

Oakland Bay MST Study

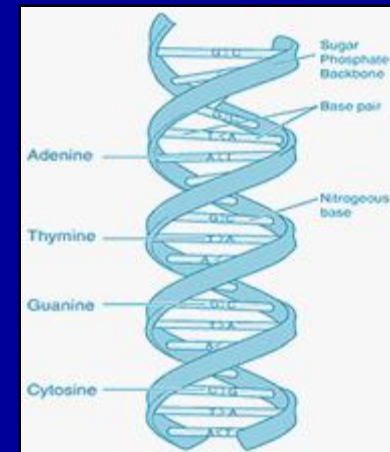
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What is Microbial Source Tracking (MST)?

DNA method that determines the host origin of fecal bacteria or viruses

MST Method

- ***Bacteroides* analysis for human, ruminant and other hosts**
 - DNA investigation run by EPA Manchester Lab
- ***Bacteroides* are not *E. coli***
 - found in intestines
 - anaerobic
 - each host species has genetically unique strain
 - parallels indicator bacteria & pathogens
- **MST provides presence/absence data**
- **2006 MST Samples**
 - 6 summer samples x 12 sites = 72 samples
 - 2 winter samples x 12 sites = 24 samples



Upper Oakland Bay Sites

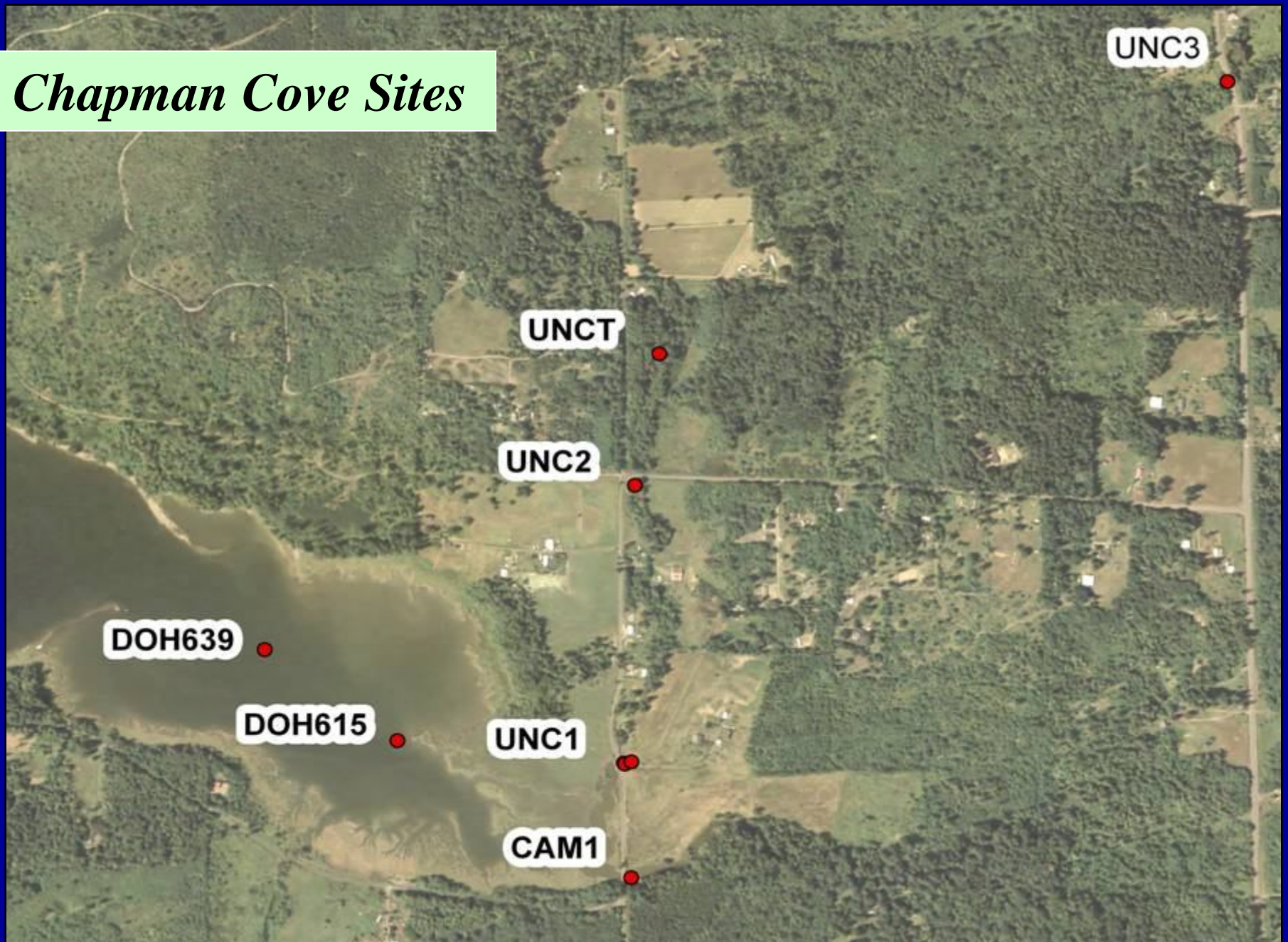


Upper Oakland Bay MST Data

Sample Site	Date	DOH FC MPN/100ml	SALINITY ppt	GB 32	CF 128	CF 193	HF 183	HF 134	Type	Summer Human	Winter Human	Summer Ruminant	Winter Ruminant
CRA 0	06/27/06	26	0	P	P	A	A	A	ruminant	2/6	1/2	5/6	0/2
	07/26/06	33	0	P	P	ND	A	A	ruminant				
	08/09/06	130	0	P	P	P	A	P	both				
	08/22/06	130	0	P	P	P	P	P	both				
	09/06/06	46	0	P	P	ND	A	A	ruminant				
	09/20/06	79	0	P	A	A	A	A	other				
	11/08/06	79	0	P	A	A	P	A	human				
	12/13/06	140	0	P	A	A	A	A	other				
TR 03	06/27/06	8	6	ND						4/5	0/2	2/5	0/2
	07/26/06	70	38	P	P	ND	P	A	both				
	08/09/06	79	7	P	A	A	A	A	other				
	08/22/06	240	5	P	A	A	A	P	human				
	09/06/06	920	7	P	P	P	A	P	both				
	09/20/06	540	6	P	A	A	A	P	human				
	11/08/06	33	0	P	A	A	A	A	other				
	12/13/06	79	0	P	A	A	A	A	other				
DOH 614	06/27/06	130	8	P	P	A	P	P	both	5/6	0/2	6/6	2/2
	07/26/06	920	6	P	P	A	P	P	both				
	08/09/06	240	9	P	P	A	A	P	both				
	08/22/06	170	6	P	P	A	A	A	ruminant				
	09/06/06	33	15	P	ND	P	P	ND	both				
	09/20/06	110	9	P	P	A	A	P	both				
	11/08/06	240	1	P	A	P	A	A	ruminant				
	12/13/06	170	4	P	P	ND	A	A	ruminant				
DOH NE	06/27/06	240	4	P	P	A	P	A	both	6/6	0/2	6/6	1/2
	07/26/06	170	18	P	P	A	P	P	both				
	08/09/06	350	8	P	A	P	A	P	both				
	08/22/06	240	4	P	P	A	P	A	both				
	09/06/06	49	11	P	P	A	P	A	both				
	09/20/06	110	11	P	P	P	P	A	both				
	11/08/06	70	0	ND	A	P	A	A	ruminant				
	12/13/06	33	0	P	A	A	A	A	other				
DEE 0	06/27/06	23	0	P	A	A	P	A	human	3/6	1/2	4/6	2/2
	07/26/06	170	0	P	P	A	A	P	both				
	08/09/06	79	0	P	P	ND	A	A	ruminant				
	08/22/06	33	0	P	A	A	A	A	other				
	09/06/06	79	0	P	P	ND	A	A	ruminant				
	09/20/06	33	0	P	P	ND	P	P	both				
	11/08/06	79	0	P	P	A	A	A	ruminant				
	12/13/06	49	0	P	A	P	A	P	both				
Upper Oakland Bay Result Summary										20/29 or 69%	2/10 or 20%	23/29 or 79%	5/10 or 50%

Legend	
P	Present
A	Absent
ND	No data
GB	General <i>Bacteroides</i>
CF	Ruminant <i>Bacteroides</i>
HF	Human <i>Bacteroides</i>

Chapman Cove Sites



Chapman Cove MST Data

Sample Site	Date	DOH FC MPN/100ml	SALINITY ppt	GB 32	CF 128	CF 193	HF 183	HF 134	Type	Summer Human	Winter Human	Summer Ruminant	Winter Ruminant
DOH 639	06/27/06	<2	24	ND						ND	1/2	ND	1/2
	07/26/06	<2	24	ND									
	08/09/06	2	23	ND									
	08/22/06	4	24	ND									
	09/06/06	2	24	ND									
	09/20/06	5	22	ND									
	11/08/06	33	10	P	A	P	P	A	both				
12/13/06	79	0	P	A	A	A	A	other					
DOH 615	06/27/06	6	24	ND						3/4	0/2	3/4	1/2
	07/26/06	46	22	P	P	A	A	A	ruminant				
	08/09/06	8	23	P	P	P	P	ND	both				
	08/22/06	11	21	P	A	A	ND	P	human				
	09/06/06	7	24	ND									
	09/20/06	130	24	P	P	A	P	A	both				
	11/08/06	110	4	P	P	ND	A	A	ruminant				
12/13/06	130	0	P	A	A	A	A	other					
UNC 1	06/27/06	350	11	P	P	A	A	P	both	3/5	0/2	4/5	0/2
	07/26/06	49	41	P	A	P	A	A	ruminant				
	08/09/06	23	18	P	A	A	A	A	other				
	08/22/06	13	17	ND									
	09/06/06	70	20	P	P	ND	P	A	both				
	09/20/06	79	18	P	A	P	P	P	both				
	11/08/06	79	0	P	A	A	A	A	other				
12/13/06	240	0	P	A	A	A	A	other					
UNC 2	06/27/06	170	0	P	P	A	P	P	both	3/6	0/2	4/6	0/2
	07/26/06	>2400	0	P	P	A	P	P	both				
	08/09/06	ND	0	P	A	P	A	A	ruminant				
	08/22/06	>2400	0	P	A	A	P	A	human				
	09/06/06	79	0	A	A	A	A	A	none				
	09/20/06	49	0	P	A	P	A	A	ruminant				
	11/08/06	23	0	P	A	A	A	A	other				
12/13/06	49	0	P	A	A	A	A	other					
UNC T	06/27/06	540	0	P	P	P	A	P	both	6/6	0/2	6/6	0/2
	07/26/06	350	0	P	P	A	A	P	both				
	08/09/06	ND	0	P	P	A	A	P	both				
	08/22/06	>1600	0	P	P	A	A	P	both				
	09/06/06	140	0	P	P	P	A	P	both				
	09/20/06	23	0	P	P	ND	A	P	both				
	11/08/06	350	0	P	A	A	A	A	other				
12/13/06	110	0	P	A	A	A	A	other					
UNC 3	06/27/06	5	0	ND						0/5	0/2	3/5	1/2
	07/26/06	23	0	P	A	A	A	A	other				
	08/09/06	ND	0	P	A	P	A	A	ruminant				
	08/22/06	350	0	P	P	A	A	A	ruminant				
	09/06/06	33	0	P	A	A	A	A	other				
	09/20/06	13	0	P	P	ND	A	A	ruminant				
	11/08/06	350	0	ND	P	ND	A	A	ruminant				
12/13/06	110	0	P	A	A	A	A	other					
CAM 1	06/27/06	540	25	P	P	A	A	P	both	3/6	0/2	5/6	1/2
	07/26/06	170	39	P	A	P	A	P	both				
	08/09/06	49	2	P	A	P	A	A	ruminant				
	08/22/06	21	2	P	A	A	A	A	other				
	09/06/06	49	16	P	A	P	A	A	ruminant				
	09/20/06	70	22	P	A	P	ND	P	both				
	11/08/06	33	0	P	A	A	A	A	other				
12/13/06	33	0	P	P	ND	A	A	ruminant					
Chapman Cove Result Summary										18/32 or 56%	1/14 or 7%	25/32 or 78%	4/14 or 29%

Legend	
P	Present
A	Absent
ND	No data
GB	General <i>Bacteroides</i>
CF	Ruminant <i>Bacteroides</i>
HF	Human <i>Bacteroides</i>

Conclusions

- Human and ruminant bacteria were ubiquitous in Upper Oakland Bay and Chapman Cove
- MST useful only after exhausting conventional analysis
- MST studies do not:
 - ID specific sources
 - Quantify relative source contributions
- MST studies do:
 - ID presence or absence
 - Provide research direction for field investigation & compliance activities