa or Red Clover	150-200	200-250	250-300	2400	Lbs DM/Acre Available
Tall Warm Season	50-100	100-200	200-300		
Other					

Forage Dry Matter (DM) Per Acre Utilized

Approximate Utilization Rate: Days on Field	Forage Consumed: Percent of Total		
1 to 2	75	0.55	% Forage Consumed
3 to 4	70	2400	Lbs DM/Acre
5 to 6	60	1320	Lbs DM/Acre Utilized
7	55		
8	45		
9+	40		

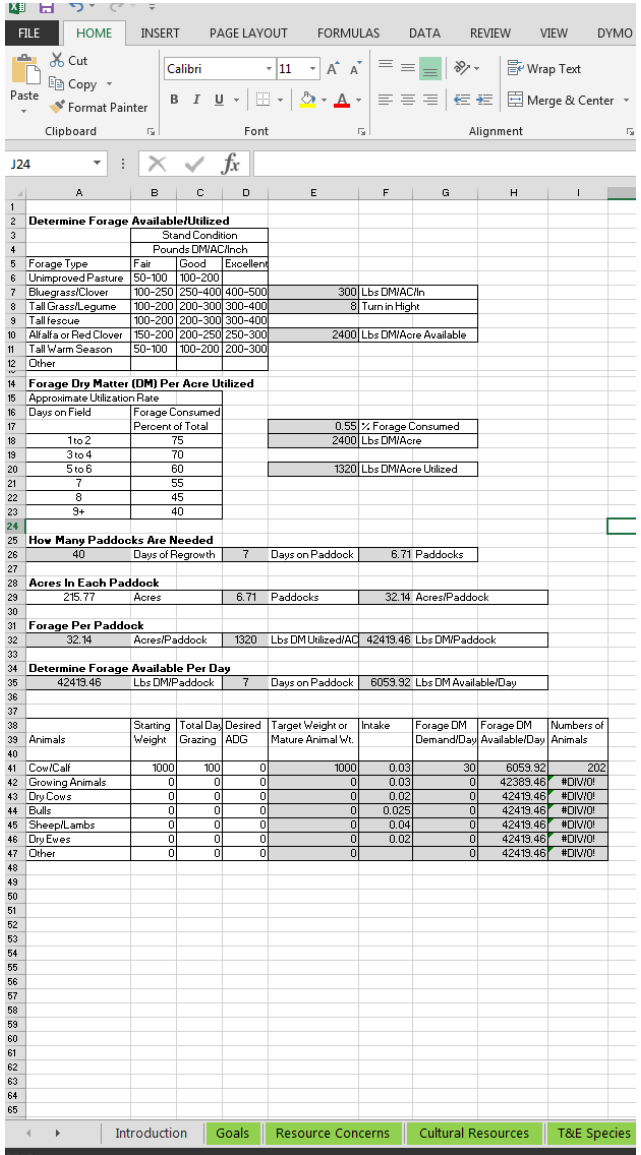
How Many Paddocks Are Needed

40	Days of Regrowth	7	Days on Paddock	6.71	Paddocks

Determine Size of Each Paddock	32.14	Acres Per Paddock	
Determine Total acres Needed	215.77	Acres	

Pasture Condition Score Sheet	Pasture Condition Score Guide	Bell curve for Pasture Condition Score Ranking
C:\Users\dburns\Downloads\AEP\Pasture Score	C:\Users\dburns\Downloads\AEP\Pasture Score	C:\Users\dburns\Downloads\AEP\Bell Curve for

Introduction | Goals | Resource Concerns | Cultural Resources | T&E Species | Existing Con



Determine Forage Available/Utilized

Forage Type	Stand Condition: Pounds DM/AC/Inch: Fair	Good	Excellent		
Unimproved Pasture	50-100	100-200			
Bluegrass/Clover	100-250	250-400	400-500	300	Lbs DM/AC/In
Tall Grass/Legume	100-200	200-300	300-400	8	Turn in Hight
Tall fescue	100-200	200-300	300-400		
Alfalfa or Red Clover	150-200	200-250	250-300	2400	Lbs DM/Acre Available
Tall Warm Season	50-100	100-200	200-300		
Other					

Forage Dry Matter (DM) Per Acre Utilized

Approximate Utilization Rate: Days on Field	Forage Consumed: Percent of Total		
1 to 2	75	0.55	% Forage Consumed
3 to 4	70	2400	Lbs DM/Acre
5 to 6	60	1320	Lbs DM/Acre Utilized
7	55		
8	45		
9+	40		

How Many Paddocks Are Needed

40	Days of Regrowth	7	Days on Paddock	6.71	Paddocks

Acres In Each Paddock

215.77	Acres	6.71	Paddocks	32.14	Acres/Paddock

Forage Per Paddock

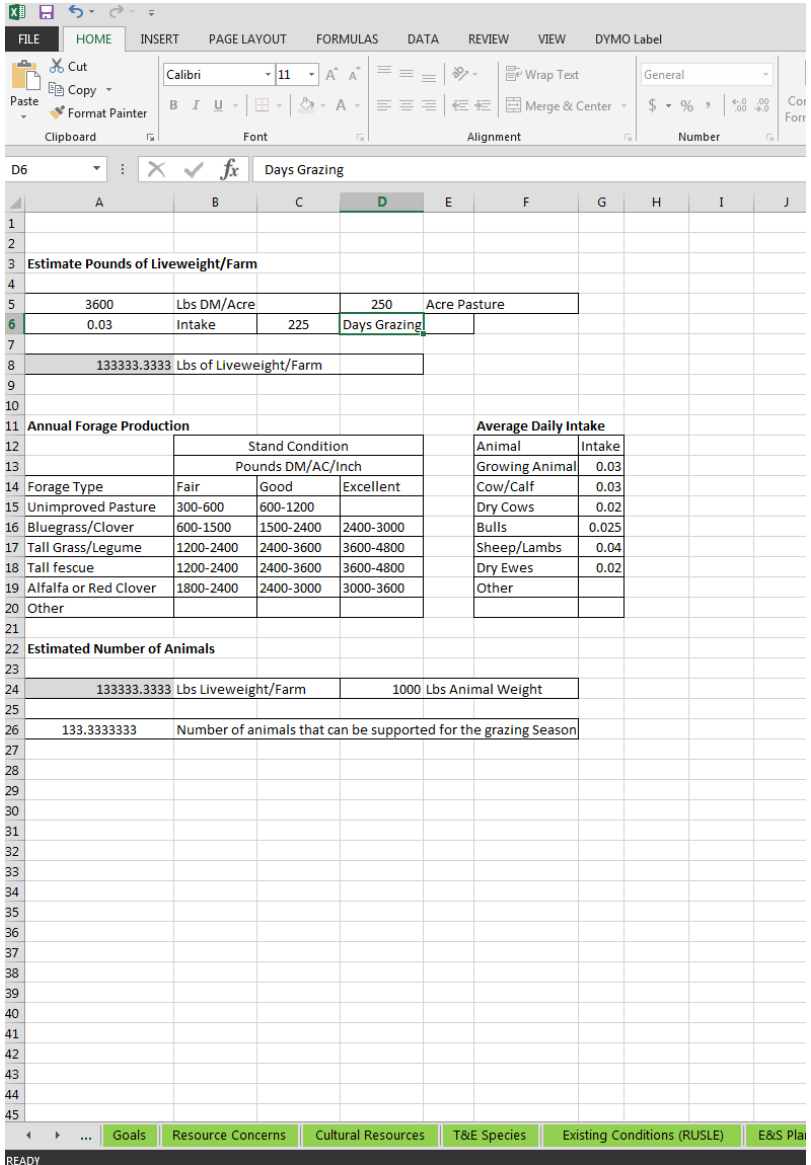
32.14	Acres/Paddock	1320	Lbs DM Utilized/AC	42419.46	Lbs DM/Paddock

Determine Forage Available Per Day

42419.46	Lbs DM/Paddock	7	Days on Paddock	6059.92	Lbs DM Available/Day

Animals	Starting Weight	Total Days Grazing	Desired ADG	Target Weight or Mature Animal Wt.	Intake	Forage DM Demand/Day	Forage DM Available/Day	Numbers of Animals
Cow/Calf	1000	100	0	1000	0.03	30	6059.92	202
Growing Animals	0	0	0	0	0.03	0	42389.46	#DIV/0!
Dry Cows	0	0	0	0	0.02	0	42419.46	#DIV/0!
Bulls	0	0	0	0	0.025	0	42419.46	#DIV/0!
Sheep/Lambs	0	0	0	0	0.04	0	42419.46	#DIV/0!
Dry Ewes	0	0	0	0	0.02	0	42419.46	#DIV/0!
Other	0	0	0	0		0	42419.46	#DIV/0!

Introduction | Goals | Resource Concerns | Cultural Resources | T&E Species



Estimate Pounds of Liveweight/Farm

3600	Lbs DM/Acre		250	Acre Pasture
0.03	Intake	225	Days Grazing	
133333.3333	Lbs of Liveweight/Farm			

Annual Forage Production

Forage Type	Stand Condition: Pounds DM/AC/Inch: Fair	Good	Excellent
Unimproved Pasture	300-600	600-1200	
Bluegrass/Clover	600-1500	1500-2400	2400-3000
Tall Grass/Legume	1200-2400	2400-3600	3600-4800
Tall fescue	1200-2400	2400-3600	3600-4800
Alfalfa or Red Clover	1800-2400	2400-3000	3000-3600
Other			

Average Daily Intake

Animal	Intake
Growing Animal	0.03
Cow/Calf	0.03
Dry Cows	0.02
Bulls	0.025
Sheep/Lambs	0.04
Dry Ewes	0.02
Other	

Estimated Number of Animals

133333.3333	Lbs Liveweight/Farm	1000	Lbs Animal Weight
133.3333333	Number of animals that can be supported for the grazing Season		

Goals | Resource Concerns | Cultural Resources | T&E Species | Existing Conditions (RUSLE) | E&S Pla

Assuring Funds are Spent Wisely

((Soil Value)+(Nutrient & Bacteria Value)) X Contract Length = Value of Benefit from BMP's

- Value of a ton of soil is based on the local value of a truckload of topsoil
- Values of a pound of N and P are based on the local cost of 46-0-0 and 0-46-0 fertilizer
- Nutrient production per AU/day is based on Ag Engineering Research from North Carolina State University 1990 (40.15 lbs. N per year and 9.12 Lbs. P per year)
- Value of bacteria is expressed as twice the value of P (Chesapeake bay model)
- Our spreadsheet includes a BMP adjustment factor to take into account for the efficiency's of different practices or overall conservation plans.
- 1 animal unit = 1000 lbs. of live weight
- Tons of soil saved is calculated utilizing the Revised Universal Soil Loss Equation
- Mass Soil erosion is calculated utilizing the Bank Erosion Hazard Index or Other Physical Measurements

Examples:

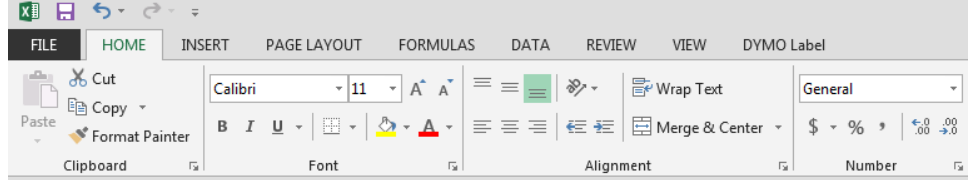
If you have a 250 acre farm and 200 animal units, and you can save 3 tons of soil per acre by implementing BMP's, then how much is appropriate to spend on BMP's?

[(Ton of topsoil cost $35 X 250 acres X 3 tons per acre) + (A cow will produce $10.04 of N and $2.74 of P +Bacteria Value @2xP $5.47(200 Animals))] X 5 year contract = $149,495.50

Likewise: If you have a 40 acre farm and 35 animal units, and you can save 3 tons of soil per acre by implementing BMP's, then how much is appropriate to spend on BMP's?

[($35 X 40 acres X 3 tons per acre) + ($10.04 + $2.74 +$5.47(35 Animals))] X 5 year contract = $10,192.96

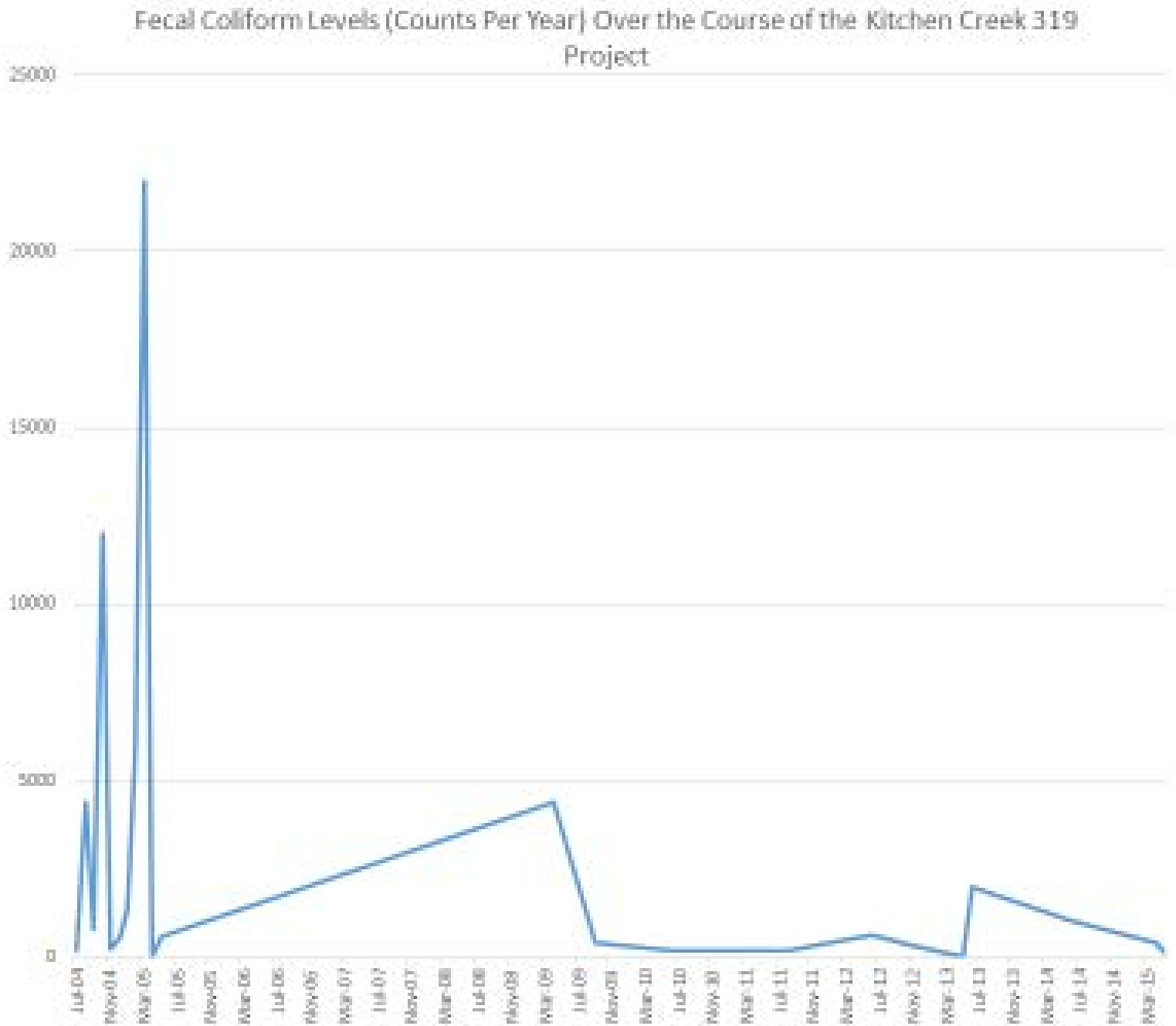
If this same farm requires stream restoration to save an additional 500 tons of soil from mass erosion then [(($35 X 40 acres X 3 tons per acre)+500) + ($10.04 + $2.74 +$5.47(35 Animals))] X 5 year contract = $97,692.96



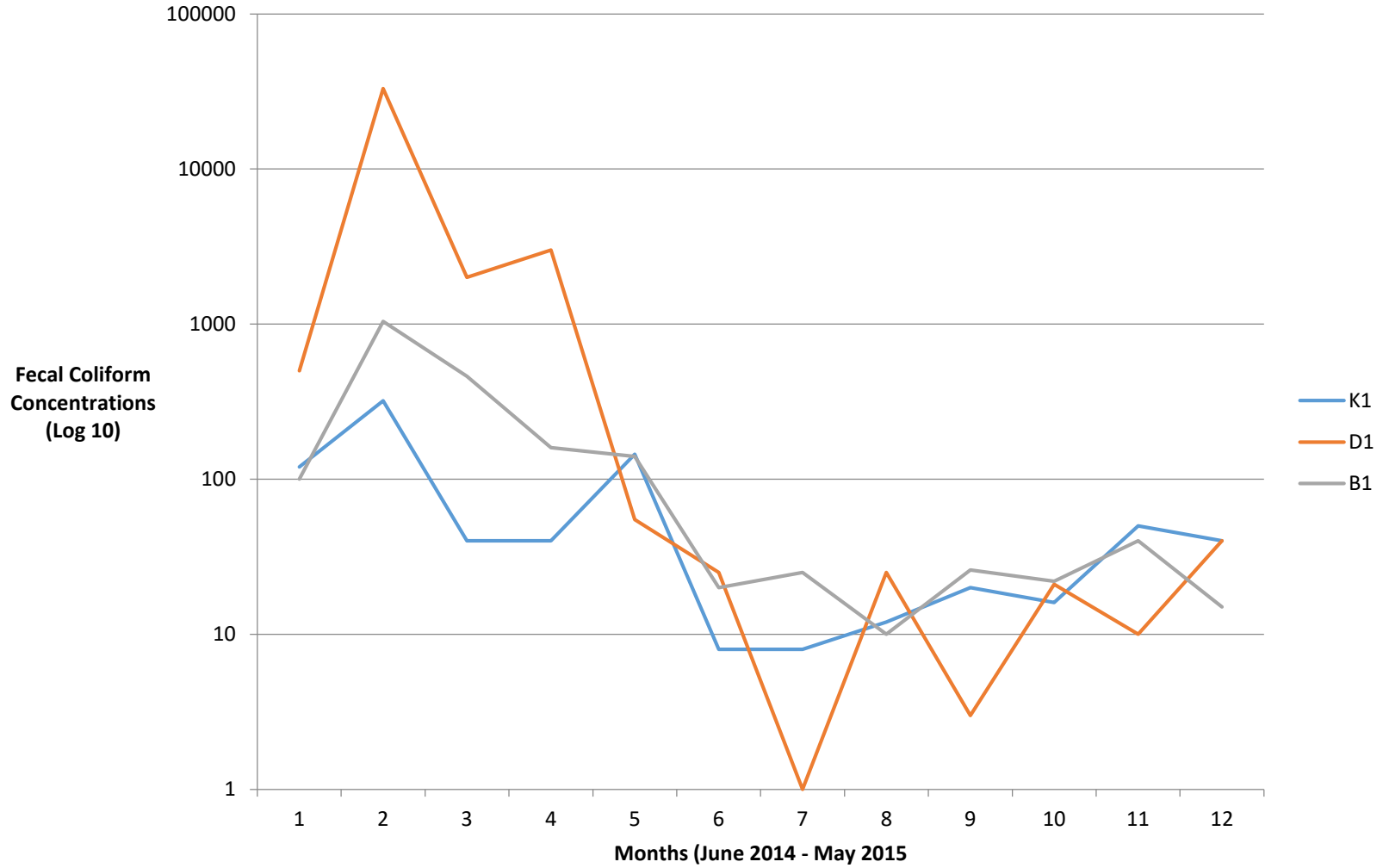
AB49

	A	B	C	D	E	F	G	H
1	Cost to Benefit Ratio Calculator							
2								
3		Value						
4	Ton of soil	$35.00						
5	Lb of N	$0.25						
6	Lb of P	$0.30						
7								
8			Value		BMP Adjustment			
9	1 AU lb N per Year	40.15	$10.04		Factor			
10	1 AU lb P Per Year	9.12	$2.74	Nutrient	100.00%			
11	1 AU Bacteria Production	2.10E+10	$5.47	Bacteria	100.00%			
12			$18.25					
13								
14		Sheet Erosion	Mass Erosion					
15	Total Animal Units	Tons of Soil	Tons of Soil	Total Acres	Length of			
16	Affected	Saved per AC	Saved	of Farm	Contract			
17	35	1	500.00	40	5			
18								
19					Cost to Benefit			
20	Anticipated Contract Value			0.00	Ratio			
21	Value of Benefit from BMP's			$97,692.96	0.00			
22	P Load Reduction			319.2	Lbs per Year			
23	N Load reduction			1405.25	Lbs Per Year			
24	Sediment Reduction			501	Tons Per Year			
25	Bacteria Load Reuctions			7.35E+11	Counts Per Year			
26								
27	*Values expressed in yellow varyables and should be changed to express local information							
28	*Values expressed in Gray are calculated and should not be altered							
29								
30	*Value of a ton of soil is based on the local value of a truck load of topsoil							
31	*Value of a pound of N and P are based on the local cost of 46-0-0 and 0-46-0 fertilizer							
32	*Nutrient production per AU per day is based on: Baker J. 1990 Unpublished manure							
33	nutrient data. Department of Biological and Agricultural Engineering, North Carolina							
34	State Univeristy, Raleigh, NC.							
35	*Value of bacteria is experssed as twice value of N and P produced annually							
36	*BMP adjustment factor should only be used if a BMP will not achieve the maximum							
37	possible load reduction for bacteria and/or nutrients, i.e. utilizing a creek buffer that							
38	is more narrow than necessary.							
39	*1 animal unit = 1000 lbs of live weight							
40	*Tons of soil saved per acre from sheet erosion should be calculated using the Revised							
41	Universal Soil Loss Equasion							
42	*Tons of soil saved by mass erosion should be calculated by physical measurments of							
43	eroded area or the Bank erosion Hazard Index							
44	*Value of Benefit from BMP's is calculated as the sum of the value of the total soil saved and							
45	the total value of nutrients and bacteria load reduced times the length of the contract.							
46								
47	(Soil Value)+(Nutrient & Bacteria Value)*Contract Length = Value of Benefit from BMP's							
48								
49								
50								

Results


Fecal Coliform Levels (Counts Per Year) Over the Course of the Kitchen Creek 319 Project
25000
20000
15000
10000
5000
0

Knapp Creek Baseline Monitoring



Finally: The Fruit of Our Labor

2016 319 Tour

Agenda

8:30 - 9:30 Presentation at GVCD Office
9:50 Arrive @ National Fish Hatchery
10:15 Leave Hatchery
10:50 Arive Sweet Springs and Drive By Kitchen Creek Projects
12:00 -1:00 Lunch
1:15 Arrive at the Canterbury Farm
2:50 Arrive at the Morgan Farm
3:15 Leave Second Creek for Milligan Creek Watershed
3:40 Arrive in Milligan Creek Watershed and visit Goodwin Farm and others
5:00 Return to GVCD Office