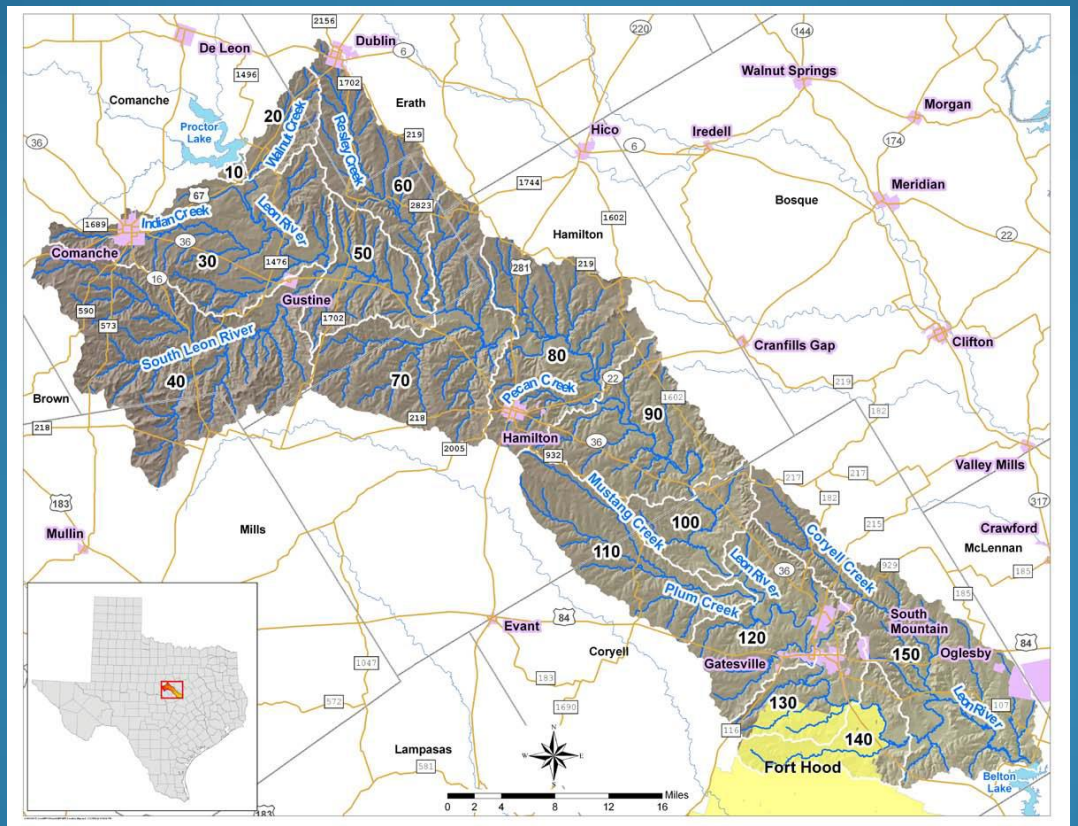
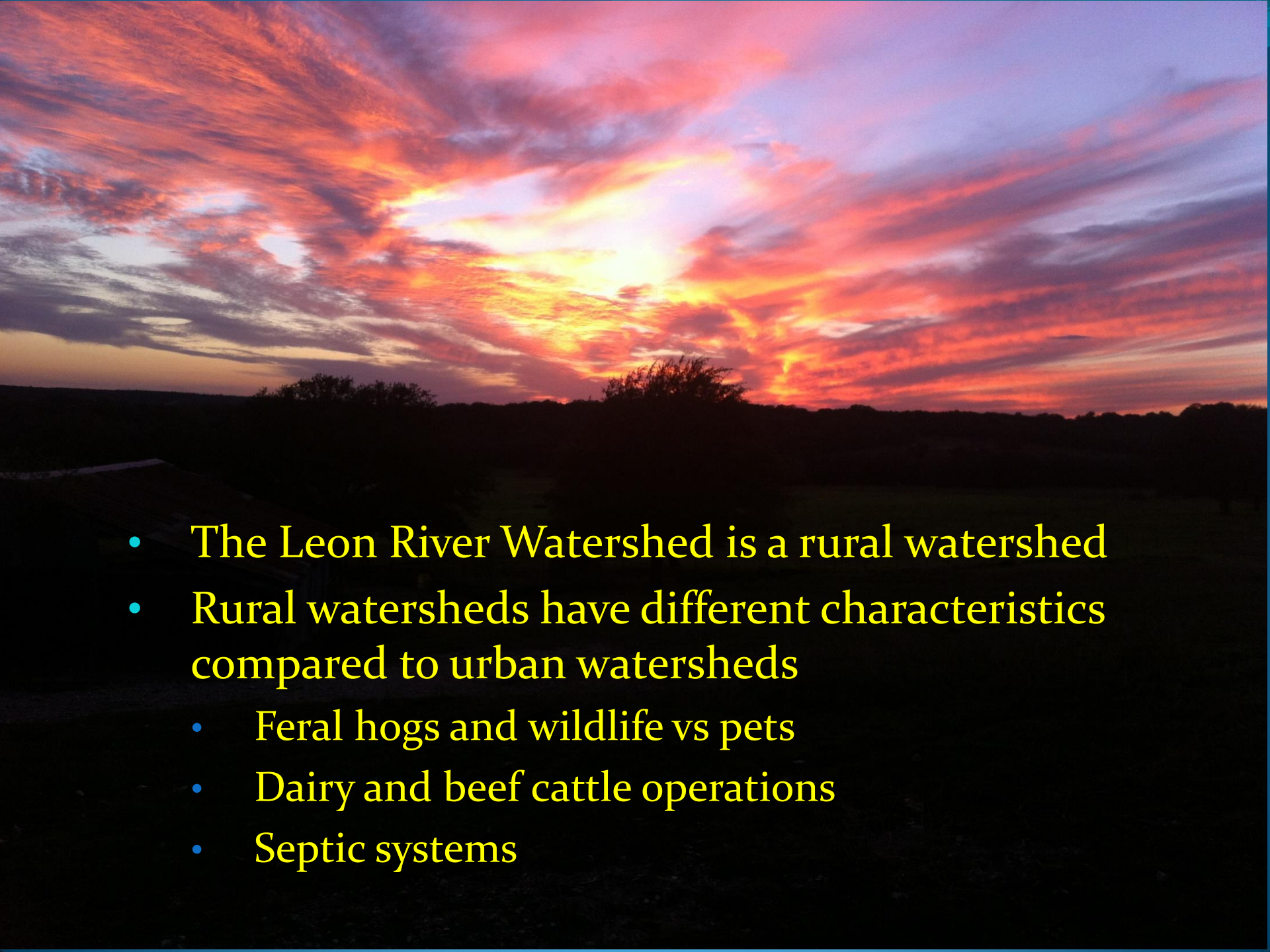

The Leon River Watershed

Leon Watershed

- Counties: Coryell, Hamilton, Comanche, and small portions of Mills and Erath
- 190 miles long, covering 1,375 square miles





- The Leon River Watershed is a rural watershed
- Rural watersheds have different characteristics compared to urban watersheds
  - Feral hogs and wildlife vs pets
  - Dairy and beef cattle operations
  - Septic systems

Leon Watershed Protection Plan

- 303d list in 1996
- TMDL prepared in 2008
  - 21% reduction in bacteria
  - Final adoption delayed in August
- Town hall meeting (2008)
- WPP submitted 2012
- WC hired June 2013
- EPA comments
- Response to comments

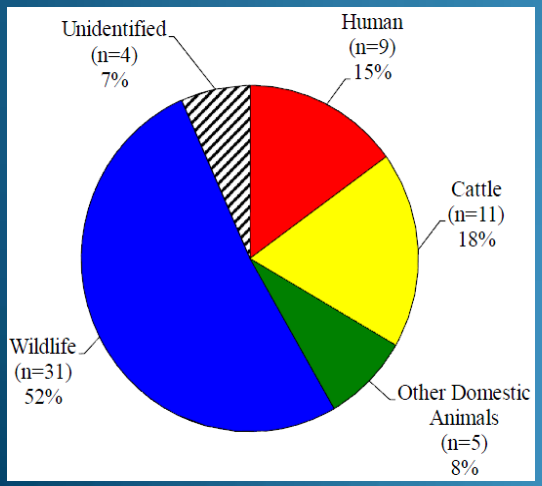
Potential Sources of Impairment

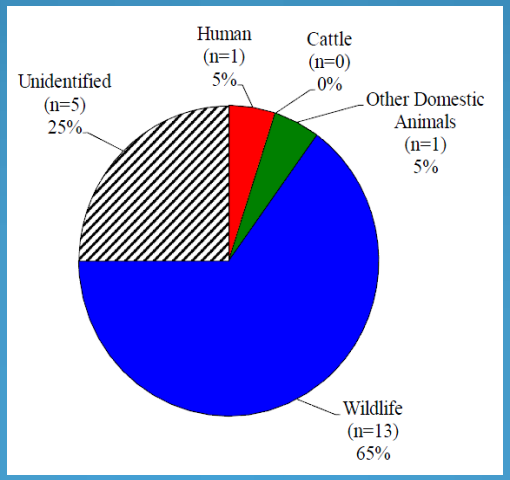
- Direct
  - Wastewater Treatment and Collection
  - Septic Systems
  - Wildlife, Feral Hogs, Livestock, and Carcass Disposal
- Indirect- "runoff"
  - Forestland- wildlife and feral hogs
  - Cropland- application of manure and fertilizers
  - Rangeland- wildlife, hogs, and livestock
  - Urban- bacterial runoff from many sources

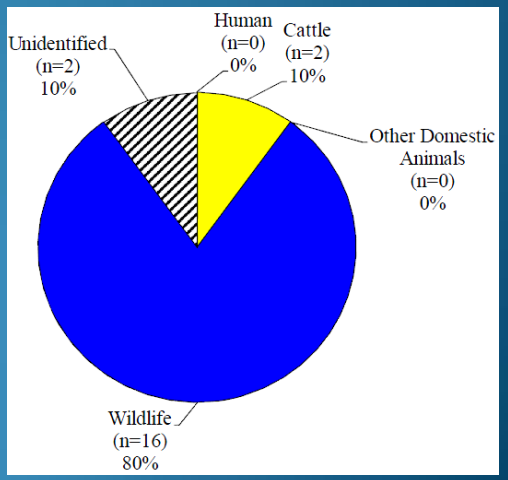
Sources of Impairment

Load Contribution of Pollutant Source (10^6 org/day)

Pollutant Source	Subwatershed														
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Direct Discharges of Pollutants to Waterbody															
WWTF	-	-	4	-	9	37	-	9	-	-	-	40	22	-	-
Wastewater Collection System	-	-	1,154	-	101	463	-	1,698	-	-	-	5,920	2,299	-	-
OSSF	12	1	305	137	9	73	52	286	25	61	57	107	423	44	109
Direct Deposition	21,672	5,101	45,552	25,131	32,463	12,282	33,089	47,570	14,544	25,742	12,637	80,495	68,250	21,887	21,012
Polluted Storm Water Wash Off															
Forest	13	6	85	56	64	17	123	122	84	76	92	236	150	256	356
Cropland	71	33	619	157	342	65	247	146	109	128	134	186	33	28	464
Rangeland	398	317	4,098	3,958	4,239	901	7,821	4,613	2,697	1,916	3,056	6,198	2,493	2,340	5,873
Waste Application Field	-	193	586	64	606	333	299	196	-	-	-	-	-	-	184
Residential/Commercial/Industrial	4,992	1,072	21,465	3,906	5,513	4,756	9,090	25,658	5,450	4,877	371	39,303	31,245	7,906	13,061
Total Source Loads	**27,157**	**6,723**	**73,868**	**33,410**	**43,348**	**18,925**	**50,720**	**80,299**	**22,909**	**32,800**	**16,346**	**132,485**	**104,914**	**32,461**	**41,059**



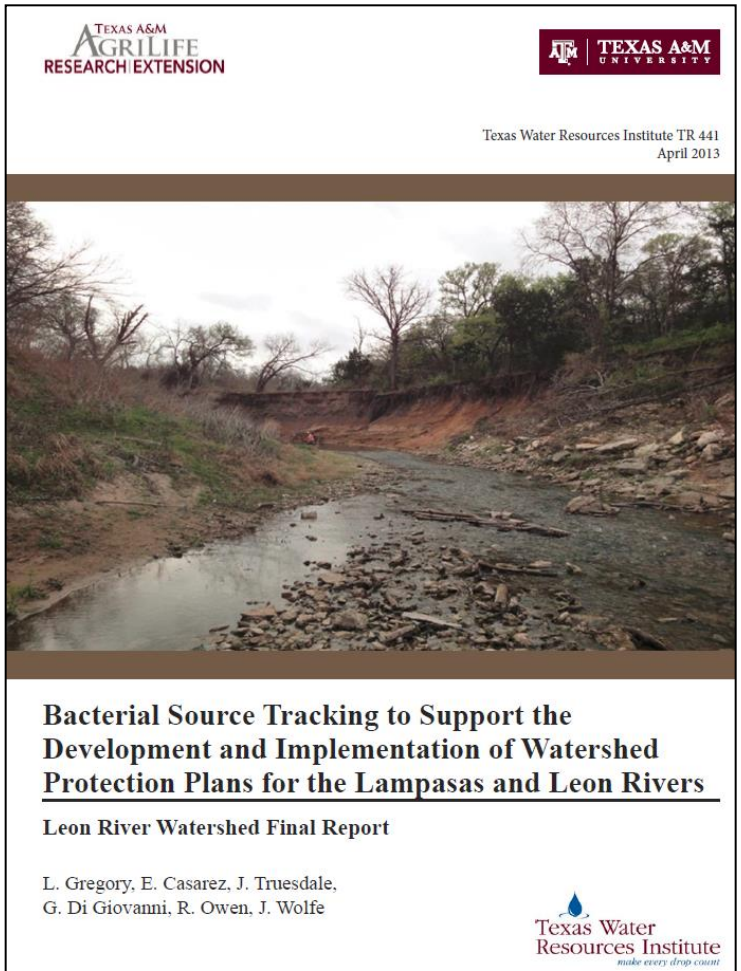




Bacterial Source Tracking

Leon River WPP

- TWRI
- Agrilife Research
- UT El Paso

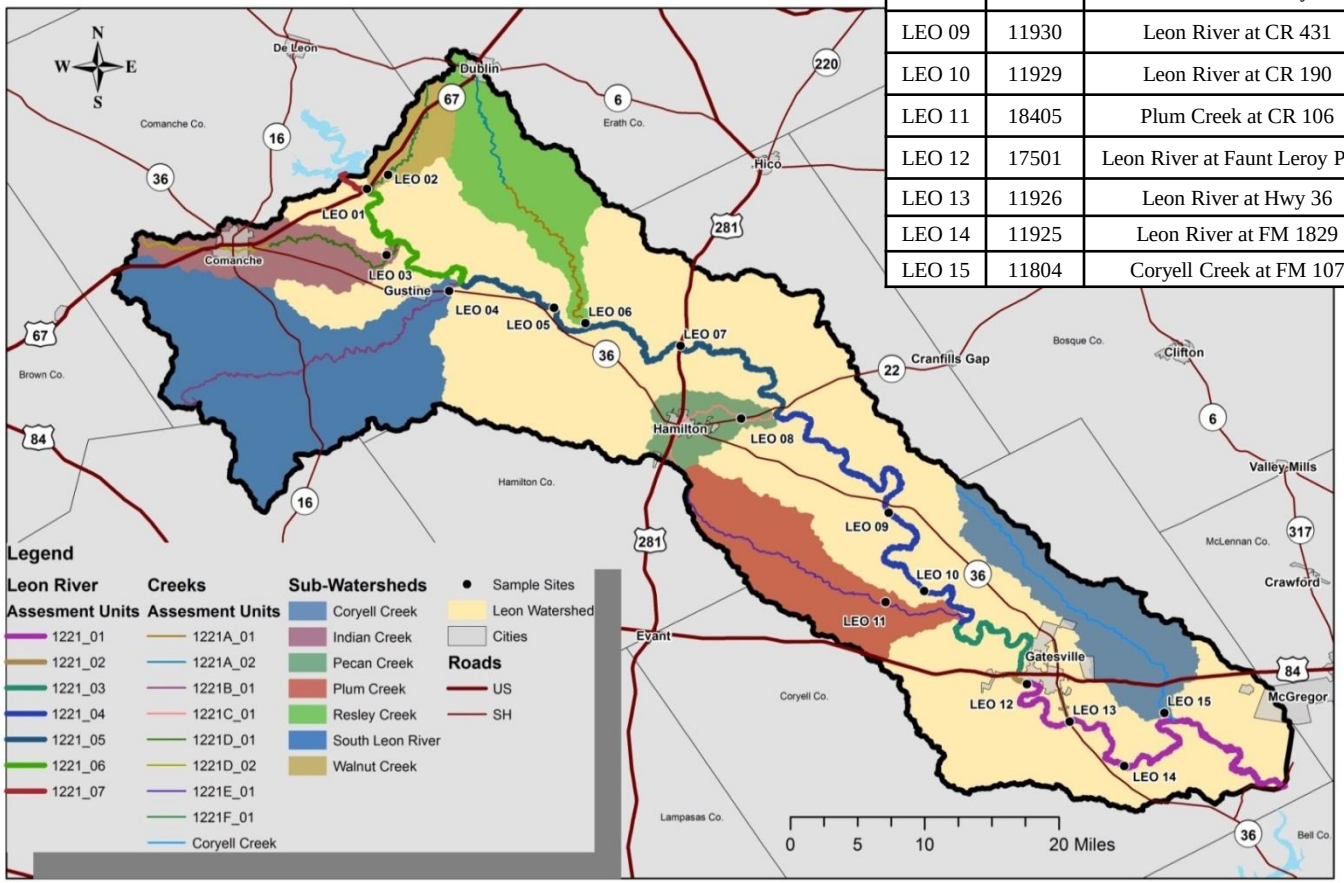


Project Goals

- **Monitor water quality and streamflow at 15 sites for 1 year**
- **Evaluate *E. coli* levels in water samples**
- **Collect known source fecal samples for inclusion in the Texas *E. coli* BST Library**
- **Conduct BST analysis to assess different sources of bacterial loading to the Leon River**

Monitoring Stations

Site	TCEQ ID	Location	County	Latitude	Longitude	USGS Gage
LEO 01	11934	Leon River at Hwy 67/377	Comanche	31.95778	-98.4593	Yes
LEO 02	17379	Walnut Creek at FM 1476	Comanche	31.97312	-98.4367	No
LEO 03	11818	Indian Creek at CR 304	Comanche	31.88658	-98.4381	No
LEO 04	11817	South Leon River at Hwy 36	Comanche	31.84813	-98.3708	No
LEO 05	11933	Leon River at CR 382	Comanche	31.82971	-98.2575	No
LEO 06	11808	Resely Creek at CR 394	Comanche	31.81303	-98.2240	No
LEO 07	11932	Leon River at Hwy 281	Hamilton	31.78746	-98.1211	Yes
LEO 08	17547	Pecan Creek at Hwy 22	Hamilton	31.71031	-98.0563	No
LEO 09	11930	Leon River at CR 431	Hamilton	31.60882	-97.8968	No
LEO 10	11929	Leon River at CR 190	Coryell	31.52514	-97.8601	No
LEO 11	18405	Plum Creek at CR 106	Coryell	31.5126	-97.9001	No
LEO 12	17501	Leon River at Faunt Leroy Park	Coryell	31.46250	-97.7492	No
LEO 13	11926	Leon River at Hwy 36	Coryell	31.38369	-97.7017	No
LEO 14	11925	Leon River at FM 1829	Coryell	31.33584	-97.6425	No
LEO 15	11804	Coryell Creek at FM 107	Coryell	31.39278	-97.5994	No

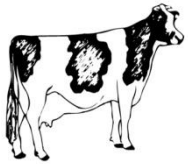


Where did the Bacteria (*E. coli*) Come From?

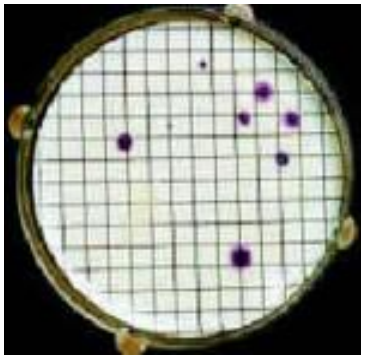
- Potential sources
  - Humans
  - Domesticated animals
  - Wildlife
- Methods for determining sources
  - Source survey
  - Modeling
  - Bacterial source tracking

Development of Texas *E. coli* BST Library

Sources



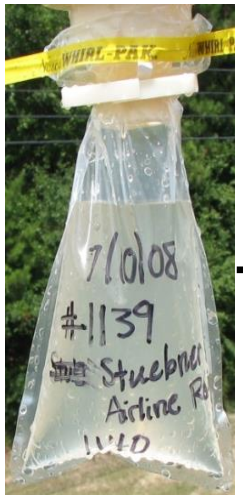
Isolate → ***E. coli***



DNA → **Fingerprint**

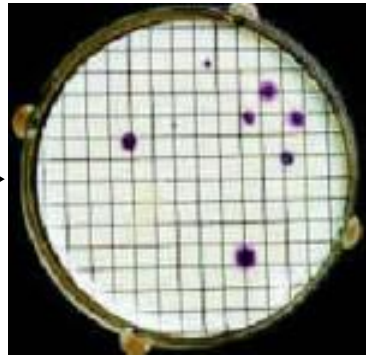
Add to → **Library**

Use of Texas *E. coli* BST Library for Identifying Water Isolates



Isolate

E. coli



DNA

Fingerprint

Compare

to Library

Source ID

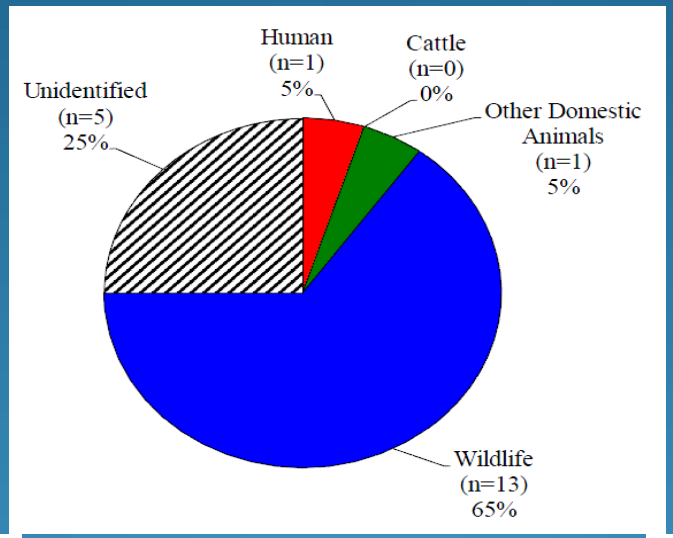
Water Quality Results

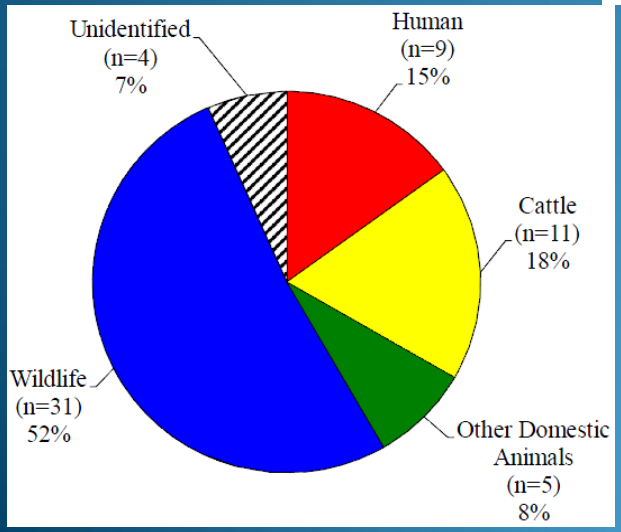
Table 5. Summary of *E. coli* enumerations, expressed as colony forming units (CFU) per 100 mL, sampled from flowing water in the Leon River watershed

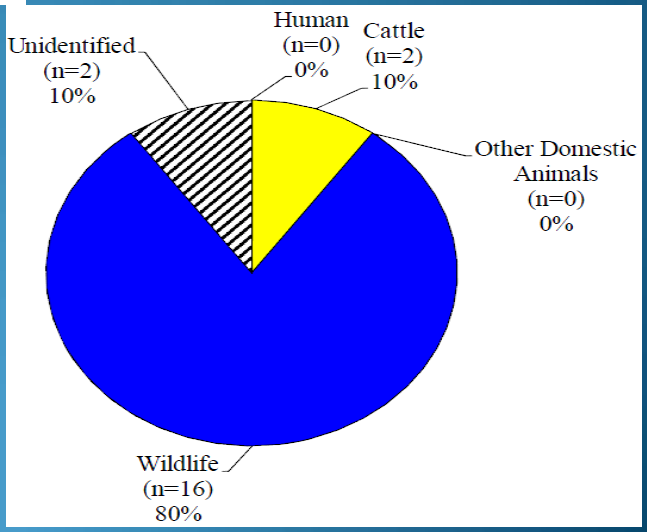
Station	TCEQ Station ID	# of Samples	Geometric Mean (CFU/100 mL)
LEO 1	11934	12	40
LEO 2	17379	8	163
LEO 3	11818	4	225
LEO 4	11817	4	32
LEO 5	11933	10	118
LEO 6	11808	5	71
LEO 7	11932	7	54
LEO 8	17547	6	16
LEO 9	11930	7	36
LEO 10	11929	12	76
LEO 11	18405	3	20
LEO 12	17501	12	75
LEO 13	11926	12	54
LEO 14	11925	12	66
LEO 15	11804	4	42

* Geometric means reported in this column were calculated using data collected fror flowing water at each respective sampling site.
* **BOLD** geometric means exceed the state's contact recreation standard of 126 CFU/100 mL

Sources of impairment from three sampling locations





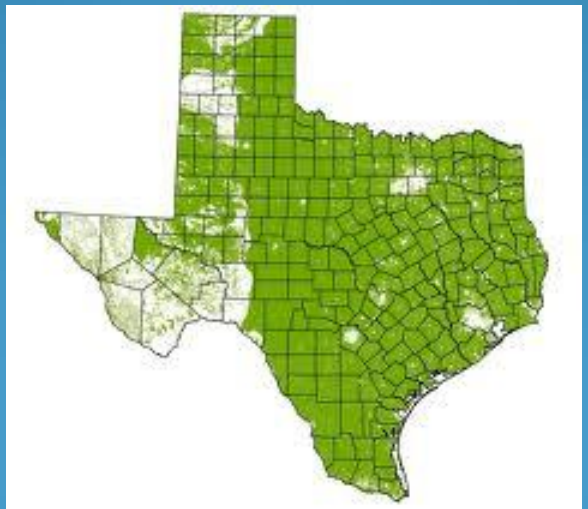


Project Results

- Geometric means of *E. coli* collected at 13 of 15 sites was in compliance with the state's primary contact recreation standard of 126 cfu/100 mL
- Primary *E. coli* sources in watershed appear to be wildlife (coyotes, deer, feral hogs, avian wildlife)
- BST results must be assessed keeping drought conditions in mind
- BST results at individual sites were similar to the results for all sites in the watershed combined
- Although non-avian wildlife vs avian-wildlife was parsed out, specific wildlife groups could not be based on the analysis

Evidence for contribution by feral hogs

- In 2011 there were an estimated 1.9-3.4 million hogs across 134 million acres of Texas
- Population growth (18-20% annually)
- Hogs “hang out” in riparian areas
- Wallowing and defecation



Feral Hogs: impact to water quality

Leon Watershed Hog Abatement

- Education and Outreach in all 3 counties
- CHAMP; Hog-Out; Coryell Abatement Program
- Traps, cameras, and spotlights given away
- Over 2,000 tails collected from bounty programs
- Helicopter hunting
- Wounded Warriors project

Feral Hog Workshops

Feral Hog Booth at CCYF

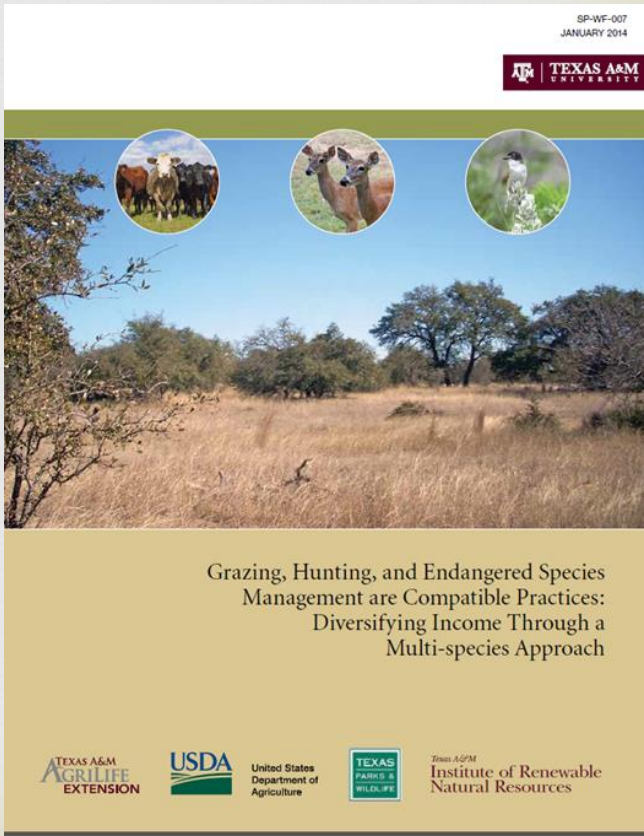
Trap Demos and Prizes

Other Wildlife Concerns

Wildlife Efforts

- Newsletter article highlighting wildlife management
- Out On The Land
- Extension publication
- 319 grant for workshops
- Wildlife Field Day

OUT ON THE LAND

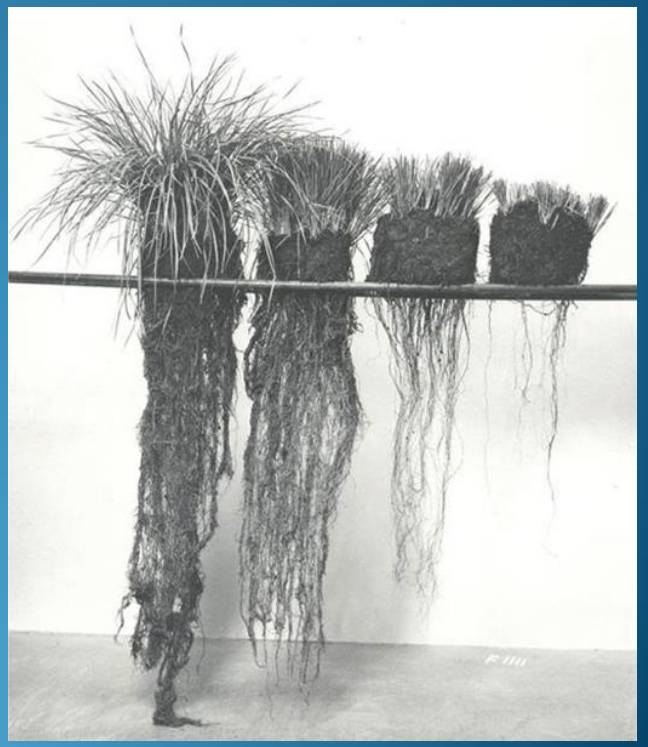


Livestock Strategy

Which side of the fence would you like to be on?

It takes grass to grow grass

Take half leave half



Workshops

- Lonestar Healthy Streams
  - Dairy
  - Beef Cattle
  - Horses
- Watershed Stewards
- Riparian Workshop

Urban Strategies

- Rainwater Harvesting
- Native Landscaping
- Minimize pollutant run-off
- Wastewater Treatment Facilities
- Septic System Maintenance

Homeowner Water Day in Comanche: Feb 26th

Hamilton County Septic Program

Coryell County Septic Program

- $100,000 funded by TCEQ
- WC and County Attorney's office
- Identify and prioritize
- Fix a few key systems
- Future 319 funding for implementation
- Expand model to Comanche

Grant Proposals: progress

- TCEQ- OSSF program for Coryell County--accepted
- TSSWCB- extension of Hamilton's OSSF program--pending
- TSSWCB- district water technician--pending
- TSSWCB- extension of Leon WC project--accepted
- TSSWCB- wildlife/riparian workshop--pending
- TDA CHAMP Grant--accepted

Newsletter

- Wastewater Treatment
- Rainwater Harvesting
- Urban BMPs
- Triennial Revisions
- Workshops highlighted

TEXAS A&M IRNR-TEWI & TEXAS STATE SOIL AND WATER CONSERVATION BOARD

March 2014

Volume 1, Issue 4

Leon River Watershed Project

Wastewater Treatment in the Leon River Watershed

Inside this issue:

Rainwater Harvesting 2

Improving water quality through water conservation at home 3

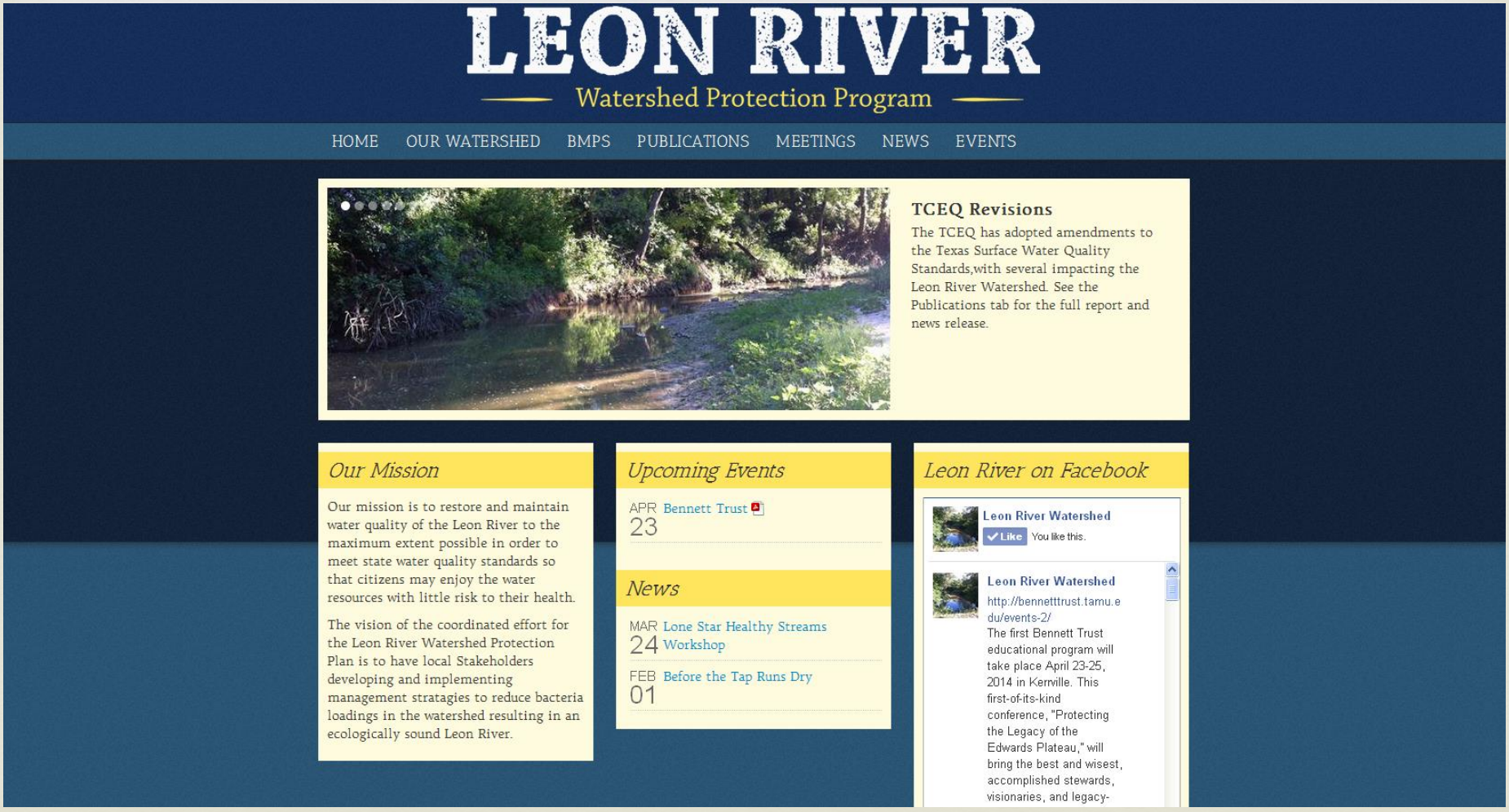
Workshops in the Leon River Watershed 4

TCEQ's triennial revisions 5

Did you know that

Project Website

http://leonriver.tamu.edu/



Social Media

Scoop.it!

Implementation Updates

TCEQ Triennial Revisions

- Adopted revisions pertinent to the Leon
  - Primary contact recreation 2
  - Splitting the Leon Watershed into 2 watersheds
  - Revisions to uses and criteria for:
    - Resley Creek- SCR2 (1030 cfu/100 ml)
    - Indian Creek- SCR2 (1030 cfu/100 ml)
    - Walnut Creek- SCR2 (1030 cfu/100 ml)
    - South Leon River- SCR1 (630 cfu/100 ml)

Northern Portion

- Resley Creek- SCR2 (1030 cfu/100 ml)
  - 209.23 and 380.57
- Indian Creek- SCR2 (1030 cfu/100 ml)
  - 719.71 and 268.53
- Walnut Creek- SCR2 (1030 cfu/100 ml)
  - 339.64
- South Leon River- SCR1 (630 cfu/100 ml)
  - 256.75

The rest of the watershed

- 1221_01 (Coryell-Lake Belton)- 174.21
- 1221_02 (Coryell-Stillhouse)- 125.03
- 1221_03 (Stillhouse-Plum Creek)- 166.37
- 1221_04 (Plum Creek-Pecan Creek)- 194.41
- 1221_05 (Pecan Creek-South Leon)- 153.37
- 1221_06 (South Leon-Walnut Creek)- 288.80
- 1221_07 (Walnut Creek-Lake Proctor)- 121.84

Summary of efforts

- Revisions to the WPP
- Septic Incentive Programs
- Over 40 WQMPs in the watershed
- TDA funding-over 2,000 feral hogs eradicated
- Pecan Creek removed from impaired list
- Hamilton WWTF conversion
- Several workshops
  - Riparian, Watershed Stewards, Well Owners, Septic, Dairy BMPs

Spreading the Word

Local stakeholders know best how to take care of their own backyard……

The only way to avoid regulation is to be involved!

Please sign up on our mailing list as a good first step

Website- Leonriver.tamu.edu

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