

Buck Creek: Watershed Protection Plan Bacterial Source Tracking Results

Presented by
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Buck Creek Watershed Coordinator

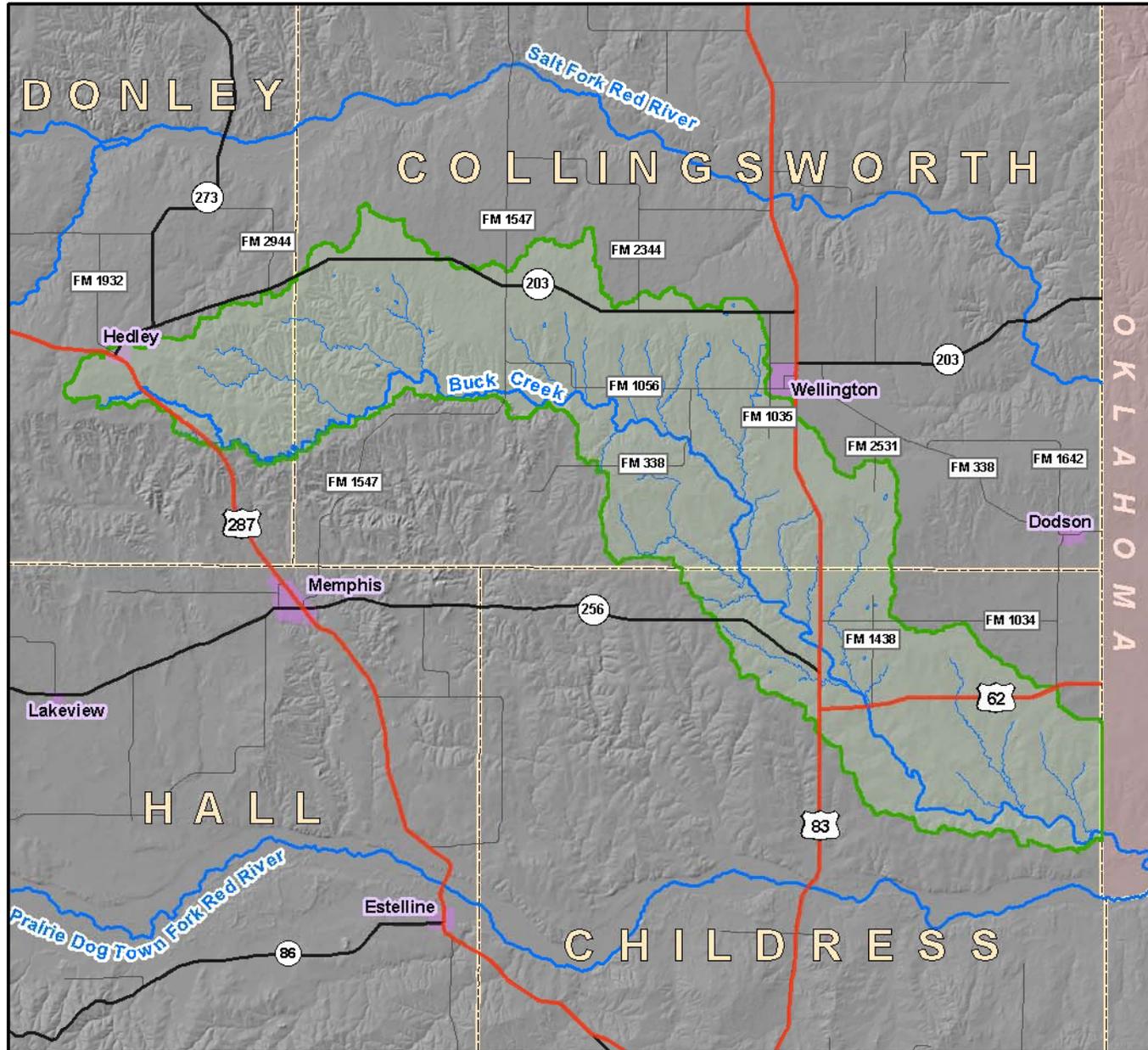
02/11/2008

 **AgriLIFE RESEARCH**
Texas A&M System
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Coordinating Entities

- **TSSWCB- Texas State Soil and Water Conservation Board- 319(h) Grant funding for non point sources**
- **SWCD-Districts:**
 - ✓ **Collingsworth County: Salt Fork District**
 - ✓ **Donley County S & W C District**
 - ✓ **Hall-Childress S & W C District**
- **TCEQ- Texas Commission on Environmental Quality**
- **Texas AgriLife Research & Extension**
- **TWRI- Texas Water Resources Institute**
- **RRA-Red River Authority**
- **Texas Parks and Wildlife**
- **USDA-APHIS troubleshooter, damage control**

Buck Creek Watershed



Texas Commission on Environmental Quality
 Total Maximum Daily Loads Program
 Mail Code 150
 P.O. Box 13087
 Austin, Texas 78711-3087

Buck Creek - Segment 207A

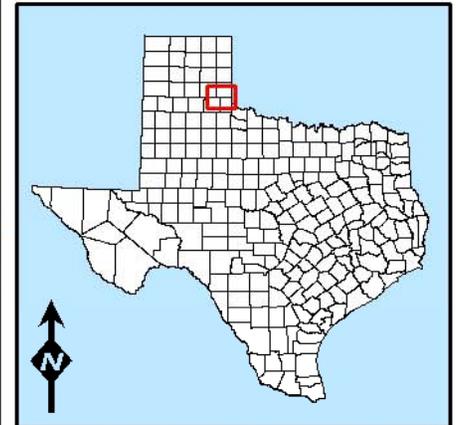
North and Northeast Texas -
 Bacteria from Non Point Sources

- U.S. Highways
- State Highways
- Ranch Roads
- Major Streams
- Stream Traces
- Watershed
- City Boundaries
- County Boundaries



Texas Statewide Mapping System (TSMS) Projection

Map Created on May 31, 2002



This map was generated by the Total Maximum Daily Loads Program of the Texas Commission on Environmental Quality. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact William Pugatch, GIS Specialist, TMDL Program, at (512) 239-5559 or send an e-mail to wpugatch@tceq.state.tx.us.

Water quality monitoring Phase I began May 2004

Bi monthly data collection:

- » Water samples for bacteria
- » Specific Conductance
- » Dissolved Oxygen
- » pH
- » Water temperature
- » Field Data- air temp, weather, stream flow

**Stakeholder Group began forming-
met at least two times per year**

Photos taken during original study



3/16/2010

Two years of data collection showed problems on some areas of Buck Creek using 2006 data criteria.

Phase II began

– Watershed Protection Plan (WPP)

- Stakeholders reviewed a set of Best Management Practices (BMPs)**
- BMPs chosen and Implementation Timelines to be developed**
- Collection of fecal specimens from the watershed for DNA isolation/comparison**
- WPP will be developed by Stakeholders**
- Monitoring continues**

While Trapping & Collecting Fecals...

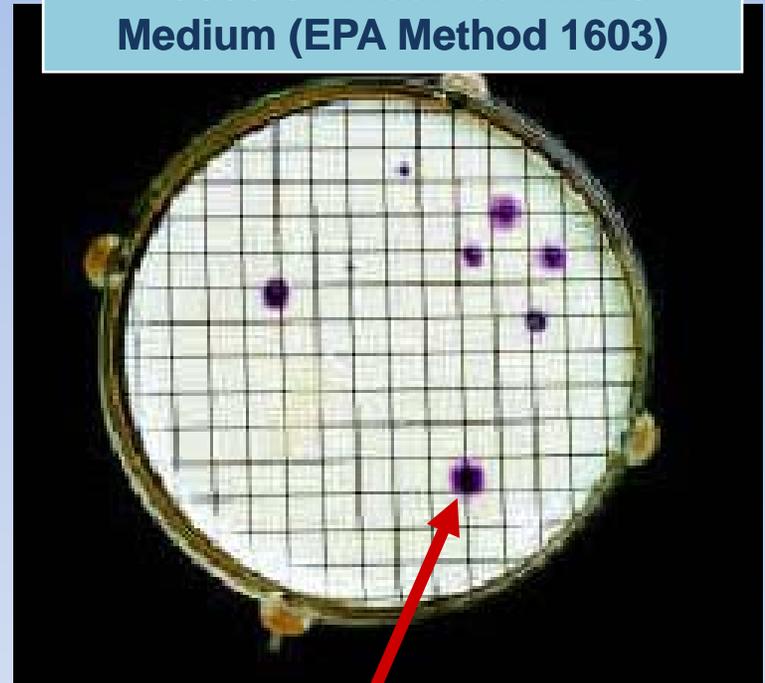


Isolation of *E. coli* From Feces and Water

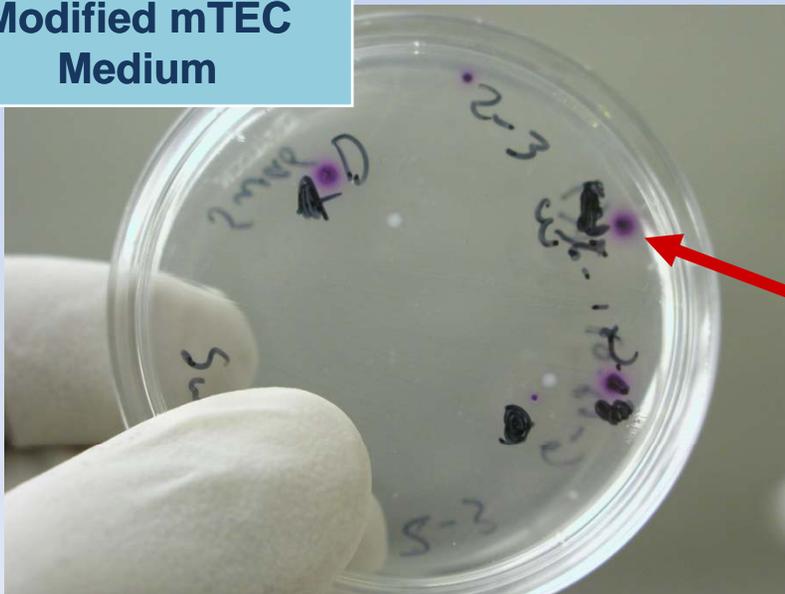
Fecal Specimens



Water Sample Filtered and Filter Placed on Modified mTEC Medium (EPA Method 1603)



Modified mTEC Medium



E. coli Colonies are Magenta

Isolation for DNA work



3/16/2010

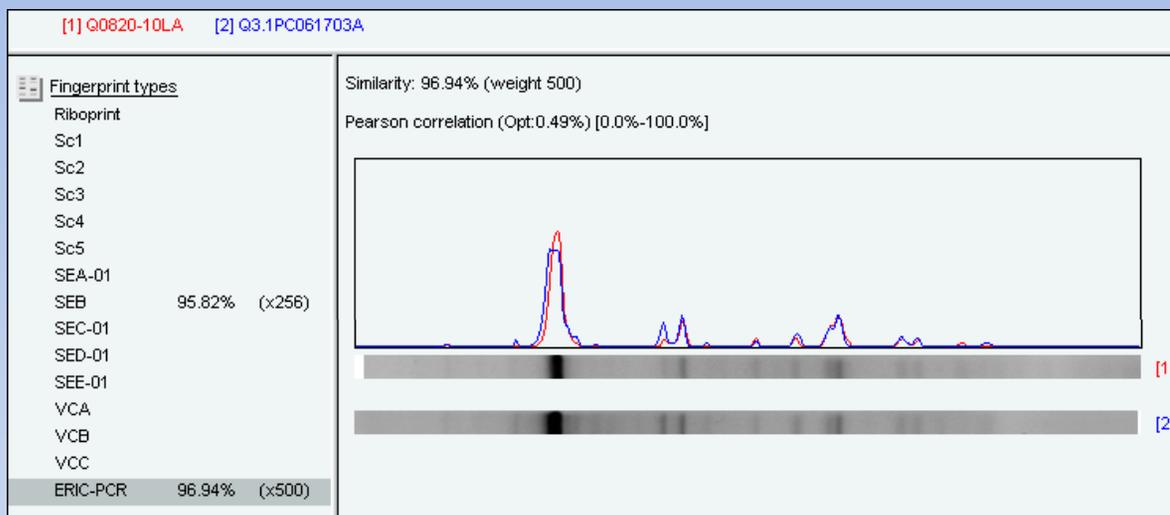


Each *E. coli* colony is streaked to NAmug plates to become an "isolate"

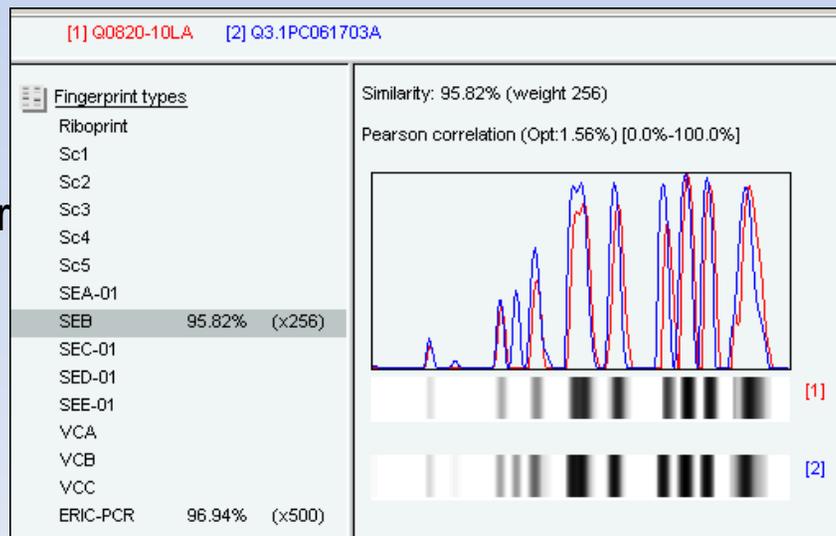
Data Analysis

Best Match Approach

Best ERIC-PCR Match (96.9% Similarity) of Water Isolate to Known Source (Pig) Isolate in Library



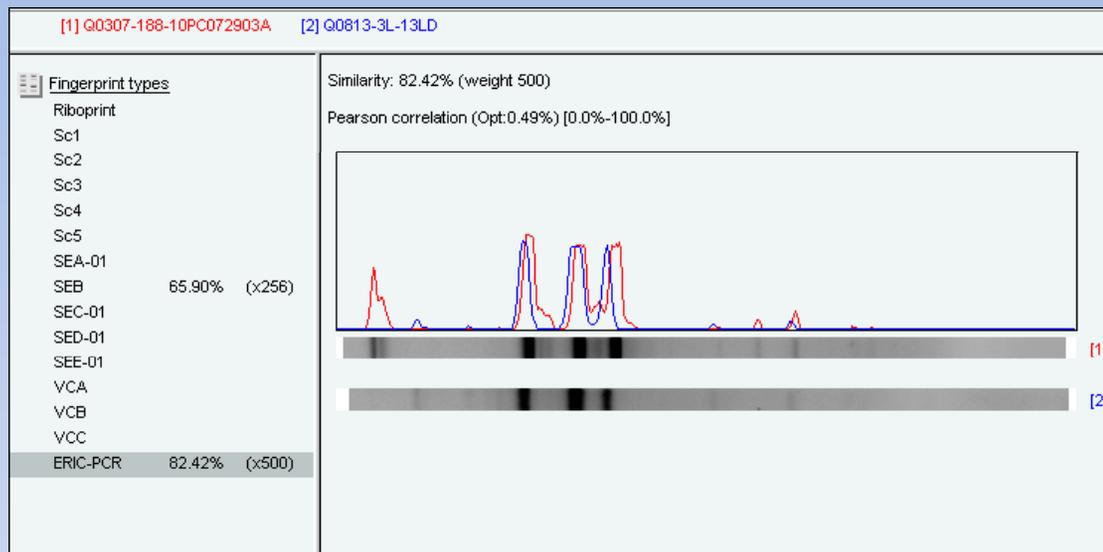
Best RiboPrint Match (95.8% Similarity) of Water Isolate to Known Source (Pig) Isolate in Library



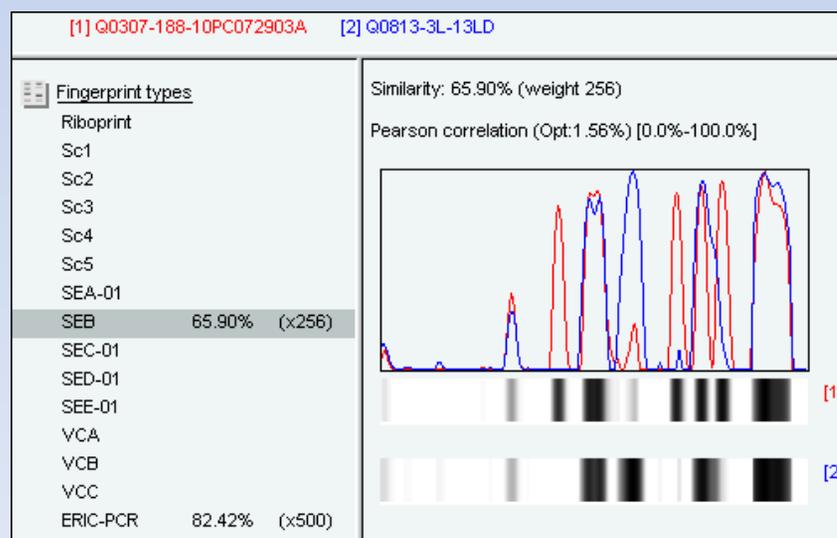
Data Analysis

Best Match Approach

No Match
(Unidentified) Water
Isolate, Best ERIC-
PCR Match of only
82.4% Sim Library
Isolate

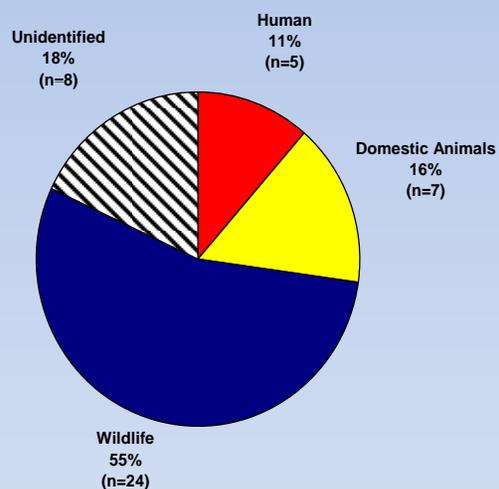


No Match
(Unidentified) Water
Isolate, Best
RiboPrint Match of
only 65.9% Sim to
Library Isolate

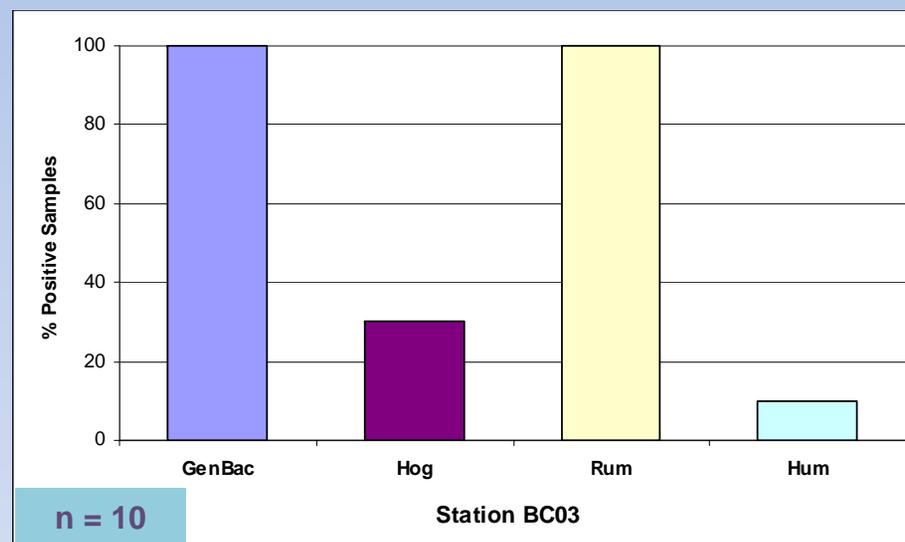


BST Results For Station BC03 CR 40; Collingsworth County

E. coli Source Identification



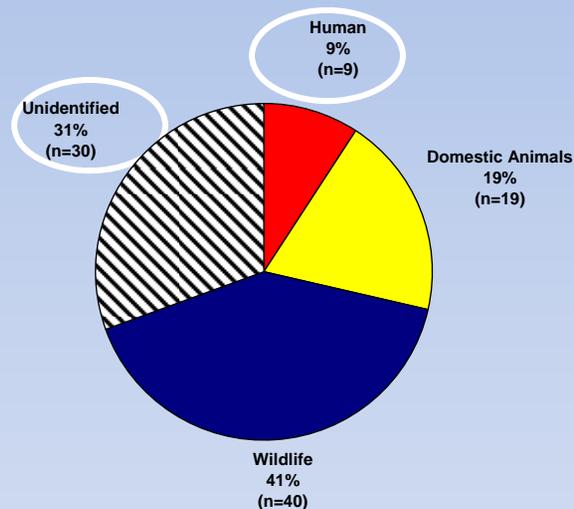
Bacteroidales Marker Occurrence



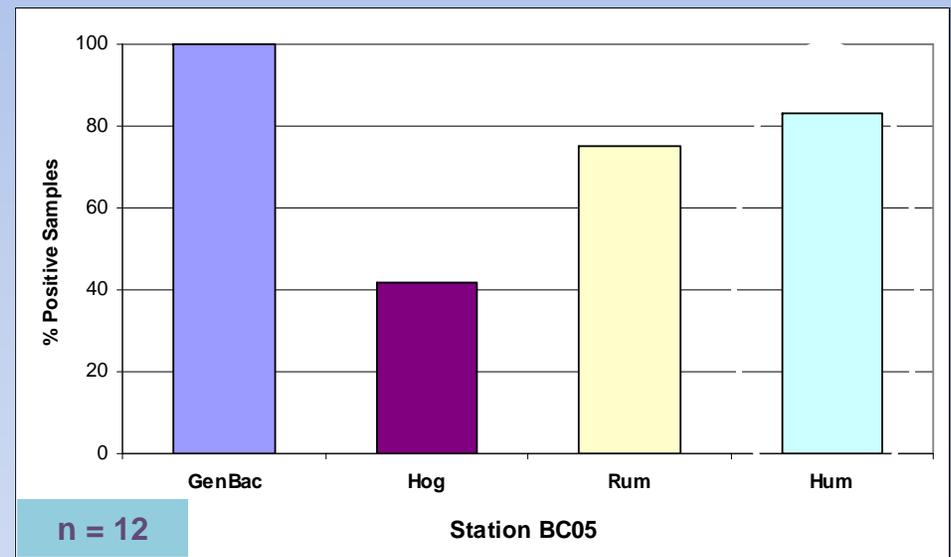
E. coli geo. mean during BST sample collection = 8.4 CFU/100 ml

BST Results For Station BC05 FM 1056; Collingsworth County

E. coli Source Identification



Bacteroidales Marker Occurrence

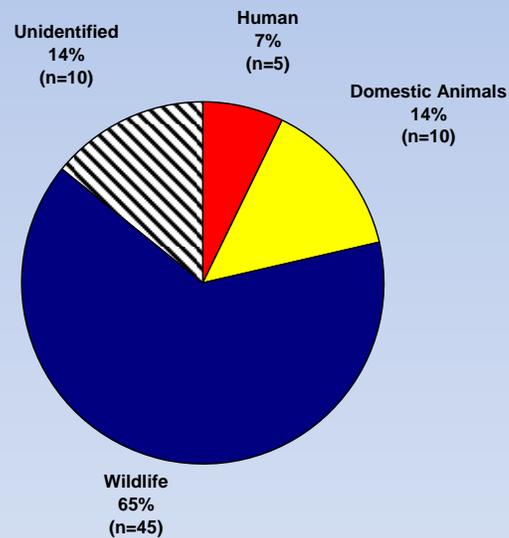


E. coli geo. mean during BST sample collection = 48.0 CFU/100 ml

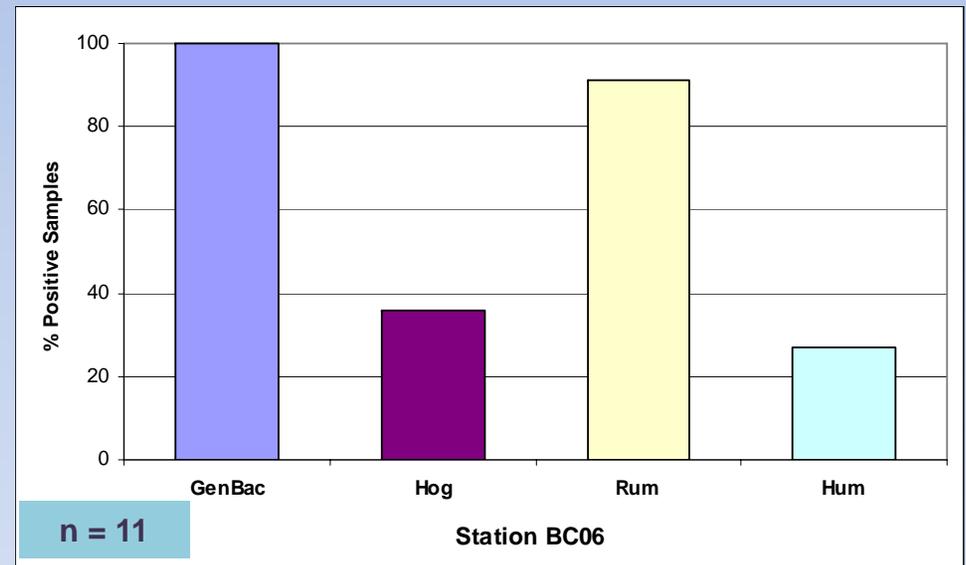
- Highest occurrence of unidentified *E. coli*
- Frequent human *Bacteroidales* marker detection, but average human *E. coli* occurrence suggests pollution from distant source or significant but infrequent pollution

BST Results For Station BC06 CR 110; Collingsworth County

E. coli Source Identification



Bacteroidales Marker Occurrence

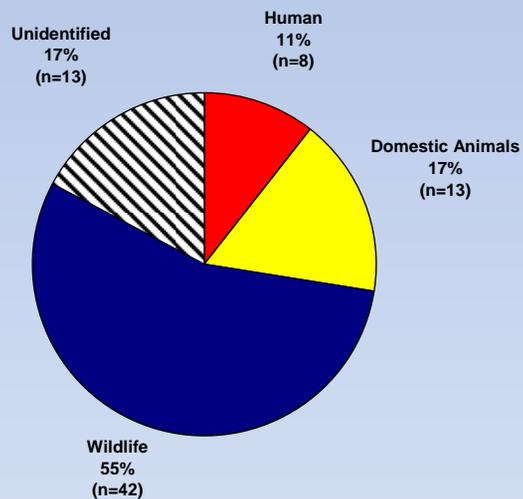


E. coli geo. mean during BST sample collection = 24.8 CFU/100 ml

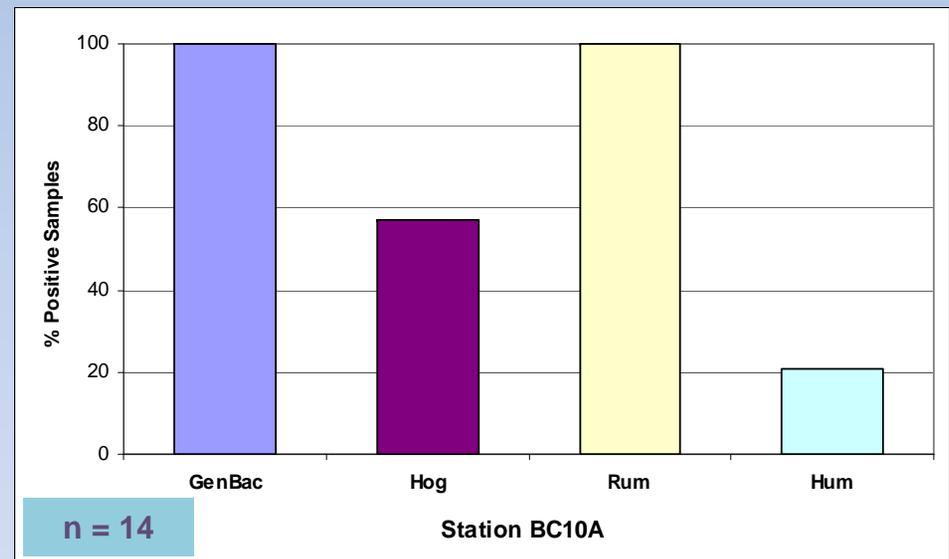
BST Results For Station BC10A

SH 256; Childress County

E. coli Source Identification



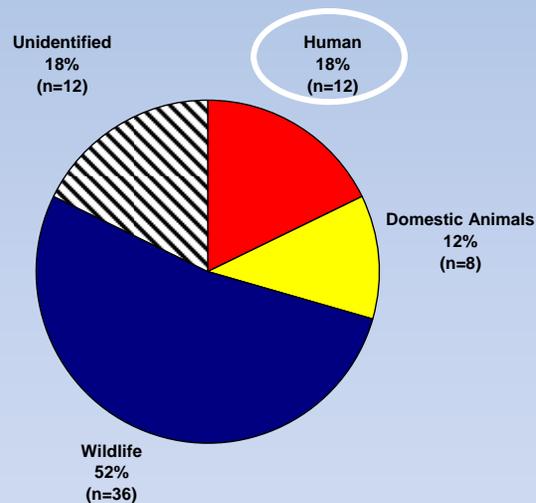
Bacteroidales Marker Occurrence



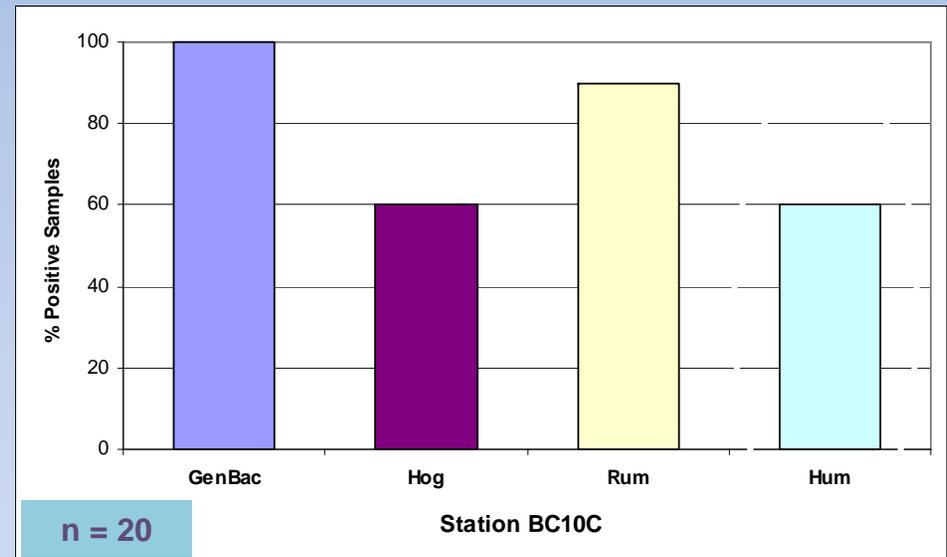
E. coli geo. mean during BST sample collection = 40.8 CFU/100 ml

BST Results For Station BC10C SH 256; Childress County

E. coli Source Identification



Bacteroidales Marker Occurrence

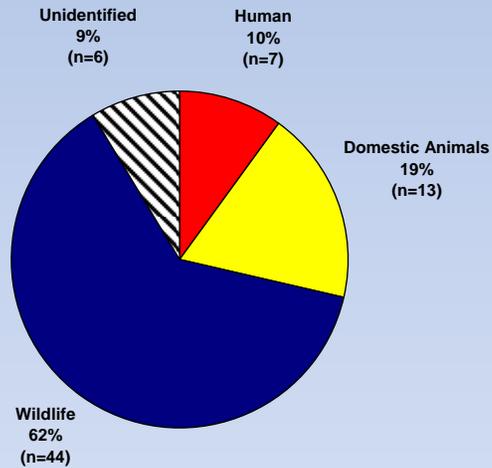


E. coli geo. mean during BST sample collection = 18.9 CFU/100 ml

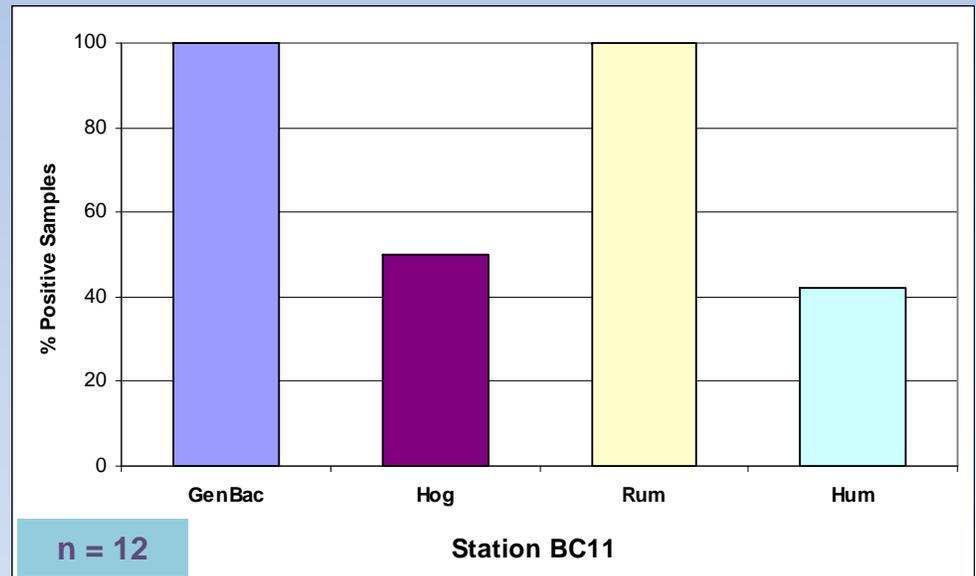
- High occurrence of human *E. coli* and frequent human *Bacteroidales* marker detection suggest frequent pollution
- However, low geo. mean levels of *E. coli*, so not likely a significant pollution load

BST Results For Station BC11 US 83; Childress County

E. coli Source Identification



Bacteroidales Marker Occurrence



E. coli geo. mean during BST sample collection = 14.1 CFU/100 ml



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