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Bacterial Source Tracking

Little Brazos River Tributaries Bacteria Assessment Project

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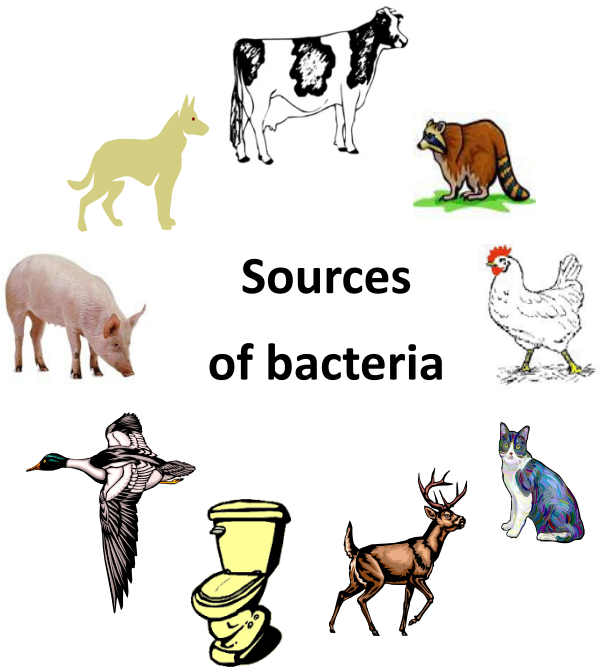
February 18, 2010

Improving Life through Science and Technology.

What is BST?

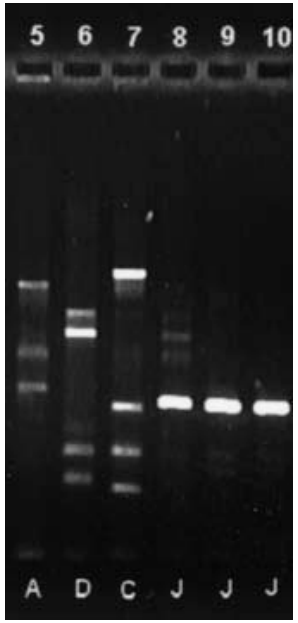
Bacterial Source Tracking

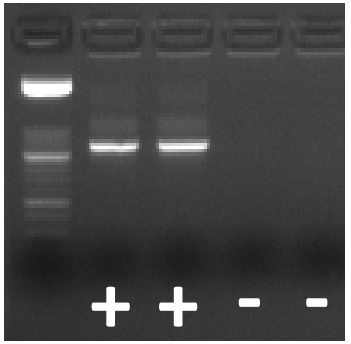
- Data collection and analysis to determine the sources of fecal contamination in a waterbody
- Based on uniqueness of bacteria from individual sources – a variety of different methods are used
- Differs from modeling in that it is not a predictive tool and does not require calibration and validation of input variables



BST for Little Brazos River Tributaries

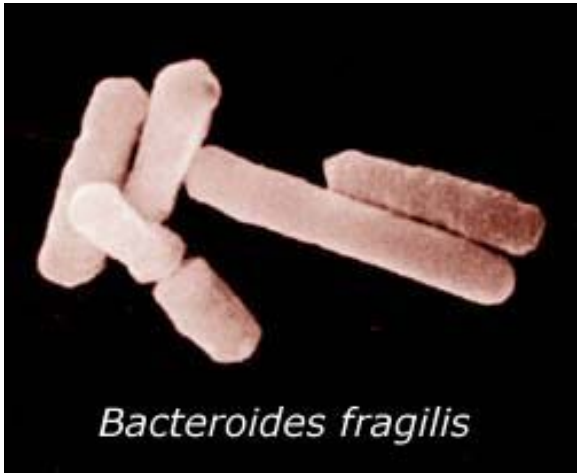
- Limited library-dependent
  - Analyze *E. coli* from 78 water samples from across the study area using both ERIC-PCR and RP fingerprinting
  - Best match ID against Statewide BST Known-Source Library
- Library independent
  - Analyze 244 water samples from across the study area using *Bacteroidales* PCR for human, ruminant, horse, and swine markers





What are *Bacteroidales*?

- More abundant in feces than *E. coli*
- Obligate anaerobes – less likely to multiply in environment
- Subgroups appear to be host specific
- Markers available for humans, ruminants, horse, swine
- Indicators of fecal contamination and potential presence of pathogens (like *E. coli*)



http://www.sourcemolecular.com/newsite/_images/bacteroidetes.jpg

LBR BST Samples

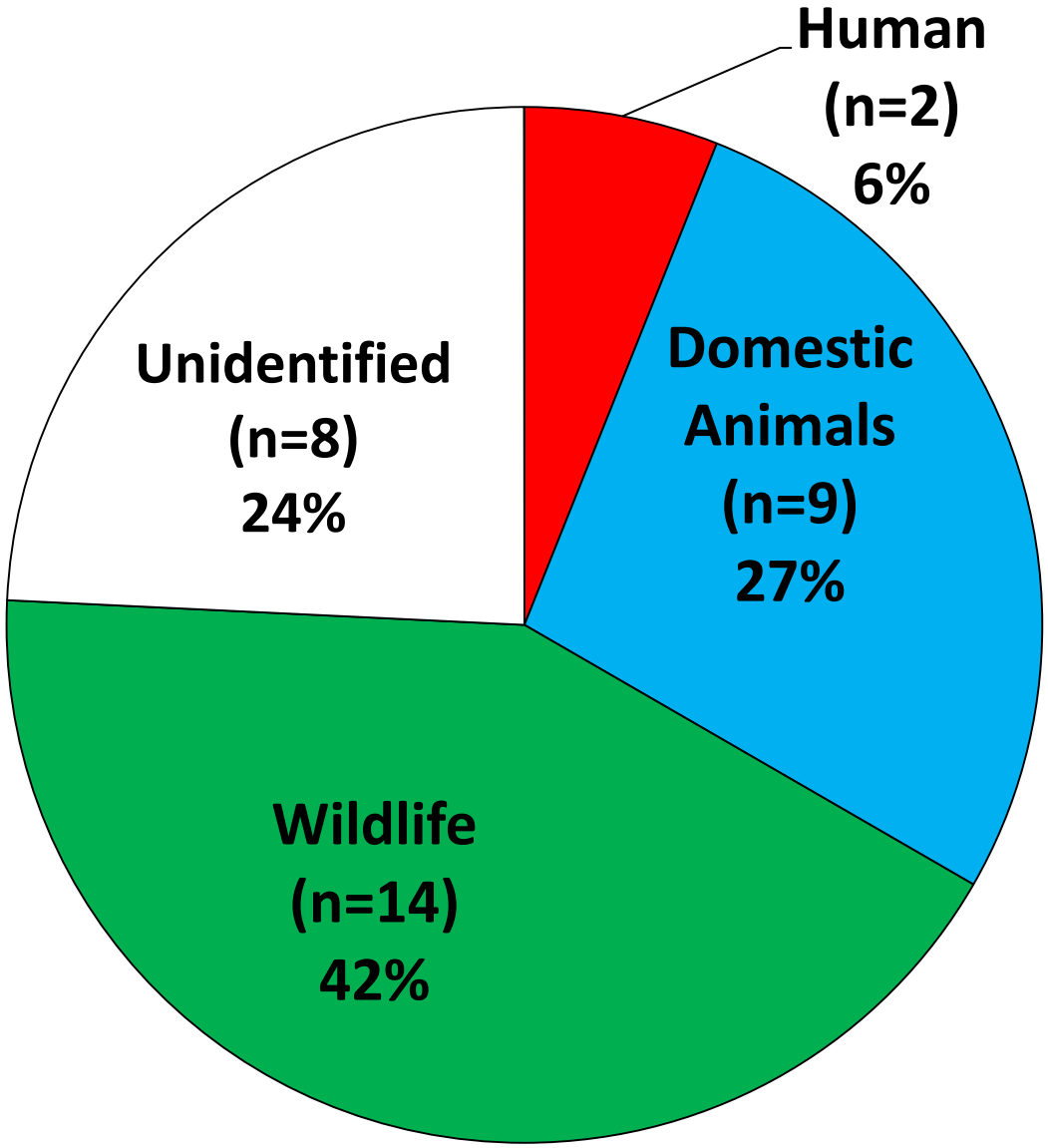
	2009								2010				
Parameter	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total Collected To-Date	Target Number to Collect
Bacteroidales													
Stream (10)	10	17	8	10	5	0	20	10	10	10	XX	100	180
WWTFs (3)		0			2			2	2	2	X	8	12
Storm - Stream (10)		0	6		14	50		10	10		X	90	40
Storm - WWTFs (3)		0			2	8		2	2		X	14	12
Bacteroidales Total												***212***	***244***
***E. coli* (ERIC-RP)**													
Stream (10)		9			5		10	10	10		X	44	40
WWTFs (3)		0			2			2	2		X	6	12
Storm - Stream (10)		0	6		14	40		10	10			80	20
Storm - WWTFs (3)		0			2	6		2	2			12	6
E. coli Total												***142***	***78***

Status of BST Analyses

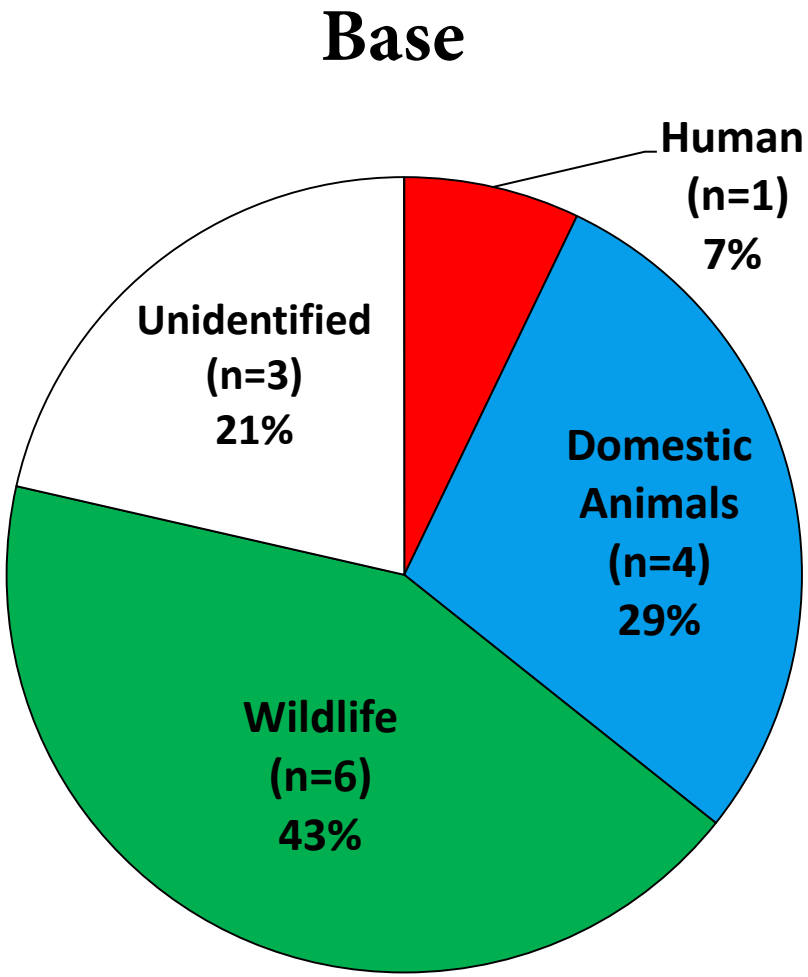
- *E. coli* (ERIC-PCR + RP)
  - 38 samples analyzed (38/78 = 49% complete)
    - Base flow = 16
    - Storm flow = 22
- *Bacteroidales* PCR
  - 125 samples analyzed (125/244 = 51% complete)
    - Base flow = 39
    - Storm flow = 86
    - Human, ruminant, horse, and swine markers

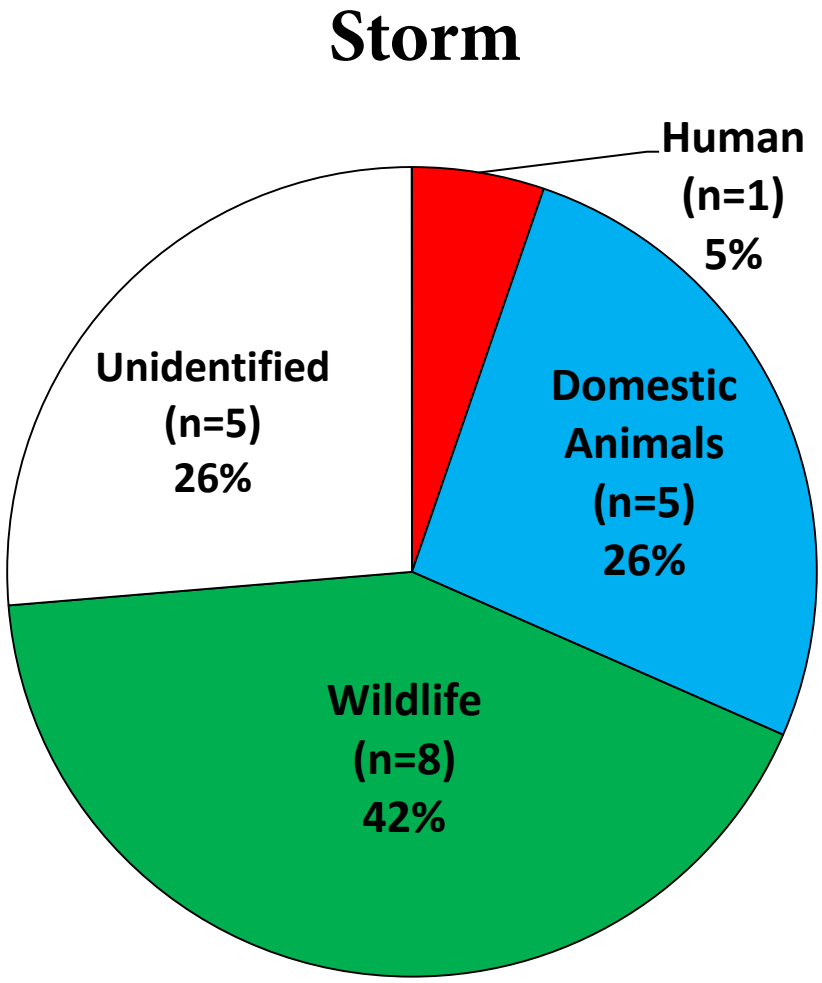
E. coli BST Results

Base + Storm Stream Samples – 3-Way Split

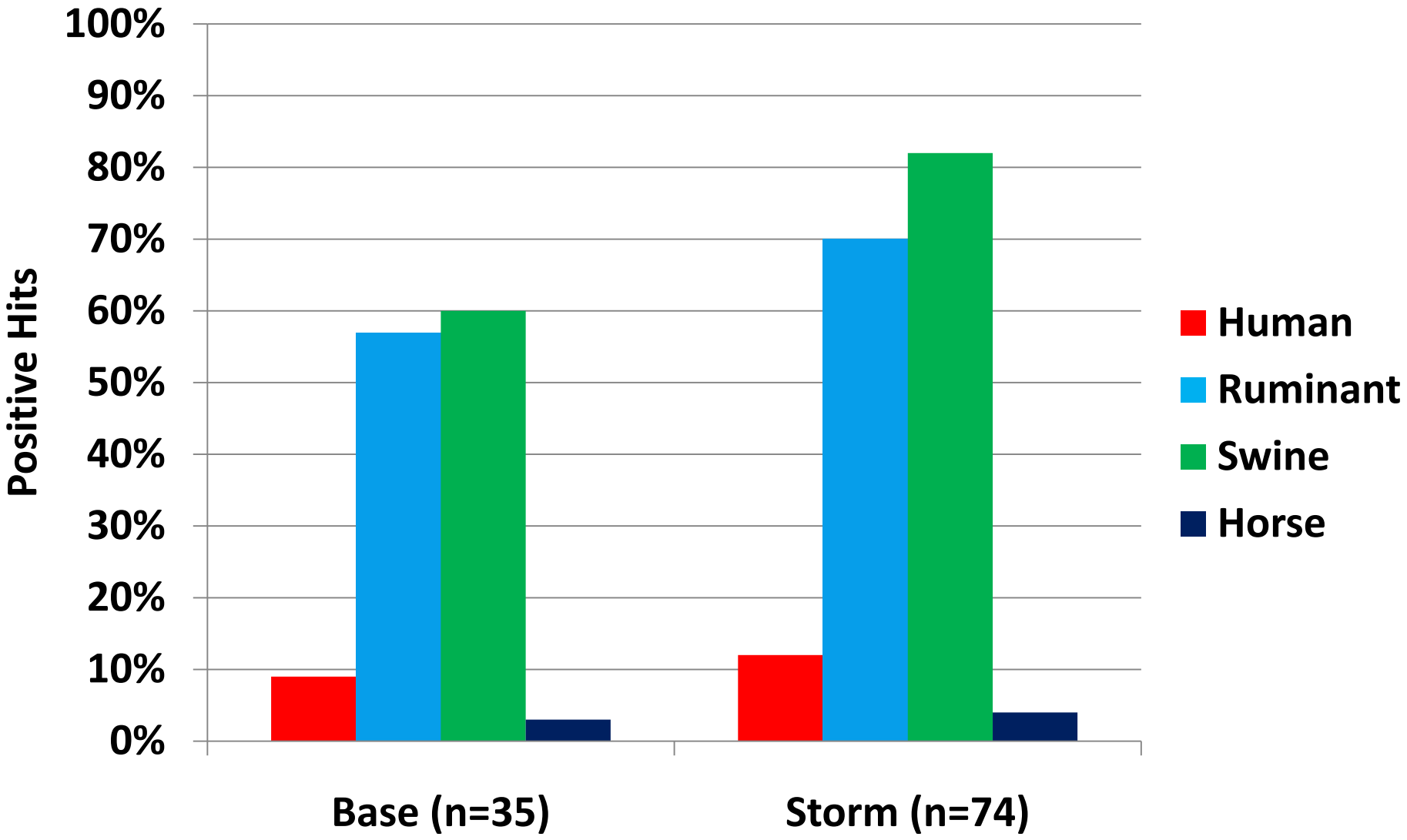


E. coli BST Results
Base v. Storm Stream Samples – 3-Way Split

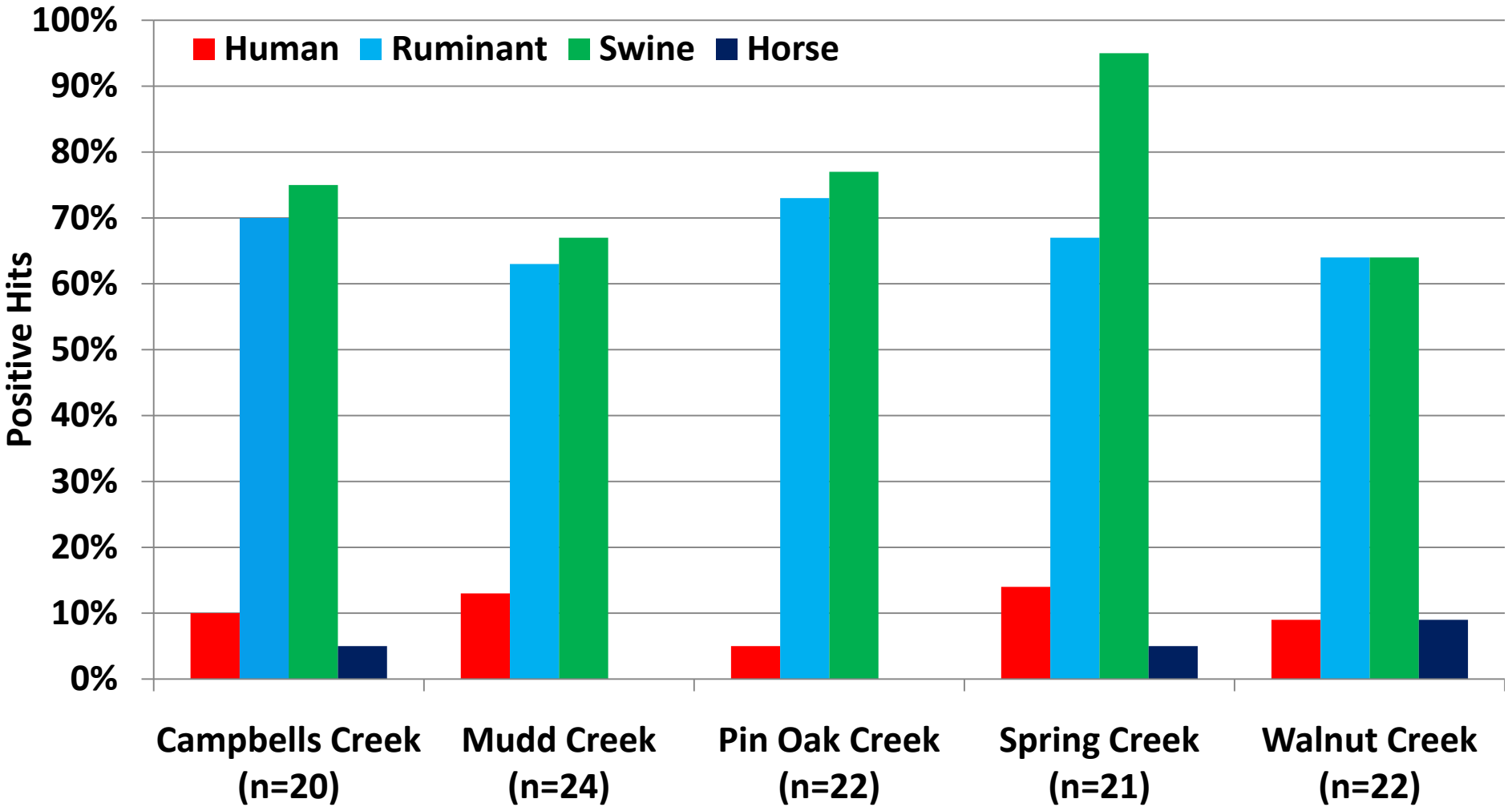




Bacteroidales BST Results
Base v. Storm Stream Samples



Bacteroidales BST Results
Sub-Watershed Stream Samples



BST Summary

- **Limited Library-Dependent Analysis**
  - **Existing Texas Statewide BST Known-Source Library appears to be working relatively well**

    (76% of stream isolates identified)
  - **Major sources in watershed appear to be wildlife and domestic animals**
- **Library Independent Analysis**
  - **Swine and ruminant markers most common**
  - **63% of positive samples had hits for BOTH swine and ruminants**
  - **Limited human hits**

BST Future Work

- Additional data will be collected and analyzed
  - 40 additional *E. coli* isolates
  - 119 additional *Bacteroidales* samples
- Results may change as more data is collected
- Final results will be presented in May 2010

Questions?

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