



Understanding The Risk of Ticks and Tick-Borne Diseases in Alaska

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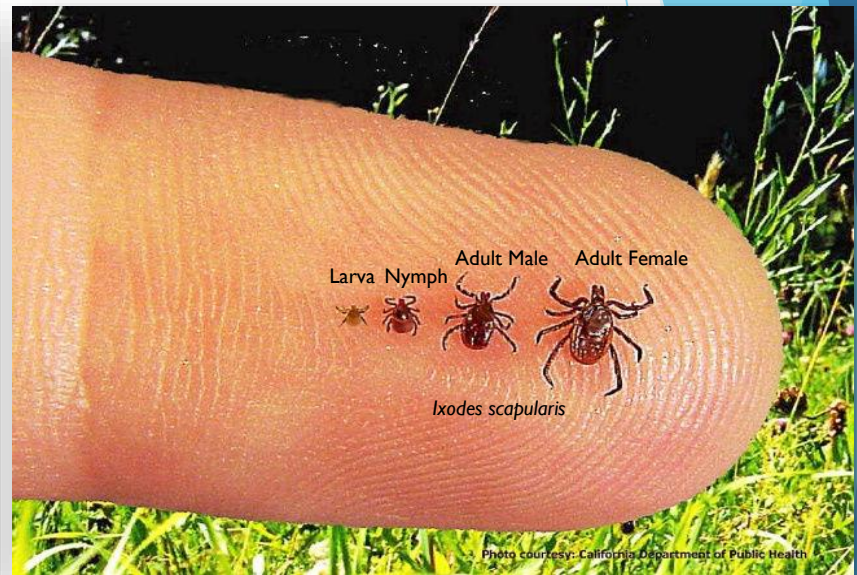
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Project Team

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 - ▶ William George, UAA, MS Biological Sciences Candidate
- ▶ Frank Witmer, Ph.D., M.A. – UAA, College of Engineering and Computer Science + student team!
- ▶ Bob Gerlach, DVM – Office of the State Veterinarian
- ▶ Kimberlee Beckman, DVM – Alaska Department of Fish and Game
- ▶ Molly Murphy, DVM, Ph.D. – UAF, Department of Veterinary Medicine

Why do we care about ticks?



Tick-borne diseases



Rocky Mountain spotted fever is classically characterized by an multiple spots around the location of the tick bite.



Tularemia is characterized by an 'orange' appearance around the location of the tick bite.



Lyme disease is classically characterized by a 'bull's-eye' type rash.



Dermacentor albipictus (Winter tick or Moose tick)

From "Tick Species of Maine", The University of Maine, n.d. (<https://extension.umaine.edu/ipm/tickid/maine-tick-species/winter-tick-or-moose-tick/>) In the public domain.



Adult Female



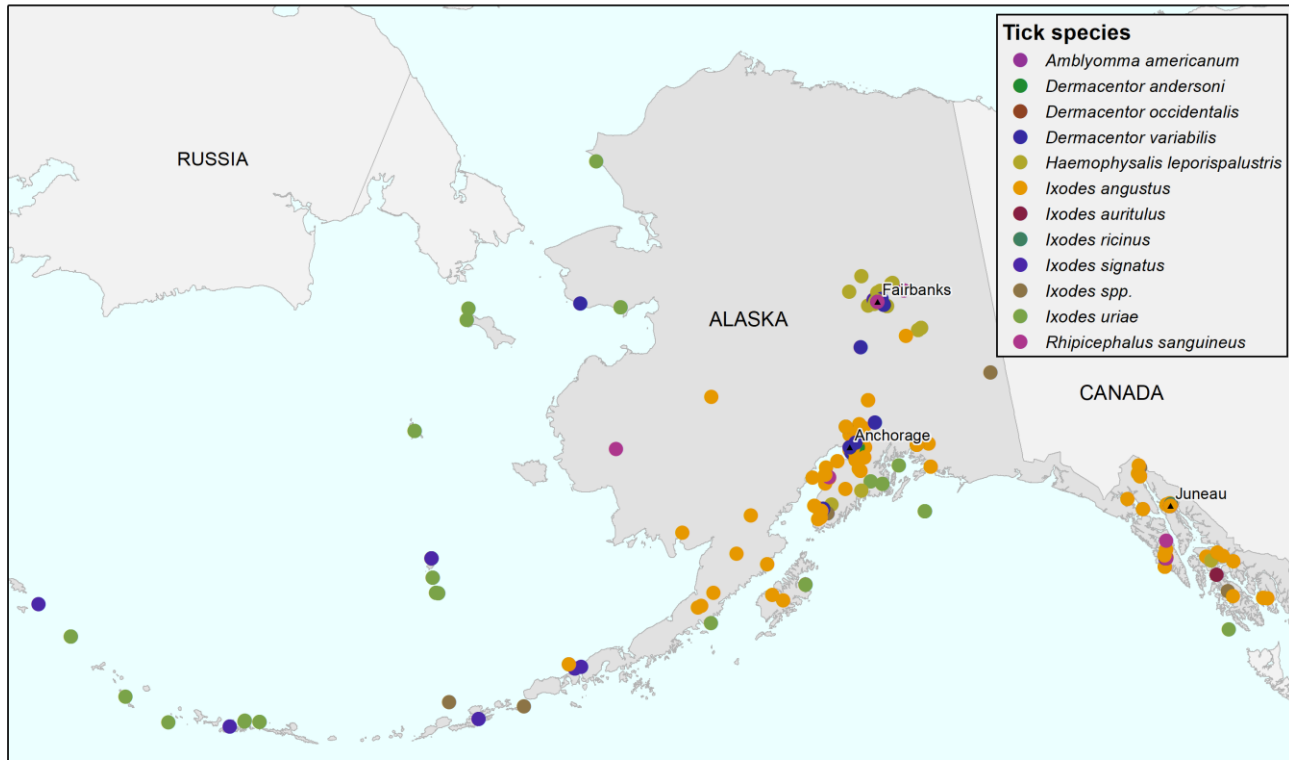
Adult Male

6 Native 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

The prevalence and medical importance of native tick species in Alaska is not well understood.

Where have ticks been reported in Alaska?



Sources: Arctos historical database from early 1900s;
ADFG and OSV since 2010



Non-Native Ticks in Alaska

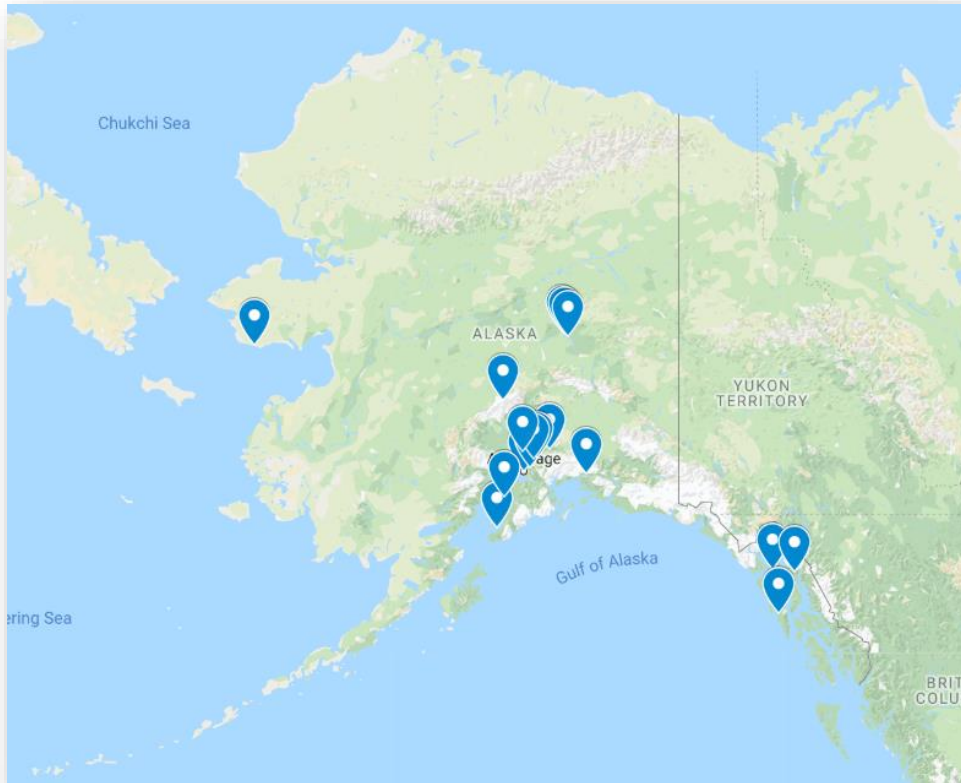
2010-2016 Tick Surveillance (Durdan et al., 2016)

8 Non-native tick species identified in Alaska

- ▶ *Dermacentor variabilis* (American Dog tick)
- ▶ *Rhipicephalus sanguineus* (Brown Dog tick)
- ▶ *Dermacentor andersoni* (Rocky Mountain wood tick)
- ▶ *Amblyomma americanum* (Lone Star tick)
- ▶ *Ixodes scapularis* (Black-legged tick)
- ▶ *Ixodes pacificus* (Western black-legged tick)
- ▶ *Ixodes ricinus* (Sheep/deer tick)
- ▶ *Ixodes texanus*

Hosts of
**American
dog ticks** had
no travel
history
outside of the
state.

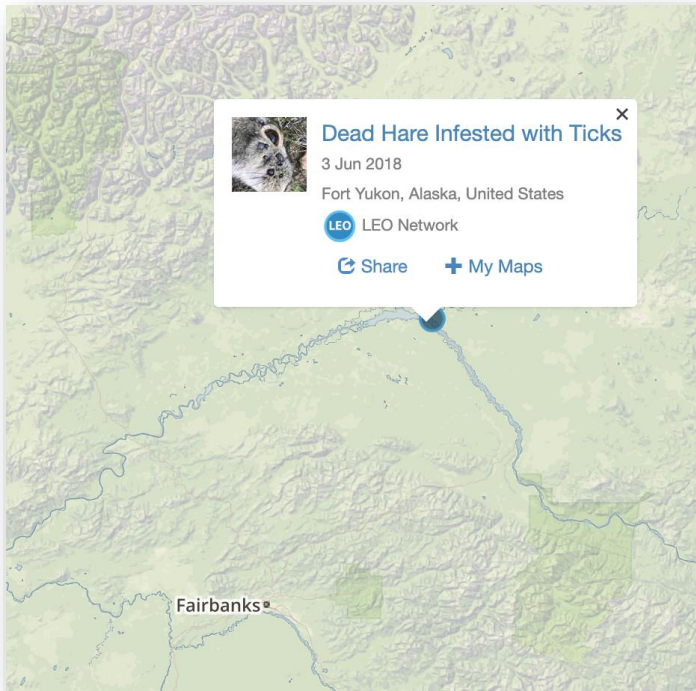
Where have non-native ticks been reported in Alaska?



2010-2018 passive surveillance

Many of these ticks are associated with recent travel outside of Alaska.

Important to observe and report



- ▶ Most tick observations are from individuals that submit them.
- ▶ How to get involved:
 - ▶ Alaska Submit-A-Tick



2010-2016 Tick Surveillance (Durdan et al., 2016)

Potential for establishment of non-native ticks – some with significant medical and veterinary importance

There hasn't been:

- environmental tick sampling
- pathogen testing
- no centralized tick surveillance system

Potential sources of non-native tick importation



Bird migration



Mammal movement



Large mammal



Small mammal

An aerial photograph of a winter forest. The trees are heavily covered in snow, and a road with white dashed lines curves through the center of the image. The overall scene is bright and wintry.

Changing distribution of ticks in Alaska

**A projected decline of
below freezing frost days**

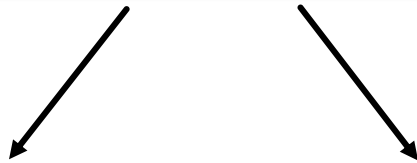
**Shorter and warmer
winters would be conducive
to several tick species**

To understand tick-borne disease emergence in Alaska in order to:



- ▶ Better estimate human and wildlife health risk
- ▶ Develop vector and pathogen control measures
- ▶ Provide current risk information to medical and veterinary professionals

Surveillance



Active

- Analyze existing tick records
- Establish long-term field sites
- Tick drags (Every other week Summer 2019)

Passive

- Use Submit-A-Tick program
- Using LEO posts
- Develop outreach materials
- Develop pathogen testing protocol
- Conduct outreach

Modeling



- Habitat suitability models for 1-2 tick species
- Potentially develop probabilistic importation models

Surveillance

Active Surveillance

Sampling techniques // Tick dragging



- Every two weeks between mid-May and July 2019
- 6-7 sampling sessions at each site
- Timed to overlap with tick seasonal activity

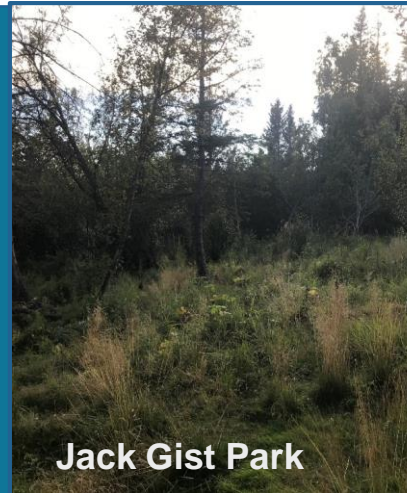
Field Site Locations

- Map ticks that have been previously submitted
- Public recreational locations
- Migratory bird sites
- Climatically diverse

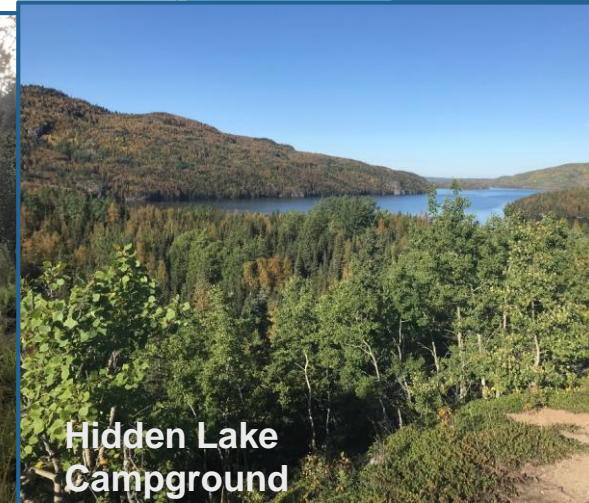


Potential field sites

- Five recreational areas in Anchorage
- Centennial Park in Soldotna
- Hidden Lake Campground (Kenai Peninsula)
- Pratt Museum in Homer
- Kachemak Bay in Homer



Jack Gist Park



Hidden Lake
Campground



Pratt Museum Trail

Passive Surveillance

- ▶ Development and implementation of the Alaska Submit-A-Tick program
- ▶ Outreach materials: Webpage, rack cards, biologists one-pagers
- ▶ Outreach to public, ADFG biologists, bird and mammal researchers, veterinarians
 - ▶ LEO, ADN, OSV newsletter, Facebook, Posters, Public talks...



Alaska Submit-A-Tick

- ▶ The public may contribute to this project by submitting ticks found on themselves, their pets, or in their personal effects
- ▶ **Potential tick submission locations:** *Office of the State Veterinarian, veterinarian, local ADFG office, local public health clinic*
- ▶ Option for submitter to receive identification and testing results



Dermacentor andersoni

Alaska tick website

<http://dec.alaska.gov/eh/vet/ticks>



Division of Environmental Health
STATE VETERINARIAN



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ALASKA SUBMIT-A-TICK PROGRAM

In 2019, the Alaska Office of the State Veterinarian, in collaboration with the Alaska Department of Fish and Game and the University of Alaska, began the Alaska Submit-A-Tick Program. Through this program, individuals who find ticks on themselves, their family members, pets, or wildlife (e.g. hunted or trapped animals) can submit ticks for species identification and pathogen testing. Veterinarians, biologists, and other Alaskans who handle domestic animals and wildlife in the state are important resources for the monitoring program, and we welcome you to submit ticks.

Researchers are asking Alaskans to submit ticks to help determine which tick species are currently in the state. Tick submissions will also help us learn more about how ticks are being imported into Alaska so that we can create effective strategies to limit their introduction. Ticks can transmit bacteria, parasites, and viruses that can cause diseases in humans and wildlife. Pathogen testing allows us to assess [tickborne disease](#) risk in the state.

Which ticks have been found in Alaska?

The [results of our tick surveillance program](#) are now available. We periodically update these results as we receive ticks so check back for the latest information!

Submit-A-Tick!

It is only through the help and participation of people like you that this surveillance effort will be successful.

If you are interested in submitting a tick that you have found, follow the steps below.

QUICK TICK LINKS

- [Information on Ticks](#)
- [Is This a Tick?](#)
- [Tick Identification](#)
- [Tick Removal](#)
- [Tickborne Diseases](#)
- [Submit-A-Tick Program](#)
- [Alaska Tick Surveillance Results](#)
- [Tick Outreach Ministries](#)

Alaska Submit-A-Tick Form

<http://dec.alaska.gov/eh/vet/ticks/submit-a-tick/>

State of Alaska Submit-A-Tick Form

This form should be used to submit ticks that have been found in Alaska on people, wildlife, pets, or in the environment. Ticks that are submitted through this program will be included in a long-term database of ticks found in the state. Tick identification and lab testing is most effective on fresh samples, so we ask that you send in your submissions as quickly as possible. Individuals interested in receiving notification regarding tick identification of submitted specimens should include their contact information below. This service is ONLY for surveillance purposes, NOT for diagnostic purposes.

Method of submission: Direct mail to Office of the State Veterinarian

Drop-off: Office of the State Veterinarian Alaska Department of Fish and Game Office: _____ (Which location?)

Veterinarian: _____ (Clinic name) Other: _____

Instructions for tick submission

1. Put the tick into a clean, small plastic or metal container (i.e., vial or small pill bottle).
2. Place the container into a Ziploc bag. Place the bag in an envelope or small box for shipping.
3. Complete this form and mail it with the tick to the Office of the State Veterinarian: 5251 Dr. Martin Luther King Jr. Drive, Anchorage 99507

OR

Deliver (both the form and tick) to a local Alaska Department of Fish and Game office or veterinarian.

Find your nearest ADFG office here:
<http://www.adfg.alaska.gov/index.cfm?adfg=contacts.main>

OFFICE USE ONLY

Intake ID: | | | | | | | | | | | | | | | |

Number of ticks in sample: _____

Date Processed: _____

Notes:

Please provide the following information about your tick submission:

Date the tick was collected: _____

Describe the geographic location where you or your pet likely encountered the tick or the location where you found the wildlife (landmarks, GPS coordinates, address, zip code, etc.):

Tick was found on: Human Dog Cat Other animal: _____

Environment (describe where you found tick): _____

If the tick was found on a person or an animal, was the tick attached (feeding)? Yes No

Has anyone in your household (including pets) traveled outside Alaska in the past 2 weeks?

No Yes, where? _____

Approximate dates of travel? Leave _____ Return _____

Has anyone in your household (including pets) traveled within Alaska in the past 2 weeks?

No Yes, where? _____

Approximate dates of travel? Leave _____ Return _____

Additional information (optional):



Contact information for the individual or household submitting ticks
(optional, but necessary if you would like to receive tick identification)

Name _____

Phone _____

E-mail _____

Thank you for your submission.

We will contact the submitter for more information if needed. Tick identification results will be sent to the email address provided, or we will call with identification results if no email address is provided on this form. For questions about this form, please contact the project team at alaskaticks@alaska.edu. Additional information about ticks and tick-borne diseases in Alaska can be found at <http://dec.alaska.gov/eh/vet/ticks>.

Materials for targeted outreach





TOGETHER WE CAN DEFEAT INVASIVE TICKS IN ALASKA

CHECK YOUR PET FOR TICKS

TRAVELING OUT OF STATE WITH THE FAMILY PET? BE SURE TO CHECK THEM FOR TICKS BEFORE FLYING BACK.



VISIT YOUR LOCAL VETERINARY CLINIC FOR MORE INFORMATION OR GO TO [HTTP://DEC.ALASKA.GOV/EH/VET/TICKS](http://dec.alaska.gov/eh/vet/ticks)

Pet owners





• TICKING TIME BOMB •

ALASKA SUBMIT-A-TICK



NATIVE TICKS

Many Alaskan residents don't know that Alaska is home to one native tick species. This tick generally preys on squirrels and hares.



NON-NATIVE TICKS

Although there is a native tick species, some non-native species have been found in Alaska, which could be problematic to the environment.



MIGRATORY BIRDS

Birds that migrate have a high chance of picking up ticks in different areas around the world and dropping them off in Alaska.



PET CHECK

When traveling, it's important to check your pet for ticks before returning to Alaska. You can even ask your vet to check your pet, when you return!



MORE INFORMATION

For more information on non-native tick species in Alaska, go to <http://dec.alaska.gov/eh/vet/ticks>



PROTECT NATURE

Together we can protect the environment and wildlife in Alaska by tracking non-native tick species that may be trying to establish a presence.

General Public



TICKS IN ALASKA

Ticks are common in many parts of the world, including Alaska. However - several new tick species have been found in Alaska. Many of these new tick species bite humans and domestic and wild animals and are capable of transmitting diseases.

What are we doing to monitor ticks in Alaska?

The University of Alaska is working with the Alaska Department of Fish and Game and the Office of the State Veterinarian to monitor ticks and tick-borne diseases in Alaska. Monitoring provides information about the risk of tick exposure in Alaska and helps identify where in the state ticks are present.

Anyone can contribute to ongoing efforts by submitting found ticks through the Alaska Submit-A-Tick program.

For more information, visit: <http://dec.alaska.gov/eh/vet/ticks>

SAFE TICK REMOVAL



- Use fine-tipped tweezers to grasp the tick as close to the skin's surface as possible.
- Pull upward with steady, even pressure. Avoid twisting or jerking the tick.
- After removing the tick, clean the bite area and your hands with rubbing alcohol, or soap and water.
- Place the tick in a clean sealed bag or container, and submit it through the Alaska Submit-A-Tick Program.

CHECK FOR TICKS



- Hair and ears
- Neck
- Under arms
- Around waist and back
- Between legs and back of knees
- Feet and between toes

Find a tick? Submit it!

Reverse for details

General Public





General Public

SUBMITTING A TICK

1. Put the tick in a clean, small container (e.g. vial or small pill bottle).
2. Download and fill out the Submit-A-Tick form from <http://dec.alaska.gov/eh/vet/ticks>
3. Place the container and completed form in an envelope or small box for mailing.
4. Mail to the Office of the State Veterinarian:

**5251 Dr. Martin Luther King Jr. Drive,
Anchorage, AK 99507**

Or drop off tick and submission form at your local ADFG office

How else can you contribute?

Local observations can help track environmental factors that influence tick and tick-borne pathogens. The Local Environmental Observer (LEO) Network is an organization of local observers and topic experts who share information about unusual animal, environment, and weather events. Participants can share observations and raise awareness about environmental changes.

Ticks and their hosts are greatly influenced by climate and other drivers of change. Timely reporting of environmental events, such as spotting a mule deer in the Interior (which can host ticks) or a moose with hair loss, can help support ongoing research.

How to submit an observation to the LEO Network

- Go to leonetwork.org or download the LEO Reporter App (available for iPhone)
- Join the LEO Network and set up a personal profile
- Click the 'Submit Observation' button



Left photo: Dead hare infested with ticks found in Fort Yukon, Alaska



Right photo: Moose with hair loss, which could be a result of an infestation of ticks.



LEO Observations

Submitting tick observations and even non-tick observations can help out tremendously!

With observation submissions + pictures, professionals can respond accordingly

Calling all biologists!

Going out into the field? Want to help with active sampling?

When you submit ticks, we can learn what kinds of ticks are feeding on Alaskan wildlife and if they are carrying any pathogens.

Request a field kit today via uaa_alaskaticks@alaska.edu

Tick Collection Guide for Small and Large Mammal Biologists



Ticks in Alaska can be found on small and large mammals, and birds. Small and large animal movement creates opportunities for tick and tick-borne pathogen dispersal. Moreover, wildlife can be reservoirs of tick-borne pathogens that cause disease in humans and animals. In Alaska, the arrival of the winter tick (*Dermacentor albipictus*) is a major concern. This tick multiplies rapidly on moose hosts, leading to substantial infestations that cause anemia and hair loss. The moose tick has been found in the Yukon on elk, moose, mule deer, and other wildlife. The migration of mule deer into the Interior of Alaska from Canada may bring moose tick into the state.

The Office of the State Veterinarian, Alaska Department of Fish & Game, and researchers at the University of Alaska are working together to understand the role of ticks and tick-borne pathogens in Alaska. The **Alaska Submit-A-Tick Program** collects tick submissions from the public, veterinarians, and wildlife biologists for species identification and pathogen testing. Tick submissions are included in a long-term database of ticks found in the state.

We recognize that tick collection is an additional task during a busy field season and appreciate your contribution to this surveillance effort. This guide was developed to assist with the collection and submission process of ticks found on mammals.

Screening small and large mammals for ticks

When searching for ticks on mammals, take extra care to look near the ear canals, nape, mandibular area, perimeter of the eyes, and feet of each animal. Ticks may be attached (i.e. feeding) or unattached. Attached ticks will likely be engorged and more visible than unattached ticks. Ticks go through three life stages (larva, nymph, and adult), and they look slightly different at each stage. Ticks are very small. Adult ticks are about the size of an apple seed, nymphs are about the size of a poppy seed, and larva are the size of a grain of sand. If you aren't sure if what you found is a tick, feel free to send it in, and we will identify it for you.



Tick removal and collection

1. Comb through the mammal's fur with your fingers to find ticks. Part fur so you can see the skin surface.
2. Using fine pointed tweezers, pluck off each tick. Gently grasp the tick as close to the skin's surface as possible, and pull upward with steady, even pressure. Do not twist or jerk the tick because this can cause the mouthparts to break off and remain in the skin.
3. Place dislodged ticks into a vial. Other clean, hard-sided containers can be used. Ziploc bags will work in a pinch, but it is easier for ticks to be crushed during transport.

Note that **multiple ticks** can be placed in the same vial (or container) if they are from the **same animal**. Please put ticks from different animals into different containers. If you are submitting multiple vials, be sure to number each vial and include the number on the submission form.

4. Fill out the *Alaska Submit-A-Tick form*. This form can be found below or at <http://dec.alaska.gov/eh/vet/ticks>. If you have ticks from more than one animal, record your contact information on the *Submit-A-Tick form* and then use the *Biologist Extension form* to record the information about tick submissions.

5. Send ticks and completed forms to the Office of the State Veterinarian: 5251 Dr. Martin Luther King Jr. Drive, Anchorage, AK 99507

Thank you for your participation! Contact us at alaskaticks@alaska.edu to request sample vials, shipping materials, or if you have any questions.

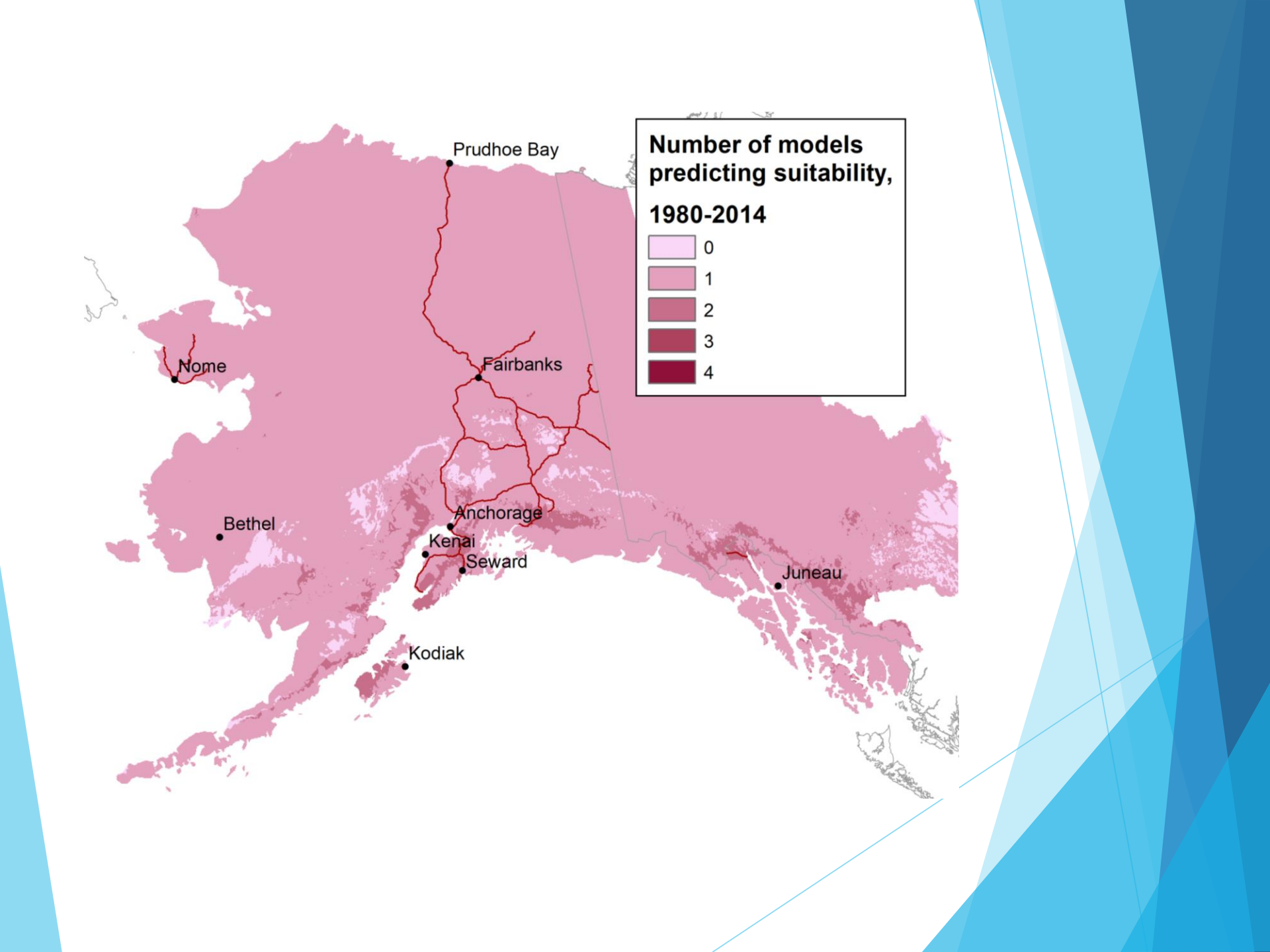
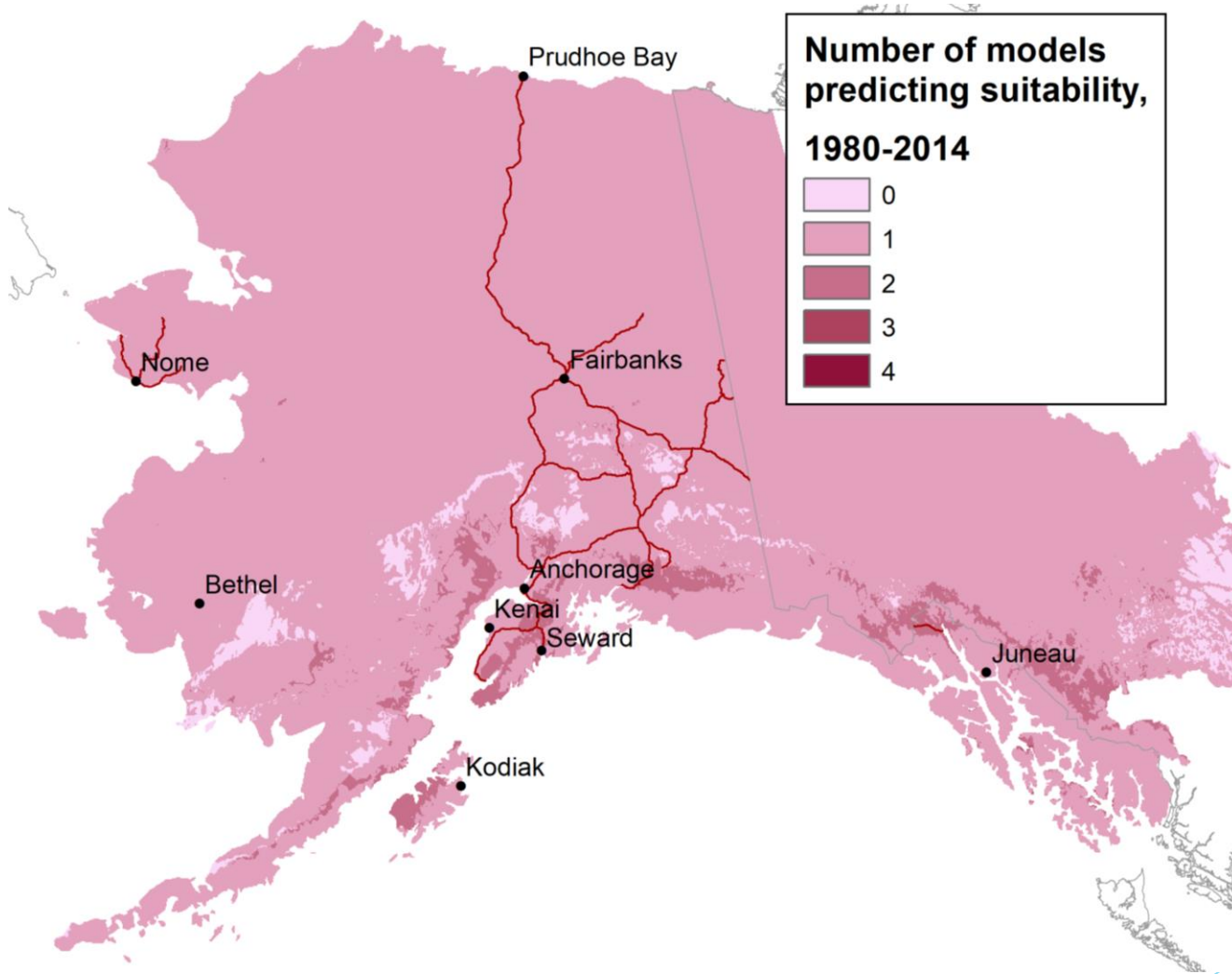
The Winter tick has been found on wildlife in the Yukon. If you see a moose with hair loss, note the location, take a photo if possible, and immediately contact Dr. Kimberlee Beckmen (kimberlee.beckmen@alaska.gov) or ADF&G



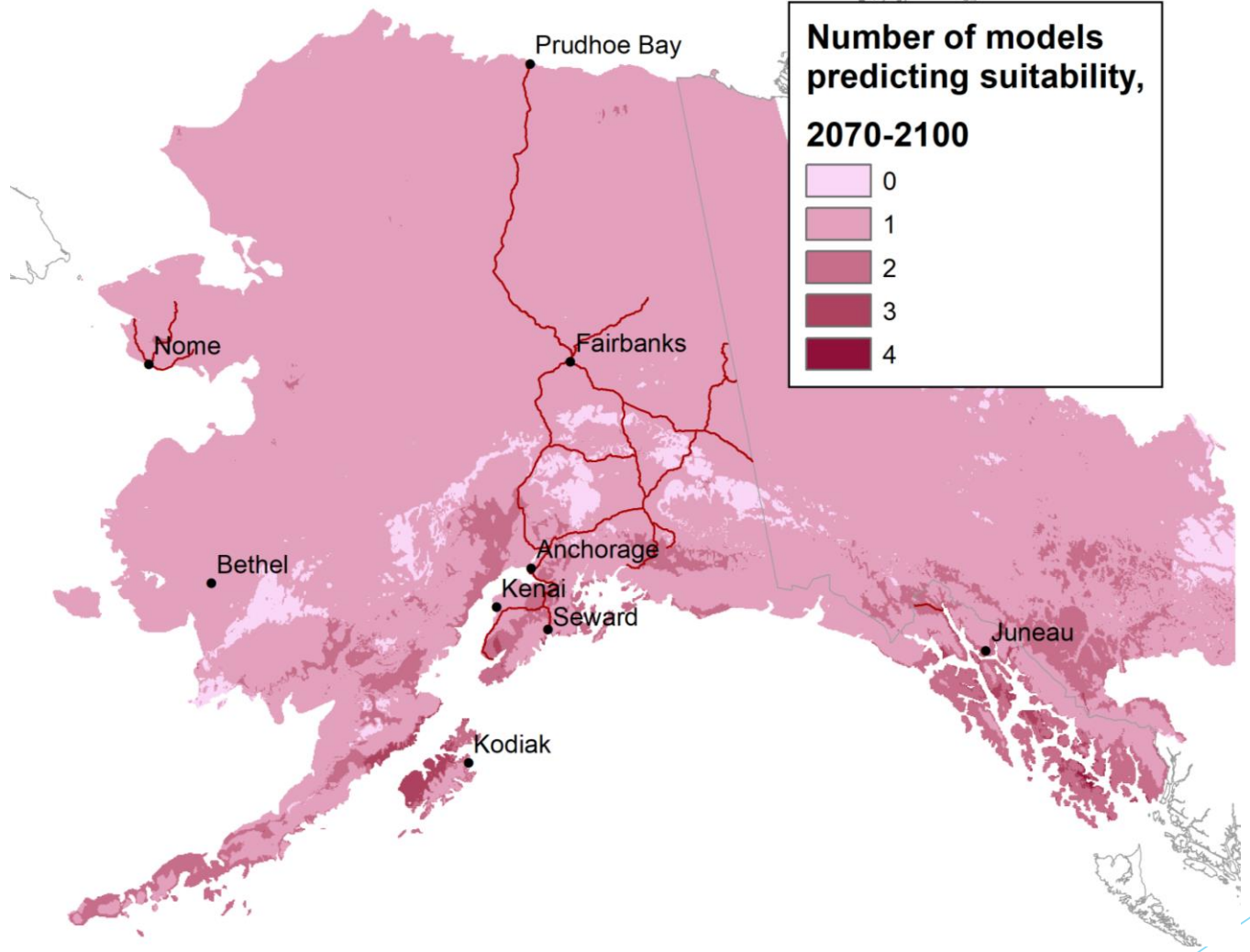
Modeling

Tick habitat suitability modeling

- ▶ **Goal** is to determine areas that can support medically important ticks, both under the current climate and in the future (shorter and warmer winters are conducive to several tick species)
- ▶ Focus on 2 species: *Ixodes pacificus* (western black-legged tick) and *Ixodes scapularis* (black-legged tick)



**Number of models
predicting suitability,
2070-2100**



Key Implications

- What is the current risk of being exposed to a tick-borne disease in Alaska?
- Are non-native ticks establishing populations in Alaska?
- Are there non-native ticks in Alaska that will affect our wildlife populations?
- Where in the state should we target our tick surveillance efforts?
- When should I test patients for tick-borne diseases?
- *How effective are community monitoring programs for helping us detect emerging human and animal health threats?*



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