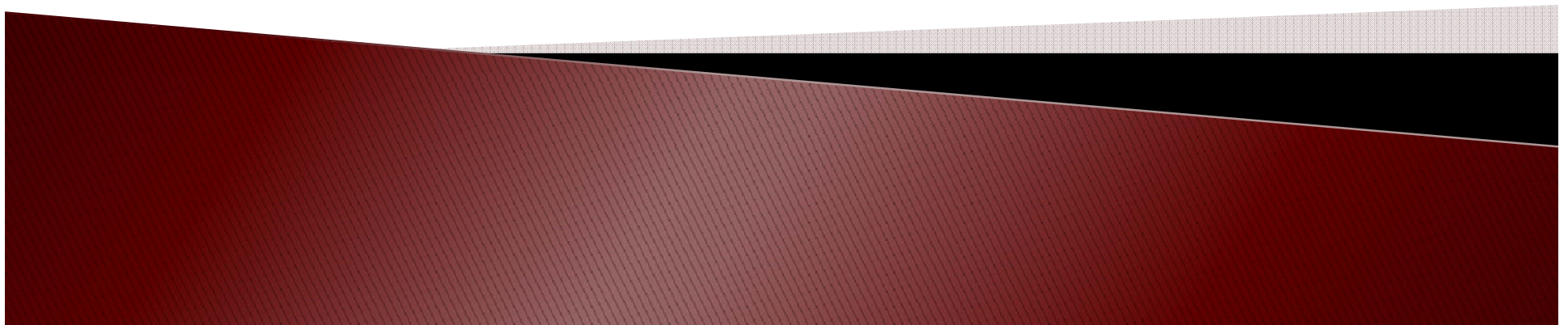


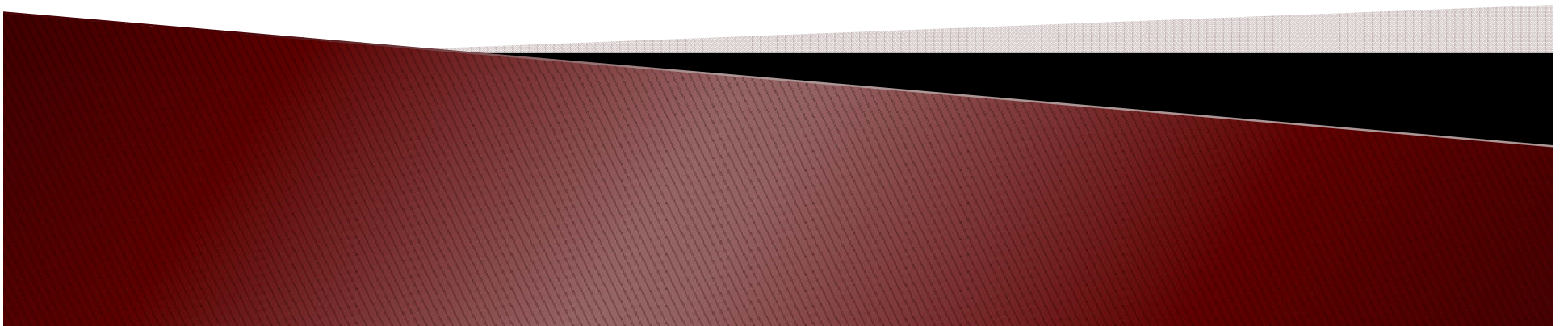
# Lampasas River Watershed Partnership

Steering Committee Meeting  
November 18, 2010

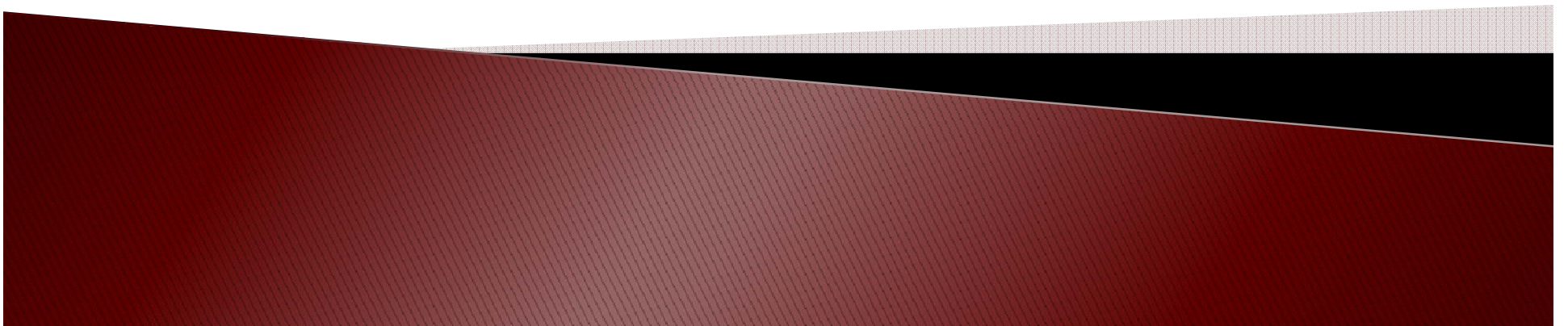
Lisa Prcin  
Watershed Coordinator  
Texas AgriLife Research at  
Blackland Research & Extension Center



# Introductions



# Past Business



# September Steering Committee Report

- ▶ Dissolution of Education and Outreach Work Group
  - Tasks will be distributed between Urban NPS and Agriculture and Wildlife Work Groups
- ▶ Resignation of David Cole, Kempner Water Supply Corp from Steering Committee
- ▶ Reviewed *E. coli* Load Duration Curves
  - Analyses indicated that load reductions were only needed in periods of high flow
- ▶ Steering Committee voted and approved a margin of safety (MOS) level set at 0%
- ▶ Discussed and made recommendations for water quality sampling locations for the new bacterial source tracking project

# October Work Group Reports – Agriculture & Wildlife

- ▶ Revisited SELECT Agriculture and Wildlife results
  - While water quality analysis (actual data) doesn't indicate an impairment, SELECT (total potential loads) indicates a potential problem
  - Decided to recommend a 10% reduction across the watershed for agriculture wildlife sources to allow for changes over time
  - Recommended management measures will be presented to Steering Committee
- ▶ Discussed 2010 NRCS EQIP Resource Concerns (priority level is county dependent)
  - Rangeland – Plant Condition, Water Quantity, Soil Erosion and Fish and Wildlife
  - Pastureland – Plant Condition, Water Quantity, Soil Erosion and Fish and Wildlife
  - Cropland – Soil Condition, Water Quality, Plant Condition and Soil Erosion
  - Irrigated Cropland – Plant Condition, Water Quantity, Soil Condition, and Soil Erosion



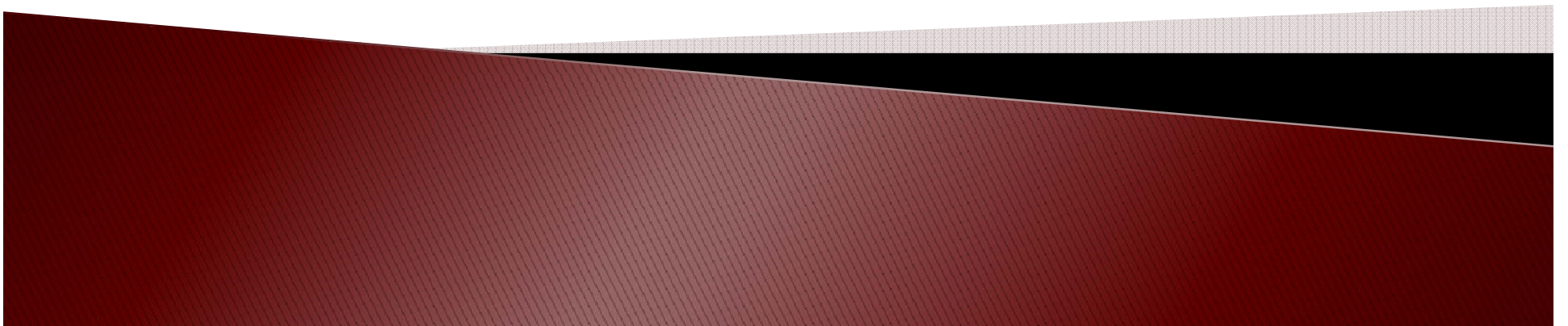
# October Work Group Reports – Urban Nonpoint Source

- ▶ Revisited SELECT Urban NPS results
  - While water quality analysis (actual data) doesn't indicate an impairment, SELECT (total potential loads) indicates a potential problem
  - Management recommendations to be discussed in later meeting
- ▶ Identified other areas of pollutant sources to be addressed
  - Illegal dumping at bridges
  - Resident waterfowl population control at city parks
  - Proper application of fertilizer for residential lawn care

# Proper Functioning Condition Workshop

- ▶ Learn about the basic interaction of Hydrology – Erosion/Deposition and Vegetation for Central Texas creeks and rivers
- ▶ One-day course; ½ Classroom, ½ Field
  - Thursday, October 28<sup>th</sup>
    - TPWD Parrie Haynes Ranch Retreat
    - 25 participants
  - Friday, October 29<sup>th</sup>
    - Evant Methodist Church & The Meis Ranch
    - 25 Participants
- ▶ Will be offered again in Spring 2011 if there is interest
  - Any preference for workshop locations and dates?

# Steering Committee Business

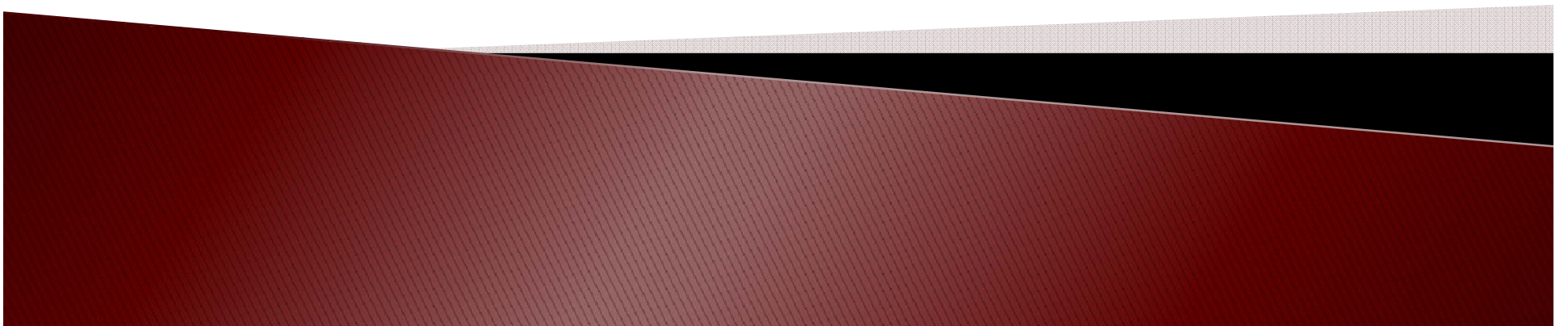


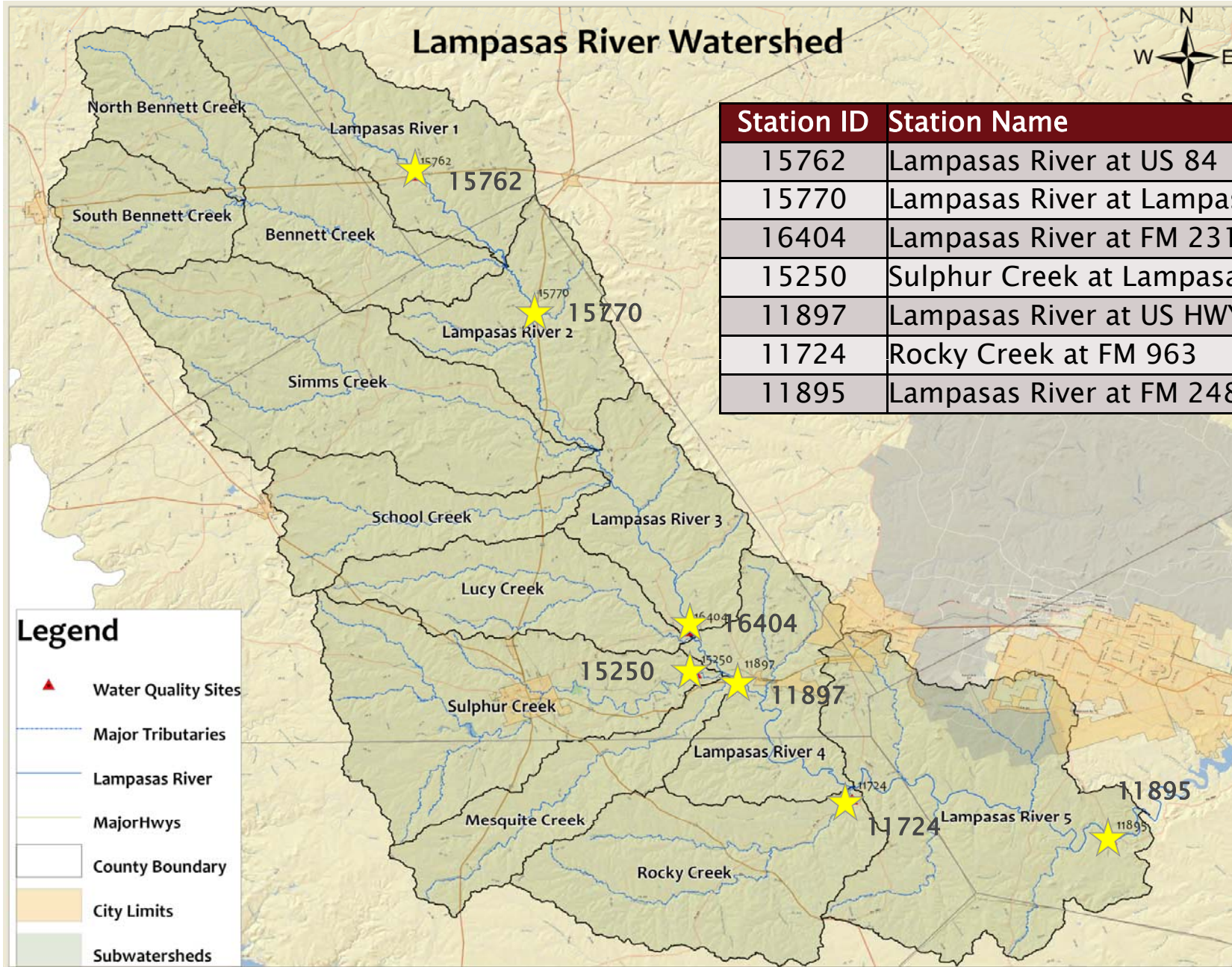


# Replacement of Steering Committee Member

- ▶ Danny Stephens of OMI, Inc previously represented the WWTF in Lampasas, owned by the City of Lampasas
- ▶ City of Lampasas terminated their contract with OMI, Inc in October 2010
- ▶ The City has requested the replacement of Mr. Stephens with new representative from the WWTF

# Review of Water Quality Data











# Lampasas River Watershed



Station ID	Station Name
15762	Lampasas River at US 84
15770	Lampasas River at Lampasas CR 105
16404	Lampasas River at FM 2313
15250	Sulphur Creek at Lampasas CR 8
11897	Lampasas River at US HWY 190
11724	Rocky Creek at FM 963
11895	Lampasas River at FM 2484

## Legend

-  Water Quality Sites
-  Major Tributaries
-  Lampasas River
-  Major Hwys
-  County Boundary
-  City Limits
-  Subwatersheds



# Water Quality Analysis

- ▶ Originally included water quality analysis for Lampasas River at FM 2484 in dataset
- ▶ Samples collected at two significantly different sites under same ID number
- ▶ Part of data collected actually at FM 2484 (within river), while part of data was collected at FM 3481 (within Stillhouse Hollow Lake)
- ▶ Because of inconsistencies in collection sites, this data should not be used for our analysis

# Potential Sources Based on Flow Condition

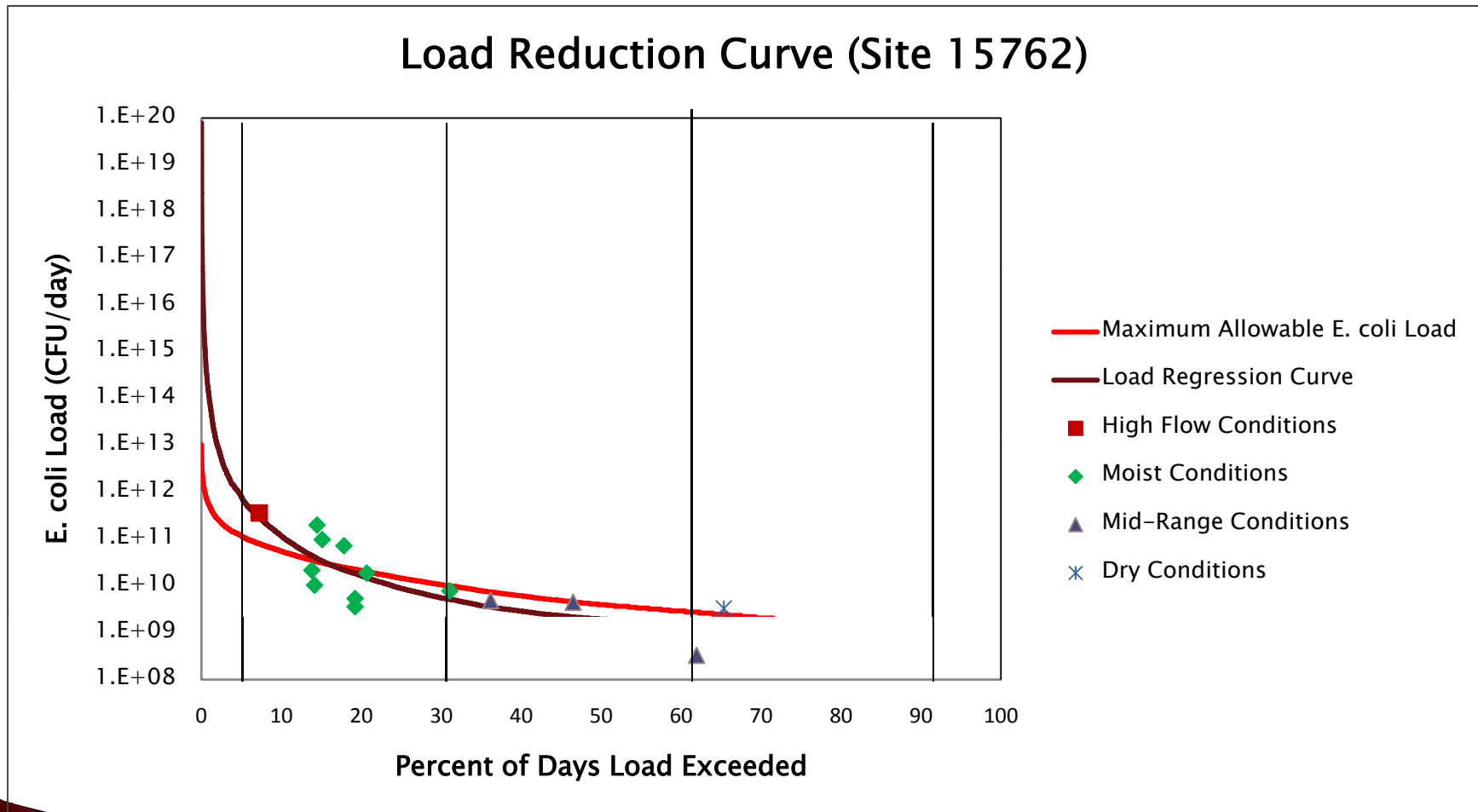
Contributing Source Area	Duration Curve Zone				
	High Flow	Moist	Mid-Range	Dry	Low Flow
Point Source				<i>M</i>	<i>H</i>
On-site wastewater systems			<i>H</i>	<i>M</i>	
Riparian Areas		<i>H</i>	<i>H</i>	<i>H</i>	
Storm water: Impervious Areas		<i>H</i>	<i>H</i>	<i>H</i>	
Combined sewer overflows	<i>H</i>	<i>H</i>	<i>H</i>		
Storm water: Upland	<i>H</i>	<i>H</i>	<i>M</i>		
Bank erosion	<i>H</i>	<i>M</i>			

**Note:** Potential relative importance of source area to contribute loads under given hydrologic condition (*H: High; M: Medium*)

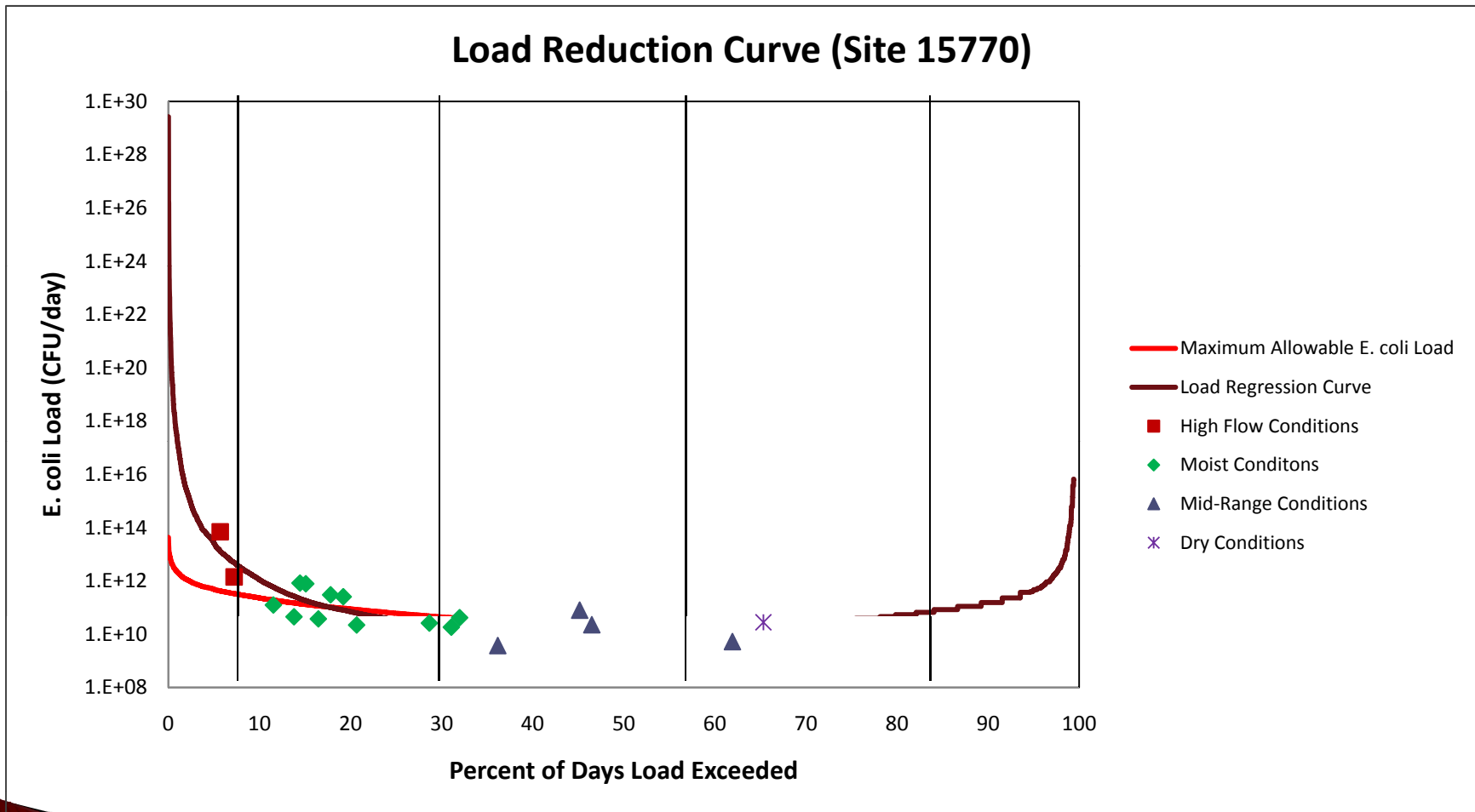
Excerpt from EPA's *An Approach for Using Load Duration Curves in the Development of TMDLs* – EPA 841-B-07-006, August 2007



# Lampasas River at US HWY 84 (15762)

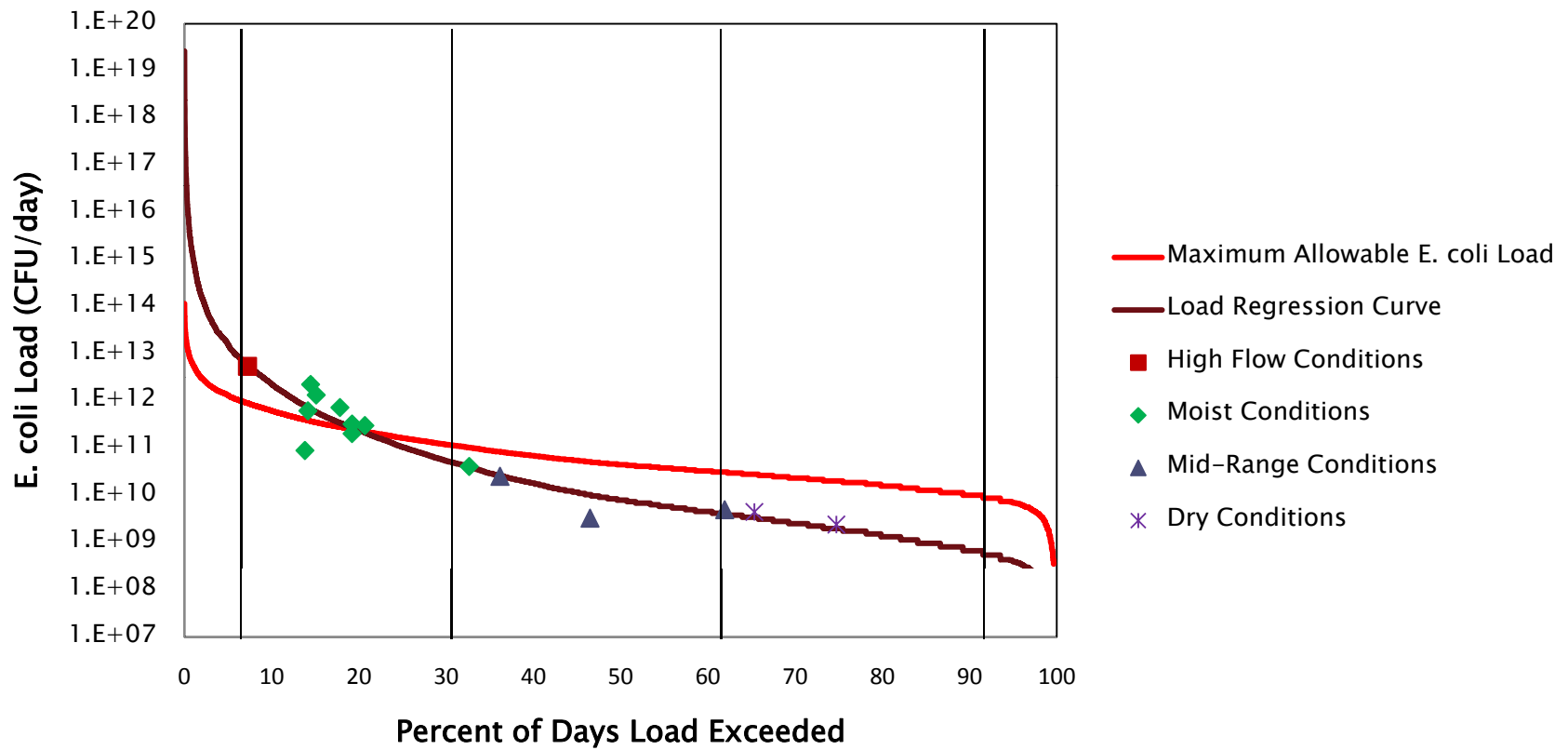


# Lampasas River at Lampasas CR 105 (15770)

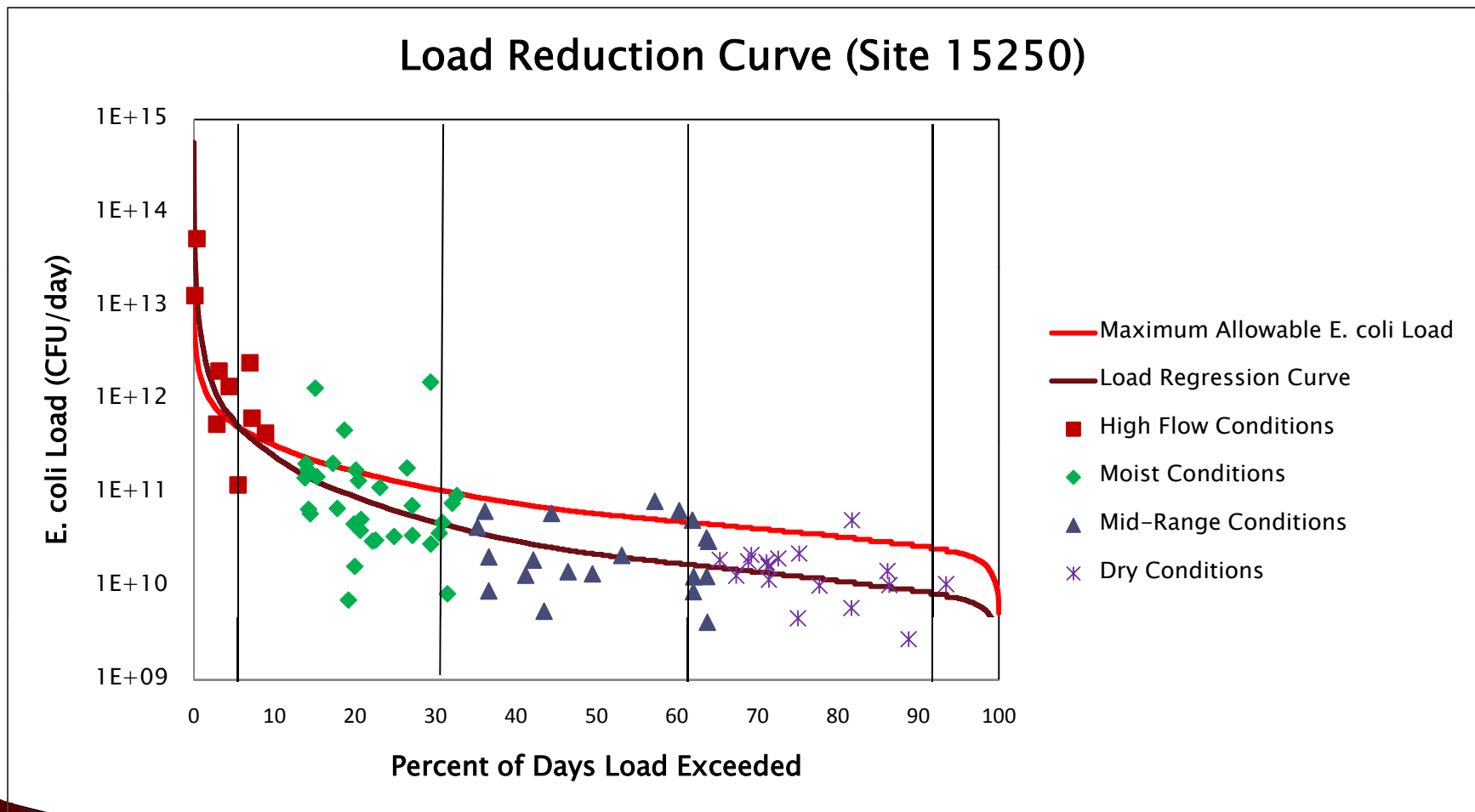


# Lampasas River at FM 2313 (16404)

## Load Reduction Curve (Site 16404)

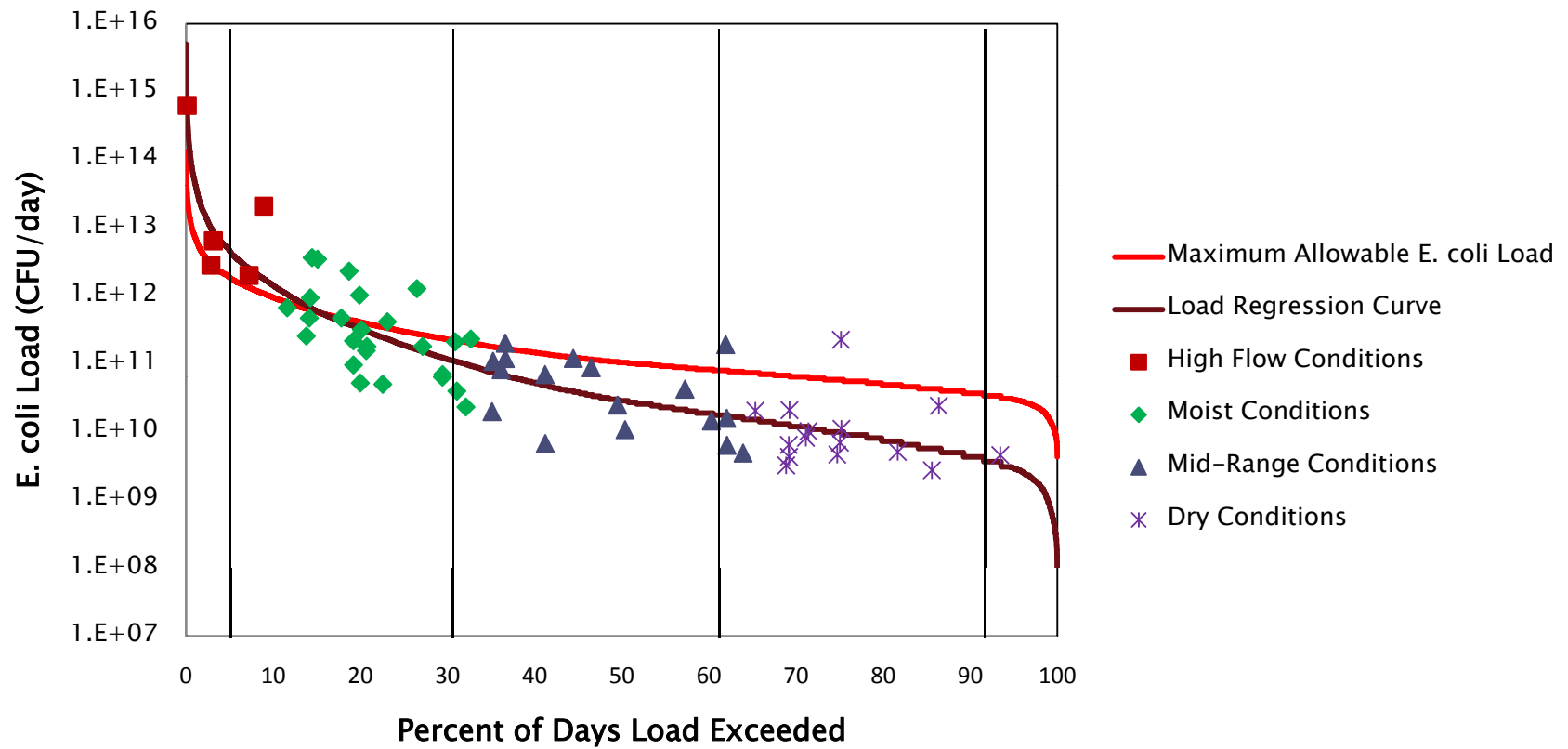


# Sulphur Creek at Lampasas CR 8 (15250)



# Lampasas River at US HWY 190 (11897)

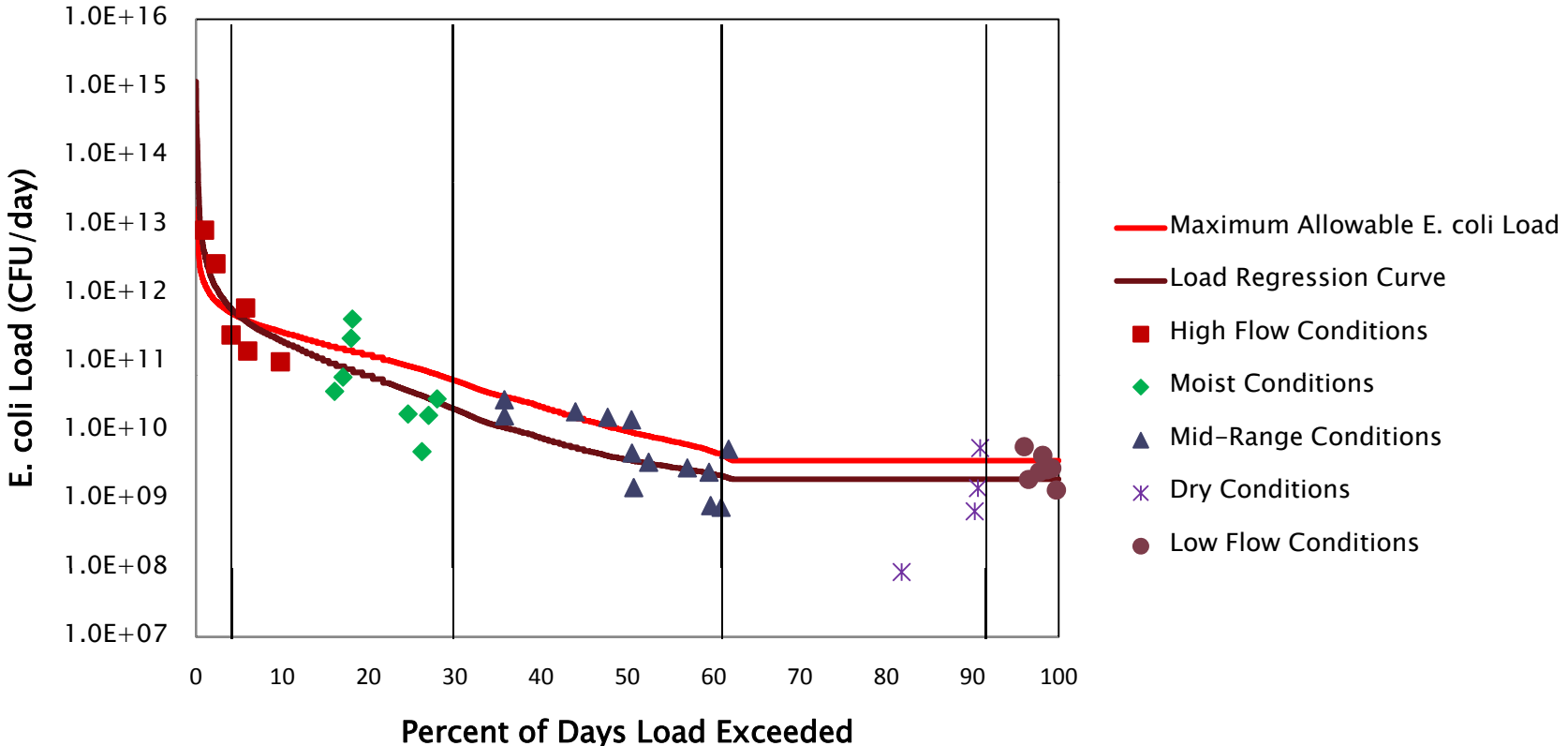
## Load Reduction Curve (Site 11897)





# Rocky Creek at FM 963 (11724)

Load Reduction Curve (Site 11724)



# Percent Load Reductions Needed by Water Quality Monitoring Site

Location	Site ID	High Flows 0 to 10	Moist Conditions 10 to 35	Mid-Range 35 to 65	Dry Conditions 65 to 95	Low Flows 95 to 100
Lampasas River at US HWY 84	15762	NA	NA	NA	NA	NA
Lampasas River at Lampasas CR 105	15770	NA	NA	NA	NA	NA
Lampasas River at FM 2313	16404	NA	NA	NA	NA	NA
Sulphur Creek at Lampasas CR 8	15250	13	NA	NA	NA	NA
Lampasas River at US HYW 190	11897	60	NA	NA	NA	NA
Rocky Creek	11724	11	NA	NA	NA	NA

# Capacity of Water Quality Monitoring Site

Location	Site ID	High Flows 0 to 10	Moist Conditions 10 to 35	Mid-Range 35 to 65	Dry Conditions 65 to 95	Low Flows 95 to 100
Lampasas River at US HWY 84	15762	NA	59	1	83	NA
Lampasas River at Lampasas CR 105	15770	NA	63	87	NA	NA
Lampasas River at FM 2313	16404	NA	61	NA	NA	NA
Sulphur Creek at Lampasas CR 8	15250	NA	6	NA	NA	NA
Lampasas River at US HYW 190	11897	NA	55	NA	NA	NA
Rocky Creek	11724	NA	NA	NA	14	NA

# Summary of *E. coli* Loads

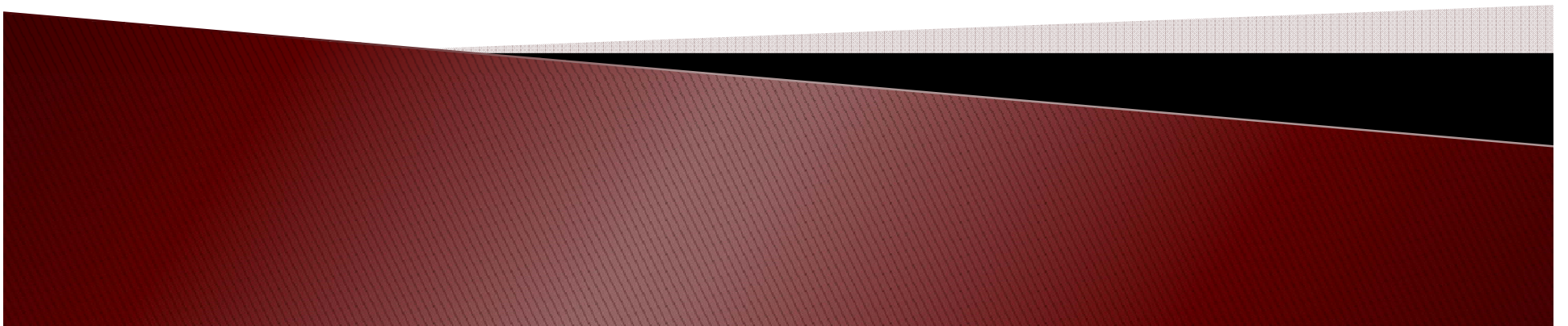
- ▶ Loads are generally well below maximum allowable for all sites with several exceptions
- ▶ Loads exceed maximum allowable in high flow conditions for all sites
- ▶ Load exceeds maximum allowable for dry conditions at Lampasas River at CR 105 (15770)
  - Because of limited data (1 sample), no assumptions can be made
- ▶ Lampasas River at US 84 (15762) – loads are within 17% of maximum allowable in dry conditions
- ▶ Lampasas River at CR 105 (15770) – loads are within 13% of maximum allowable loads during mid-range conditions

# Potential Sources Based on Flow Condition

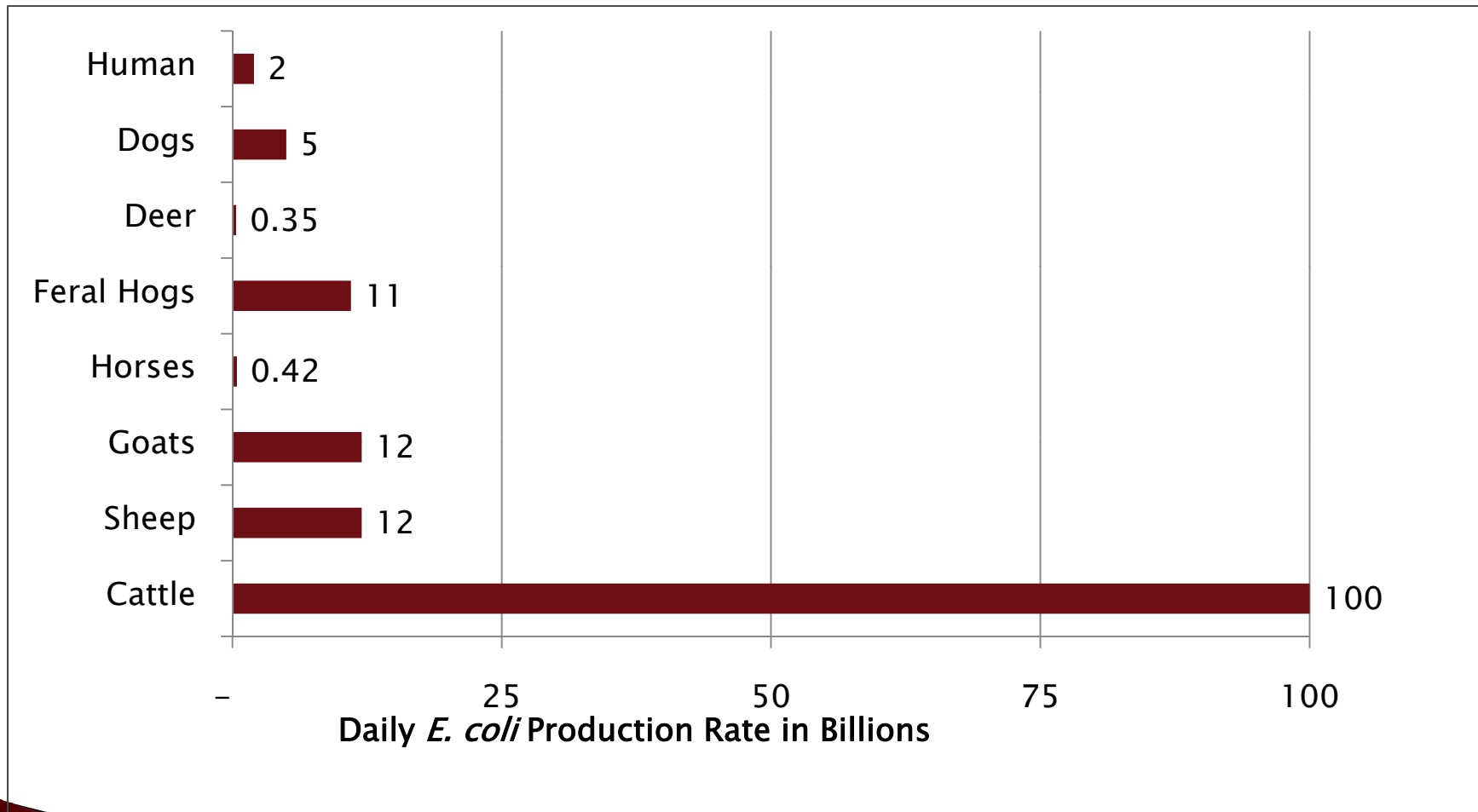
- ▶ Potential sources in High Flow conditions
  - Many different sources
- ▶ Potential sources in Mid-Range conditions
  - Septic Systems
  - Direct deposition within riparian areas
  - Storm water: impervious surfaces, urban areas
  - Sanitary sewer overflows
  - Storm water: upland deposition, overland flow
- ▶ Potential sources in Dry Conditions
  - Point sources
  - Septic Systems
  - Direct deposition within riparian areas
  - Storm water: impervious surfaces, urban areas



# Work Group Recommended Best Management Practices

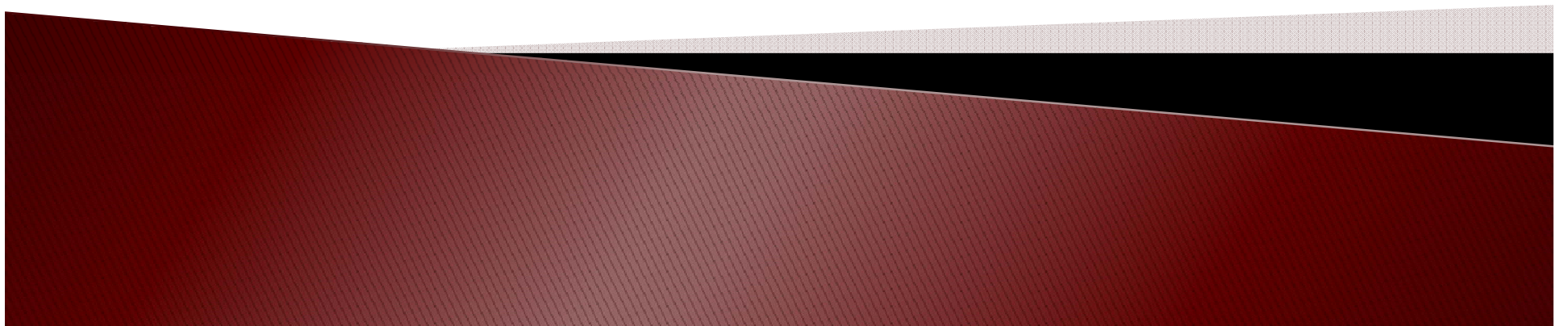


# Daily *E. coli* Production Rate by Source (in billions)



Excerpt from USEPA, 2001. Protocol for Developing Pathogen TMDLs: Source Assessment. 1<sup>st</sup> ed. EPA841-R-00-002. Ch 5 pp 1-18. Washington, D.C.:USEPA Office of Water

# Agriculture & Wildlife Work Group Recommendations



# Agriculture & Wildlife Work Group Recommendations

- ▶ Recommended 10% reduction across the watershed for agriculture and wildlife sources to maintain current water quality and allow for changes in the watershed over time

# Recommendations for Livestock Operations

- ▶ 10% reduction in livestock contribution will be accomplished through enrollment of 10% of livestock operations with in Water Quality Management Plans (TSSWCB) over a 10 year period
  - A WQMP is a site-specific plan developed through and approved by soil and water conservation districts for agricultural or silvicultural lands. A WQMP includes appropriate land treatment practices, production practices, management measures, technologies, or combinations thereof and is certified by the TSSWCB as to be consistent with SWQS (TSSWCB 2009a).

# Livestock Operations

- ▶ Method for determining the number of livestock operations within watershed
  - Consensus among NRCS, County Extension Agents and agriculture producers that livestock operations maintain an *AVERAGE* of approximately 20 animal units
    - Cumulative cattle, sheep, goats and horses
  - Total number of animal units in each subwatershed was divided by average livestock operation capacity (20 AU)
  - Utilized NRCS Animal Unit Conversions
    - Cow w/calf = 1.00 AU
    - Horse = 1.25 AU Equivalent
    - Sheep (mature) = .20 AU Equivalent
    - Goat (mature) = .15 AU Equivalent

# Livestock Populations by Subwatershed

Subwatershed	ID	Cattle	Sheep	Horse	Goats
Lampasas River 1	1	2,392	1,363	98	1,538
North Bennett Creek	2	1,249	734	50	826
Bennett Creek	3	1,529	786	62	895
South Bennett Creek	4	1,099	646	40	727
Lampasas River 2	5	1,390	262	62	349
Simms Creek	6	3,032	982	123	1,183
Lampasas River 3	7	1,284	242	53	322
School Creek	8	1,218	229	52	305
Lucy Creek	9	1,267	238	47	318
Lampasas River 4	10	1,968	255	50	470
Sulphur Creek	11	3,205	457	89	774
Lampasas River 5	12	7,824	485	403	1,864
Mesquite Creek	13	2,312	218	48	536
Rocky Creek	14	4,568	412	110	1,055
Total		34,337	7,309	1,287	11,162



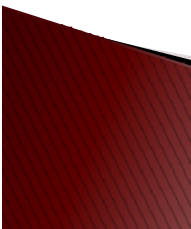
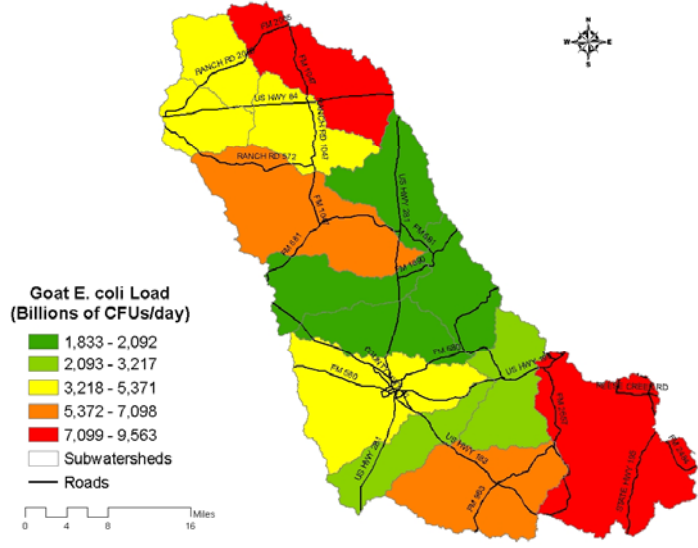
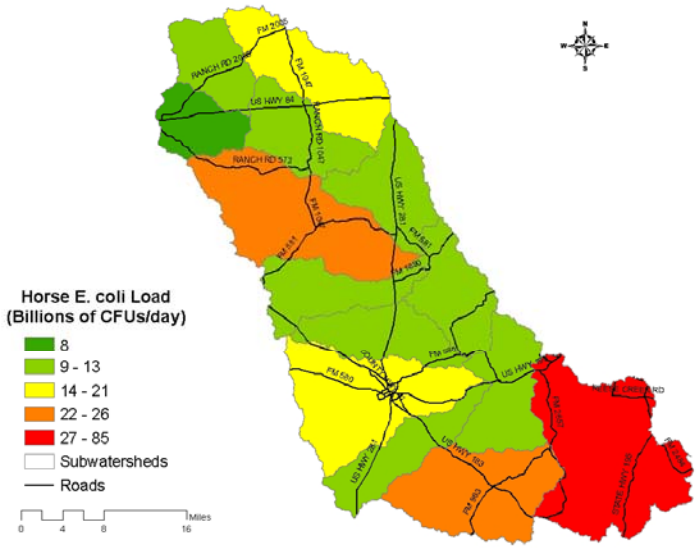
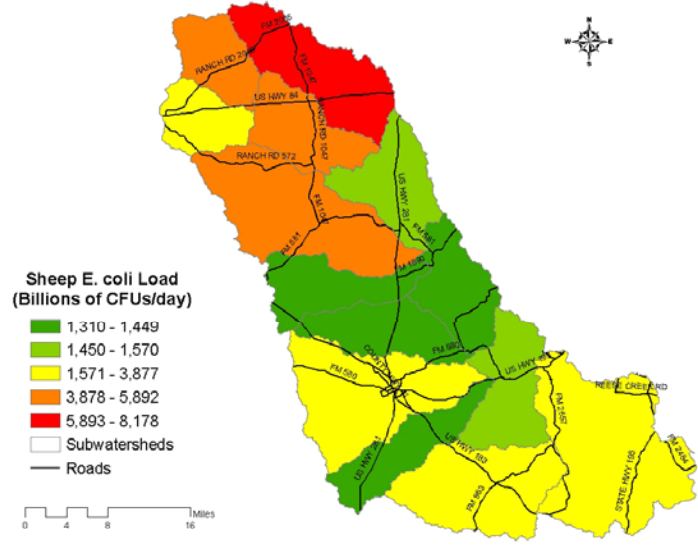
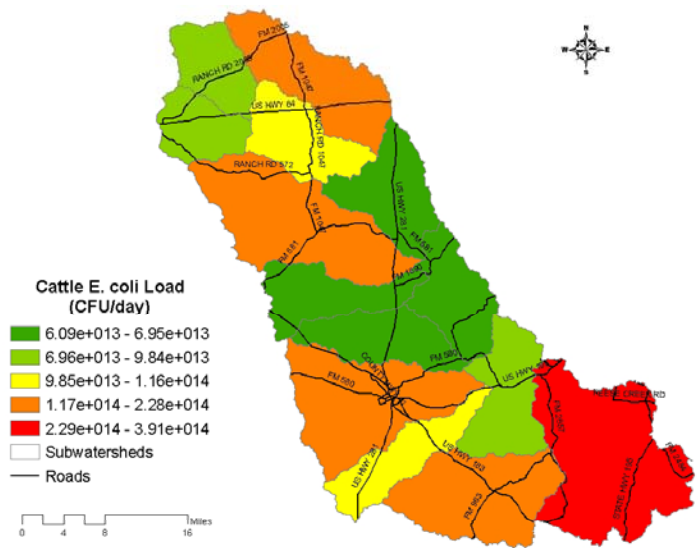
# Number of Livestock Operations by Subwatershed

Subwatershed	ID	Number of Animal Units	Number of Livestock Operations	10% of Livestock Operations
Lampasas River 1	1	3018	151	15
North Bennett Creek	2	1582	79	8
Bennett Creek	3	1898	95	9
South Bennett Creek	4	1387	69	7
Lampasas River 2	5	1572	79	8
Simms Creek	6	3560	178	18
Lampasas River 3	7	1447	72	7
School Creek	8	1375	69	7
Lucy Creek	9	1421	71	7
Lampasas River 4	10	2152	108	11
Sulphur Creek	11	3524	176	18
Lampasas River 5	12	8704	435	44
Mesquite Creek	13	2496	125	12
Rocky Creek	14	4946	247	25
Total per Watershed		39082	1954	195

# Recommended Conservation Practices

- ▶ Prescribed grazing
- ▶ Conservation cover
- ▶ Conversion to native grasses and forbs
- ▶ Alternative watering facilities
- ▶ Cross-fencing
- ▶ Riparian Forest Buffers
- ▶ Brush management on uplands with subsequent herbaceous cover
- ▶ Stream crossings
- ▶ Riparian Herbaceous Buffers

# Potential *E. coli* Loading from Livestock Operations to Prioritize Focus Areas

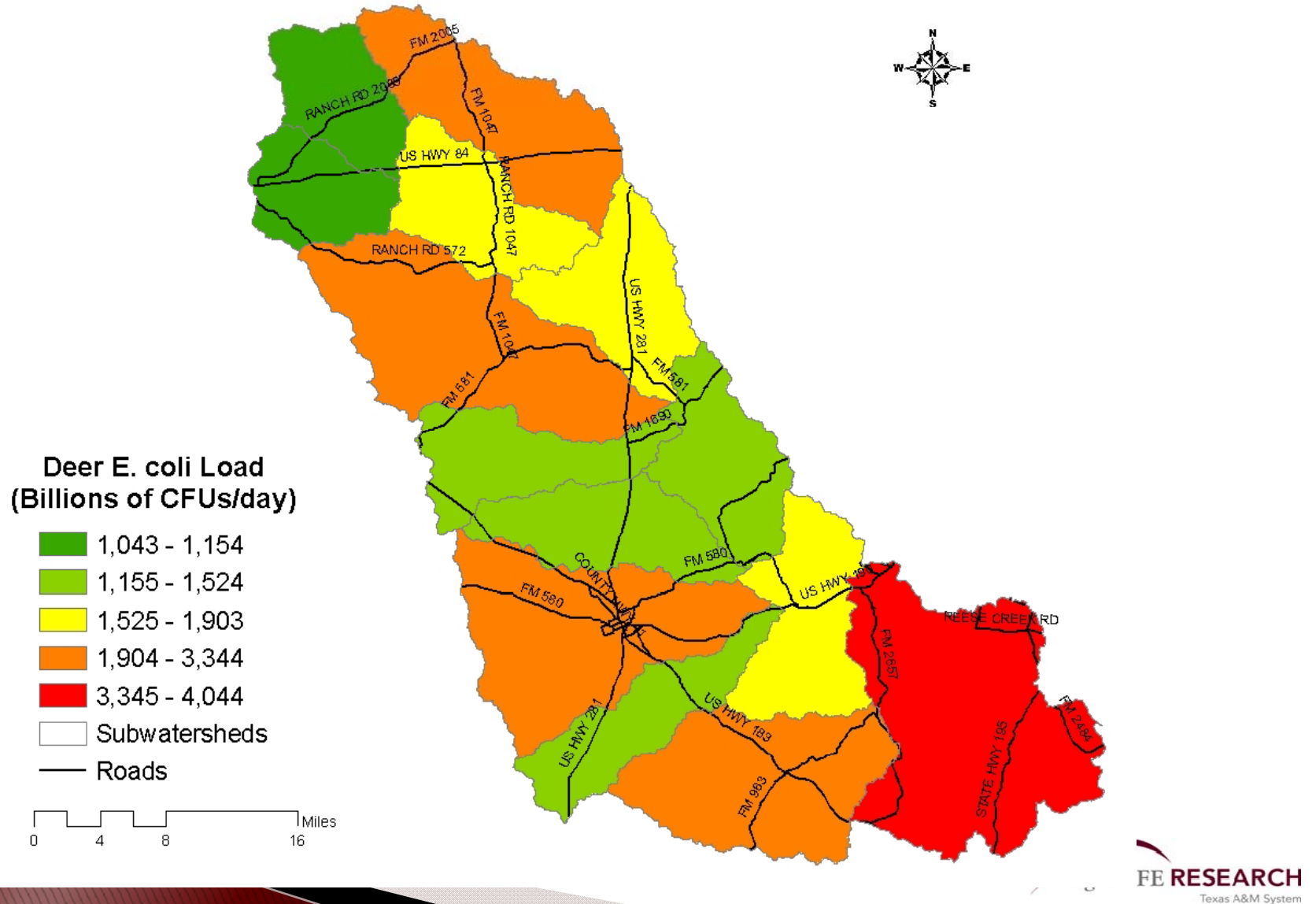


# Recommendations for Deer

- ▶ TPWD does not actively manage native wildlife populations (deer) for water quality purposes
- ▶ Encourage landowner enrollment into Wildlife Management Plans
- ▶ Encourage landowner participation in Wildlife Management Associations

Subwatershed	ID	Number of Deer
Lampasas River 1	1	1,486
North Bennett Creek	2	3,264
Bennett Creek	3	700
South Bennett Creek	4	940
Lampasas River 2	5	3,928
Simms Creek	6	4,527
Lampasas River 3	7	3,519
School Creek	8	3,772
Lucy Creek	9	2,564
Lampasas River 4	10	4,463
Sulphur Creek	11	7,820
Lampasas River 5	12	11,556
Mesquite Creek	13	3,945
Rocky Creek	14	6,834
Total per Watershed		59,316

# Potential *E. coli* Loading from Deer to Prioritize Focus Areas



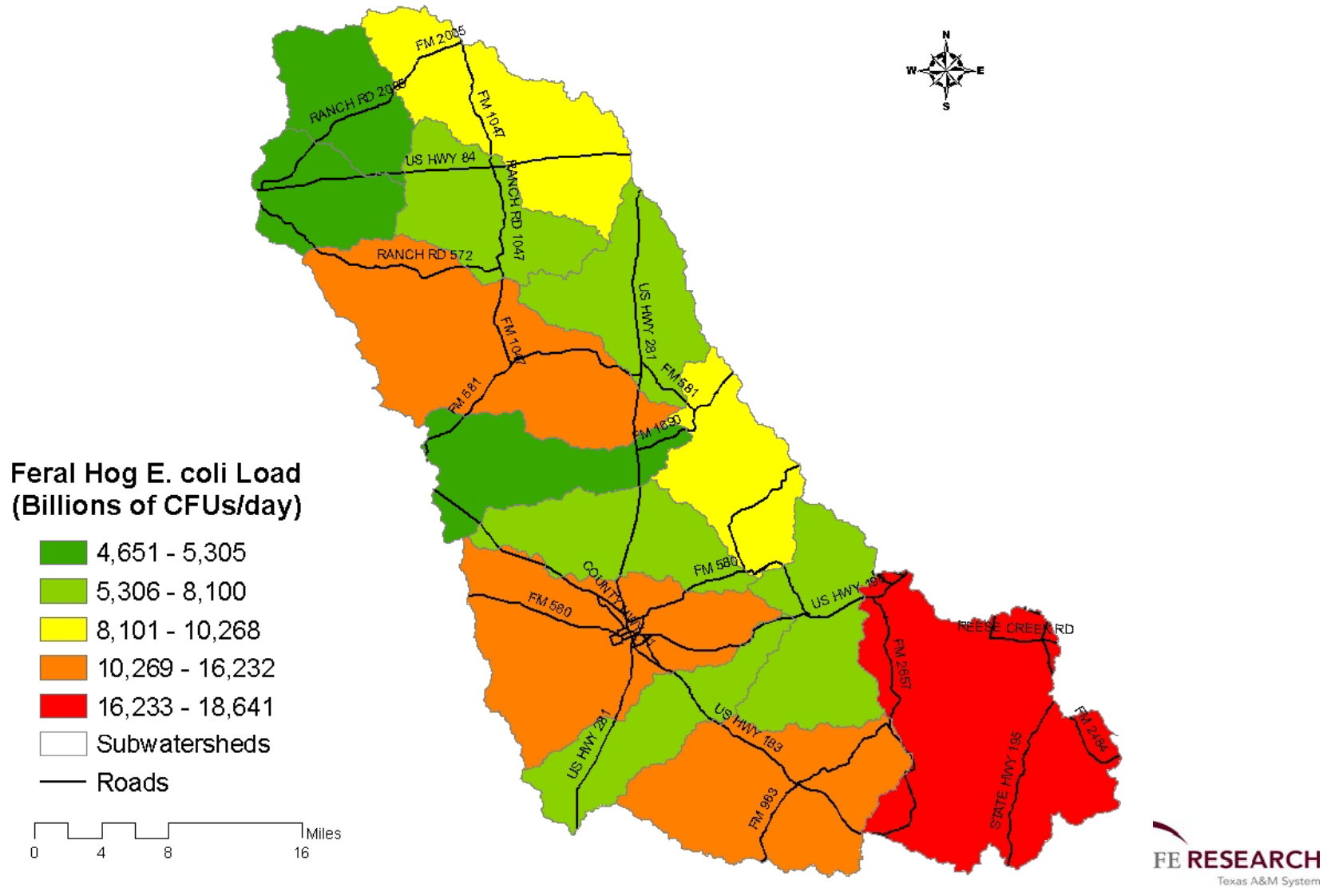
# Recommendations for Feral Hogs

- ▶ Removal of feral hogs
- ▶ Support county-wide trapping programs
- ▶ Educational programs
  - Texas AgriLife Extension Service
- ▶ Hunters for the Hungry
- ▶ Develop a hog trap rental or cost-share program
- ▶ Educate hunters to fence deer feeders with hog proof fences
- ▶ Enforce Texas Animal Health Commission regulations on trap and transport of live feral hogs

Subwatershed	ID	Number of Feral Hogs	10% of Feral Hogs
Lampasas River 1	1	1867	187
North Bennett Creek	2	930	93
Bennett Creek	3	1114	111
South Bennett Creek	4	846	85
Lampasas River 2	5	1473	147
Simms Creek	6	2951	295
Lampasas River 3	7	1667	167
School Creek	8	965	97
Lucy Creek	9	1276	128
Lampasas River 4	10	1260	126
Sulphur Creek	11	2561	256
Lampasas River 5	12	3389	339
Mesquite Creek	13	1266	127
Rocky Creek	14	2700	270
Total per Watershed		24265	2427



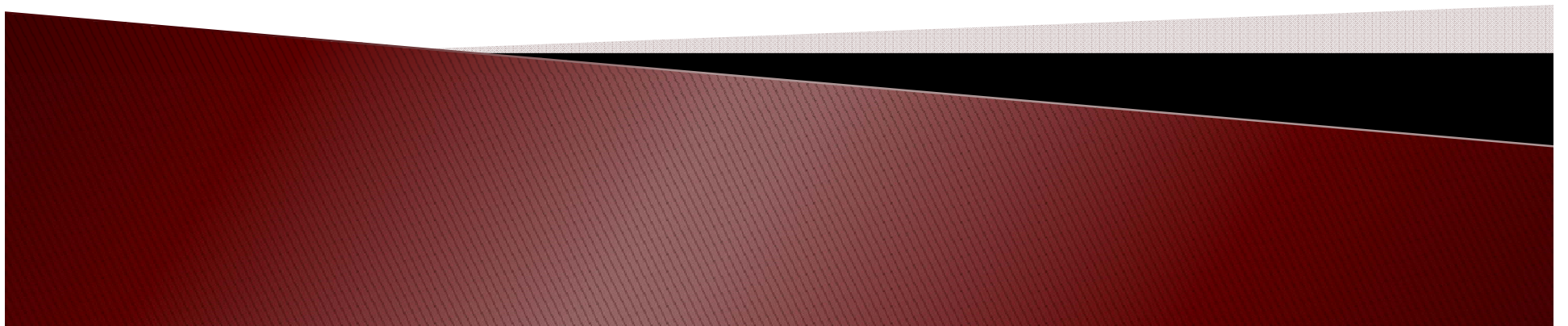
# Potential *E. coli* Loading from Feral Hogs to Prioritize Focus Areas



# Other Conservation Programs

- ▶ Texas Parks and Wildlife Department Private Landowner Programs
- ▶ Texas Forest Service Stewardship Program

# Urban NPS Work Group Recommendations



# Recommendations for WWTF

- ▶ Two WWTF in operation in the watershed
- ▶ Both are operating well below permitted discharge
- ▶ Both test *E. coli* levels daily per permit requirements
- ▶ Recommendations:
  - Make a positive statement about plants operating well below state standards
  - Encourage plants to maintain current housekeeping in regards to operation

# Recommendations for Sanitary Sewer Systems

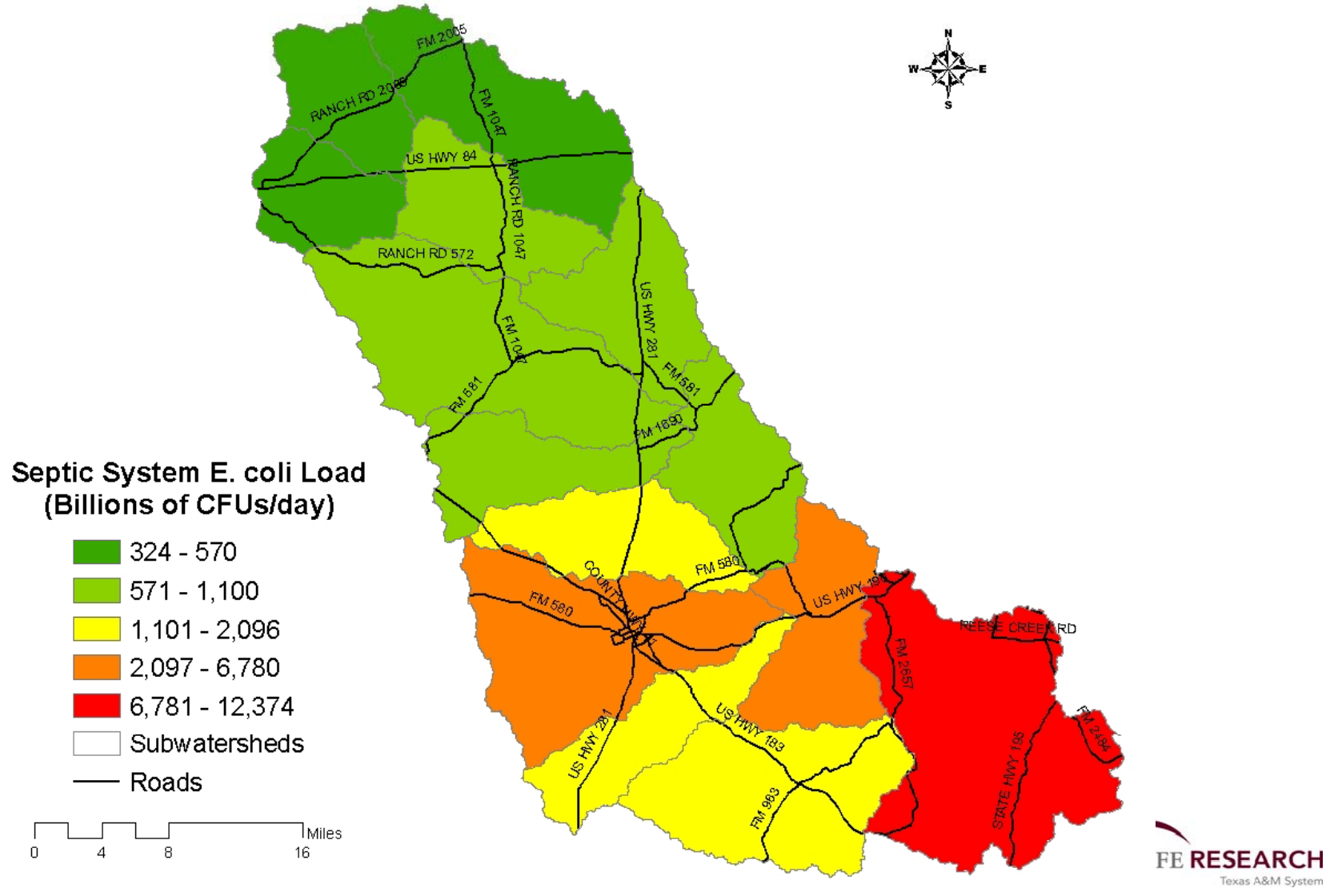
- ▶ Routinely inspect sewer lines to identify problem areas
- ▶ Replace old clay pipe sewer lines
- ▶ Clean & maintain existing sewer lines
- ▶ Ordinances to determine proper size for grease traps, to inspect them and require grease traps be properly cleaned & maintained

# Recommendations for Septic Systems

- ▶ Map permitted and unpermitted septic systems within the watershed
  - Identify and address target areas
- ▶ Repair or replacement of failing septic systems
- ▶ Connections to municipal systems (where applicable) and removal of septic systems
- ▶ Enforcement of noncompliant systems
- ▶ Owner education
  - Encourage repair and pump-out logs to be kept by homeowners &/or maintenance providers
- ▶ Public education
  - Coordinate with Texas Real Estate Commission to educate real estate agents, property inspectors, and consumers about identification and consequences of inadequate maintenance and failure of septic systems



# Potential *E. coli* Loading from Septic Systems to Prioritize Focus Areas



# Dogs

- ▶ Pet waste stations in parks and popular walking trails
- ▶ Public education



# Other Urban NPS Pollutant Source Concerns

- ▶ Residential lawn care
  - Proper application rate and usage of fertilizers and pesticides
- ▶ Management of resident waterfowl
  - Periodic relocation of resident waterfowl to prevent overpopulation and concentration in parks
- ▶ Illegal dumping
  - Signage
  - Illegal dumping tip line
  - Partnership cleanup events
  - Household hazardous waste collection events
- ▶ Other?

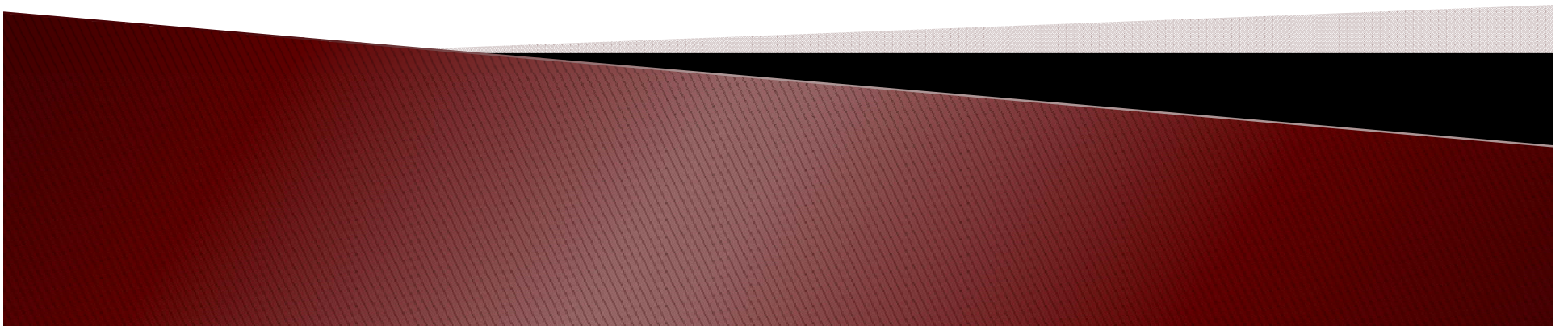
# Voluntary MS4 Measures

- ▶ Cities with 50,000+ residents (Killeen) must operate under a Municipal Separate Storm Sewer System (MS4) permit
- ▶ Smaller cities may voluntarily implement the same measures

# Voluntary MS4 Minimum Measures

- ▶ Public education and outreach
- ▶ Public involvement or participation
- ▶ Detection and elimination of illicit discharges
- ▶ Controls for storm water runoff from construction sites
- ▶ Cost–construction storm water management in areas of new development and redevelopment
- ▶ Pollution prevention and “good housekeeping” measures for municipal operations

# Status of the Lampasas River Watershed Partnership





# What have we accomplished?

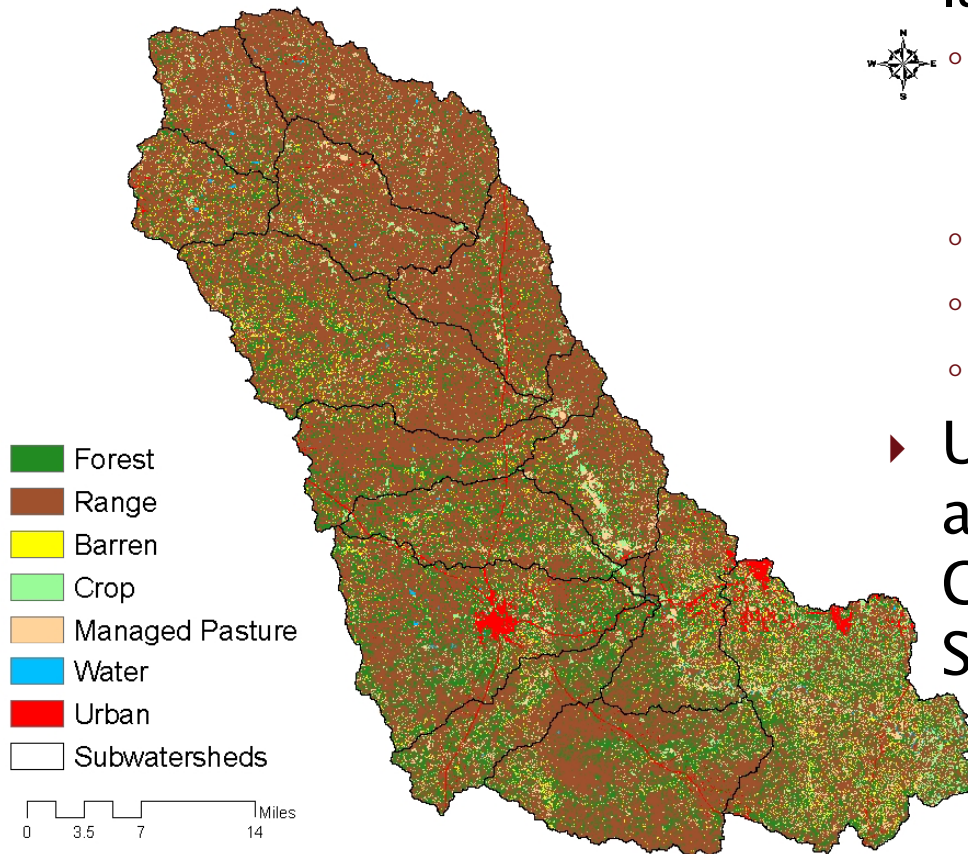
- ▶ The Partnership adopted State Surface Water Quality Standards as Water Quality Goals for the Partnership
  - E. coli : geomean < 126 cfu per 100 ml
  - Chloride: mean < 500 mg/l
  - Sulfate: mean < 100 mg/l
  - Total Dissolved Solids: mean < 1200 mg/l
  - Dissolved Oxygen:  $\geq 3.0$  mg/l
  - Nitrate Nitrogen<sup>\*\*</sup>: mean < 2.76 mg/l
  - Orthophosphate<sup>\*\*</sup>: mean < 0.5 mg/l
- ▶ <sup>\*\*</sup>State screening criteria – 85% of state’s waterbodies are below this level<sup>\*\*</sup>

# What have we accomplished?

- ▶ As a result of the TAG meeting, TCEQ revisited the data that initially placed the Lampasas River on the 303(d) List
  - Data that originally placed the Lampasas River on the 303(d) list no longer meets the new criteria
- ▶ This information was presented to the Partnership and the consensus was to support delisting of the river.
- ▶ The Lampasas River has been removed on the Draft 2010 Integrated Report of Impaired Waterbodies that was approved by the TCEQ Commissioners on August 25<sup>th</sup>
- ▶ Draft is pending EPA's approval

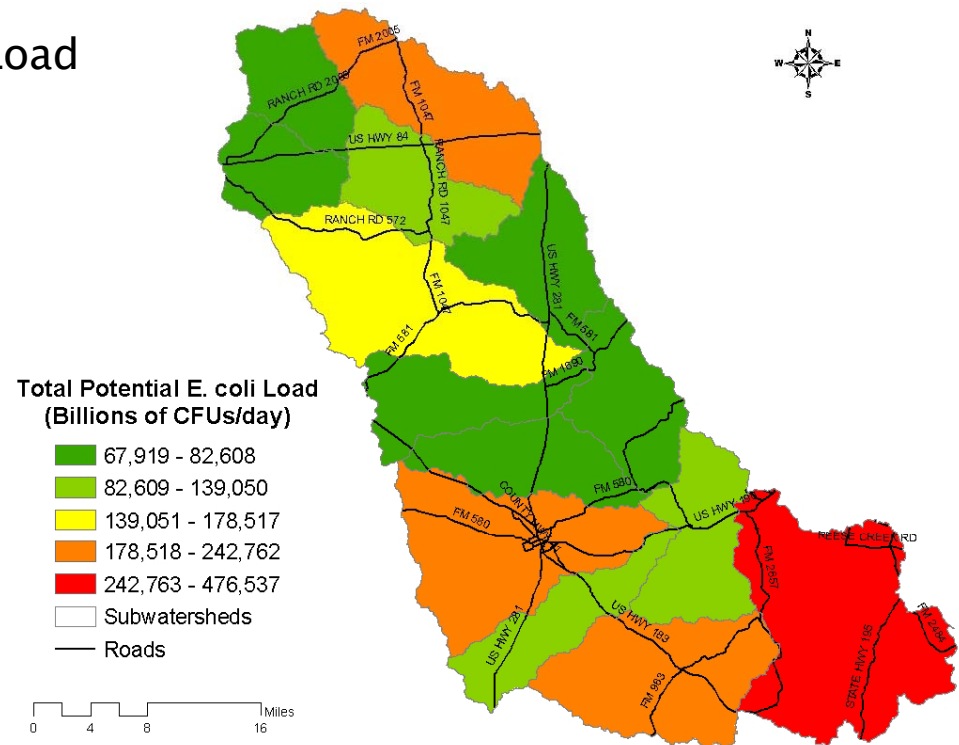
# What have we accomplished?

- ▶ Updated watershed land use and land cover from satellite imagery
  - National Agriculture Imagery Program (NAIP) Digital Ortho Imagery- 2008
  - National Land Cover Dataset- 2001
  - Crop Data Layer- 2008
  - Ground Truth Data
- ▶ Updated land use has been approved by the Steering Committee and used in the SELECT analysis



# What have we accomplished?

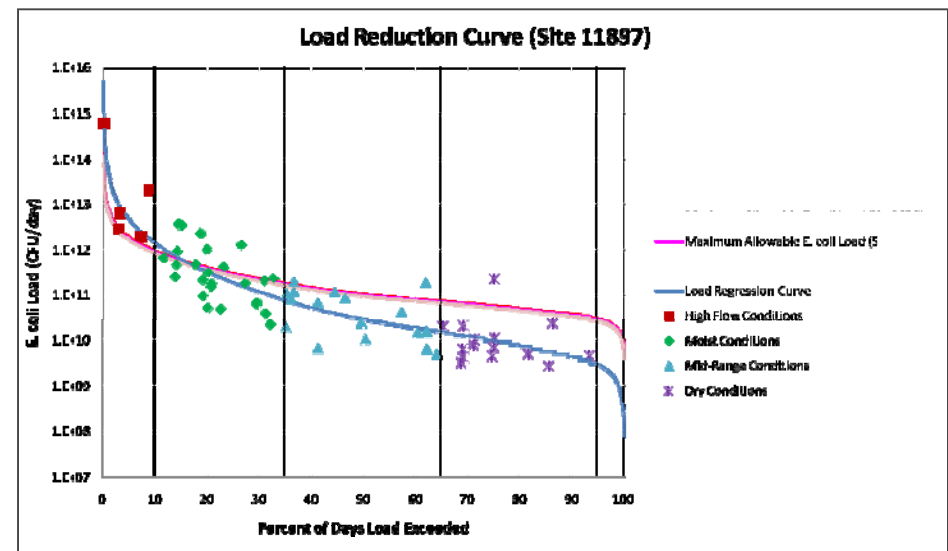
- ▶ Utilized SELECT (Spatially Explicit Load Enrichment Calculation Tool) to determine potential bacteria contribution from:
  - Septic Systems
  - Wastewater Treatment Facilities
  - Dog Waste
  - Horses
  - Sheep
  - Goats
  - Cattle
  - Confined Animal Feeding Operations
  - Deer
  - Feral Hogs



SELECT Output for Total Potential *E. Coli* Load

# What have we accomplished?

- ▶ Developed Load Duration Curves for six water quality sites in watershed
  - Percentage of time a pollutant load meets or exceeds a target level
- ▶ Water quality analysis indicates no need for bacteria load reduction, with the exception of during the High Flow Regime





# What have we accomplished?

## *NRCS Riparian Proper Functioning Condition Workshop*

- ▶ Participants learned the basic interaction of Hydrology – Erosion/Deposition and Vegetation for Central Texas creeks and rivers
- ▶ Two workshops held in October 2010
- ▶ One-day course; ½ Classroom, ½ Field
- ▶ Will be offered again in Spring 2011, if there is interest

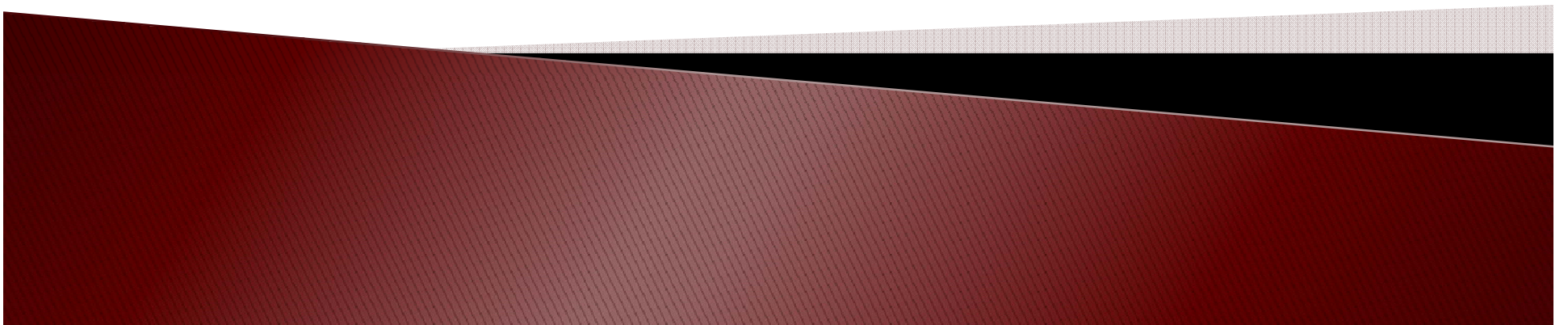




# What are we doing now?

- ▶ Work Groups have outlined management practices to sustain water quality at or below current conditions
- ▶ Management practices identified thus far include:
  - Encouraging land owner enrollment into Water Quality Management Plans through TSSWCB or NRCS to implement conservation practices
  - Feral hog trap loan program
  - Map permitted and unpermitted OSSFs within the watershed
  - Pet waste stations in parks and along hiking trails
  - Many, many more...

# Next Steps



# What is next?

- ▶ November 2010
  - Steering Committee Meeting
    - Present work group recommended practices to Steering Committee for discussion
    - Load reduction associated with BMP
- ▶ December 2010
  - **Happy Holidays – No meetings**
- ▶ January 2011
  - Work Group Meetings
    - Discussion of measures of BMP effectiveness, available technical assistance, sources of funding and long term monitoring
- ▶ February 2011
  - Work Group Meetings
    - Develop outreach and education strategies

# What is next?

- ▶ March 2011
  - Steering Committee Meeting
    - Present final work group recommendations, finalize priorities and long-term monitoring
- ▶ April/May 2011
  - Distribute WPP for public comment
- ▶ June/July 2011
  - Partnership Meeting
    - Address public comments
- ▶ July – November 2011
  - TSSWCB and EPA Consistency Review Period
- ▶ **Print WPP & begin implementation**