Pathogen Reduction Projects in North Alabama

French Mill, Piney Creek, & Hurricane Creek

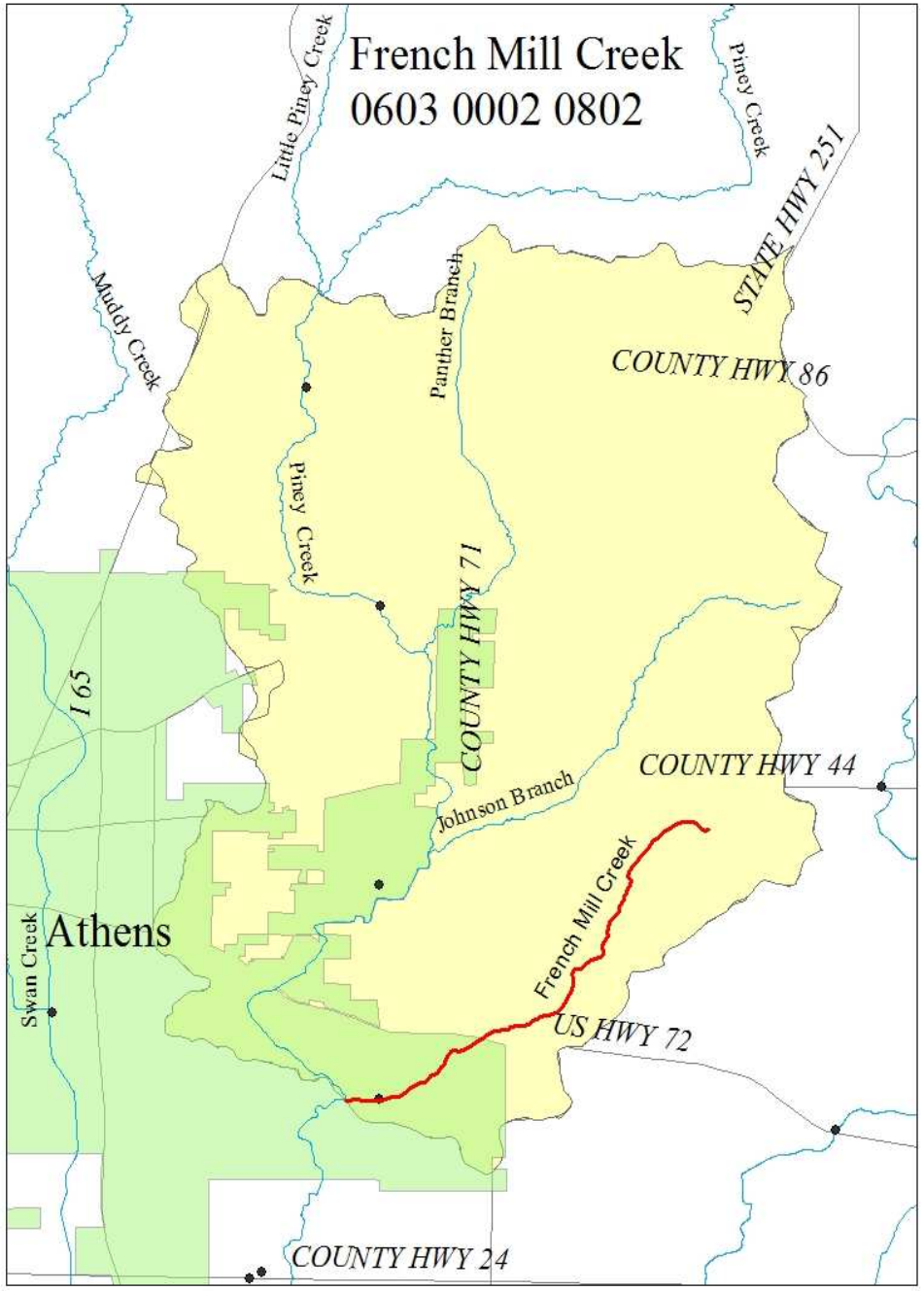
By: Sam Sandlin
Limestone and Madison County
Soil and Water Conservation Districts

French Mill – Tributary to Piney Creek
Piney Creek - Tributary to Tennessee River

- USE CLASSIFICATION IS "FISH AND WILDLIFE" (OAW, PWS, S, SH, F&W, LWF, A&I)
- ORIGINALLY 303 d LISTED FOR PATHOGENS IN 1998

  (>180 colony forming units / 100mL)
- TMDL completed December 2006
- PRIOR TO 2010 SAMPLED FOR "Various" FECAL COLIFORMS
- AFTER 2010 SPECIFICALLY SAMPLED FOR E. COLI.

  (>180 cfu/100 mL)


French Mill Creek
0603 0002 0802
Little Piney Creek
Piney Creek
STATE HWY 251
Muddy Creek
Panther Branch
COUNTY HWY 86
Piney Creek
COUNTY HWY 71
I 65
COUNTY HWY 44
Johnson Branch
French Mill Creek
Athens
Swan Creek
US HWY 72
COUNTY HWY 24

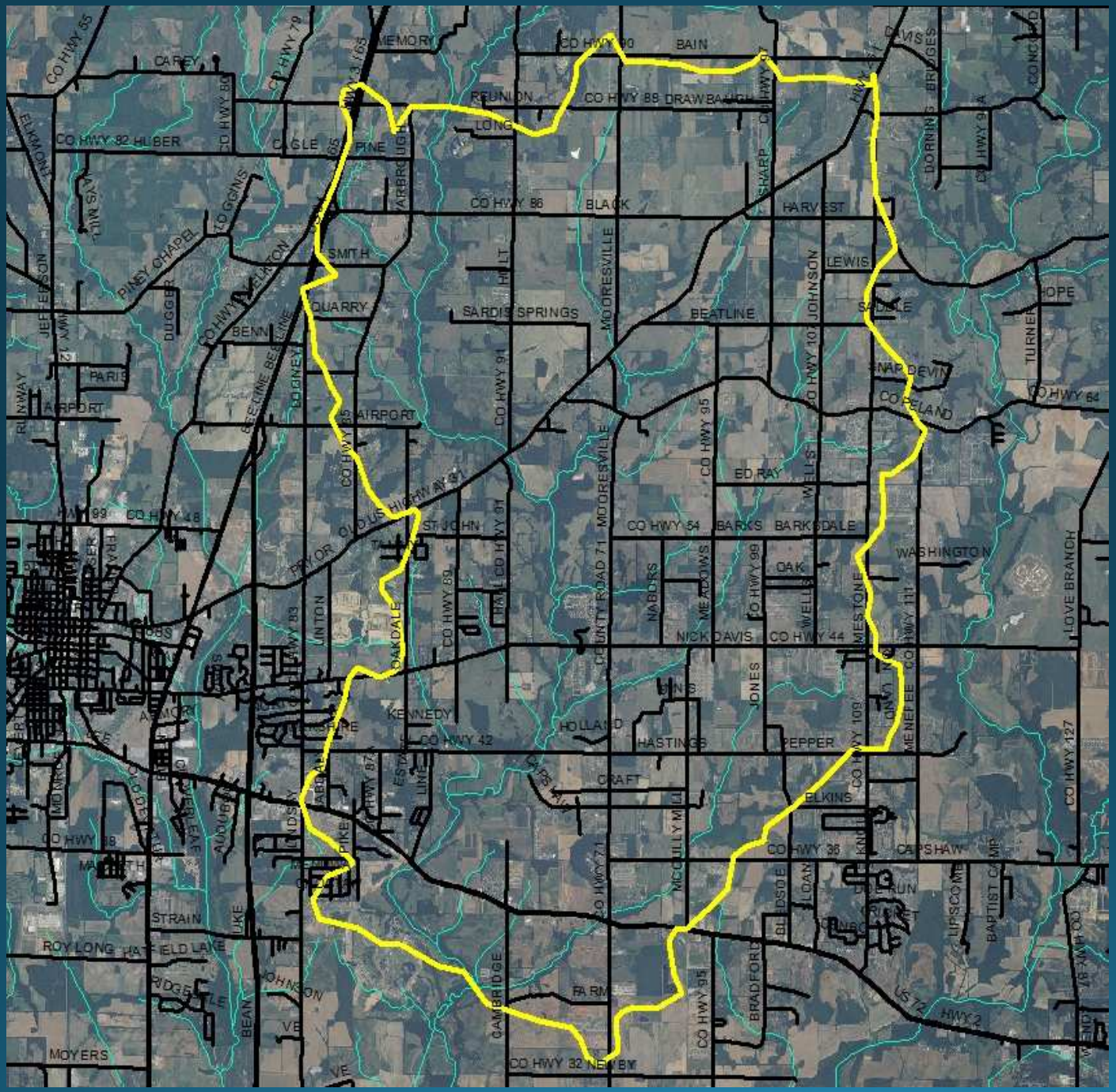

CO HWY 55
CAREY
MEMORY
CO HWY 90
BAIN
REUNION
CO HWY 89 DRAWBAUGH
CO HWY 82 HUBER
CO HWY 86
BLACK
HARVEST
SMITH
QUARRY
SARDIS SPRINGS
BEATLINE
LEWIS
SADDLE
CO HWY 64
CO HWY 95
ED RAY
CO HWY 54 BARKS BARKSDALE
WASHINGTON
CO HWY 48
ST JOHN
CO HWY 99
OAK
NICK DAVIS
CO HWY 44
HOLLAND
HASTINGS
PEPPER
KENNEDY
CO HWY 42
CRAFT
ELKINS
CO HWY 36
CAPSHAW
STRAIN
ROY LONG
MOYERS
CO HWY 32 NEWBY
US 71
HWY 2

Table 4.1

Load calculation compared to the geomean criterion of "200 col/100 ml" for French Mill Creek

Average Flow measured at FMCL-1 for Geomean Samples:	7.9 cfs	
Geometric Mean Fecal coliform concentration measured:	280 col/100 mL	
Allowable fecal coliform maximum concentration minus MOS:	180 col/100mL	=200 - 10%
Margin of saftey for the maximum criteria	20 col/100mL	=10% of criteria

Load Calculations:

Load = Fecal Coliform * measured flow * Conversion Factor

Load in col of Fecal Coliform/day

Fecal Coliform in col/100 mL

Measured Flow in cfs

Conversion Factor = 24468984 (ml-s/ft3-day)

Current Load:			conversion		flow		concentration
The current total load =	5.41E+10	col/day	Total Load = 24468984	*	7.9	*	280
Point source	0.00E+00	col/day	there are no point sources in this watershed				

Allowable Load:			conversion		flow		concentration
Allowable total load =	3.48E+10	col/day	Total Load = 24468984	*	7.9	*	180
Point source	0.00E+00	col/day	There are no point sources in this watershed				

Margin of Saftey			conversion		flow		concentration
MOS load =	3.87E+09	col/day	Total Load = 24468984	*	7.9	*	20

Source	Current Load (col/day)	Allowable Load (col/day)	Required Reduction (col/day)	Reduction %	Final Load (col/day)
NPS load	5.41E+10	3.48E+10	1.93E+10	36%	3.48E+10
Point Source	0.00E+00	0.00E+00	0.00E+00	0%	0.00E+00

TMDL = WLA + LA + MOS

TMDL	WLA	LA	MOS
3.87E+10	0.00E+00	3.48E+10	3.87E+09

Percent Reduction to Achieve the Fecal Coliform Standard:

Total reduction: 36% = (current load - allowable load) / current load

The following assumptions are made for calculating the allowable load.

The water quality criterion for fecal coliform for summer geomeans is 200 col/100 mL.

To account for an explicit Margin of Safety (MOS) a target concentration of 180 col/100 ml was used to calculate the allowable load compared to the maximum criterion which = 200- 10% of 200

Current Load:				conversion		flow		concentration
The current total load =	5.41E+10	col/day	Total Load = 24468984	*	7.9	*	280	
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Margin of Saftey				conversion		flow		concentration
MOS load =	3.87E+09	col/day	Total Load = 24468984	*	7.9	*	20	

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NPS load	5.41E+10	3.48E+10	1.93E+10	36%	3.48E+10
Point Source	0.00E+00	0.00E+00	0.00E+00	0%	0.00E+00

TMDL = WLA + LA + MOS

TMDL	WLA	LA	MOS
3.87E+10	0.00E+00	3.48E+10	3.87E+09

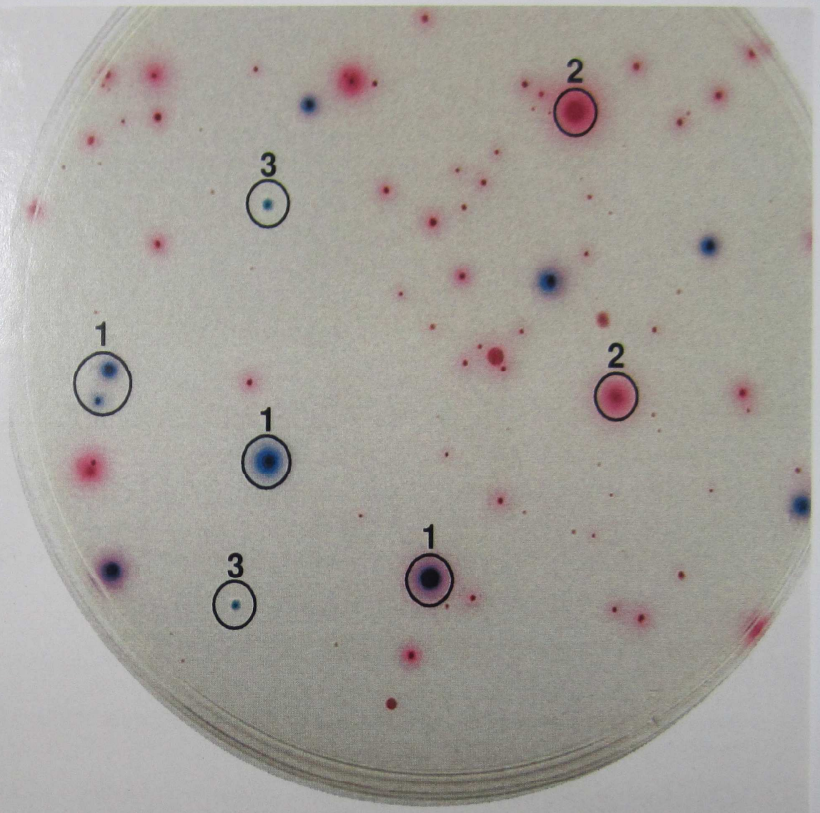
Percent Reduction to Achieve the Fecal Coliform Standard:

Total reduction: 36% = (current load - allowable load) / current load

AWW Standards

The table below displays how AWW uses the red-yellow-green traffic light symbol to summarize relatively safe and unsafe levels of *E. coli* in water. Note that the value of 200 *E. coli*/100 mL level defining safe versus unsafe water corresponds closely with EPA's and ADEM's criteria of 235 *E. coli*/100 mL Statistical Threshold Value (based on a single sampling event).

		***Number of E. coli per 100 mL***
STOP!		>600 relatively unsafe for human contact
CAUTION!		200-600 increasing risk for human illness
GO!		<200 relatively safe for human contact



Coliscan® Easygel® Guide

Target organisms: *E. coli* and other coliforms

Colony Color Guide:

1 - *E. coli* (dark blue/purple)
2 - Other Coliforms (pink/red)
3 - Teal/Green colonies

Date of Sample – AWW volunteer – C. Williams	# E. Coli cfu/100 mL
July 2014	100 cfu /100 mL
August 2014	67 cfu/100 mL
September 2014	100 cfu/100 mL
October 2014	3000 + cfu/100 mL (single sample violation)
November 2014	330 cfu/100 mL (5 day mean)
December 2014	67 cfu/100 mL
January 2015	67 cfu/100 mL
February 2015	300 cfu/100 mL (5 day mean)
March 2015	100 cfu/100 mL
April 2015	260 cfu/100 mL (5 day mean)
May 2015	130 cfu/100 mL
June 2015	130 cfu/100 mL
July 2015	130 cfu/100 mL
August 2015	200 cfu/100 mL (5 day mean)
September 2015	300 cfu/100 mL (5 day mean)
October 2015	0 cfu/100 mL
November 2015	30 cfu/100 mL

Watershed Partnership Members

Limestone County Soil and Water Conservation District

Alabama Department of Environmental Management

Natural Resources Conservation Service

Limestone County Cattleman's Association

Limestone County Commission

Alabama A&M University

Alabama Water Watch

Limestone County Water Department - Drinking Water Festival

Participants/Farmers/Volunteers/Landowners

Public Meeting Held March 3, 2014 @ AU Tennessee Valley Research and Extension Center – Belle Mina, AL

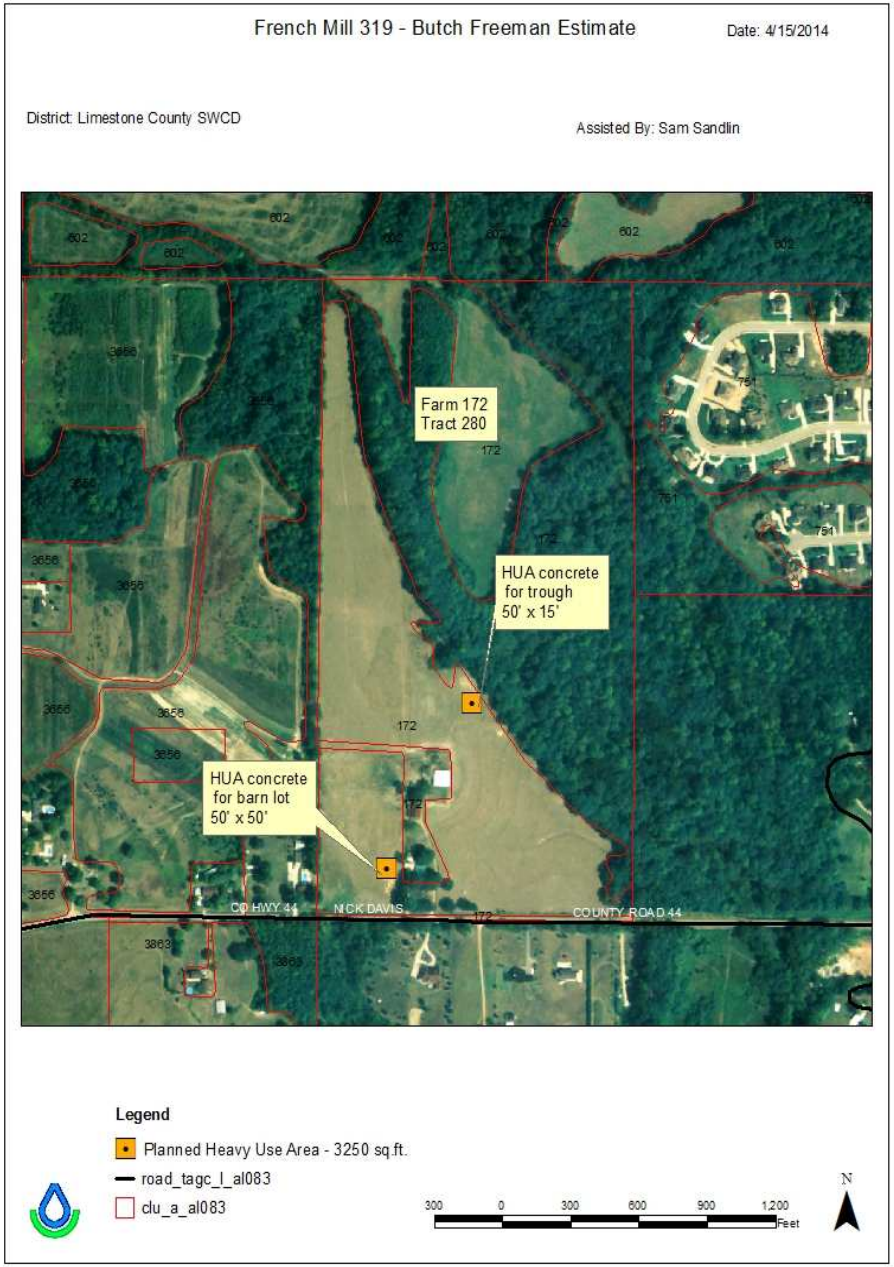
APPROVAL AND FUNDING PROCESS

- FIELD VISIT TO DETERMINE ELIGIBILITY
- DEVELOP A CONSERVATION PLAN
- CREATE A CONTRACT TO OBLIGATE COST-SHARE FUNDING
- APPROVAL OF LCSWCD BOARD
- PROVIDE DESIGNS AND SPECIFICATION DETAILS OF PRACTICES TO PARTICIPANT
- ISSUE APPROVAL TO START PRACTICE
- CONSTRUCTION/OVERSIGHT/CHECK-OUT
- REIMBURSE PARTICIPANT AGREED COST-SHARE

ELIGIBLE PRACTICES

- BEST MANAGEMENT PRACTICES THAT TREAT PATHOGENS, EXCESSIVE NUTRIENTS, OR EROSION & SEDIMENTATION ISSUES ON CROPLAND, IDLELAND OR PASTURELAND.

Conservation Plan and Map



CROP CONVERSION TO GRASS OR TREES

CRITICAL AREA TREATEMNTS

STABLE OUTLETS – Waterways, Borders, Filter Strips

TERRACES

Residue Management / Soil Health

Grass planting/Soil Testing/ Nutrient Management and Timing

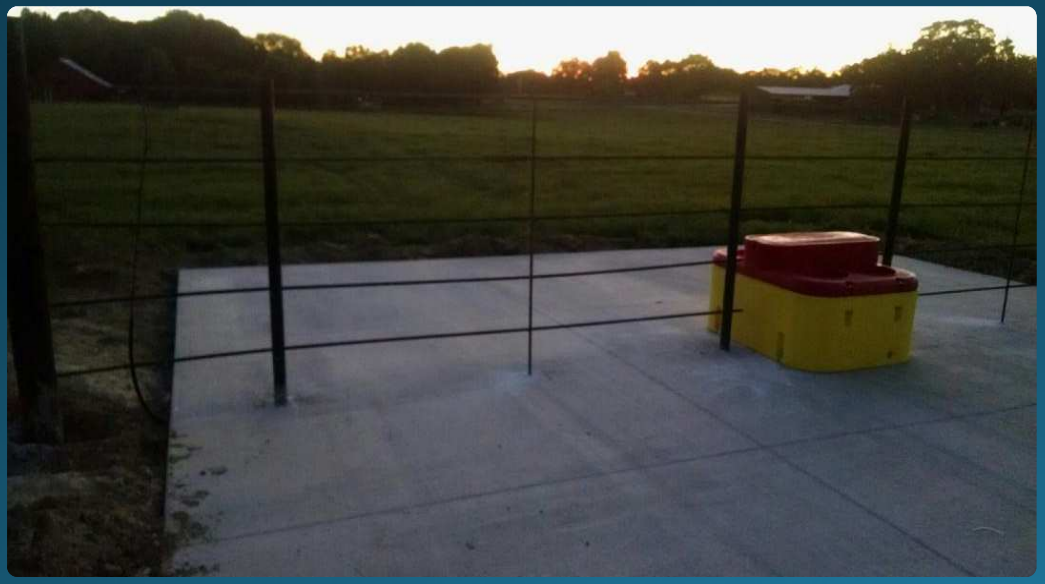
Cross Fencing / Rotational Grazing

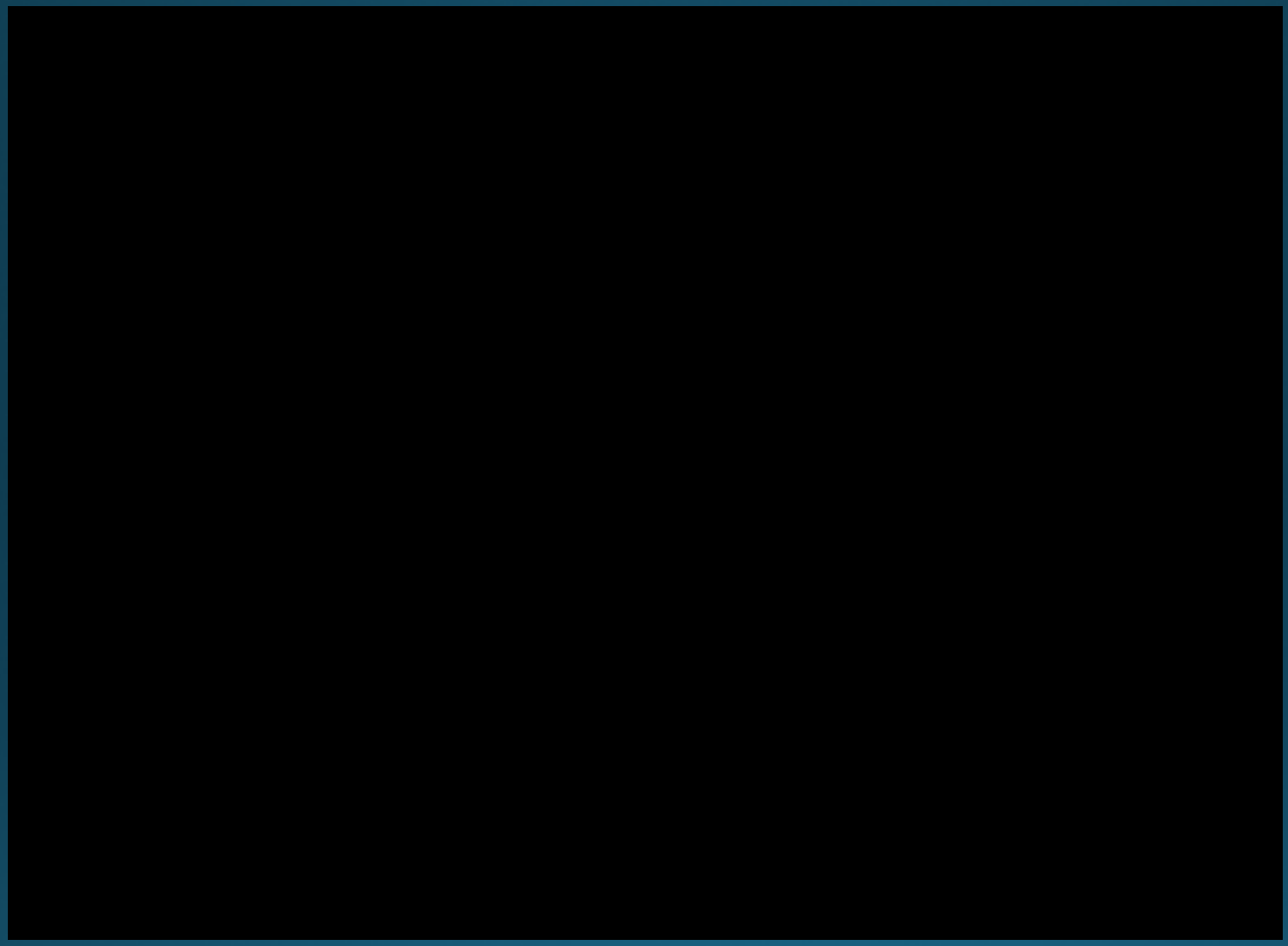
EXCLUSION OR CROSS FENCING

Livestock Exclusion Fencing

Livestock Water Facilities


DEERE





Video by University of Delaware Cooperative Extension

HEAVY USE AREA PROTECTION

HUA - Concrete

HUA-Gravel Geotextile

COMPLETION OF PRACTICES AND PAYMENTS

- PARTICIPANT COMPLETES PRACTICES ACCORDING TO PLAN AND SPECIFACATIONS
- TURN IN COPY OF BILLS
- PRACTICE CHECKOUT VISIT
- APPROVAL OF PAYMENT AT MONTHLY SWCD BOARD MEETING
- PARTICIPANT PICKS UP CHECK AND SIGNS RECIEPT OF PAYMENT AT OFFICE WHEN NOTIFIED.

SOCIAL SECURITY NUMBER OR TAX ID NEEDED TO MAKE PAYMENTS TO PARTICIPANTS

PARTICIPANT WILL RECEIVE 1099 ON 319 FUNDS RECEIVED

$20,000 PAYMENT LIMITATION

CLEAN WATER IS THE ULTIMATE GOAL!

- AlSO INCREASE AWARENESS, EFFICIENCY, & PROFIT ON PRIVATE LAND

- PARTIPANTS ARE IMPROVING WATER QUALTIY!

This Project was fully or partially funded by the Alabama Department of Environmental Management through a Clean Water Act Section 319 (h) nonpoint source grant provided by the U.S. Environmental Protection Agency – Region 4.

Hurricane Creek – Tributary to Flint River
Flint River - Tributary to Tennessee River

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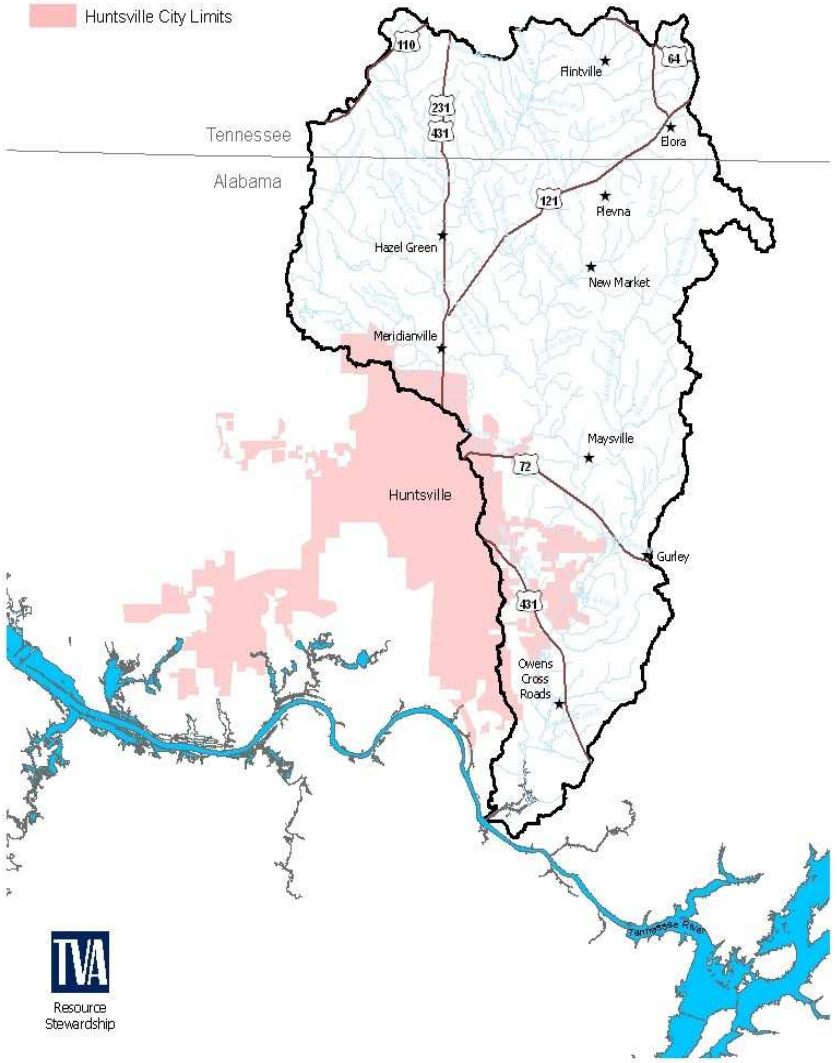
- ORIGINALLY 303 d LISTED FOR PATHOGENS IN 1998

  (>180 colony forming units / 100mL)
- TMDL completed December 2006
- PRIOR TO 2010 SAMPLED FOR "Various" FECAL COLIFORMS
- AFTER 2010 SPECIFICALLY SAMPLED FOR E. COLI.

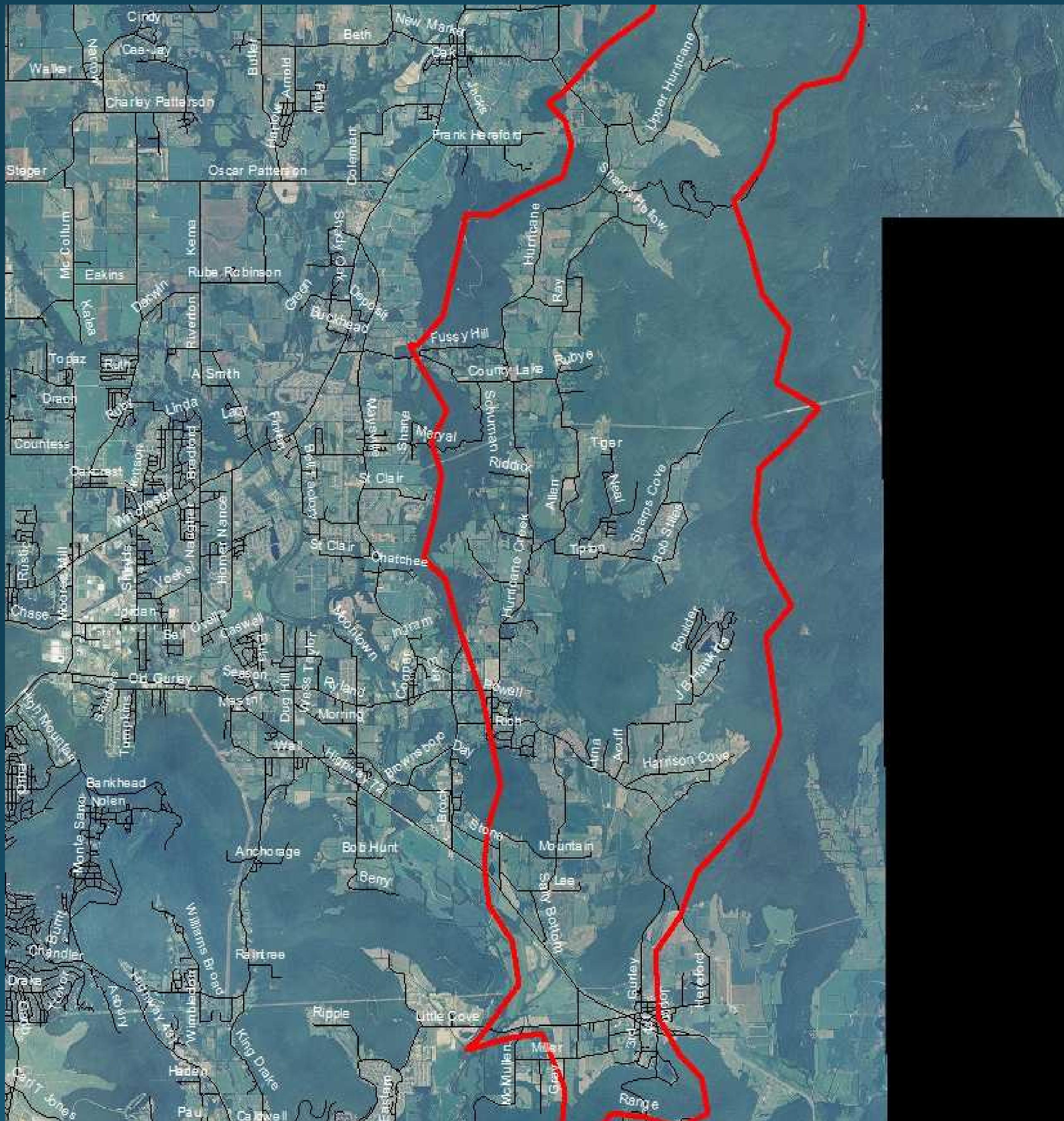
  (>180 cfu/100 mL)

Flint River Watershed



- Water intake for City of Huntsville located just downstream of mouth of Flint River

Photo from USGS Report: Water Quality of the Flint River Basin, Alabama and Tennessee 1999-2000



Cindy
Beth
Walker
Cee-Jay
Butler
Arnold
Charley Patterson
Frank Hereford
Upper Hurricane
Stager
Oscar Patterson
Coleman
McCollum
Kerns
Hurricane
Eakins
Rube Robinson
Ray
Dobbin
Green
Buckhead
Fussy Hill
Topaz
Ruth
A Smith
County Lake
Rubye
Drach
Linda
Schuman
Countess
Shane
Tiger
St Clair
Allen
Neal
Starns Cove
Bob Stiles
Tipton
Hurricane Creek
Chatchee
Chase
Jordan
Caswell
Sportown
Ingram
Boulder
Old Gurley
Season
Dug Hill
Ryland
Powell
Morning
Rich
Tompkins
Wall
Brownsboro
Day
Acuff
Harrison Cove
Bankhead
Nolen
Monte Sano
Stone
Mountain
Anchorage
Bob Hunt
Berry
Lee
Williams Broad
Chandler
Raintree
Gurley
Hereford
Drake
Wimbledon
Ripple
Little Cove
King Drake
Miller
McMullen
Haden
Range
Carl T Jones
Caldwell
Eastham

Figure 3.1 – Landuse Map of Hurricane Creek Watershed

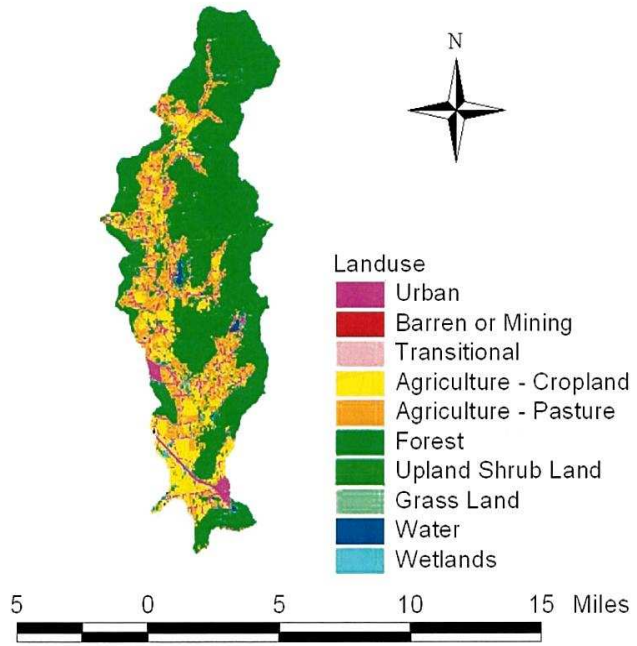


Table 4.1

Load calculation compared to the geomean criterion of "200 col/100 ml" for Hurricane Creek*

Average Flow measured at HURM-3 for Geomean Samples:	19.3 cfs	
Geometric Mean Fecal coliform concentration measured:	749 col/100 mL	
Allowable fecal coliform maximum concentration minus MOS:	180 col/100mL	=200 - 10%
Margin of saftey for the maximum criteria	20 col/100mL	=10% of criteria

Load Calculations:

Load = Fecal Coliform * measured flow * Conversion Factor

Load in col of Fecal Coliform/day

Fecal Coliform in col/100 mL

Measured Flow in cfs

Conversion Factor = 24468984 (ml-s/ft3-day)

Current Load:			conversion		flow		concentration
The current total load =	3.54E+11	col/day	Total Load = 24468984	*	19.3	*	749
Point source*	0.00E+00	col/day	Not Applicable				

Allowable Load:			conversion		flow		concentration
Allowable total load =	8.51E+10	col/day	Total Load = 24468984	*	19.3	*	180
Point source*	0.00E+00	col/day	Not Applicable				

Margin of Saftey			conversion		flow		concentration
MOS load =	9.46E+09	col/day	Total Load = 24468984	*	19.3	*	20

Source	Current Load (col/day)	Allowable Load (col/day)	Required Reduction (col/day)	Reduction %	Final Load (col/day)
NPS load	3.54E+11	8.51E+10	2.69E+11	76%	8.51E+10
Point Source	0.00E+00*	0.00E+00*	0.00E+00*	0%	0.00E+00*

TMDL = WLA + LA + MOS

TMDL	WLA	LA	MOS
9.46E+10	0.00E+00* 1.51E09 (Summer)** 7.57E+09 (Winter)**	8.51E+10	9.46E+09

** Gurley WWTP WLA

Percent Reduction to Achieve the Fecal Coliform Standard:

Total reduction: 76% = (current load - allowable load) / current load

* Gurley WWTP load was not included in the TMDL calculation since the discharge is located downstream of the sampling station of concern.

The following assumptions are made for calculating the allowable load.

The water quality criterion for fecal coliform for summer geomeans is 200 col/100 mL.

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Margin of Saftey			conversion		flow		concentration
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NPS load	3.54E+11	8.51E+10	2.69E+11	76%	8.51E+10
Point Source	0.00E+00*	0.00E+00*	0.00E+00*	0%	0.00E+00*

TMDL = WLA + LA + MOS

TMDL	WLA	LA	MOS
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** Gurley WWTP WLA

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Watershed Partnership Members

- Alabama Department of Environmental Managem
- Madison County Soil and Water Conservation District
- Natural Resources Conservation Service
- Flint River Conservation Association
- Tennessee Valley Authority
- Participants/Farmers/Volunteers/Landowners
- "Bi-Monthly Madison County Watershed Advisory Committee"

Public Meeting Held July 18, 2013 @ Hurricane Valley Community Center Gurley, AL

Outreach and Education

- Earth Day Events
- Flint River Cleanups
- Madison County Drinking Water Festival
- Public Meetings
- Land Judging
- Agriculture Tours
- Teacher Workshops

Weekend Stream Clean Ups FRCA and Madison County Commission

Biological Sampling

Biological Sampling (IBI) with Tennessee Valley Authority or Geological Survey of Alabama

Thank You.

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