Bacterial Source Tracking
Big Cypress Creek
Bacteria Assessment Project

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What is Bacterial Source Tracking (BST)?

• 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 Methods

• A variety of different methods have been used
• Can be classified according to approach:
  • Phenotypic v. Genotypic
  • Library-dependent v. Library-independent
Phenotypic BST Methods (Library-Dependent)

Methods:
• Kirby-Bauer Antibiotic resistance analysis (ARA)
• Carbon source utilization (CSU)

Advantages/Disadvantages:
• Less expensive
• Less discriminating
Genotypic BST Methods (Library-Dependent)

Methods:

- DNA fingerprinting
  - Enterobacterial repetitive intergenic consensus sequence-polymerase chain reaction (ERIC-PCR)
  - RiboPrinting® (RP)

Advantages/Disadvantages:

- More expensive
- More discriminating
Library-Independent BST

Approach:

• Genotypic detection of microorganisms based on marker genes (DNA)
• Does not require known-source library
• Most common approach targets *Bacteroidales*
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
- Not pathogens
Library-Independent BST

Considerations:

• Rapid and less expensive than library-dependent methods

• Limited markers – human, ruminant, horse, swine for *Bacteroidales*

• New markers being developed
BST for Big Cypress Creek

- Limited library-dependent
  - Analyze *E. coli* from ~100 water samples from across the study area using both ERIC-PCR and RP fingerprinting
  - Library may be supplemented with known fecal samples from the area

- Library-independent
  - Analyze ~250 water samples from across the study area using *Bacteroidales* PCR for human, ruminant, horse, and swine markers
BST for Big Cypress Creek

<table>
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<th>‘X’ denotes a single sampling event</th>
<th>Parameter</th>
<th>2009</th>
<th>2010</th>
<th>Total # Samples</th>
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<td>WWTFs (2)</td>
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Next Steps for BST

• North East Texas Municipal Water District will conduct the source surveys for each stream and the outcomes will help AgriLife Research understand usefulness of existing known source library for BST

• North East Texas Municipal Water District will begin collecting water samples and AgriLife Research will begin BST on a subset of those samples – September 2009

• AgriLife Research will be back at a stakeholder meeting to provide an update on the progress of BST

• BST should be completed ~August 2010
Questions?

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