

Preliminary evaluation of the potential shedding of *Mycobacterium bovis* by coyotes and raccoons



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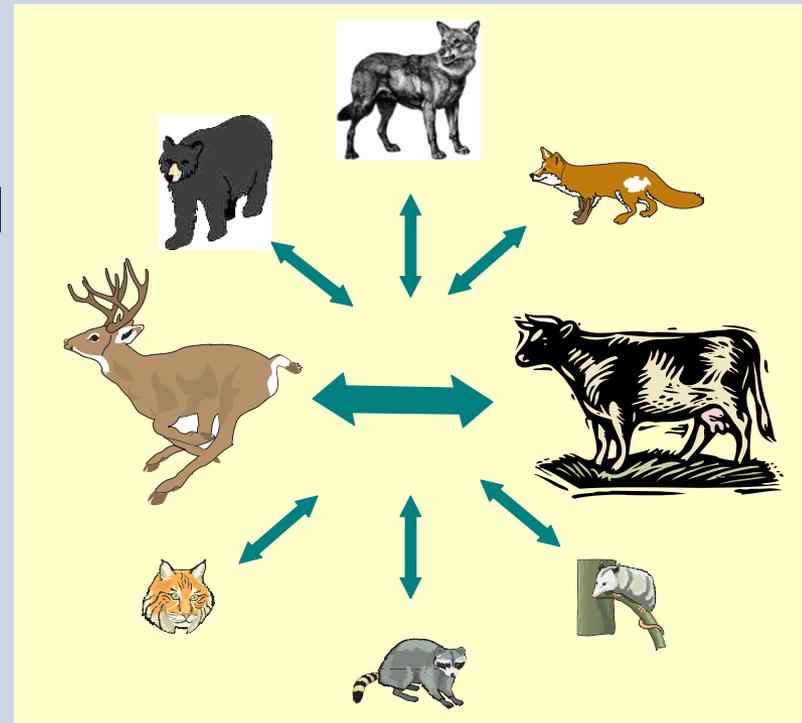
Wildlife positive for bTB in Michigan



- White-tailed deer
- Black bear
- Bobcats
- Coyotes
- Raccoons
- Red fox
- North American opossums



- It is widely believed that white-tailed deer shed bTB and transmit it to cattle by indirect contact via shared feed
- Do other wild species that are infected with bTB also shed and transmit bTB to cattle and other wildlife?



- If wildlife species in addition to deer shed *M. bovis* potential for spread of the disease increase and control and eradication efforts become more complicated and expensive



- Large number of coyotes and raccoons in affected areas of Michigan



- Coyotes and raccoon interact with farms, cattle and feed/water resources.
- Do coyotes and raccoons shed *M. bovis*?

Studies



- One captive study
 - Coyotes

- Two field studies
 - Coyotes
 - Raccoons



Captive Coyotes



- 4 Coyotes were orally inoculated with 1 ml of 1.0×10^5 CFU of *M. bovis*.
- Samples - oral & nasal swabs and feces.



Sample Testing

Swabs → Culture

Feces → Culture

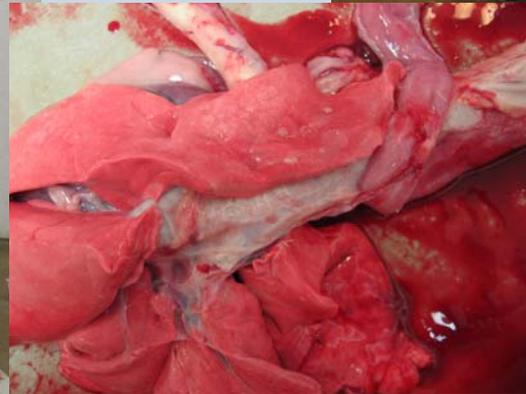


Expose guinea pigs

- Swabs collected every 2 weeks, feces every week
- Modified culture techniques

Necropsy

- Coyotes – 140 days PI
- Guinea pigs – 12 days after coyotes



- Tissues
- Lymph nodes
- Tested by Culture & Histology

Results –Captive Coyotes

- 10 sets of swabs & 19 fecal samples collected per coyote
- Last day of collection – 129 days PI (~5 months)
- Swabs –all negative
- Feces –all negative
- Necropsy results:
 - Coyotes
 - Histology – One coyote retropharyngeal lymph node w/ lesion & single acid fast bacillus
 - Culture – negative
 - Guinea pigs
 - Histology – negative
 - Culture – negative



Summary – Captive Coyotes

- Coyotes given low dose of *M. bovis* (1×10^5 CFU) compared to possible high dose received in the field from consuming infected deer.



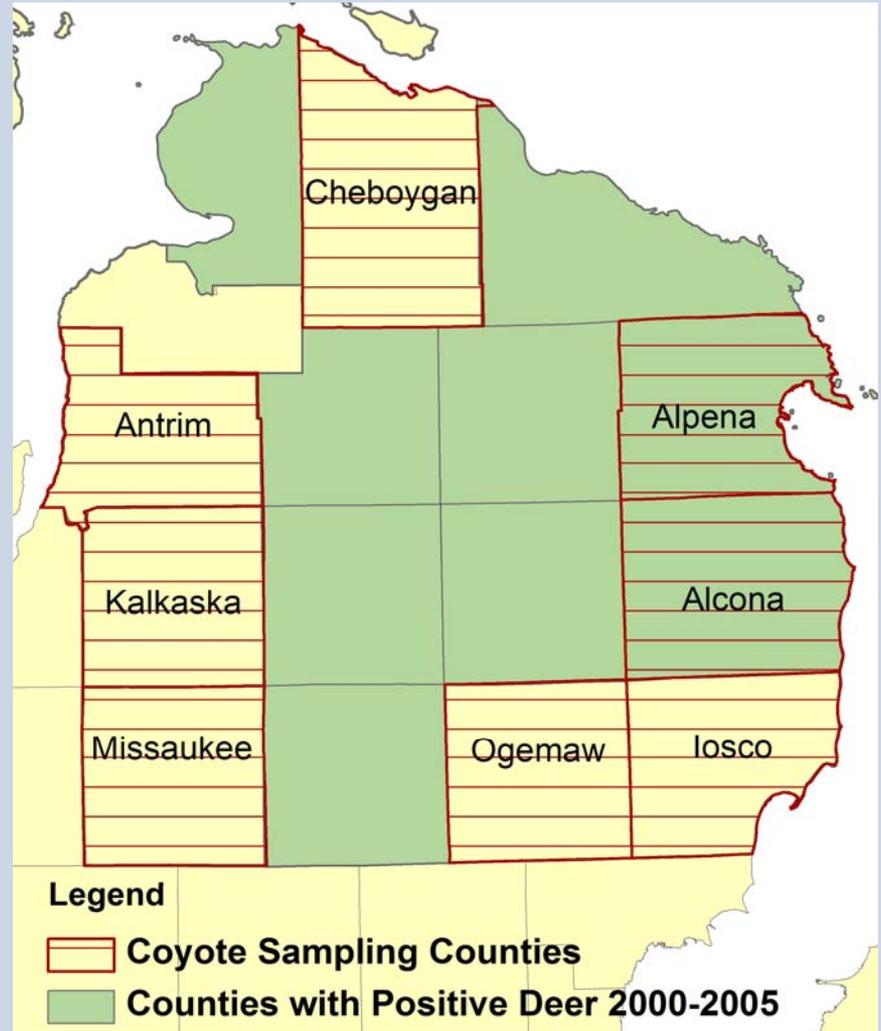
- Coyotes apparently not susceptible to low dose infection with *M. bovis*.

- Additional studies giving coyotes dosages with higher concentration of *M. bovis* or field studies using naturally infected coyotes are needed to know if coyotes shed *M. bovis*.



Coyotes- Field Study

■ Reported prevalence



Raccoons

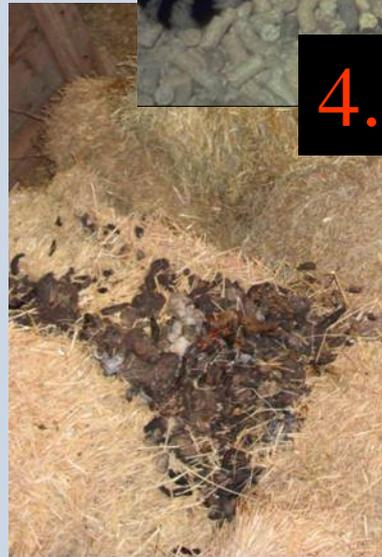
■ Reported prevalence



■ Counties being sampled



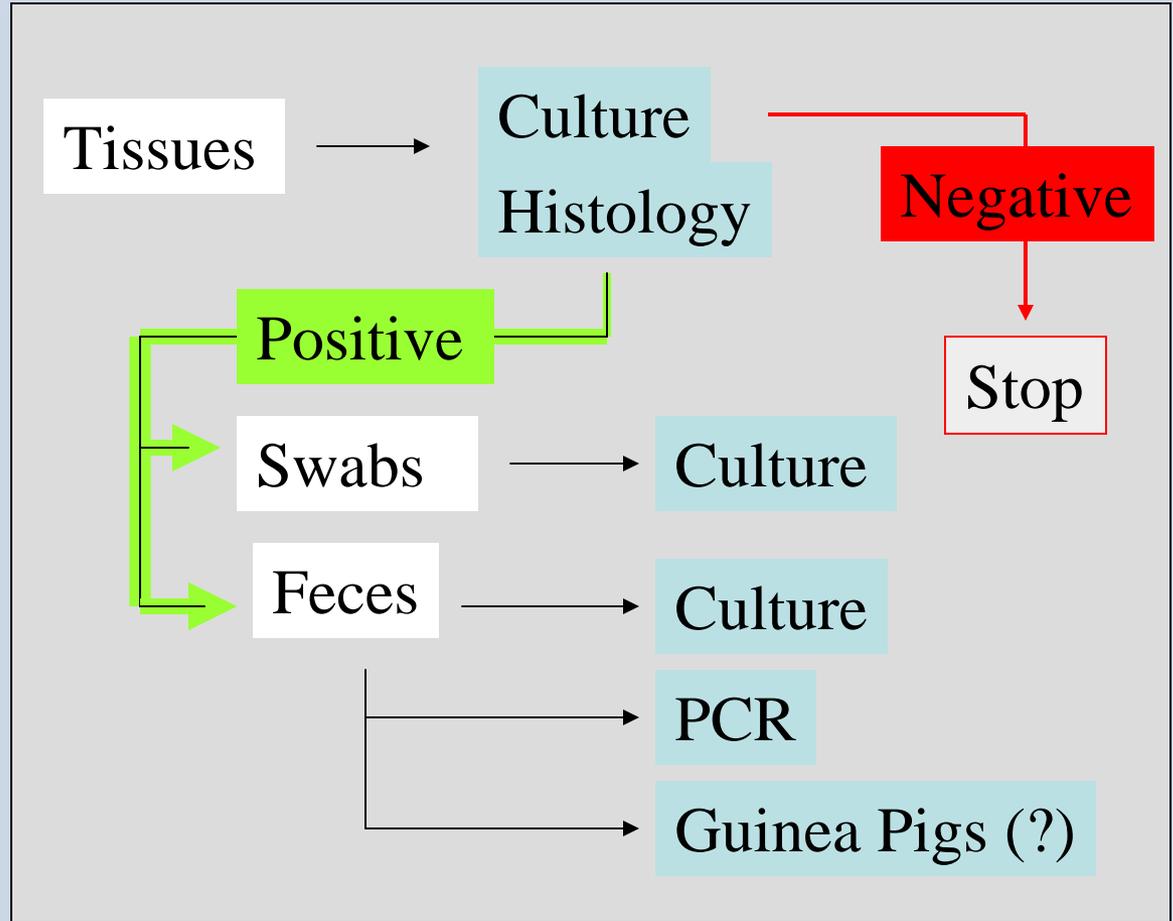
4.2%



Field Studies



Trapping & necropsy of coyotes & raccoons



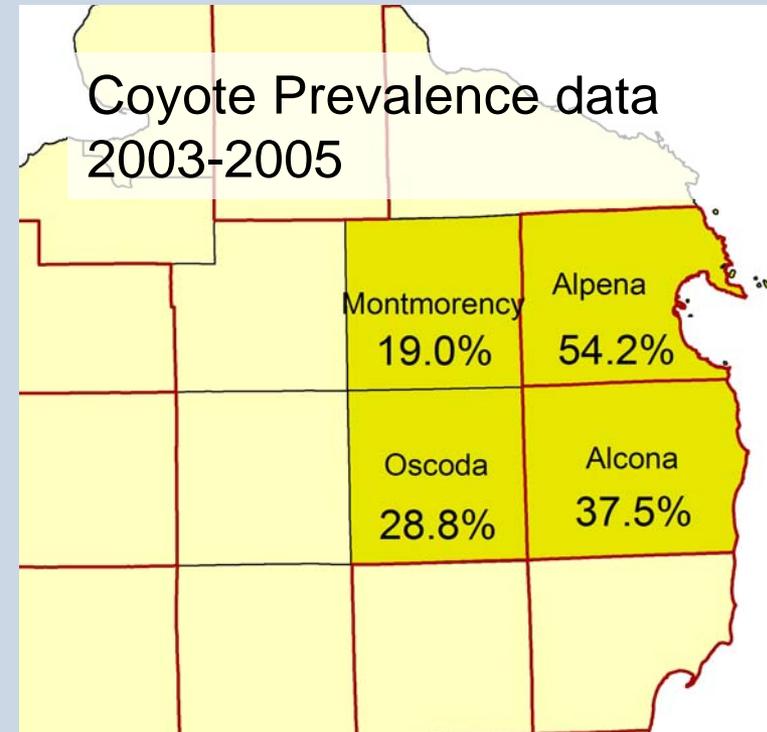
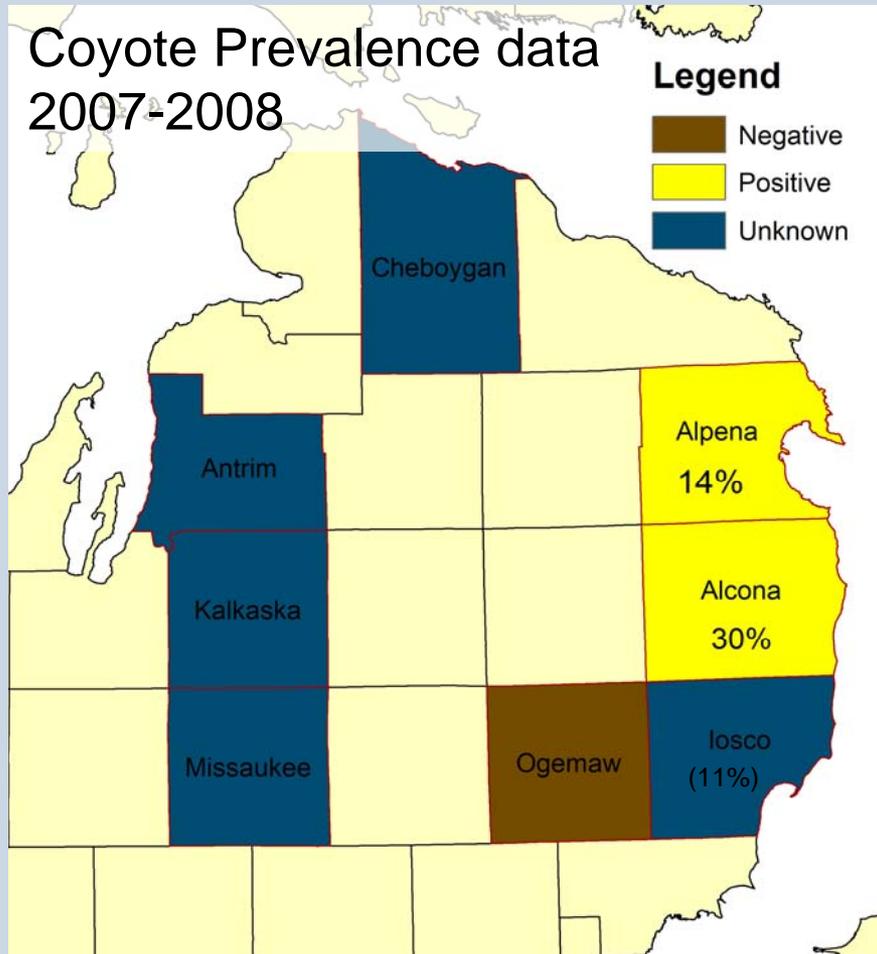
Results – Field Studies

	Coyotes	Raccoons
Capture goal	252	210
Total caught	141	154
Positive by tissue culture	12 , (2 pending)	1*
Positive - Swab culture	(14 pending)	—
Positive - Fecal culture	(14 pending)	—
Positive – Fecal PCR	(14 pending)	—

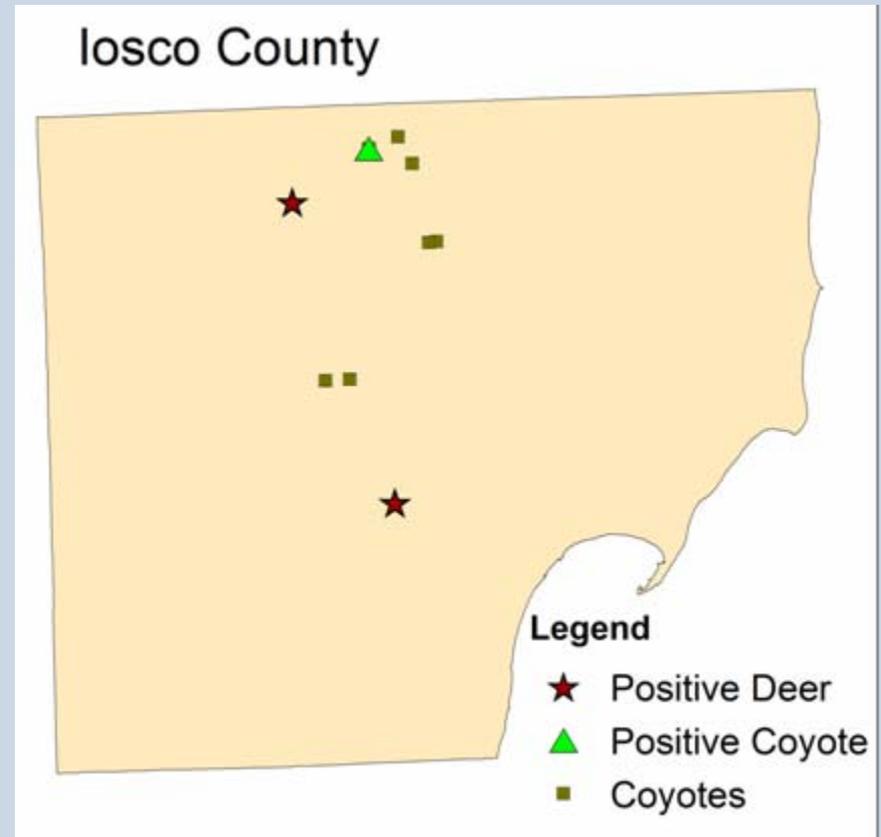
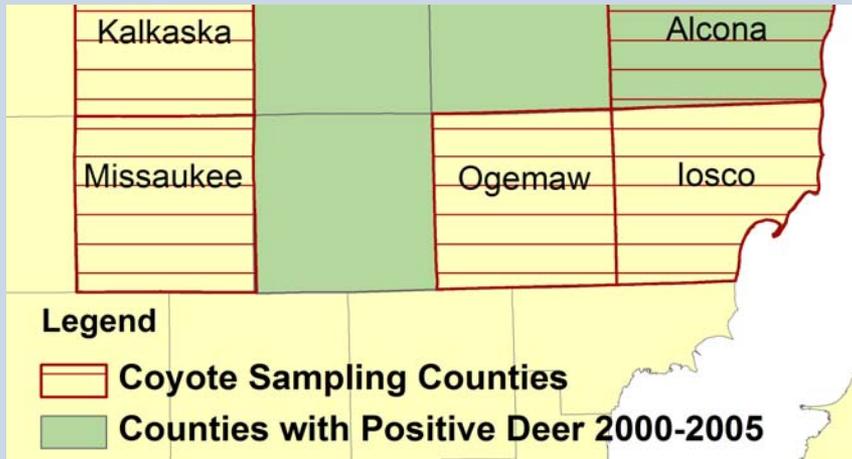
Results - Coyotes

County	Goal	# Trapped (as of 7/1/08)	Culture Positive (as of 7/1/08) #positive/#cultured
Alcona	30	30	9/30
Alpena	32	22	3/20 (plus 1 positive on histology, culture pending)
Antrim	30	1	0/1
Cheboygan	32	15	0/15
Iosco	32	8	1/8 positive on histology, culture pending
Kalkaska	32	31	0/29
Ogemaw	32	32	0/32
Missaukee	32	0	0/0

Results - Coyotes



County	Goal	# Trapped	Culture Positive
Iosco	32	8	(1 on histology, culture pending)



- Iosco County – 2 positive deer winter of 2007/2008

Summary –Field Studies

■ Coyotes (n=141)

- Can only compare prevalence in one county (Alcona) between 2003/2005 (37.5%) and 2007/2008 (30%) = no difference
- Preliminary results in most counties:
 - more to be trapped
 - more to be cultured
- No shedding data (all samples still to be cultured)
- No age data
- No positive coyotes from negative deer TB counties
- One positive coyote found where two new TB positive deer were found, in Iosco County

Summary –Field Studies

■ Raccoons

- Of 154 raccoons trapped (about $\frac{3}{4}$ of goal), one tissue positive for Mycobacterium complex.
 - Unable to speciate
- Palmer, et al. (2002) found that raccoon shed bTB in saliva and nasal secretions when given high does of bTB or multiple low doses.

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