2017 Tick Surveillance Report

Marin/Sonoma Mosquito and Vector Control District March 2018

In 2017, the Marin/Sonoma Mosquito and Vector Control District (the District) laboratory staff collected a total of 521 *Ixodes pacificus* ticks. These ticks were tested for both *Borrelia burgdorferi*, the causative agent of Lyme disease, and *Borrelia miyamotoi*, a bacterium closely related to the spirochete that causes tick relapsing fever, resulting in a similar illness.

Ticks were collected mainly along trails at Marin and Sonoma County regional parks, with limited collection at state parks and the Golden Gate National Recreation Area.

Questing Tick

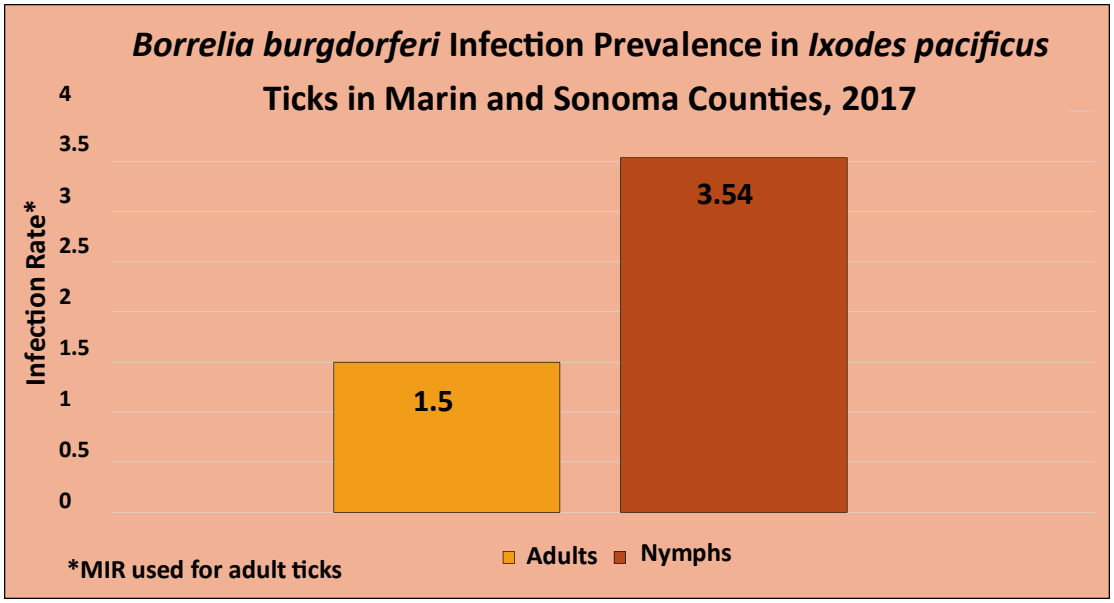
Flagging

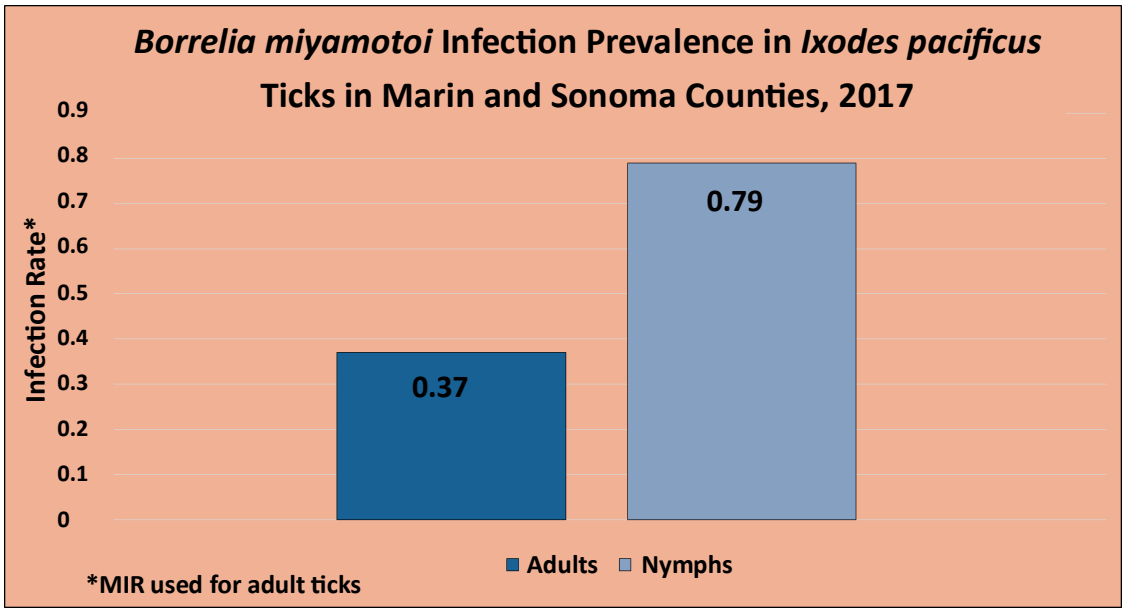
Ticks were collected by a method called flagging, in which a flannel sheet is dragged over the grass bordering a trail. Questing ticks attach to the flannel, then are placed in vials and brought to District headquarters for testing.

All ticks were tested by Real-Time Polymerase Chain Reaction (RT-PCR) using multiplex chemistry, which makes it possible to detect the DNA of more than one pathogen at a time. Adults were grouped by sex and collection site, and tested in pools of between 1 and 5 ticks. This yielded a Minimum Infection Rate (MIR) for adult ticks, which is equal to the number of positive pools divided by the total number of ticks tested, multiplied by 100.

Due to a higher expected rate of infection among nymphs, nymphal ticks were tested individually, which yielded an Infection Rate (IR). This rate is equal to the number of positive nymphs divided by the total number of nymphs tested, multiplied by 100.

District-Wide Tick Testing Results





*Minimum Infection Rate (MIR) = Number of Positive Pools/Total Number of Ticks Tested x 100

Tick Testing Results for Sonoma County

Sonoma County Adult Ticks Tested in 2017

Location	Ticks Tested	Pools Tested	*B. burgdorferi* Pos. Pools (MIR)	*B. miyamotoi* Pos. Pools (MIR)
Crane Creek RP	12	4	0	0
Helen Putnam RP	39	11	0	0
Hood Mt. RP	95	26	3 (3.2)	0
Foothill RP	1	1	0	0
N. Sonoma Mt. RP	4	1	0	0
TOTALS	**151**	**43**	**3 (2.0)**	**0**

Sonoma County Nymphal Ticks Tested in 2017

Location	Ticks Tested	*B. burgdorferi* Pos. Ticks (IR)	*B. miyamotoi* Pos. Ticks (IR)
Helen Putnam RP	1	0	0
Hood Mt. RP	45	2 (4.4)	0
Foothill RP	1	0	0
Howarth Park	1	0	0
TOTALS	**48**	**2 (4.2)**	**0**

Tick Testing Results for Marin County

Marin County Adult Ticks Tested in 2017

Location	Ticks Tested	Pools Tested	*B. burgdorferi* Pos. Pools (MIR)	*B. miyamotoi* Pos. Pools (MIR)
Old St. Hilary's OSP	14	3	0	0
Olompali SP	13	5	0	0
Roy's Redwoods OSP	52	13	1 (1.9)	1 (1.9)
Horse Hill NP	2	2	0	0
Camino Alto OSP	35	11	0	0
TOTALS	**116**	**34**	**1 (0.86)**	**1 (0.86)**

Marin County Nymphal Ticks Tested in 2017

Location	Ticks Tested	*B. burgdorferi* Pos. Ticks (IR)	*B. miyamotoi* Pos. Ticks (IR)
Old St. Hilary's OSP	125	0	1 (0.8)
Olompali SP	14	5 (35.7)[a]	0
Roy's Redwoods OSP	51	2 (3.9)	1 (2)
Camino Alto OSP	12	0	0
Golden Gate NRA	4	0	0
TOTALS	**206**	**7 (3.4)**	**2 (0.97)**

[a] **Note small sample size**

The Western Fence Lizard

***Ixodes pacificus* Life Stages**

Western Fence Lizard

An interesting component of the *Borrelia burgdorferi* ecology in California is its relationship with the western fence lizard. A protein in the blood of the lizard can kill the spirochete in the gut of a nymph when the tick takes a blood meal. Larval ticks pick up the spiral-shaped bacteria when they feed on rodents. Then they molt and become infected nymphs. If an infected nymph feeds on a western fence lizard, the bacteria can be cleared from the tick's system, then as an adult it takes its next blood meal without passing along the bacteria.