

Microbial Source Tracking in Bevens and Carver Creeks

WMOAC 9-27-2016

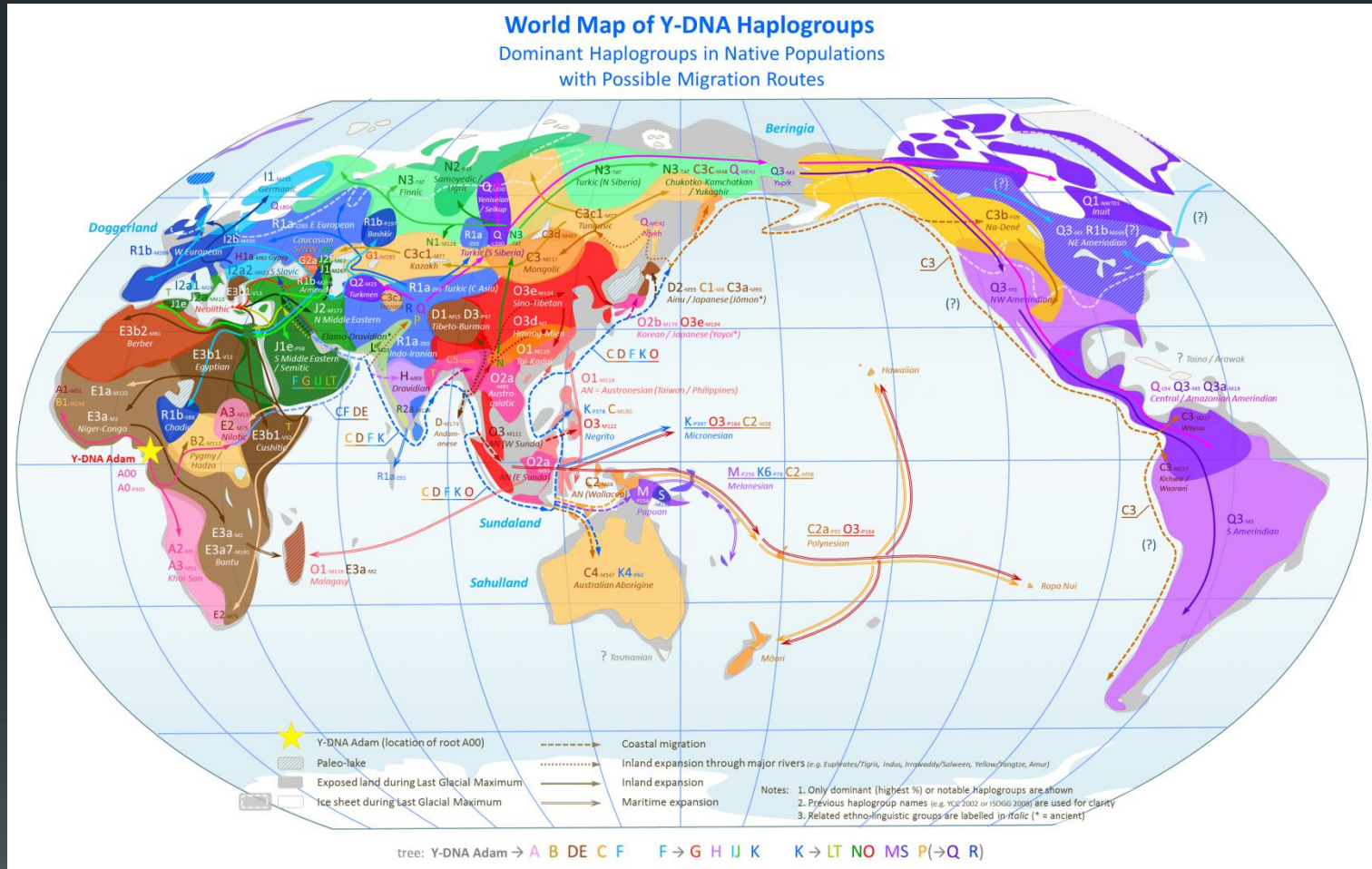




Overview

- What is MST?
- How does it work?
- Why identify sources of fecal bacteria in waterways?
- WMO MST monitoring overview
- Next Steps
- Questions

What is MST?

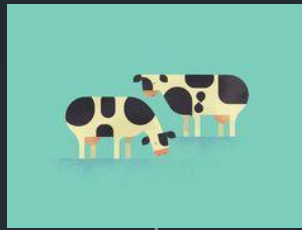


*Distinct human genetic variation by location on earth. (Chan, 2013)

What is MST?



- MST refers to Microbial Source Tracking, or identifying the particular animal host that a given bacteria originated from.
- The technology takes advantage of distinct bacterial DNA sequences that are the result of the bacterium's source environment.
- Bacteria belonging to the same Genus can have distinct genetic sequence differences due to cellular evolution over time.



Fecal Sample

Fecal Sample

How does it work? Marker ID



Perform analysis of all DNA



Classify Normal Bacterial Flora



Compare target normal flora DNA from each host (*Bacteroides* sp.)

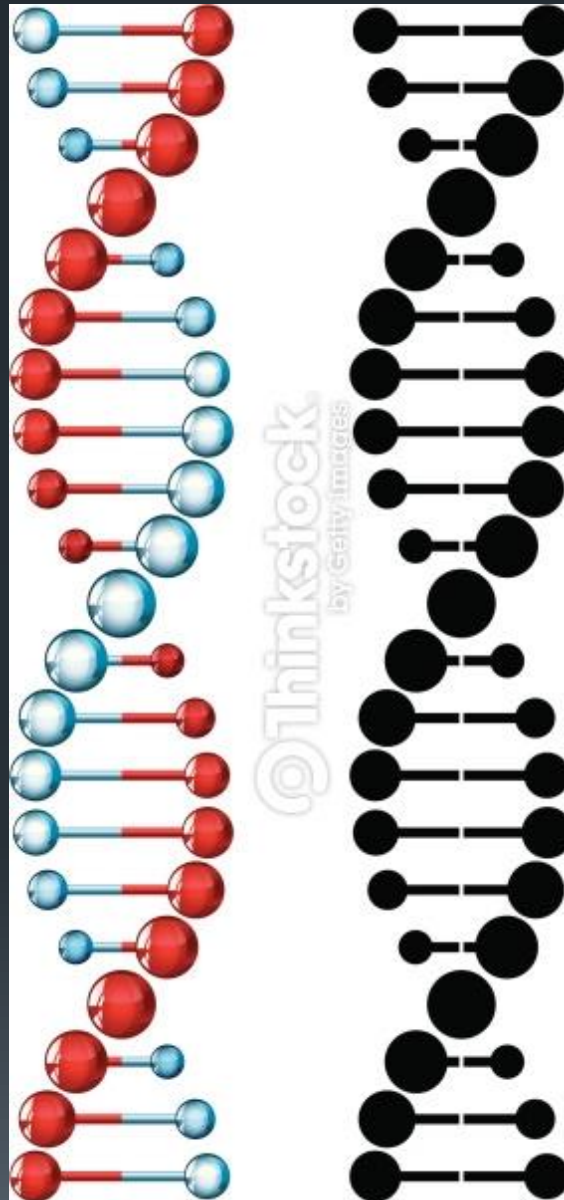


Identify unique gene sequence associated with each host sampled



How does it work? Marker ID

Human specific *Bacteroides*
DNA target



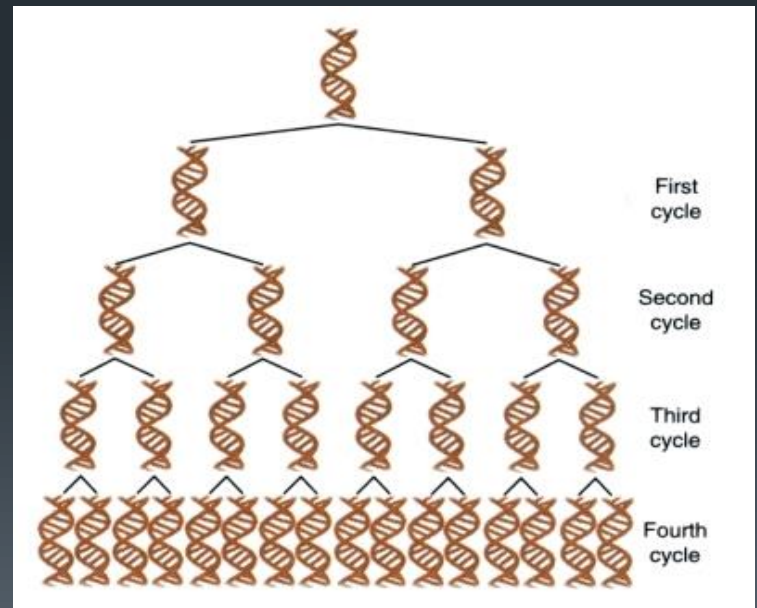
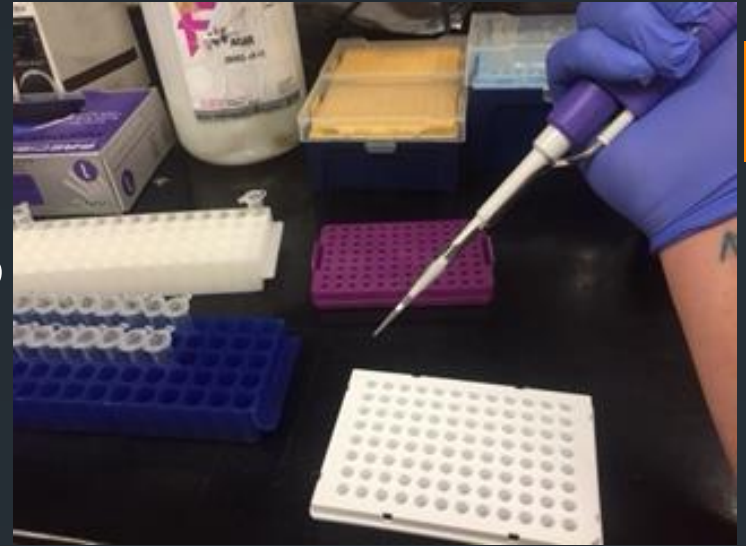
Cow specific *Bacteroides*
DNA target



How does it work?

Environmental DNA ID

- These unique sequences are utilized to develop markers that can be used in a laboratory to determine fecal source loading in environmental samples utilizing Polymerase Chain Reaction (PCR) methods.
- The technology dyes the DNA molecules as they are being amplified, allowing for the quantification of the environmental target DNA.



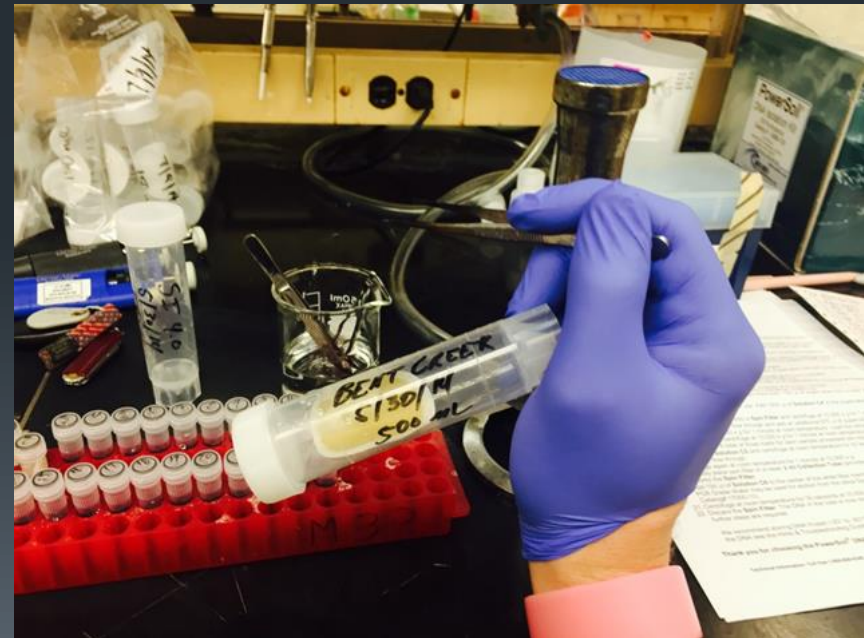
Why identify sources of fecal bacteria in waterways?



- Subwatershed scale source identification allows staff to determine fecal loading “hotspots” to direct WMO staff and financial efforts.
- MST can help staff determine the success of projects that have already been implemented.
- MST has limitations: Though there are markers for several animal hosts found in each watershed, cost and staff time factors limit the analysis that can be done.
- Further, the technology cannot identify specific locations the loading is coming from.

WMO MST Monitoring Overview

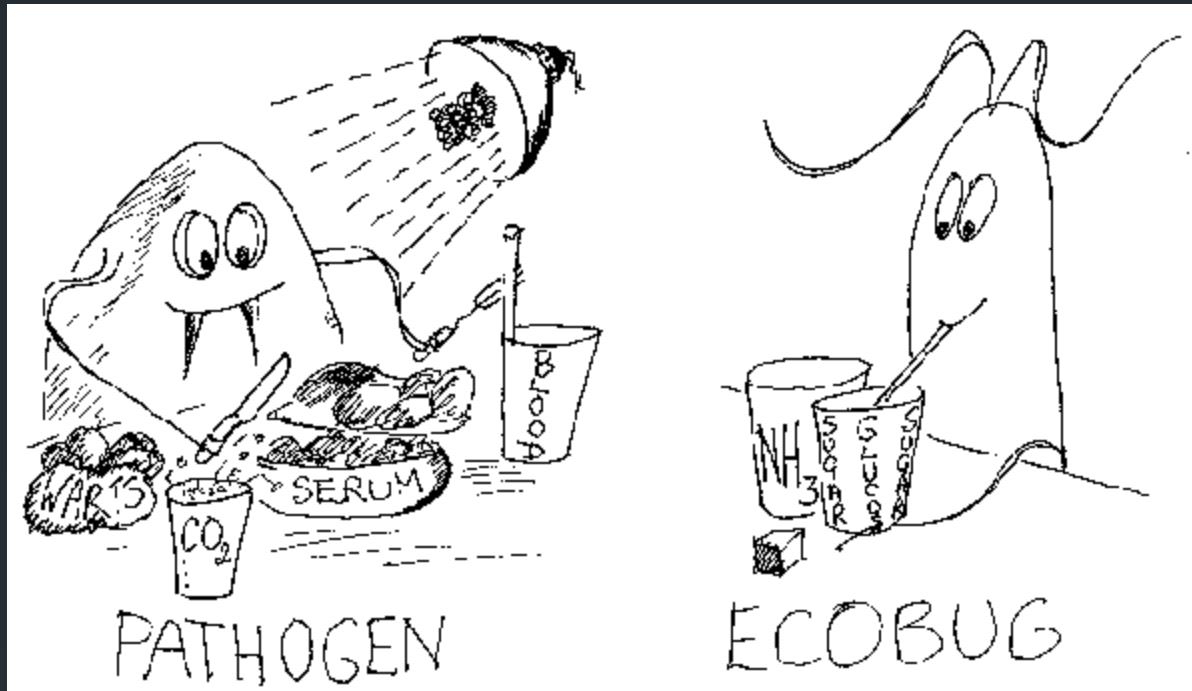
Microbial Source Tracking Subwatersheds



Next Steps

- Finish environmental sample analysis.
- Perform QA/QC on obtained data.
- Present Findings to WMOAC in October/November.

Questions?



Soil, Water
& Climate

