LAVACA RIVER WATERSHED PROTECTION PLAN

Allen Berthold, Michael Schramm - TWRI

June 29, 2017

Texas A&M AgriLife Extension

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Overview

- Chapter 1 – Intro to watershed management
- Chapter 2 – Describes the watershed
- Chapter 3 – Describes current water quality
- Chapter 4 – Assessment of potential pollutant sources

Overview

- Chapter 5 – Strategies to reduce bacteria loading
- Chapter 6 – Education and outreach programs
- Chapter 7 – Financial and technical resources
- Chapter 8 – Measuring progress and success

Overview

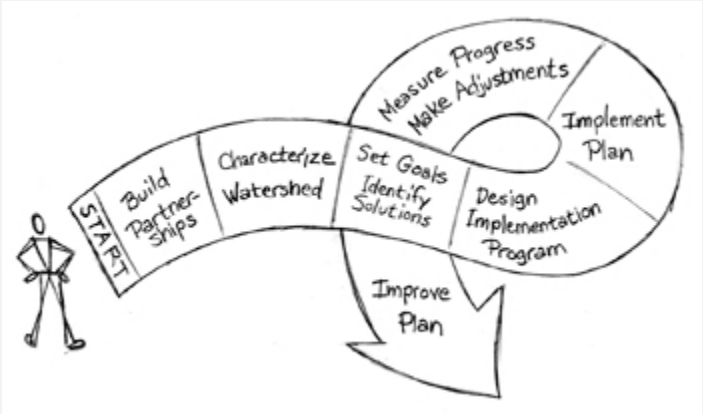
- Appendix A – Calculations and references for potential loadings
- Appendix B – Calculations and references for potential load reductions
- Appendix C – EPA Nine Elements of Successful Watershed Protection Plans

CHAPTER 1

Introduction to Watershed Management

pages 1-4

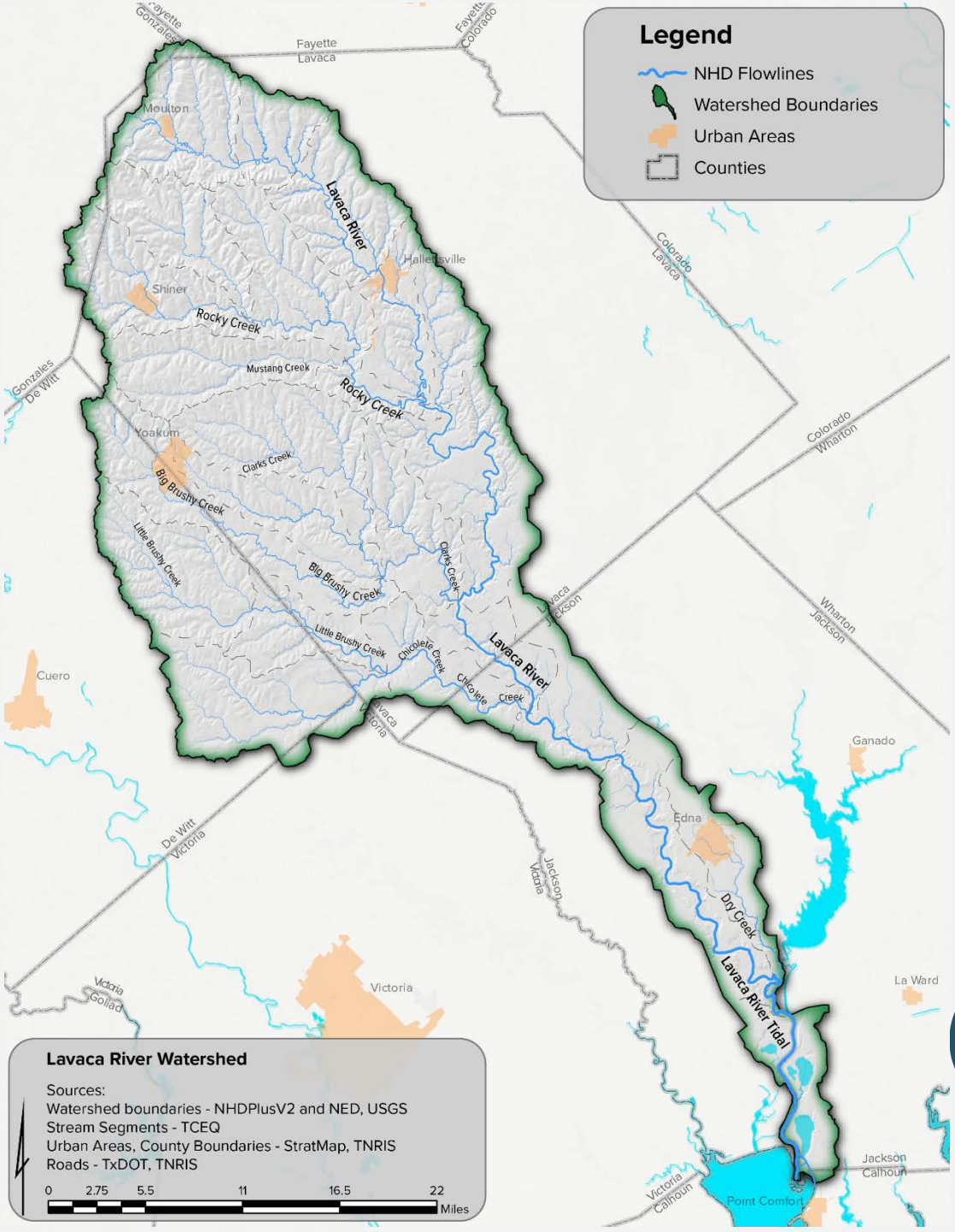
- Describes the concepts of “watersheds”, point and non-point source pollution, stakeholders, adaptive management, and the watershed approach.
- Provides EPA’s nine key elements to watershed protection plans



CHAPTER 2

Watershed Description
pages 5-14

- 909 sq miles
- 802 miles of streams and rivers
- Includes non-tidal and tidal segments of the Lavaca



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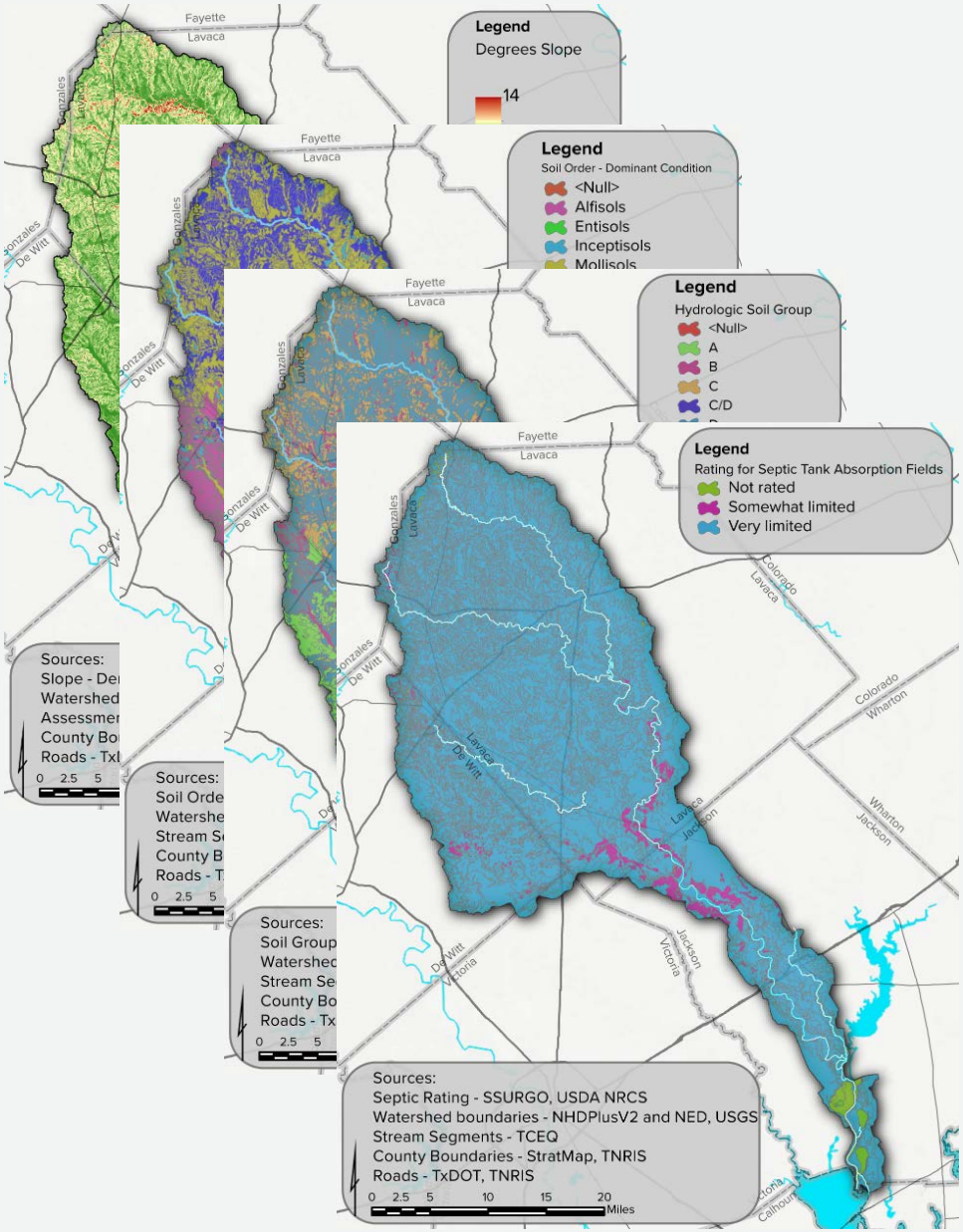
Watershed Description
pages 5-14

Soils and topography:

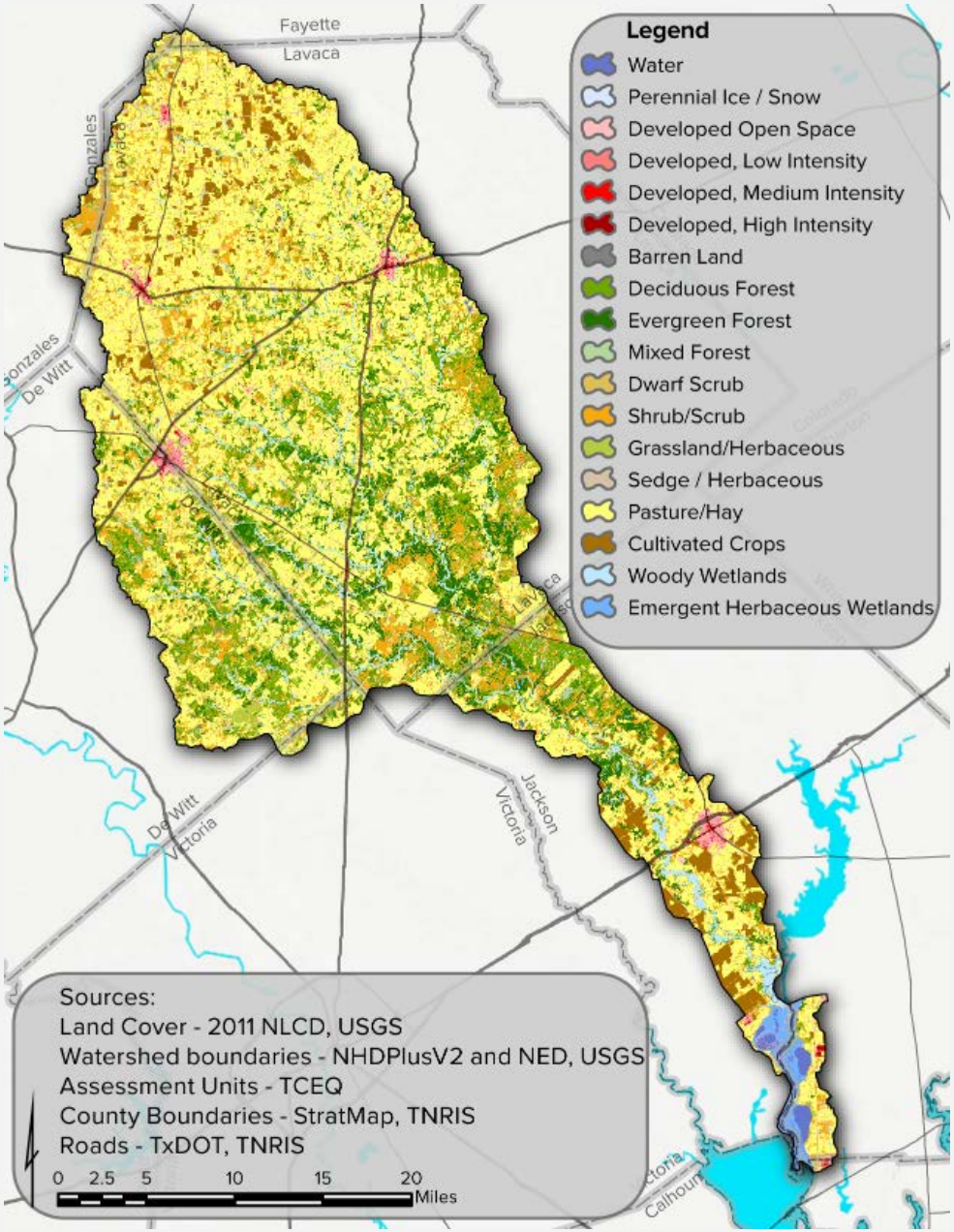
- Low elevation (290 ft average)
- Mostly flat (1 degree slope avg)
- Soils well suited for ag production
- Moderate to low water infiltration
- Limited septic suitability



Watershed Description
pages 5-14

Land use:

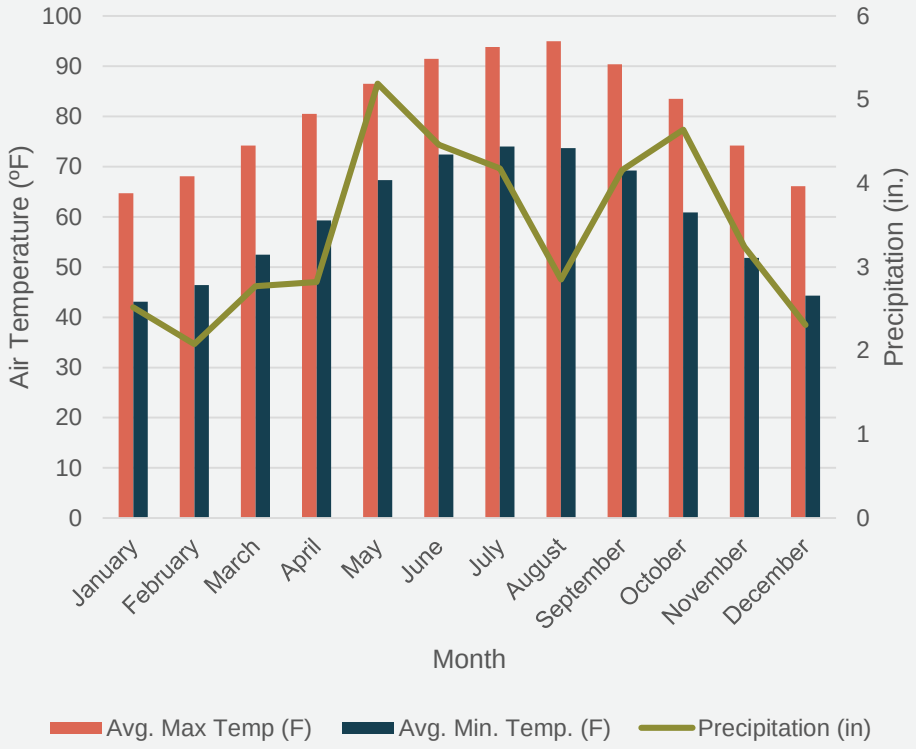
- 62% -hay/pasture/brush/grass
- 6% - Urban/developed
- 4.5% row crops



Watershed Description
pages 5-14

Climate:

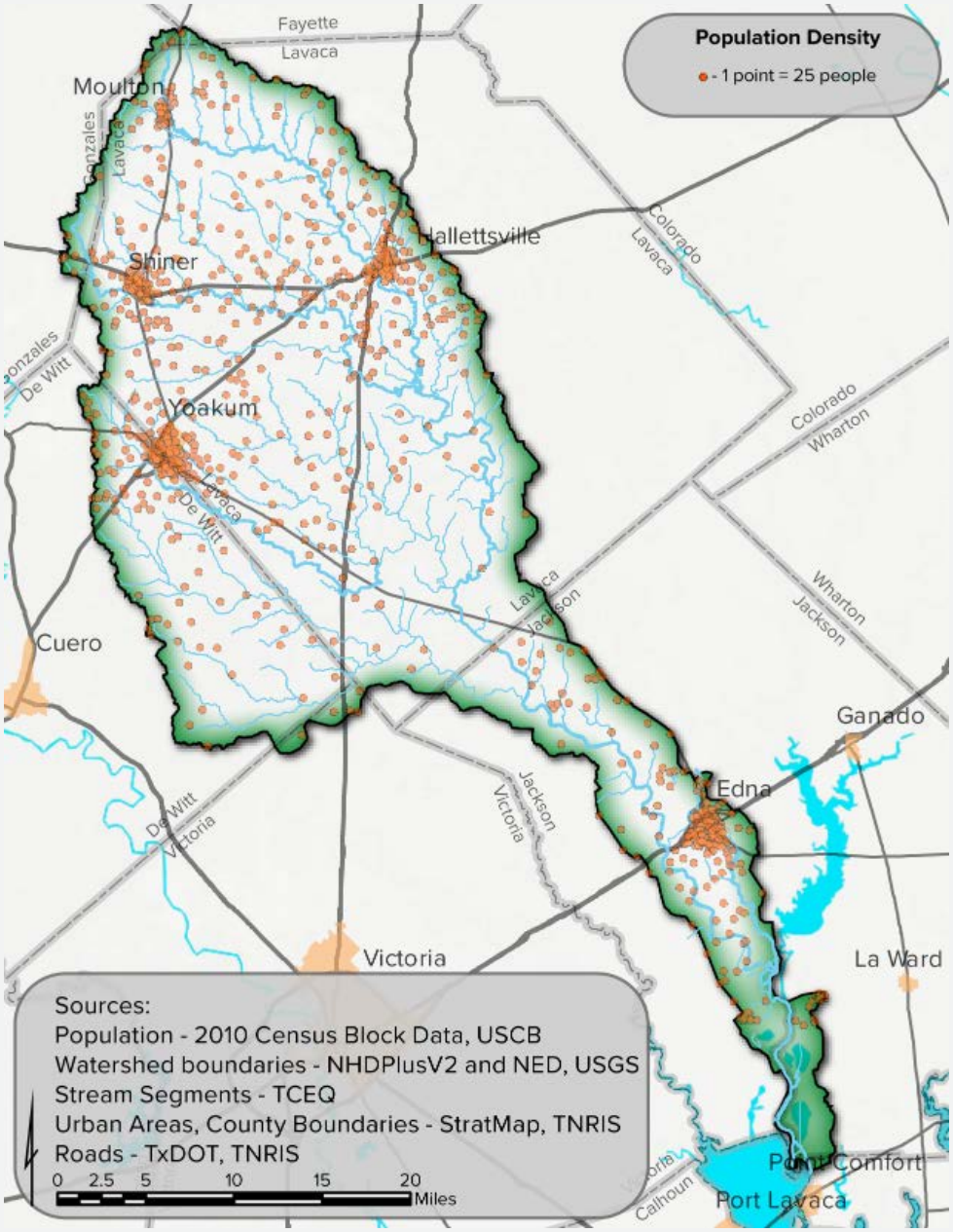
- Peak highs ~95°F in August
- Minimum lows ~45°F in January
- ~41” of rainfall/yr
- May rainfall ~5”
- February rainfall ~2”



Watershed Description
pages 5-14

Population demographics:

- ~30,000 people
- Minor population growth expected
- 13-16% with college degrees
- 17-38% do not speak English as primary language



CHAPTER 3

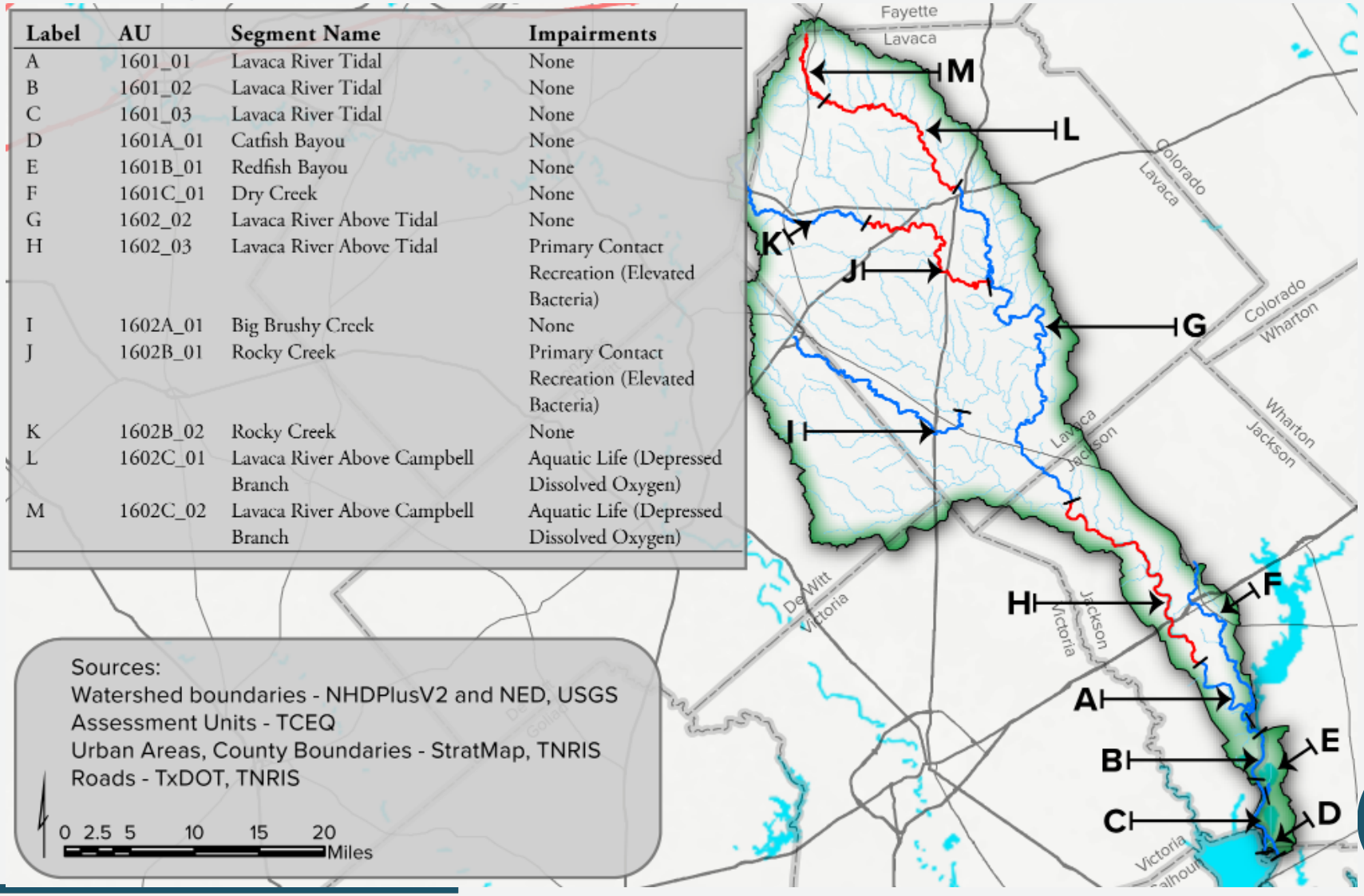
Water Quality
pages 15-33

- Intro to Texas water quality standards
- TCEQ defined segments and “AUs”
- Overview of existing bacteria, DO, nutrients, and water flow data
- Identify and quantify (where possible) potential sources of bacteria loads

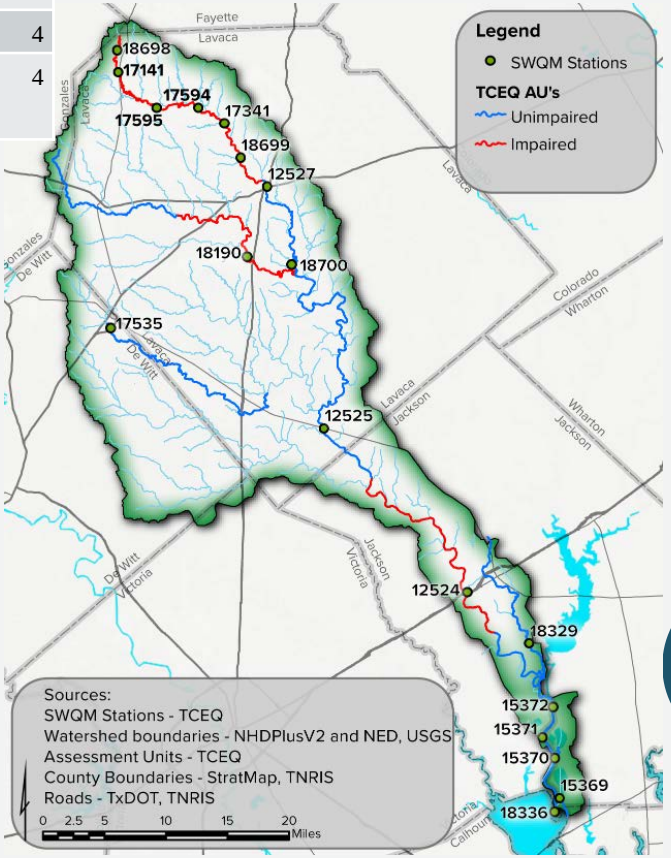
Water Quality

pages 15-33

Label	AU	Segment Name	Impairments
A	1601_01	Lavaca River Tidal	None
B	1601_02	Lavaca River Tidal	None
C	1601_03	Lavaca River Tidal	None
D	1601A_01	Catfish Bayou	None
E	1601B_01	Redfish Bayou	None
F	1601C_01	Dry Creek	None
G	1602_02	Lavaca River Above Tidal	None
H	1602_03	Lavaca River Above Tidal	Primary Contact Recreation (Elevated Bacteria)
I	1602A_01	Big Brushy Creek	None
J	1602B_01	Rocky Creek	Primary Contact Recreation (Elevated Bacteria)
K	1602B_02	Rocky Creek	None
L	1602C_01	Lavaca River Above Campbell Branch	Aquatic Life (Depressed Dissolved Oxygen)
M	1602C_02	Lavaca River Above Campbell Branch	Aquatic Life (Depressed Dissolved Oxygen)

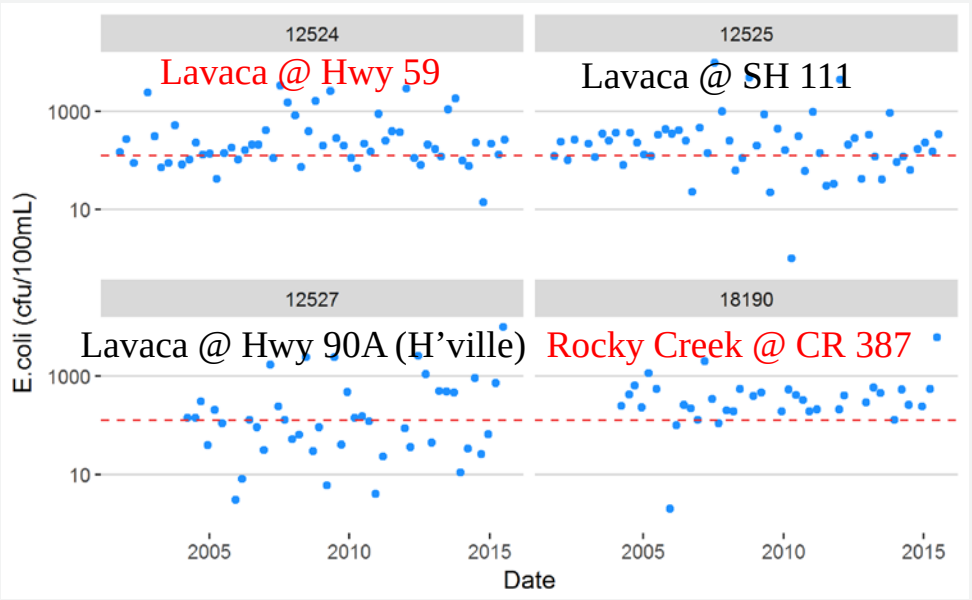


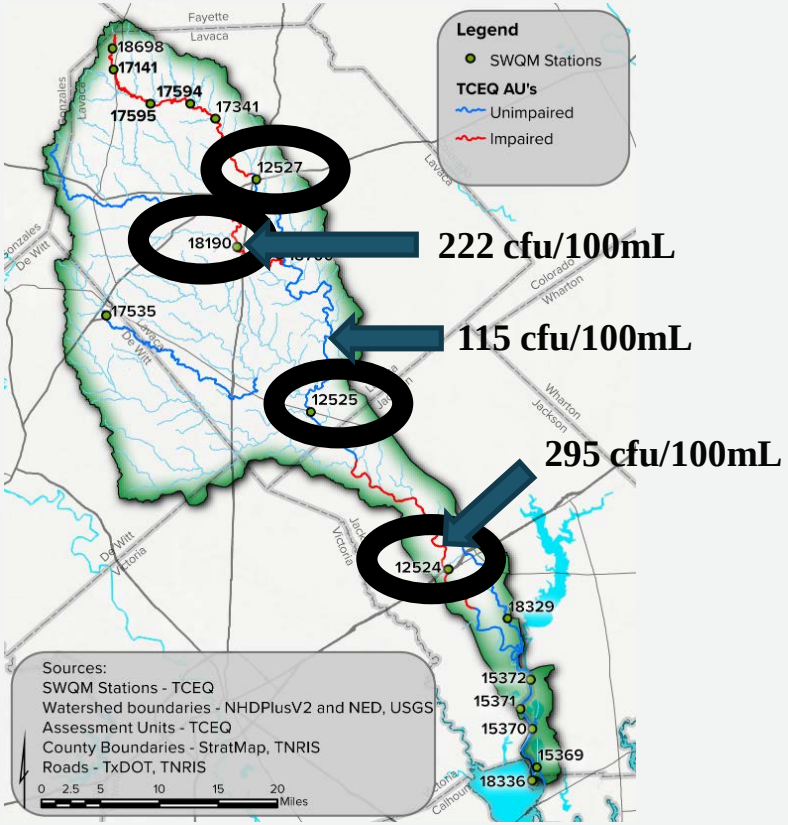
Station			Annual samples			
	AU	Description	Conventional	Field	Flow	Bacteria
15372	1601_01	Lavaca River @ Frels Landing		12		
15371	1601_02	Lavaca River @ Mobil Dock		12		
15370	1601B_01	Lavaca River @ Mouth of Redfish Lake		12		
15369	1601A_01	Lavaca River @ Mouth of Swam Lake		12		
18336	1601_03	Lavaca River near Lavaca Bay	4	12		
12525	1602_02	Lavaca River @ SH 111	4	12	12	4
12524	1602_03	Lavaca River @ Hwy 59	4	12	12	4
18190	1602B_01	Rocky Creek @ Lavaca CR 387	4	4		4
12527	1602_02	Lavaca River @ Hwy 90A Hallettsville	4	4	4	4



Current Water Quality conditions

Chapter 3.1 pages 17-19





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Summary of Potential Sources

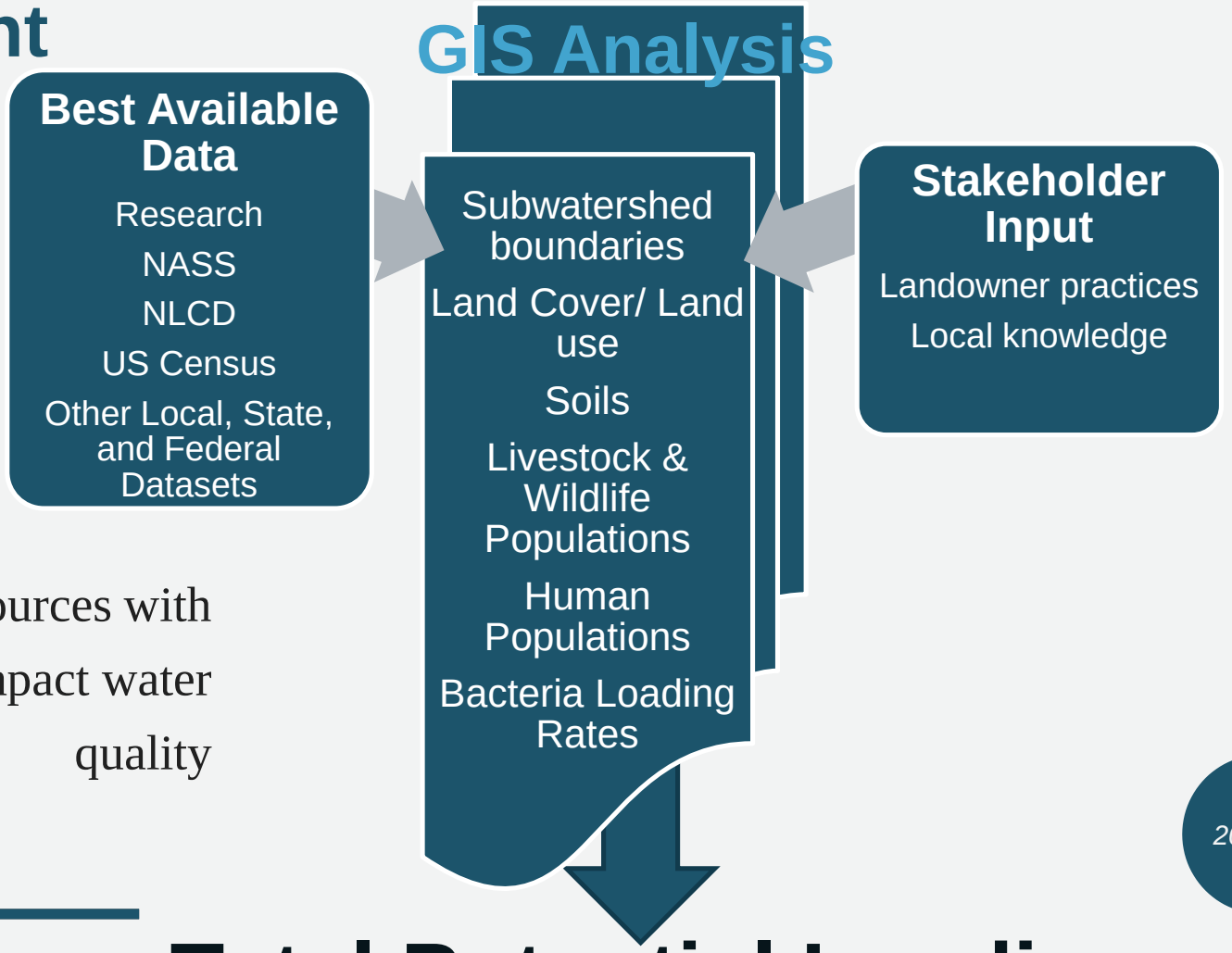
Chapter 3.5 pages 24-33

Pollutant Source	Potential Cause	Potential Impact
Livestock	• Runoff from pastures • Overgrazing • Manure transport to streams • Direct deposition into streams	Fecal material and bacteria directly deposited into stream or through runoff
Wildlife	• Manure transport to streams • Direct deposition into streams • Riparian degradation	Fecal material and bacteria directly deposited into stream or through runoff
OSSFs	• System failure • Improper design	Insufficiently or untreated water runoff to streams
Urban Stormwater	• Increased runoff from impervious surface • Improper disposal of pet waste	Increased velocity and volume of stormwater quickly transport bacteria laden water to streams
Permitted Dischargers/SSOs	• Inflow & Infiltration • Overloaded or aging infrastructure	Untreated waste enters waterbody

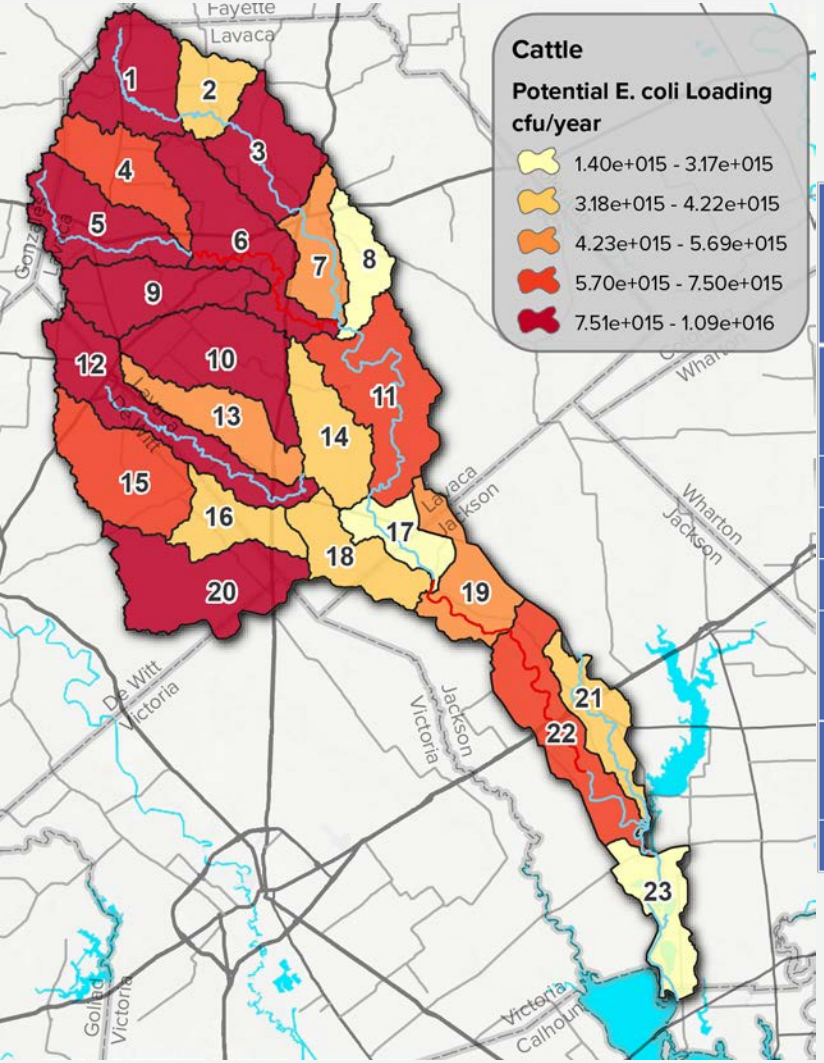
CHAPTER 4

Pollution Source Assessment

pages 40-50

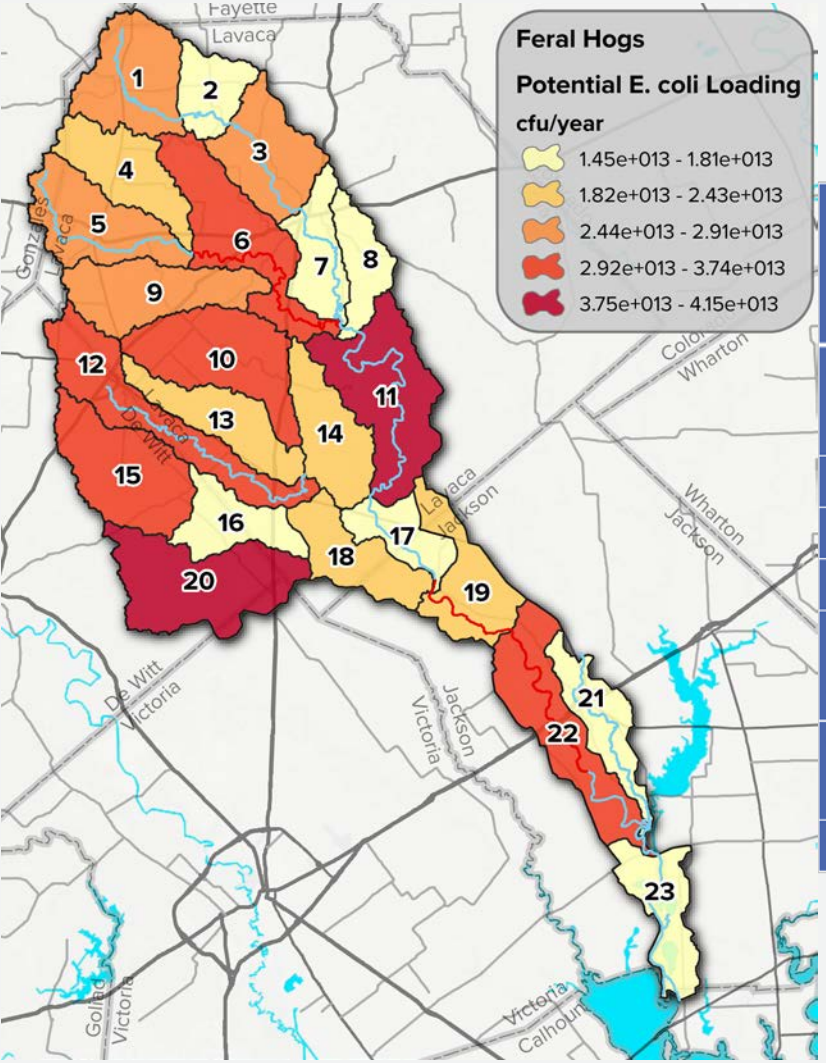


Identify the areas and sources with highest ***potential*** to impact water quality



Source	Lavaca		Rocky Creek	
	Potential Load†	Highest Priority Subwatersheds	Potential Load†	Highest Priority Subwatersheds
Cattle	1.45×10^{17}	1, 3, 5, 6, 9, 10, 12, 20	3.53×10^{16}	5, 6, 9
Feral Hogs	6.03×10^{14}	11, 20	1.18×10^{14}	6
Dogs	3.71×10^{15}	5, 7, 12, 21	7.34×10^{14}	5
OSSFs	9.29×10^{14}	6, 12	2.67×10^{14}	6
Urban Stormwater	4.27×10^{7}	5, 7, 12, 21	8.48×10^{6}	5
WWTFs	1.62×10^{10}	1, 5, 7, 12, 21, 23	4.05×10^{9}	5

† in units of cfu E. coli per year



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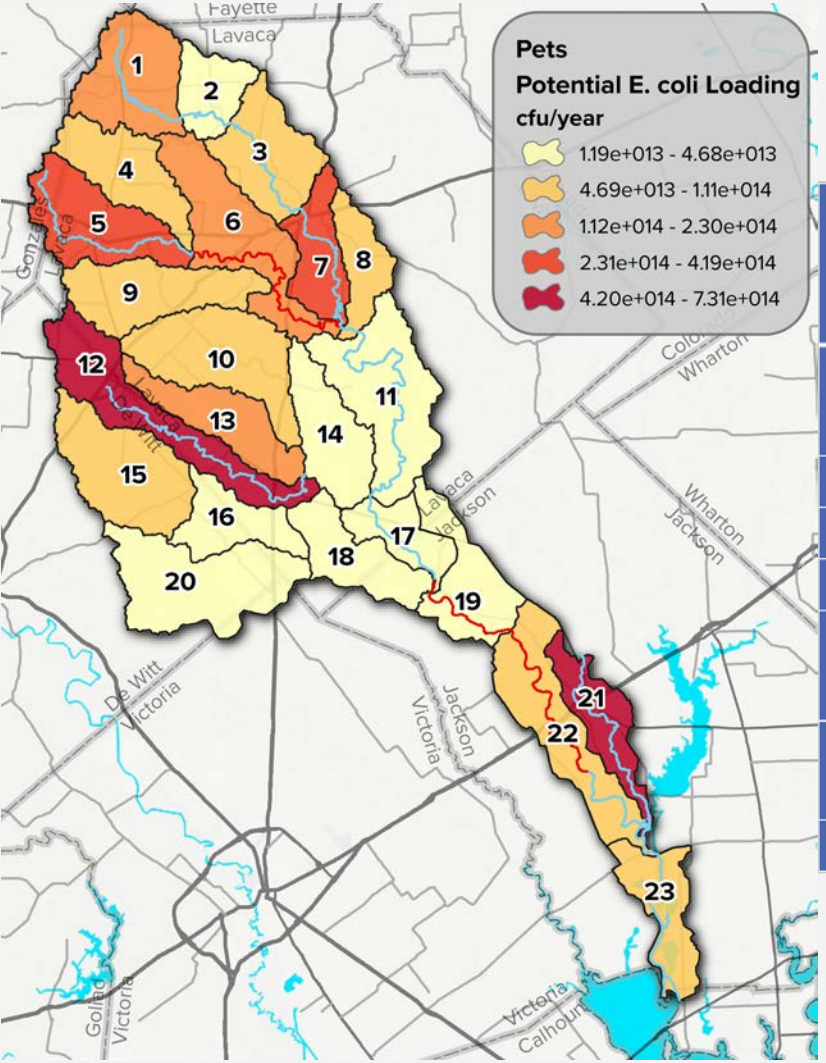

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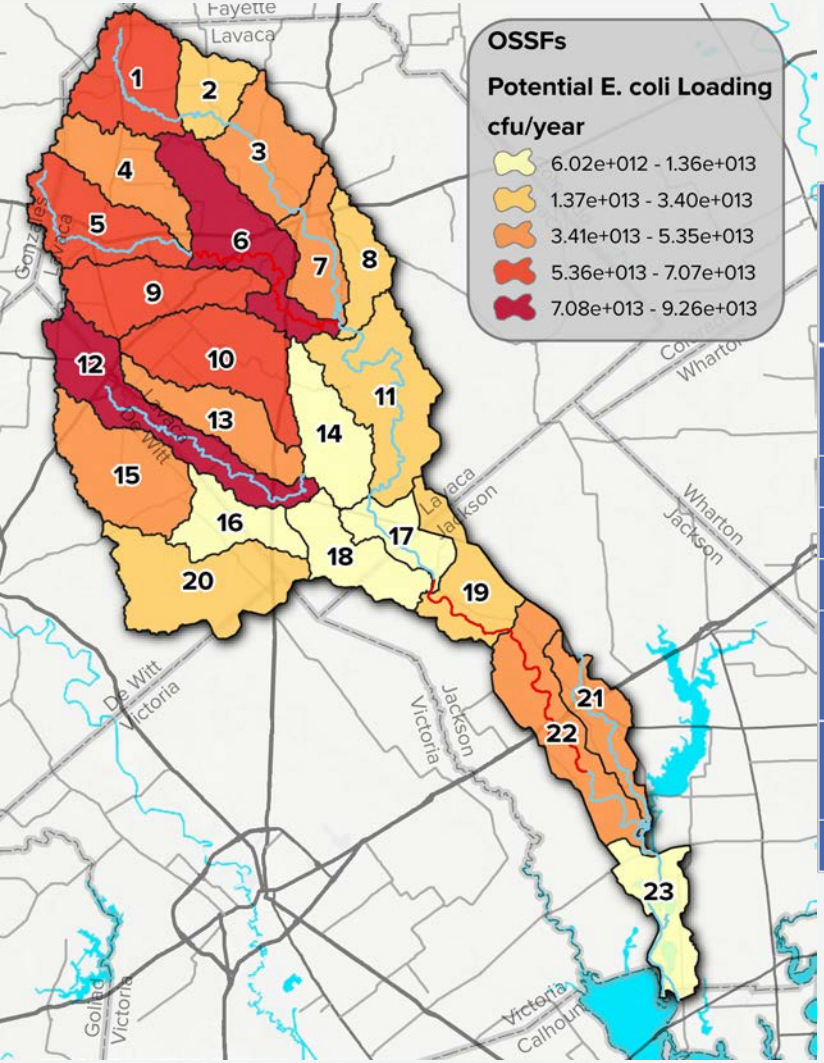

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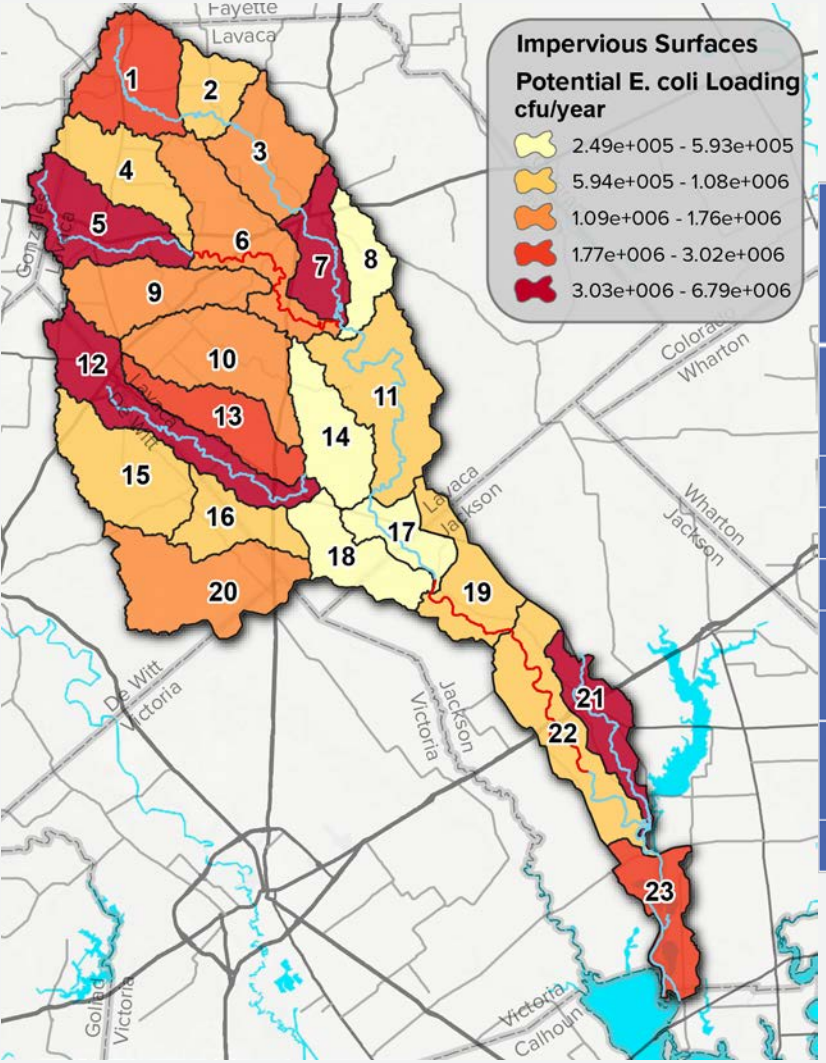

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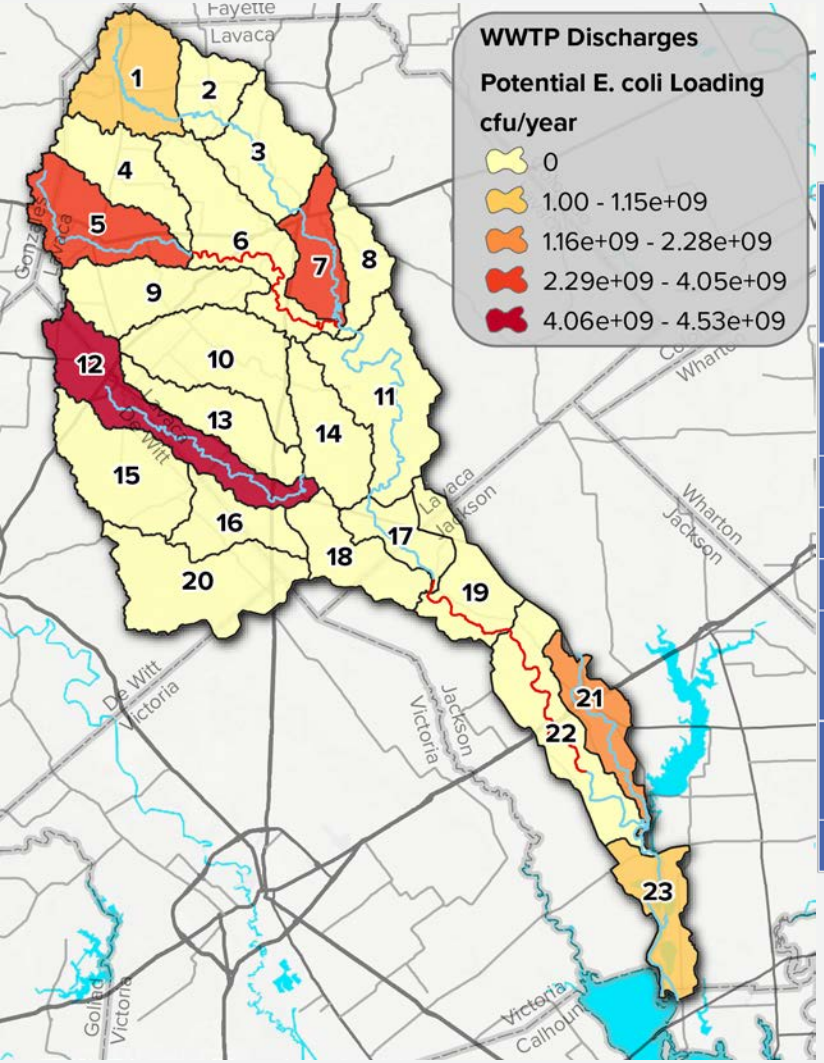

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† in units of cfu E. coli per year

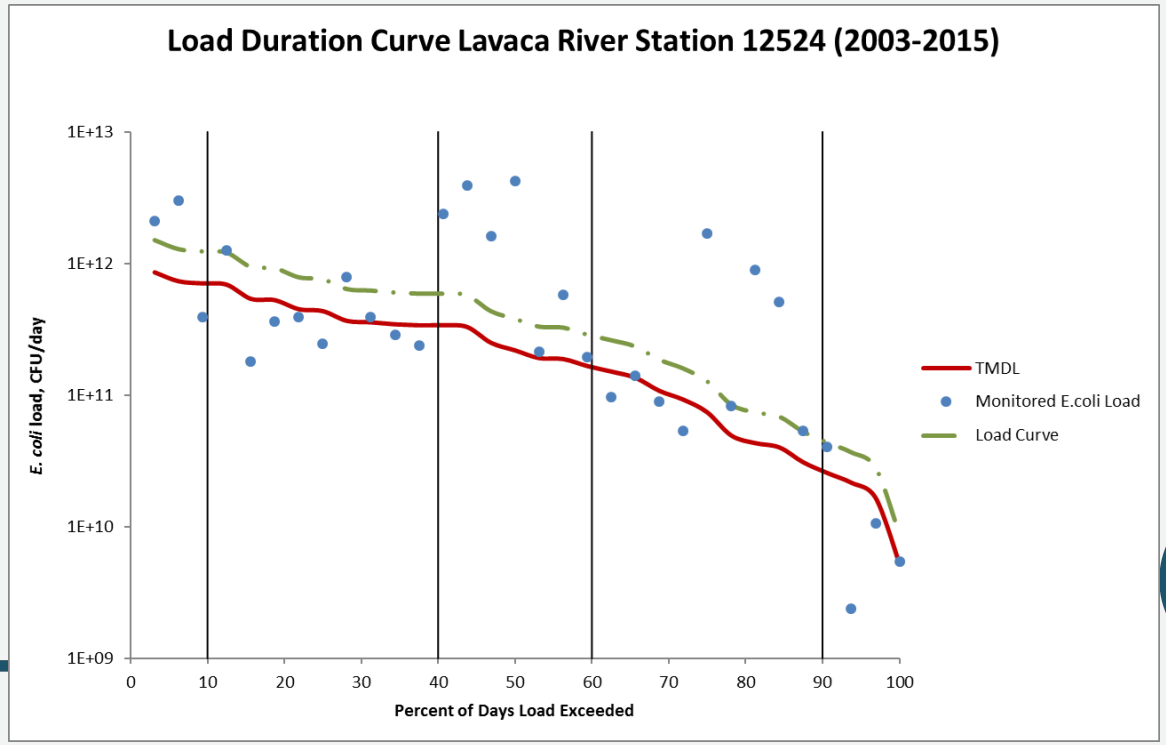
Pollution Source Assessment

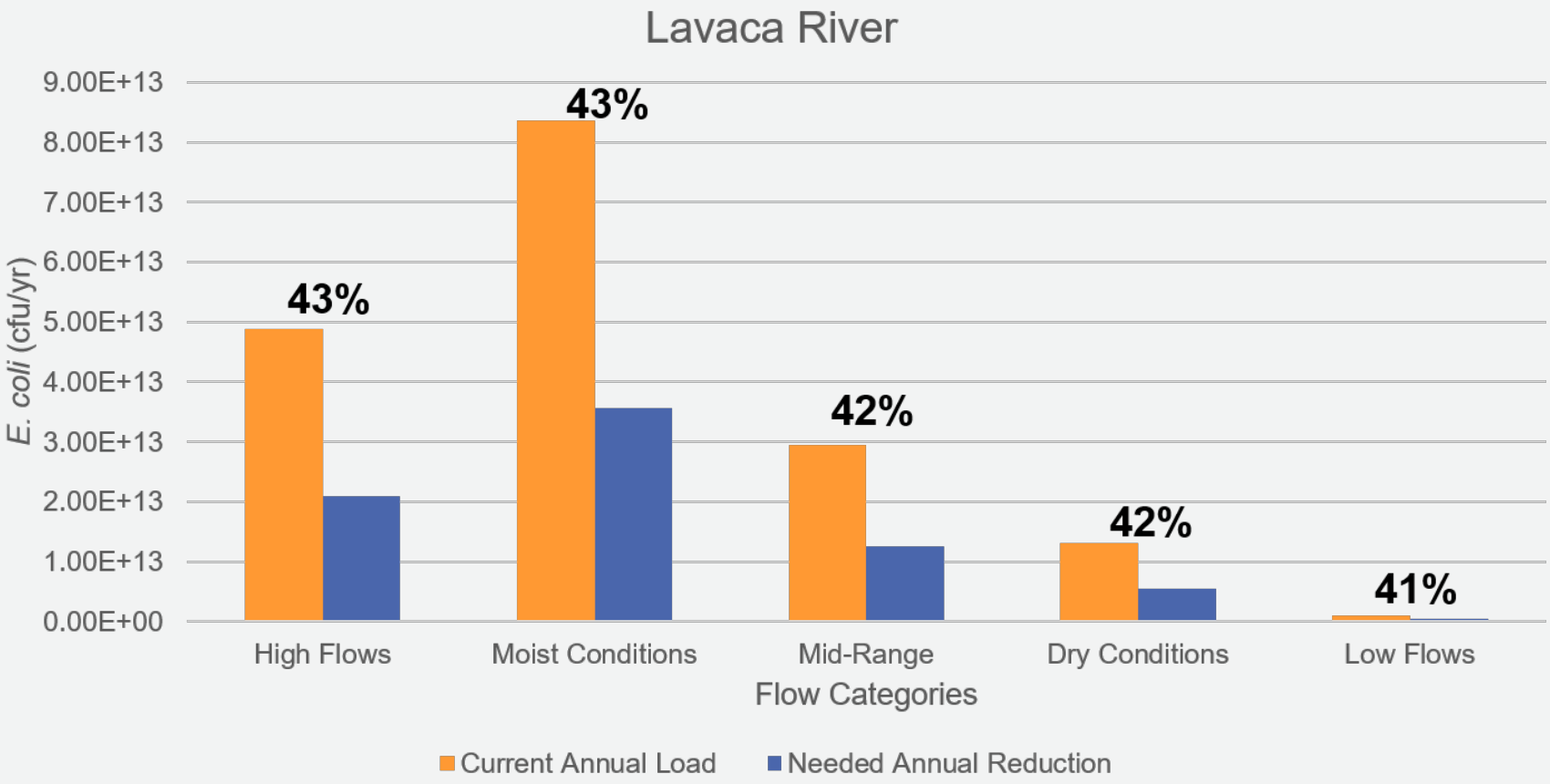
pages 34-40

- Load Duration Curve
  - Method to visualize and assess pollutant loads in relation to streamflow
  - Used to estimate pollutant capacity of the stream, and estimate needed reductions
  - More details: https://www.epa.gov/sites/production/files/2015-07/documents/2007_08_23_tmdl_duration_curve_guide_aug2007.pdf

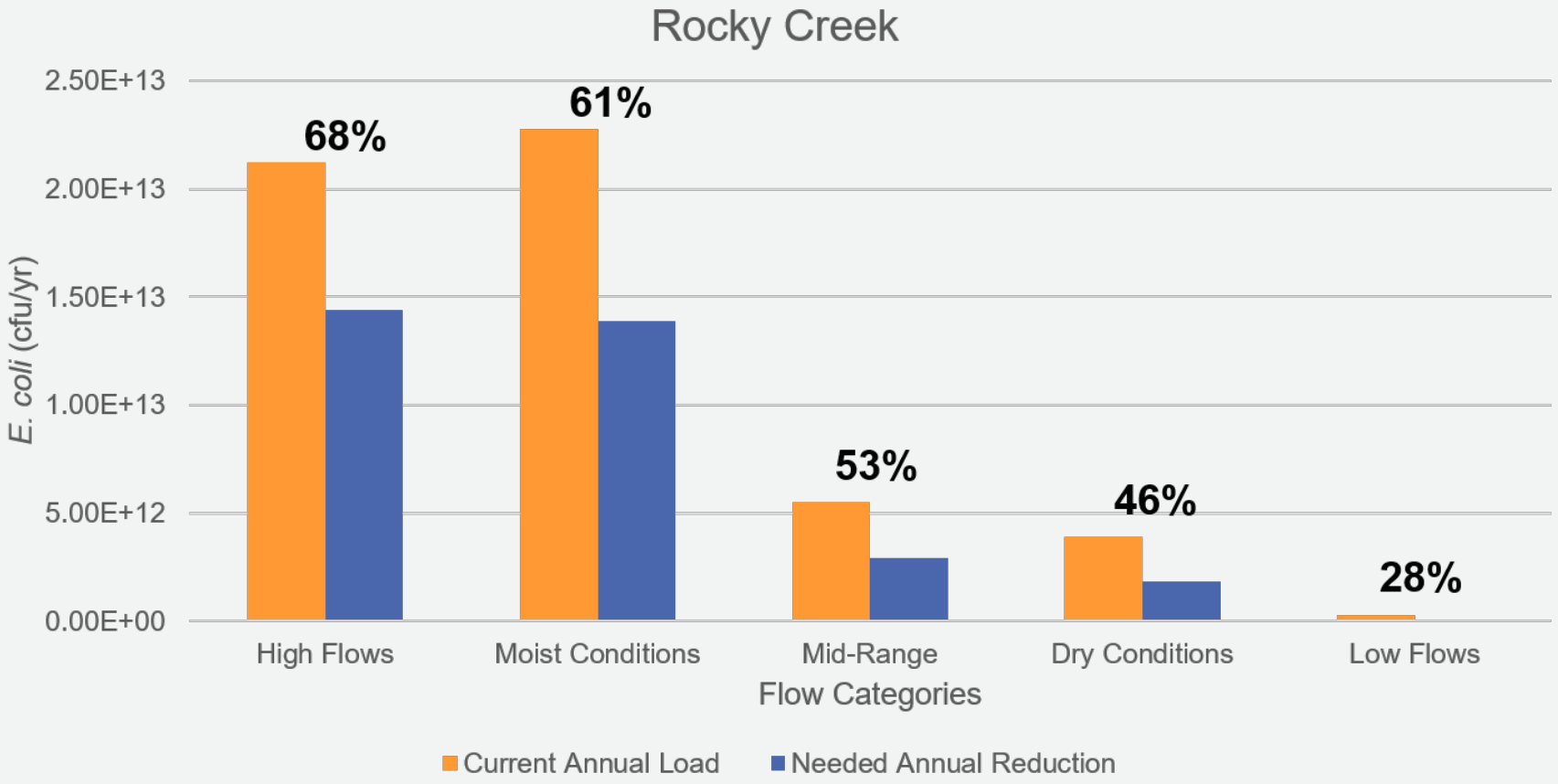
So far, determined important subwatersheds and potential magnitudes of loadings for different sources.

Next step is to determine how much reduction is needed to achieve water quality standards





Total reduction of 7.51×10^{13} cfu/yr



Total reduction of 3.31×10^{13} cfu/yr

CHAPTER 5

Management Measures

Bacteria Source: Cattle and other livestock (pages 53-55)

Objectives:

- Work with producers to develop voluntary, property specific conservation plans and WQMPs that improve grazing practices and water quality
- Provide technical and financial support for producers to implement needed practices

Strategy:

- Fund a regional or watershed WQMP technician
- Develop, implement 100 conservation plans or WQMPs (30 in Rocky Creek)
- Deliver Lone Star Healthy Streams workshops

Estimated Load Reductions after full implementation:

- 3.34×10^{14} cfu *E. coli* per year in the Lavaca River
- 7.51×10^{13} cfu *E. coli* per year in Rocky Creek

Management Measures

Bacteria Source: Feral hogs (pages 57-58)

Objectives:

- Work with landowners to voluntarily reduce feral hog populations
- Reduce food availability for feral hogs

Strategy:

- Reduce and maintain feral hogs populations by 15% in both watersheds (2,439 hogs and 478)
- Construct fences around deer feeders
- Develop and implement wildlife habitat management plans and practices
- Feral Hog Management Workshop

Estimated Load Reductions after full implementation:

- 8.48×10^{13} cfu *E. coli* per year in the Lavaca River
- 1.66×10^{13} cfu *E. coli* per year in Rocky Creek

Management Measures

Bacteria Source: On-Site Sewage Facilities (pages 59-60)

Objectives:

- Reduce number of failing OSSFs
- Work with counties and communities to replace failing systems as funding allows
- Educate homeowners

Strategy:

- Develop repair and replacement program
- Identify, repair and replace 40 failing OSSFs within Lavaca River watershed and 11 in Rocky Creek watershed
- OSSF operations and maintenance workshops

Estimated Load Reductions after full implementation:

- 4.72×10^{13} cfu *E. coli* per year in the Lavaca River
- 1.30×10^{13} cfu *E. coli* per year in Rocky Creek

Photo courtesy of Ryan Gerlich TAMU

Management Measures

Bacteria Source: Dog Waste (pages 61-62)

Objectives:
- Educate residents on proper pet waste disposal
- Install and maintain pet waste stations in high visibility areas

Strategy:
- Install at least 5 pet waste stations in area parks
- Develop and provide educational resources to residents

Estimated Load Reductions after full implementation:
- 3.71×10^{13} cfu *E. coli* per year in the Lavaca River
- 7.63×10^{12} cfu *E. coli* per year in Rocky Creek

Management Measures

Bacteria Source: Urban stormwater runoff (pages 63-64)

Objectives:
- Educate residents on stormwater best management practices
- Work with various stakeholders to identify and install stormwater BMP demonstration projects

Strategy:
- Identify and install stormwater BMPs as funding becomes available
- Deliver Riparian and Stream Ecosystem workshop and others as appropriate

Estimated Load Reductions after full implementation:
- Not calculated

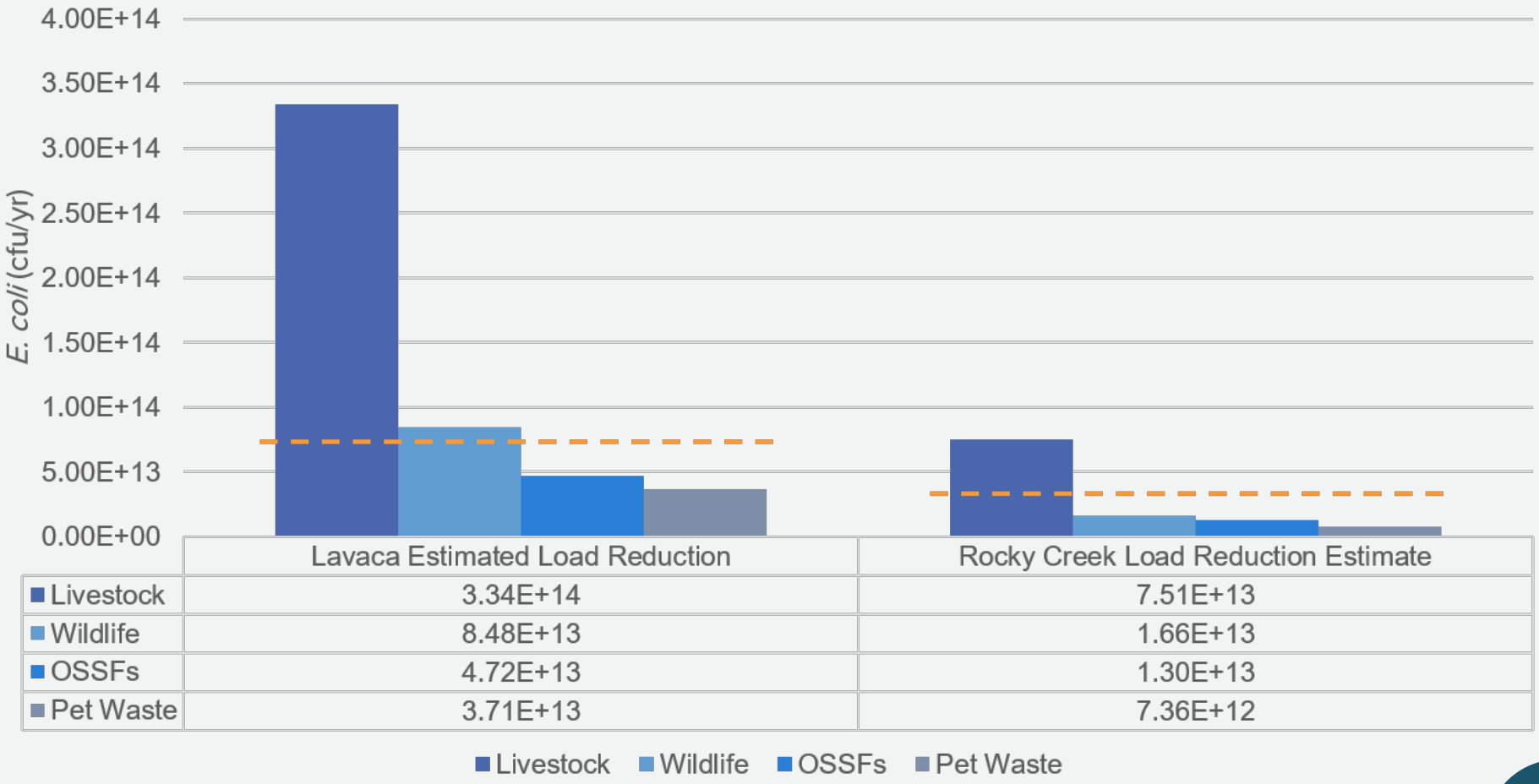
Management Measures

Bacteria Source: Sanitary Sewer Overflows (pages 65-66)
Objectives: • Reduce unauthorized discharges and SSOs • Repair or replace sewage infrastructure with I&I issues • Educate residents and homeowners
Strategy: • Develop program to repair/replace damaged sewage pipes and connections • Identify, repair and replace damaged connections as funding allows • Develop and deliver education material to residents and property owners
Estimated Load Reductions after full implementation: • Not Calculated

Management Measures

Bacteria Source: Illicit and illegal dumping (page 67)
Objectives: • Promote and expand education efforts across the watershed
Strategy: • Develop and deliver educational and outreach materials to residents
Estimated Load Reductions after full implementation: • Not calculated

Potential load reductions if management measures are fully implemented (pg 68)



	Lavaca Estimated Load Reduction	Rocky Creek Load Reduction Estimate
Livestock	3.34E+14	7.51E+13
Wildlife	8.48E+13	1.66E+13
OSSFs	4.72E+13	1.30E+13
Pet Waste	3.71E+13	7.36E+12

CHAPTER 6

Education and Outreach
pages 69-73

- **Watershed coordinator** – leads the efforts to establish and maintain working partnerships with stakeholders
- **Public meetings** – Future meetings approximately annually or as needed
- **Education programs** – Description of available programs that will be delivered in the watershed

Education and Outreach Programs and Activities	Responsible Party	Unit Cost	Planned Delivery (years after implementation begins)†										Total Cost
			1	2	3	4	5	6	7	8	9	10	
Livestock													
Lone Star Healthy Streams (Cattle) ‡	AgriLife Extension, Watershed Coordinator	N/A		1		1		1		1		1	N/A‡
Management Practice Field Days	AgriLife Extension, Watershed Coordinator, NRCS	$1,000			1		1		1		1		$5,000
Feral Hogs													
Lone Star Healthy Streams (Feral Hog) ‡ or Feral Hog Management Workshop	AgriLife Extension, Watershed Coordinator, Texas Wildlife Services, TPWD	N/A or $3,000 per Feral Hog Workshop	1		1		1		1		1		$15,000
OSSFs													
OSSF Owner O&M Training	AgriLife Extension	$3,000	1		1		1		1		1		$15,000
General Watershed Management													
Texas Watershed Stewards	AgriLife Extension	N/A		1		1		1		1		1	N/A‡
Texas Well Owners Network	AgriLife Extension	N/A		1		1		1		1		1	N/A‡
Texas Riparian and Ecosystem Training	AgriLife Extension	N/A	1		1		1		1		1		N/A‡
Watershed Newsletter	Watershed Coordinator	$500	1	1	1	1	1	1	1	1	1	1	$5,000

† number of programs delivered per period, not cumulative

‡ additional funding not required; currently funded through existing resources

Schedule:
Table 24
Page 90

CHAPTER 7

Financial and Technical Resources

Technical Resources

Pages 74-78

Technical Assistance	
Management Measure	**Potential Sources**
MM1 : WQMPs or Conservation Plans	TSSWCB; local SWCDs; NRCS; Extension
MM2: Feral hog control	Extension; TPWD; NRCS; TSSWCB
MM3: On-site sewage systems	Lavaca County Designated Representative, Jackson County Office of Permitting; Extension
MM4: Pet waste management	City public works departments; Extension
MM5: Stormwater runoff management	City public works departments; engineering firms; Extension
MM6: Inflow and Infiltration	City public works departments; engineering firms, TCEQ
MM7: Illicit Dumping	Extension; County law enforcement; TPWD game wardens

Financial and Technical Resources

Financial Resources

Pages 78-84

Some Examples:

- Coastal Zone Management Program and Coastal Management Program
- Clean Water Act Section 319 Nonpoint Source Grants
- Conservation Innovation Grants
- Environmental Quality Incentives Program (EQIP)
- Regional Conservation Partnership Programs

CHAPTER 8

Measuring Success

pages 85-88

- The primary goal of the WPP is to ***restore water quality in the Lavaca River and Rocky Creek to the water quality standards set by the state of Texas*** through the long-term conservation and stewardship of the watershed's resources.
- Current standard: 126 cfu/100 ml
- Targets:

Station(s)	Segment	Current Concentration†	5 yrs after implementation†	10 yrs after implementation†
12424	1602_03 Lavaca River Above Tidal	295	211	126
18190	1602B_01 Rocky Creek	222	174	126

† in units of MPN *E. coli*/100mL

Measuring Success

pages 85-88

- Milestones are used to evaluate implementation progress
- Interim milestones provide targets every few years to ensure implementation stays on track
- Summarized in and Table 23 of the WPP (pages 89-90)

Management Measure	Responsible Party	Unit Cost	Implementation Goals (years after implementation begins)†										Total Cost
			1	2	3	4	5	6	7	8	9	10	
Livestock													
Hire WQMP field technician	TSSWCB, SWCDs	$75,000/ yr	1										
Develop 100 WQMPs/Conservations Plans	TSSWCB, SWCDs, NRCS	$15,000	20		40		60		80		100		$1,500,000
Feral Hogs													
Install feral hog enclosures	Landowners	$200	As many as possible										N/A
Feral Hog Removal	Landowners	N/A	15% reduction or > 2,439 hogs per year										N/A
Develop and implement Wildlife Management Plans and Practices	Landowners, TPWD, TSSWCB, NRCS	N/A	As many as possible										N/A
OSSFs													
Develop OSSF repair/replacement program	Watershed Coordinator, Counties, AgriLife Extension	N/A	1										N/A
Repair/replace faulty OSSFs	Homeowner	$8,000			10		20		30		40		$320,000
Pet Waste													
Install and maintain pet waste stations	Cities	$500			2		3		4		5		$2,500
Develop educational and outreach materials	Cities, AgriLife Extension, Watershed Coordinator	N/A	Develop and deliver annually										N/A
Urban Stormwater													
Identify and install potential stormwater BMP projects	Cities	$4,000 to $45,000 per acre treated	As many as possible										N/A
SSOs and Unauthorized Discharges													
Develop program to repair private connections contributing to I&I	Cities, AgriLife, Property Owners	N/A	1										N/A
Smoke testing and repair of faulty pipes and connections	Cities, Contractors	$2,000-$2,500 per mile; $3,000-$20,000 per repair	As funding allows										N/A
Develop and deliver educational materials	Cities, AgriLife, TWRI	N/A	Develop and deliver annually										N/A
Illicit Dumping													
Develop educational and	Counties, AgriLife Extension,	N/A	Develop and deliver annually										N/A

EPA'S NINE ELEMENTS

EPA's Nine Elements

- Identify the causes and sources of impairments – Chapters 2, 3, 4, and Appendix
- Estimated Load Reductions – Chapter 5
- Proposed Management Measures – Chapter 5
- Technical and Financial Needs – Chapter 5 and 7
- Information, Education, and Public Participation – Chapters 5 and 6
- Schedule – Chapter 8
- Milestone – Chapter 8
- Evaluation Criteria – Chapter 8
- Monitoring Component – Chapter 8

WHAT'S NEXT?

The next steps

- Is the current draft WPP and associated I-Plan approved for submission to TCEQ?
- If so, draft documents will be submitted this summer
- Currently develop 319 grant proposal to fund implementation of the WPP, expand monitoring, fund a coordinator
- Plan on meeting summer or fall of next year for the next update!

Thank you!

A big thank you to all the stakeholders that took part in these meetings and provided feedback!

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