

County-Level Distribution of Ixodes and Lyme Disease Spirochetes in US

This new summary article by employees of the CDC, presents the first county-level map of the distribution of Lyme disease spirochetes in host seeking *Ixodes* ticks between 2004-2019 in the contiguous United States. Data compiled for this summary was from literature searches; publicly available tick-borne pathogen surveillance databases (ArboNet Tick module); and internal CDC pathogen testing databases to map the county-level distribution of Lyme disease spirochetes reported in host-seeking *Ixodes pacificus* and *Ixodes scapularis* across the contiguous US.

Investigators narrowed their search to include only host-seeking ticks, because ticks in this state are most likely to bite humans, and because host-seeking ticks provide enhanced spatial precision compared to ticks collected from mobile hosts. Data used was restricted to studies that collected ticks by flagging, dragging or CO2 Traps. Ticks that were collected from mobile hosts such as wildlife, pets, and livestock were excluded because county of exposure could not be confirmed. County level pathogen infection data was included from these sources when provided.

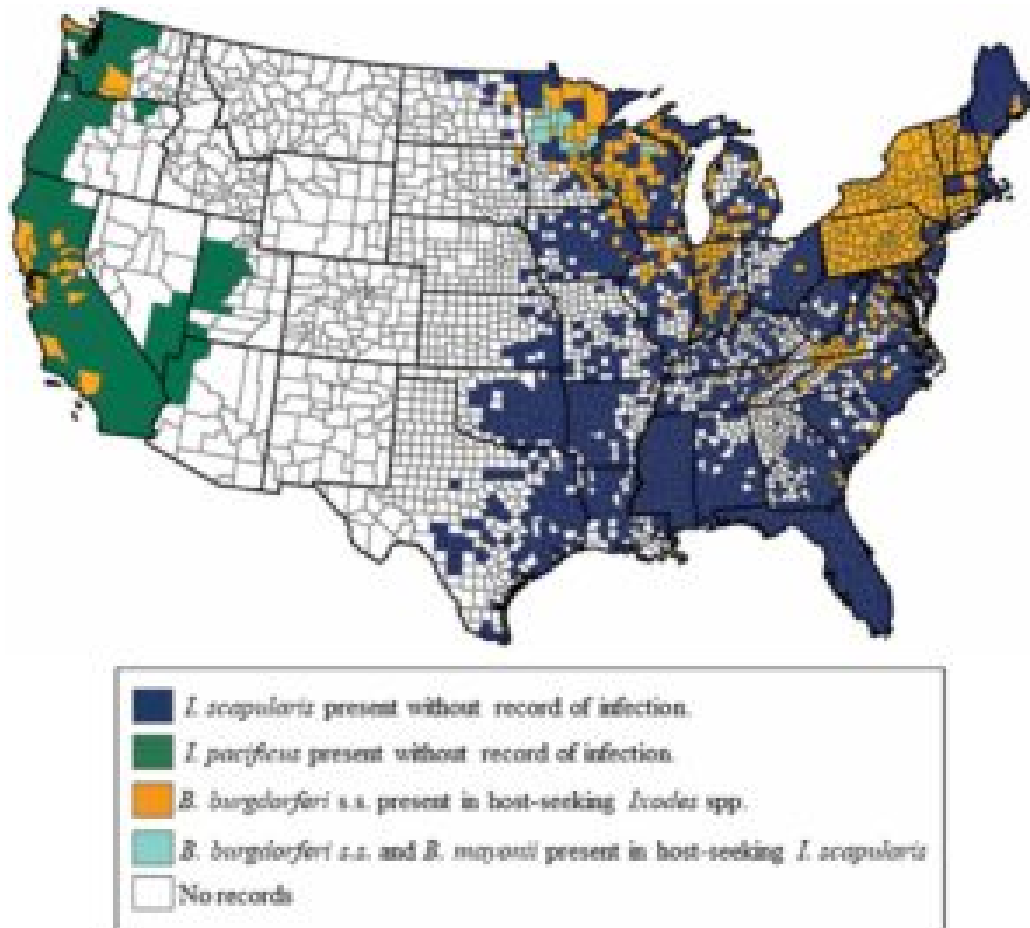
Authors report *B. burgdorferi* s.s. infected *I. scapularis* from 384 counties in 26 eastern states of the Northeastern, North Central and Mid-Atlantic regions. *B. burgdorferi* s.s. infected *I. pacificus* were reported from 20 counties 2 western states, primarily from northern and north-coastal California. *Borrelia mayonii* was reported in *I. scapularis* in 10 counties in Minnesota and Wisconsin, where records of *B. burgdorferi* s.s. were also reported.

Important caveats that the authors state in regard to this mapping effort:

- "The reported distribution of *B. burgdorferi* s.s and *B. mayonii* in host seeking ticks is almost certainly an underestimate of the actual distribution of these disease agents."
- "Though support for and participation in tick and tick-borne pathogen surveillance has increased in the US in recent years, collection and pathogen testing efforts have been limited with most efforts focused on US regions where Lyme disease cases are most commonly reported."
- "In some instances, lack of records could represent lack of sampling effort or low prevalence of pathogens within sampled tick populations."

The authors were confident in the distribution of tick presence records, but for counties where Lyme disease spirochete has not been documented in ticks, they were unable to determine whether this represented a true absence of pathogen or a merely a failure to detect the pathogen. Lack of data is especially evident in the Rocky Mountain region, Western plains and Southwestern region in regard to both tick presence and pathogen detection; and in the Southeastern region and Western states for pathogen detection. Continued surveillance and reporting will likely result in additional counties to be added to the map, and reporting densities of infected host-seeking ticks for many jurisdictions may be possible in the future.

In comparison to a broad distribution of vector ticks, the resulting map shows a more limited distribution of Lyme disease spirochetes.



Reported distribution of Lyme disease spirochetes, *B. burgdorferi* s.s. and *B. mayonii* in host-seeking *I. scapularis* (eastern United States) or *I. pacificus* (western United States), relative to the previously reported distribution of these vector species. Ticks were considered present in a county if at least one tick was recorded (Eisen et al. [2016] or CDC [2020]). Counties where ticks have been reported without records of infection may be reported as such either if ticks were not tested or if the pathogen was not detected in tested samples.

LDA NOTE: Contained in the journal article: This work is written by (a) US Government employee(s) and is in the public domain in the US.

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Amy C Fleshman, Christine B Graham, Sarah E Maes, Erik Foster, Rebecca J Eisen, Reported County-Level Distribution of Lyme Disease Spirochetes, *Borrelia burgdorferi sensu stricto* and *Borrelia mayonii* (Spirochaetales: Spirochaetaceae), in Host-Seeking *Ixodes scapularis* and *Ixodes pacificus* Ticks (Acari:Ixodidae) in the Contiguous United States, *Journal of Medical Entomology*, 2021;tjaa283, <https://doi.org/10.1093/jme/tjaa283>

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