

Alaska Tick Surveillance Annual Report | 2019

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Background

The geographic range of many tick species has expanded substantially due to changes in climate, land use, and animal and human movement. Additionally, recent records of new tick species found on people and pets in Alaska suggests that non-native ticks are being imported. Rapid ecological change in the state has raised the concern regarding the emergence of vector-borne disease threats to public and wildlife health. This report summarizes information gathered through the passive surveillance associated with the Alaska Submit-A-Tick Program, as well as the active surveillance conducted by the UAA project team during the summer of 2019.

Development of the Alaska Submit-A-Tick Program

In 2019, we established a systematic, statewide passive surveillance system to collect ticks in Alaska. Through the “Alaska Submit-A-Tick Program,” the public, veterinarians, clinicians, and biologists can voluntarily submit ticks that they find on themselves, a family member, a pet, in the environment, or on wildlife to the Office of the State Veterinarian for species identification and pathogen testing. Submitters have the option to request species identification results. With each tick submission, we request information on the date of collection, host, probable location of tick encounter, and history of travel inside or outside of Alaska of anyone or any pet within a submitter’s household within the two weeks prior to submission. Submitted ticks are morphologically identified to species, life stage, and sex. Pathogen testing is the next phase of the surveillance program.

Key components of the surveillance program include 1) a program website where the public can access information on how to identify ticks, how to safely remove a tick, and how to submit a tick to the program (<https://dec.alaska.gov/eh/vet/ticks>), 2) a standardized surveillance form that accompanies tick submissions, and 3) targeted outreach materials to increase awareness of the program. Tick submissions can be dropped off or mailed to the Office of the State Veterinarian in Anchorage. They can also be submitted to local Alaska Department of Fish and Game offices. This approach was essential for ensuring a broad geographic reach across Alaska.

Active surveillance for ticks

We selected 10 recreational sites in southcentral Alaska to conduct drag sampling for ticks. We chose parks and campgrounds with trails, off-leash dog parks, and forested areas in order to target locations with substantial overlap between human, dog, and wildlife activity. The five sites in Anchorage were Far North Bicentennial Park, University Lake Park, Ruth Arcand Park, Connors Lake Park, and Kincaid Park. On the Kenai Peninsula, we sampled Centennial Park in Soldotna, Hidden Lake Campground in the Kenai National Wildlife Refuge, Slidehole Campground in Anchor Point, and Jack Gist Park in Homer. The tick sampling location within each recreational site was selected through discussion with the natural resources manager in each jurisdiction who was familiar with high-use forested areas in the parks.

We drag sampled for ticks every two weeks between 24 May and 28 September 2019. We chose these dates to coincide with a likely peak in questing activity of the multi-host hard tick species previously reported in Alaska. We sampled for ticks by dragging a 1-m² cloth made of rubber-bonded cotton fabric with a rope attached to a 48” dowel inside the top edge. Weighted “fingers” were sewn to the bottom half of the drag in order to sample near the ground. We dragged 1,000 m² in each recreational site.

During each sampling session, we completed an observational assessment to collect information on environmental features that could influence the density of ticks. We collected temperature, humidity, and the wind speed at the time of tick dragging, measured canopy cover

density, and noted the average height of the groundcover and presence of small and large mammals, birds, and dogs.

From September to October, we implemented a mark-recapture protocol at the five parks in Anchorage and two additional sites at Far North Bicentennial Park. At every site, we deployed 100 Sherman traps and six Tomahawk traps, and collected vegetation data including plant community composition at the site level and dominant species at the trap level. Traps were open for two nights.

Main findings:

- In 2019, there were 232 records collected representing 522 individual ticks. The number of tick records in 2019 was more than double the number collected in the previous year, likely reflecting the increase in awareness of ticks and the program.
- The majority of ticks (45.8%) submitted were *Ixodes angustus*.
- Of the 232 tick records in 2019, most were found on animals (41% on domestic animals and 44% on wildlife). Other submitted ticks were found on humans (9%) and in the environment (7%).
- The largest number of records were from May-August, peaking in July.
- Ticks were received from all six Alaska Public Health Regions in 2019 with most ticks from the Interior region (n=160, 31%), Anchorage (n=109, 21%), the Gulf Coast (n=78, 15%), and Southwest (n=67, 13%).
- In 2019, 11 non-native ticks were submitted from hosts without recent travel history. No tick species met the criteria for establishment in any borough.
- Active surveillance in Anchorage, including tick drags and small mammal trapping yielded two adult *I. angustus*.

Results

In 2019, there were 232 records representing 522 individual ticks (Table 1).¹ Non-native ticks (including *Amblyomma americanum*, *Dermacentor andersoni*, *D. variabilis*, *Ixodes pacificus*, *I. ricinus*, *I. scapularis*, *I. texanus*, and *Rhipicephalus sanguineus*) accounted for 15% (n=34) of the records. In the first year of the Alaska Submit-A-Tick Program, we received specimens of 13 tick species. The majority of tick records were submitted by the public (n=123, 53%) followed by biologists (n=68, 29%), and veterinarians (n=37, 16%). Human health professionals submitted 4 records (2%).

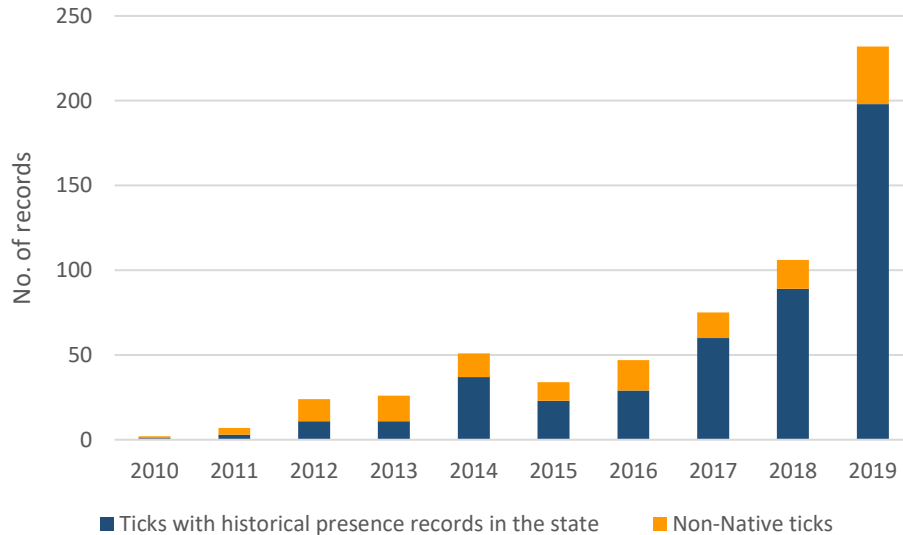
Table 1. Number of ticks recorded in Alaska in 2019

Species	Total ticks
Tick species with historical presence records in Alaska	
<i>Haemaphysalis leporispalustris</i>	142
<i>Ixodes angustus</i>	239
<i>Ixodes auritulus</i>	1
<i>Ixodes signatus</i>	11
<i>Ixodes uriae</i>	84
Non-native tick species	
<i>Amblyomma americanum</i>	12
<i>Dermacentor andersoni</i>	3
<i>Dermacentor variabilis</i>	12
<i>Ixodes pacificus</i>	2
<i>Ixodes ricinus</i>	1
<i>Ixodes scapularis</i>	8
<i>Ixodes texanus</i>	4
<i>Rhipicephalus sanguineus</i>	3

The total number of tick records collected each year has increased over the past 10 years, with the largest increases in the records of tick species that have historically been present in the state (Figure 1). Much of this increase is likely due to increased awareness of ticks and promotion of the Alaska Submit-A-Tick Program.

¹ These numbers include ticks submitted from both JBER and UAA tick drags and small mammal trapping.

Figure 1. Number of tick records collected in Alaska from 2010-2019

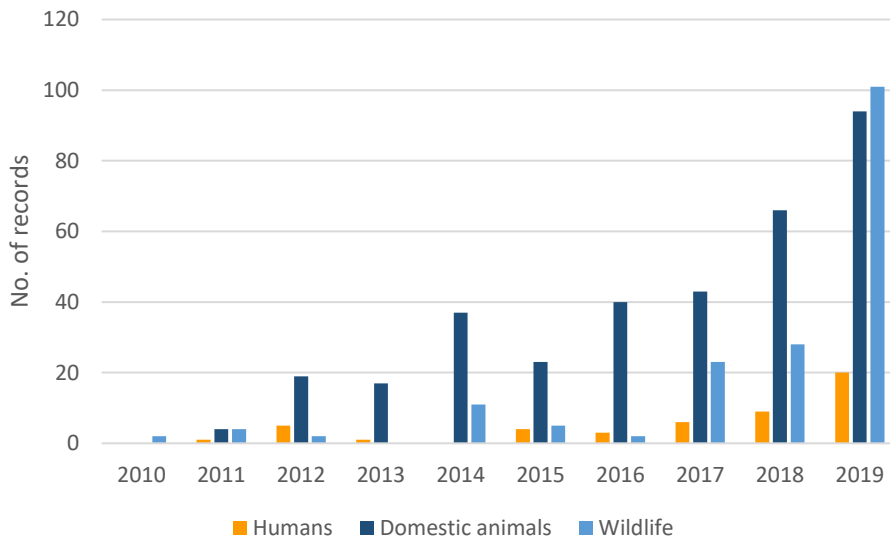


Host information

In 2019, the most common host for reported ticks was domestic animals (n=94 records, 41%) followed by small wild mammals (n=77 records, 33%), wild birds (n=24 records, 10%), and humans (n=20 records, 9%). A small number of ticks were found off of a host in the environment (n=16 records, 7%) in places like a bed or in nesting materials of bird colonies. Only one record was missing host information.

Over the past 10 years, the number of ticks submission from domestic animals and wildlife has increased the most substantially (Figure 2).

Figure 2. Submissions by host

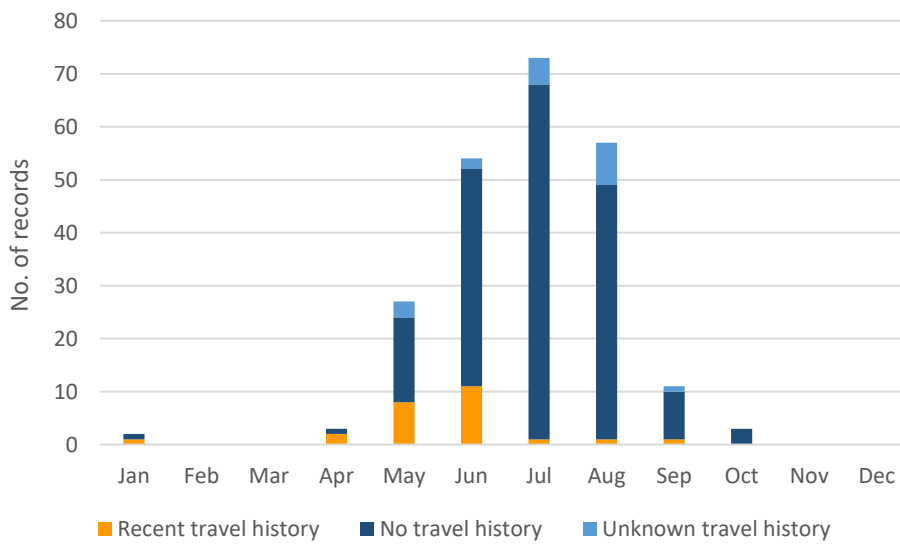


Seasonality and travel history of hosts for submitted ticks

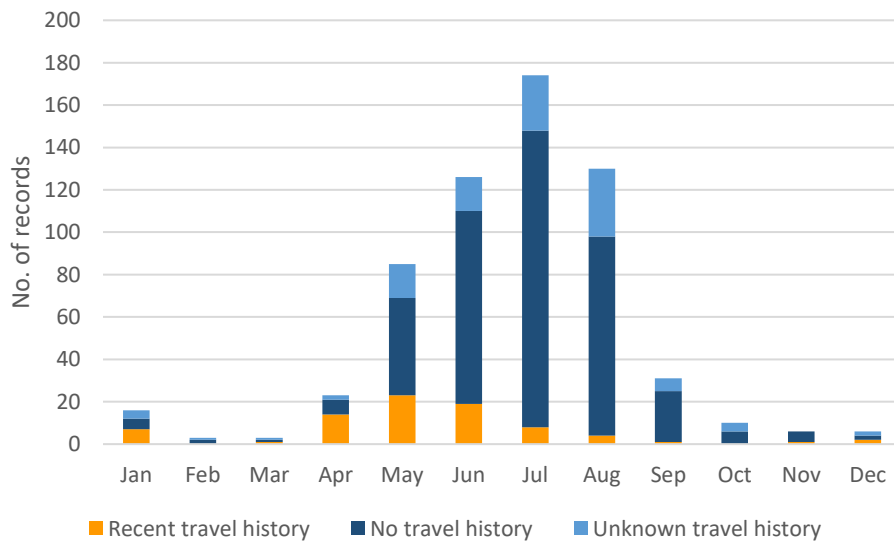
In 2019, most ticks were submitted between May and September, with a distinct peak in June—August (Figure 3). The peak of travel-related tick submissions was slightly earlier in the year compared to overall tick submissions. Travel-related tick submissions occurred in most months except February, March, November, and December with the largest number of submissions in May—August. These trends were similar to the trends in submissions between 2010-2019.

Figure 3. Seasonality of travel in a) 2019 and b) 2010-2019

A) 2019



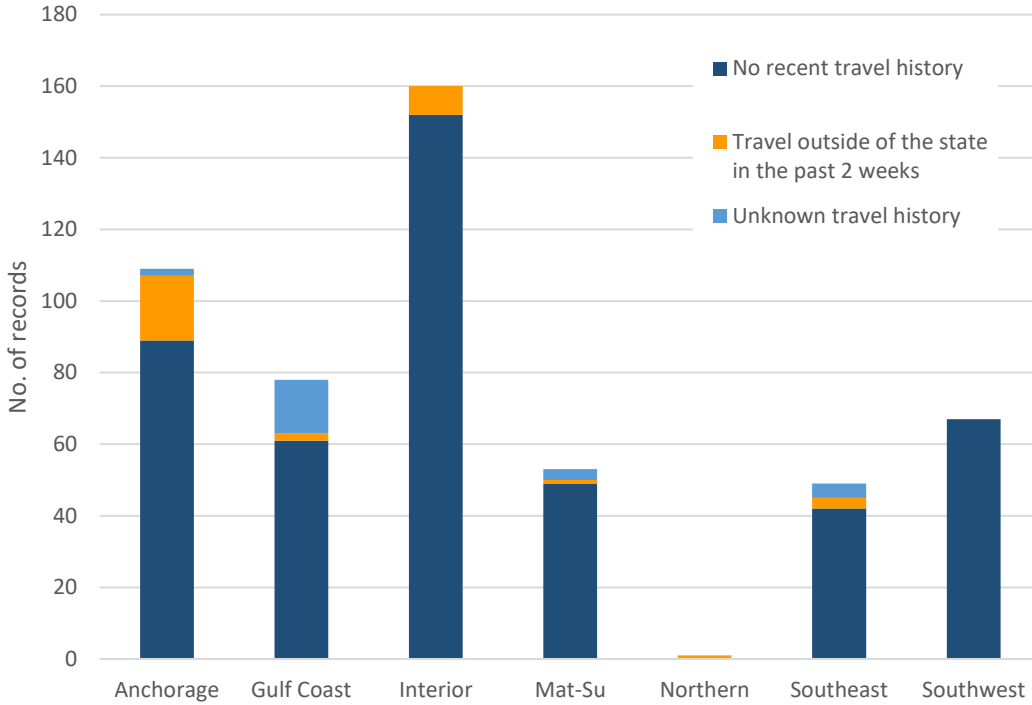
B) 2010-2019



Tick submissions by geographic region

The Alaska Submit-A-Tick program received ticks from all six Alaska Public Health Regions in 2019 (Figure 4). While the largest percentage of found ticks came from the Interior Region (n=160, 31%), the program received substantial numbers of ticks from other regions, including Anchorage (n=109, 21%), the Gulf Coast (n=78, 15%), and Southwest (n=67, 13%). A similar amount of ticks were found in the Southeast Region (n=49, 9%) and Mat-Su (n=53, 10%). Only one tick was found in the Northern Region of Alaska.

Figure 4. Tick submissions by Alaska Public Health Regions



Evaluation of establishment criteria

In order to be considered *established* and reproducing locally, two or more life stages or 6 individuals of a particular tick species need to be found in a borough in a single year from a host without travel history outside of the state in the prior two weeks. In 2019, 11 non-native ticks were submitted from hosts without recent travel history (Table 2). No tick species met the criteria for establishment in any borough.

Table 2. Number of non-native ticks submitted to the Alaska Submit-A-Tick Program in 2019 from hosts that had not traveled out of state in the prior two weeks by borough and life stage (A=adults, N=nymphs, L=larvae, Tot = total ticks).

Year	Anchorage				Fairbanks North Star				Kenai Peninsula				Matanuska-Susitna				Southeast Fairbanks			
	A	N	L	Tot	A	N	L	Tot	A	N	L	Tot	A	N	L	Tot	A	N	L	Tot
<i>Dermacentor variabilis</i>	1	--	--	1	--	--	--	--	1	--	--	1	2	--	--	2	2	--	--	2
<i>Ixodes pacificus</i>	1	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
<i>Ixodes texanus</i>	--	--	--	--	--	--	--	--	1	--	--	1	--	--	--	--	--	--	--	--
<i>Rhipicephalus sanguineus sl</i>	1	--	--	1	2	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--

Active surveillance results

Each field site was visited every other week, during which time 1m² tick flags were slowly dragged over vegetation/leaf litter, stopping to check the flags for ticks every 10m. A total sample area of 1,000 m² was sampled during per site per visit. Some sampling days were cancelled because of weather or wildfire-related circumstances.

Two adult *I. angustus* ticks were collected through tick dragging in 2019 at Kincaid Park (female; collected in June) (Figure 5) and Hidden Lake Campground (male; July). All Anchorage and the Kenai Peninsula field sites will be resampled in June-August 2020.



During small mammal trapping, we captured 95 individuals, including 11 recaptures, across four species: tundra vole (*Microtus oeconomus*), house mouse (*Mus musculus*), northern red-backed vole (*Myodes rutilus*), and cinereus shrew (*Sorex cinereus*). Northern red-backed voles and cinereus shrews comprised 62 percent and 32 percent of our unique captures, respectively. The sites with the most captures had high abundance of tall grass (mostly *Calamagrostis canadensis*). We did not see ticks on any of the small mammals we collected. We will repeat the mark-recapture assessment at these sites in June-Aug 2020.

Figure 5. Adult, female *I. angustus* collected at Kincaid in 2019.

Discussion

Accurate and timely records of the distribution of tick species and host associations are critical for developing clinical and public health guidelines for tick-borne disease prevention. Most of the tick submissions from the first year of the Alaska Submit-A-Tick Program were from the public, followed by biologists, and veterinarians. Veterinarians and clinical care providers are important contributors to the tick surveillance program because they are often the first point of contact for people who find a tick on their self, a family member, or a pet. In Alaska, biologists who regularly interact with wildlife are key resources for sentinel surveillance for ticks, particularly in wilderness areas where humans and domestic animals may rarely come into contact with ticks.

While the number of tick encounters in Alaska will likely continue to rise, the risk of tick-borne disease remains low. There have been no reported cases of locally acquired tick-borne diseases in humans in the state. While some Alaskan native tick species are known vectors of human pathogens, these species tend to feed on wildlife and stay close to the nest of their hosts. We do not currently have an estimate of the prevalence of tick-borne pathogens in the Alaskan tick or wildlife population.

We found no records of *D. albipictus*, the winter tick, in this study. This tick has been found in western Canada and has caused severe morbidity and mortality in moose in the northeastern United States. A decrease in the Alaskan moose population would negatively impact an important food resource for many residents, particularly those living in rural areas. Outreach to hunters and trappers with information on where to look for ticks on a variety of mammalian wildlife such as moose, wolves, foxes, bears, and caribou may provide an early warning of newly imported tick species.

Tick encounters while traveling out of state to tick endemic areas continue to be a public health concern for Alaskans. Before traveling out of state, particularly if traveling with a pet, check the Centers for Disease Control and Prevention tick distribution maps (https://www.cdc.gov/ticks/geographic_distribution.html) to see if ticks are a concern in your destination. Wearing long pants and DEET when spending time outdoors in the summer months in these areas will likely be the best way to avoid tick bites. Check with your veterinarian about putting your pet on flea and tick prevention before travel out of state. Do a thorough tick check on yourself, your family members, your pets, and your luggage before returning to Alaska.

Conclusion

While the risk of tick bites and acquiring a tick-borne disease in Alaska remains low, new tick species may be arriving and establishing in the state. Monitoring tick distributions through the Alaska Submit-A-Tick Program will likely be the most resource-effective method for collecting and disseminating up-to-date information to clinicians, veterinarians, and the public. Alaskans should become familiar with identifying ticks, and clinicians and veterinarians should review common tick-borne disease symptoms. Continue to take precautions to avoid tick bites when traveling to tick endemic areas, and do tick checks on yourself and your pets before traveling back to Alaska. Biologists who spend time in the field in the summer should also check for ticks on themselves at the end of each field day, particularly if handling wildlife regularly. We will continue the Alaska Submit-A-Tick Program in 2020. Please send all ticks to the Alaska Office of the State Veterinarian.

For a historical overview of tick surveillance in Alaska, please see:

Hahn MB, Disler G, Durden L, Coburn S, Witmer F, George W, Beckmen K, and R Gerlach. (In review). Establishing a baseline for tick surveillance in Alaska: Tick collection records from 1909-2019. *Ticks and Tick-borne Disease*. 11(5).

Acknowledgements

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