Ticks parasitizing dogs, cats, humans and wild vertebrates in Alaska: invasion potential

Kimberlee Beckmen, Alaska Department of Fish and Game, Division of Wildlife Conservation

Eight species of ticks were recorded from domestic dogs in Alaska. Some of these ticks were collected from dogs with recent travel histories to other countries or other U.S. states, which appears to explain records of some ticks that are not native to Alaska, such as *Amblyomma americanum* (lone star tick), *Ixodes scapularis* (blacklegged tick) and *Ixodes ricinus*. However, we also recorded *Dermacentor variabilis* (American dog tick) from dogs (and humans) both with and without travel history, suggesting that this non-indigenous tick could be establishing in Alaska. Other ticks commonly recorded from dogs were the indigenous species *Ixodes angustus* and the cosmopolitan invasive species *Rhipicephalus sanguineus* (brown dog tick). Domestic cats were only parasitized by one tick species, the native *I. angustus*. Six species of ticks were recorded from humans: *A. americanum* (without host travel history), *Dermacentor andersoni* (Rocky Mountain wood tick) (travel associated), *D. variabilis* (with and without travel history), *Haemaphysalis leporispalustris* (rabbit tick, native to Alaska), *I. angustus* and *R. sanguineus*. *Ixodes angustus* predominated among tick collections from native mammals. Also, *Ixodes texanus* (first record from Alaska) was collected from a marten (*Martes americana*), *H. leporispalustris* was recorded from a snowshoe hare (*Lepus americanus*) and the avian-associated tick *Ixodes auritulus* was collected from a Northwestern crow (*Corvus caurinus*). The establishment of *D. variabilis, D. andersoni* and/or *A. americanum* in Alaska would have significant implications for animal and human health.

Ticks (Acari: Ixodidae) parasitizing dogs, cats, humans and wild vertebrates in Alaska: Invasion potential

Dr. Kimberlee B. Beckmen, Wildlife Veterinarian

Wildlife Health and Disease Surveillance Program

Division of Wildlife Conservation

Alaska Department of Fish and Game

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Research article

OXFORD

Sampling, Distribution, Dispersal

New Records of Ticks (Acari: Ixodidae) From Dogs, Cats, Humans, and Some Wild Vertebrates in Alaska: Invasion Potential

Lance A. Durden,[1,2] Kimberlee B. Beckmen,[3] and Robert F. Gerlach[4]

[1]Department of Biology, Georgia Southern University, 4324 Old Register Rd., Statesboro, GA 30458 (ldurden@georgiasouthern.edu), [2]Corresponding author, e-mail: ldurden@georgiasouthern.edu, [3]Alaska Department of Fish and Game, Wildlife Health and Disease Surveillance Program, Division of Wildlife Conservation, 1300 College Rd., Fairbanks, AK 99701 (kimberlee.beckmen@alaska.gov) and [4]Alaska Department of Environmental Conservation, Division of Environmental Health, 5251 Dr. Martin Luther King Jr. Ave., Anchorage, AK 99507 (bob.gerlach@alaska.gov)

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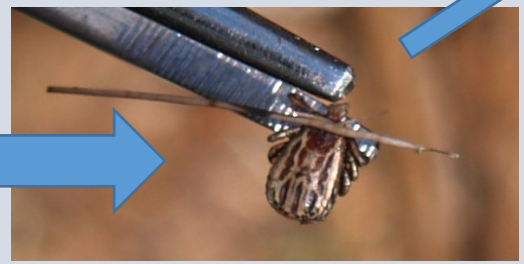
Moose Winter tick

Dermacentor albipictus

- Expanded of the range of the Moose Winter Tick advancing toward Alaska, found on **moose, caribou, elk and mule deer in the Yukon**
- Increasing sightings of invasive mule deer in Interior
- 58% of the ~1000 mule deer in the Yukon are infested



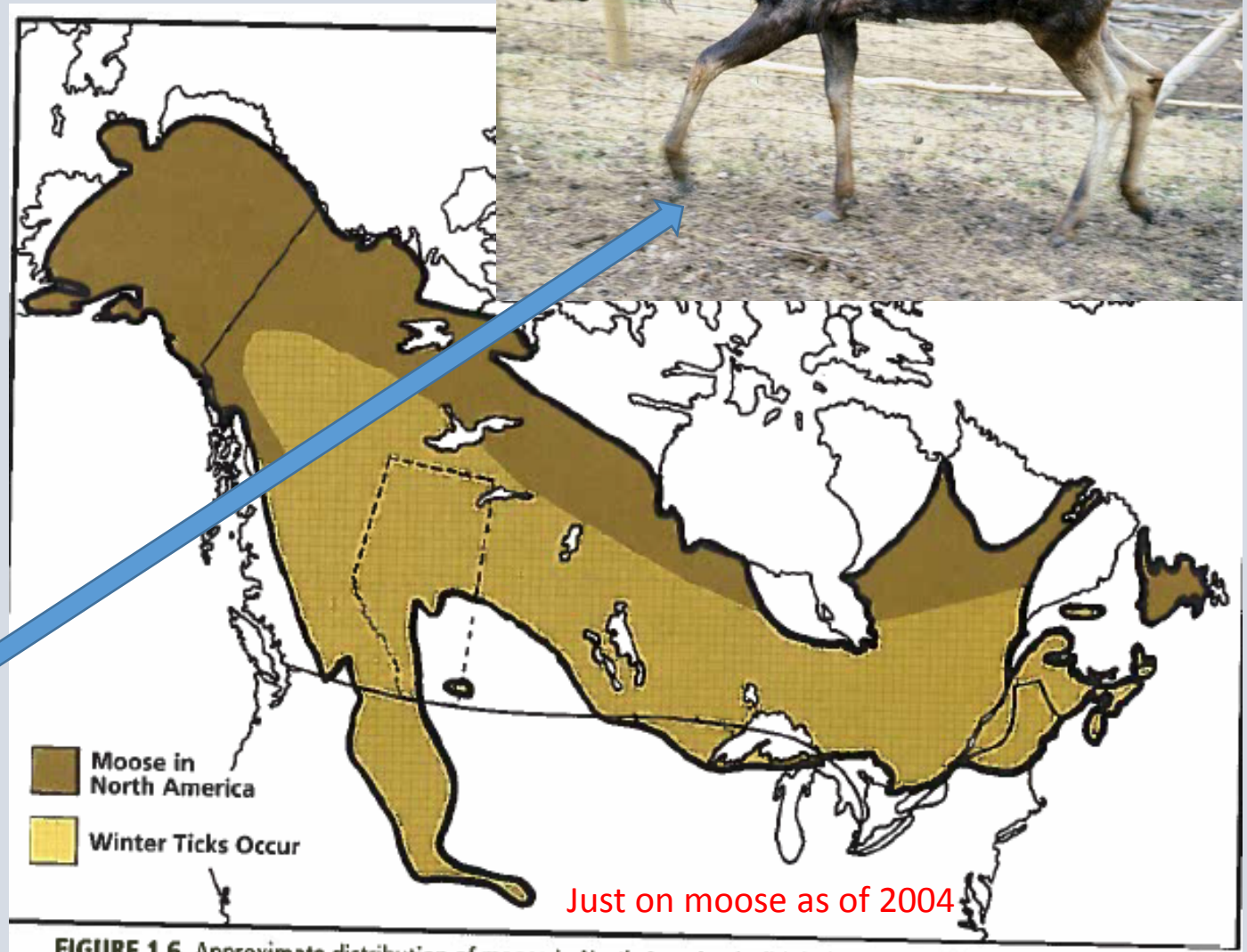


FIGURE 1.6. Approximate distribution of moose in North America (solid dark line) showing where, within that distribution, the winter tick occurs. The northern limits of winter ticks on moose are not well defined.

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Moose Winter Tick kills moose!

- Heat loss, anemia, starvation, esp. young moose
- Directly linked to moose declines in Maine, Vermont, New Hampshire, Minnesota and Montana
  - Brainworm (aka Moose Sickness) and liver flukes also contribute to moose declines (and mule deer can transmit these as well)

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BACKGROUND

- Survey by WHDS/ADF&G and the State Veterinarian to detect Moose Winter Tick
- Non-native dog ticks - American dog tick and Rocky Mountain wood tick –were detected on dogs with no travel history
- If either of these dog ticks become established in AK, there could be major consequences for dogs, humans, native mammals
- Wide spread, general lack of awareness of the many native ticks on wildlife in Alaska that can also spread **zoonotic** diseases

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INDIGENOUS/NATIVE *Wildlife* TICK SPECIES IN ALASKA

Haemaphysalis leporispalustris (**Hare/Rabbit Tick**) → Lagomorphs

Ixodes angustus (***Squirrel/Vole tick)*** → Small & Medium-sized Mammals

Ixodes auritulus and I. howelli → Birds

Ixodes signatus and *I. uriae* → Seabirds

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Brown Dog Tick

Invasive but clearly established indoors→ Dogs

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RESULTS of 202 tick specimens of 10 species

8 species parasitized domestic dogs:

- 1 invasive established species (Brown dog tick)
- 2 native species (Squirrel/vole, Bird ticks)
- 5 non-native species (*American Dog, Rocky Mtn. Wood, Lone Star, Castor bean, Blacklegged deer ticks)*

6 species parasitized humans:

- 3 non-native spp. (*American Dog, Rocky Mtn. Wood, Lone Star ticks)*
- 2 native sp. (*Hare and vole ticks*)
- 1 invasive established sp. (*Brown dog tick*)

1 native species parasitized domestic cats: *(*Squirrel/vole tick*)*

4 native spp. parasitized native vertebrates:

- *Hare, vole, bird and* <u>*RACCOON*</u>** ticks* (* was recorded from AK for the first time, on a marten).

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INVASIVE TICKS RECORDED FROM DOMESTIC DOGS, ALASKA, 2011-2016

Tick *Species*	# Dogs	Localities*	Travel History
Brown Dog tick *Rhipicepphalus sanguineus*	**15**	A,C,F,H,NR,P,S,W	1 visited TX; 1 imported from Japan; **13 with no travel**
American Dog tick *Dermacentor variablis*	**15**	A,F,H,J,NP,S,V,W	9 visited KS, MA, ND, PA,NY, CA, MN, OR, RI; **6 with no travel**
Lone Star tick *Amblyomma americanum*	2	ER, F	**1 no travel** (owner had traveled to GA, PA & TX); TN
Rocky Mountain Wood tick *Dermacentor americanum*	2	A,S	1 visited CA, 1 visited OR
Blacklegged deer tick *Ixodes scapularis*	2	J, S	Relocated from MN; **Friend in house visiting from WI**
Castor bean tick *Ixodes ricinus*	2	F,J	1 imported from Austria; 1 imported from Germany

*A=Anchorage, C=Chugiak, ER=Eagle River, F=Fairbanks, H=Homer, J=Juneau, NP=North Pole, NR=Nome River, P=Palmer, S=Sitka, V=Valdez, W=Wasilla.

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ALL TICKS RECORDED FROM HUMANS, ALASKA, 2011-2016

Tick Species	# Hosts	Localities*	Host Travel History
Lone star tick	**3**	**G,F,K**	**1 visited TN, 1 KS, 1 found on countertop in Kotzebue**
Rocky Mtn Wood tick	1	A	Visited OR
American Dog tick	6	A,DF,FW,NP,W	4 visited PA, RI, TN, SD/WY or WI; **1 with no travel**
Hare tick	1	H	None
Squirrel tick	2	C,G	None
Brown Dog tick	1	**B**	**None**

*A=Anchorage, B=Bethel, C=Cordova, D-Denali National Park, F=Fairbanks, FW= Fort Wainwright, G=Gustavus, H=Haines, NP=North Pole, K=Kotzebue, W=Willow.

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TICK SURVEY SUMMARY

- Brown dog tick is now widely distributed in AK, mainly on dogs.
- Humans and domestic dogs were parasitized by a combination of native and non-native ticks.
- Some records of non-native ticks could be explained by recent travel histories, e.g., dogs imported from Europe
- However, some dogs and humans with no travel history were parasitized by non-native ticks:
  - 5 of 10 records of the ***American Dog Tick*** on dogs
  - 1 of 5 records of ***American Dog Tick*** on humans
  - 2 of 3 records of ***Lone Star Tick*** (1 on a dog, 1 on a human)
- Regardless of travel history, other non-native ticks are also showing up in AK (***Rocky Mountain Wood tick and Blacklegged deer tick***).

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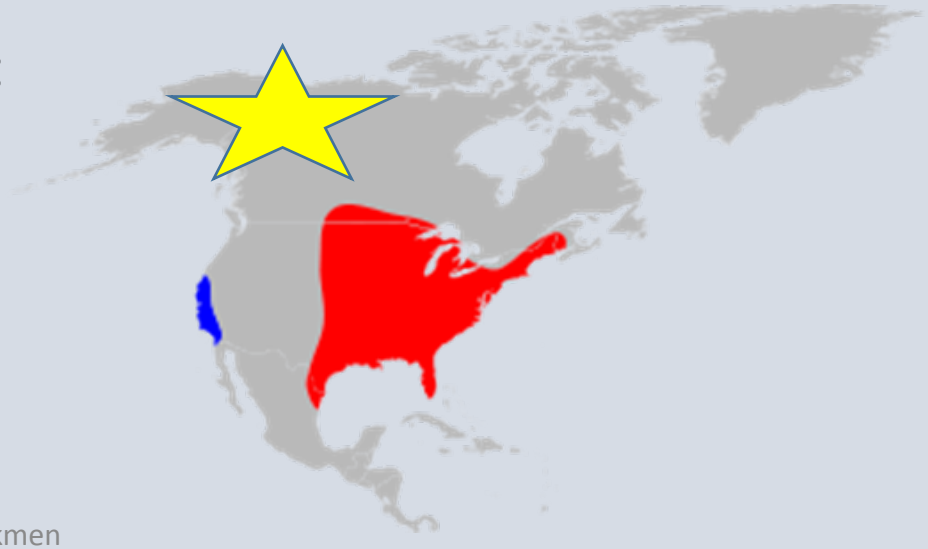
Dermacentor variabilis (American dog tick)

- Appears to be establishing in Alaska
- Every year, pet owners, take their dogs on vacation with them – Alaskan and visitors bring back dogs with attached ticks.
- It has expanded its range in other parts of N. America – most recently in N. Canada.
- Establishment in AK would have consequences for small mammals (larvae & nymphs parasitize these hosts), dogs & wild carnivores (wolves, coyotes, foxes, bears) & possibly, ungulates.
- It can cause **tick paralysis** & transmit zoonotic pathogens:
  - Rocky Mountain Spotted Fever
  - Q fever
  - Tularemia
  - Tick Fever
  - Human monocytic ehrlichiosis
  - Several dog, cattle and cat diseases



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Tick Longevity & Host Association

American dog ticks can take from 2 to 3 yrs to complete their lifecycle and adults can live 2 to 3 years.

- During that time they will feed for
  - 2 to 7 days as larvae
  - 2 to 11 days as nymphs
  - 3 to 15 days as adults

<2% of the life of an adult tick is on an animal thus **~99.5%** of their life not on an animal.

Dryden MW, Payne PA. Biology and Control of ticks infesting dogs and cats in North America Vet Ther 2004;26:2-16.

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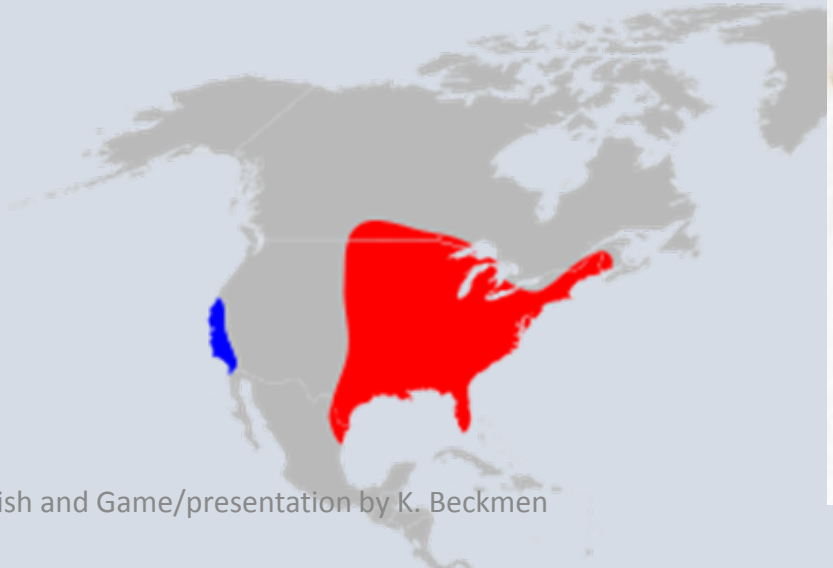
Amblyomma americanum (lone star tick)

- Could (maybe?) establish in Alaska
- Is considered a tropical/subtropical/warm temperate genus BUT has expanded as far north as Maine in recent years.
- Can transmit zoonotic pathogens:
  - Human Monocytic Ehrlichiosis
  - Granulocytic Ehrlichiosis
  - other forms of Ehrlichiosis
  - *Borrelia lonestari* (STARI)
  - Heartland virus
  - Bourbon virus
  - Tularemia
  - Rocky Mountain Spotted Fever
- Other conditions
  - Tick Paralysis
  - Allergy to red meat



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2 OTHER TICKS OF IMMEDIATE CONCERN

Dermacentor andersoni (Rocky Mountain wood tick)

- We recorded 5 specimens in Alaska
- This species is expanding its range in N. Canada.
- Same human and animals TBD importance as *American Dog tick* AND a vector of Colorado Tick Fever virus

Dermacentor albipictus (Moose Winter Tick)

- A 1-host tick, ungulates
- Parasitize moose and other cervids but can be carried asymptomatically by horses, cattle, bison, etc.
- Major cause of moose declines in the Lower 48
- Range expansions and proximity
- 1/3 of specimens in TN study carried *Borrelia sp.*

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Table 1. Tick-borne diseases reported to the CDC, United Stated, and 2002-2011 [Source: CDC]

Disease	Year									
	2002	2003	2004	2005	2006	2007	2008	2009§	2010	2011
Lyme	23,763	21,273	19,859	21,304	19,931	27,444	35,198	38,468	30,158	33,097
RMSF	1,104	1,091	1,738	2,029	2,288	2,221	2,563	1,815	1,985	2,802
Eh/An (total)*	750	727	934	1,404	1,455	1,999	2,107	2,267	2,615	3,562
Babesiosis‡										1,128

§Reporting criteria revised in 2009

*Includes human granulocytic anaplasmosis and human monocytic ehrlichiosis

‡Babesiosis became nationally notifiable in 2010

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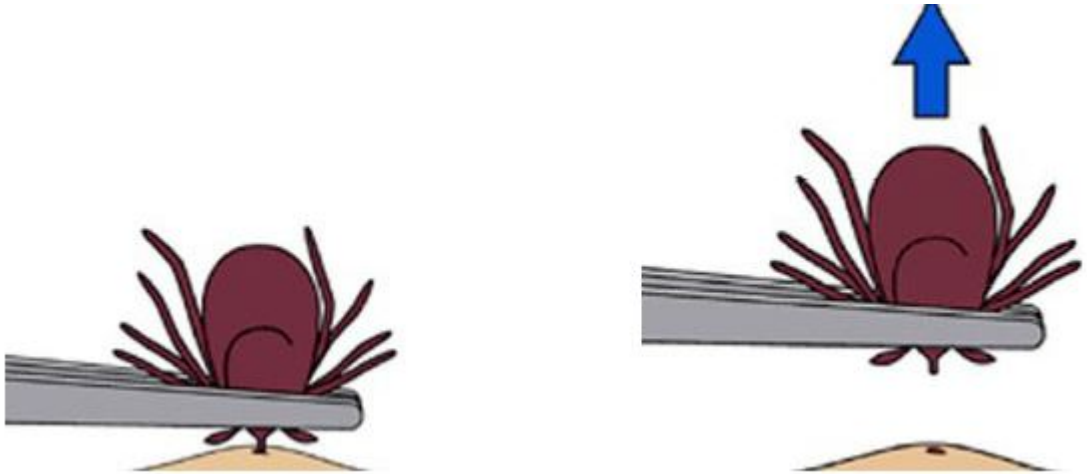
Tick Diseases: Saliva is key

- Anticoagulant, anesthetic, anti-inflammatory
- Host response to saliva determines host specificity
- Secrete cement to attach, dissolves after feeding

- Saliva transmits diseases but 24-36hr of feeding needed to transmit.
- Use product that prevents attachment and kills quickly
- Remove ASAP



PULL TICKS Correctly and SAFELY! Tick remover tool or pointed/fine tipped tweezers

➢Grasp head closest to skin, pull upward with steady even pressure (don't twist or jerk)

➢Put tick in alcohol or sealed container (do not squash with your fingers & save)

➢Clean/disinfect and wash your hands

Use Tick Preventatives May-Sept and when traveling

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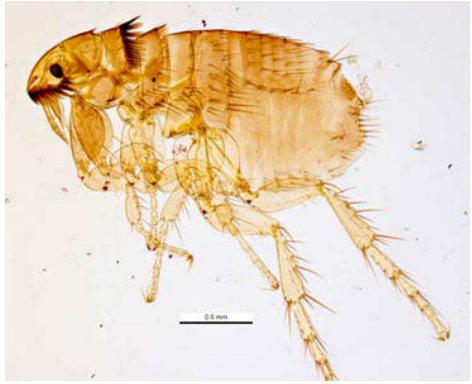
Other Invasives to be on the look out for

Here and established

- Dog lice on wolves and coyotes
- Cat ear canker mites on wolverine
- Northern rat flea on voles/lemmings/mice

Likely to establish soon



- Cat fleas on dogs
- Canine Heartworm
- Deer parasites, viruses and Chronic Wasting Disease that could devastate our wild ungulates

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Future directions

- Dr. M. Murphy UAF Dept.VM pathologist, conducting PCR for *Franciella tularensis* and *Borrelia spp.* on a subset. Student extracting DNA, primers on order
- Alaska veterinarians and pet owners will be asked to submit ticks to OSV ➡ ID @GSU.
- ADF&G will collect wild ungulate ticks
- Derek Sikes (UAF Museum of the North) will accession/ curator of identified/verified specimens.
- ADF&G wishes to institute a surveillance program for Moose Winter Tick and create a hunt with disease surveillance on mule deer

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Thanks!

- Derek Sikes (University of Alaska Museum of the North) for accessioning specimens.
- Veterinarians and the public for submitting specimens.
- Biologists and Technicians at Alaska Department of Fish and Game.
- Dr. Gerlach, Alaska Department of Environmental Conservation.
- Dr. Durden, Georgia Southern University.

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