



How many Western Black-Legged ticks carry Lyme disease at Pepperwood Preserve compared to Fairfield Osborn Preserve?

Evelyn Kim, Siah Baakoi, Olivia Benedetti, and Alan Arreola

Department of Science and Technology, Sonoma State University, Rohnert Park, CA 94928



Introduction

Sonoma County is listed as having one of the highest rates of Lyme disease, *Borrelia burgdorferi*, cases per 100,000 people in the Western United States (Kovner, 2016). Western Black-Legged ticks, *Ixodes pacificus*, are carriers of Lyme disease and can be often found in local grasslands. Earlier this spring, we observed the abundance of Western Black-Legged ticks in the grasslands at Fairfield Osborn Preserve, and found a high presence of the species (Benedetti, Kim, Nand, & Rebel, 2019).

Fairfield Osborn Preserve was the location of our initial study, and receives visitors daily despite being a private preserve. The same motive applies to Pepperwood Preserve, with the exception that it is more accessible despite being a private preserve as well. The female adult ticks have the ability to bite & infect organisms (besides nymphs of both genders) with Lyme disease. This inspired us to continue our current research question as well as our hypothesis. Due to spring being the peak of tick season, we hypothesized that there would be more ticks at Fairfield Osborn Preserve compared to Pepperwood Preserve, and thus having a higher presence of Lyme disease (Salked, 2014).

Materials and Methods

- We collected ticks at Fairfield Osborn Preserve on 2.23.19 and on 4.14.19. We also collected ticks at Pepperwood Preserve on the second date. On the first date we sampled three times; On the second date we sampled 6 times at each site.
- We took 1m x 2m white flannel cloth mounted on a pole tied to the length of a rope and dragged it for about 40-50 paces at each site (Russel, 2016).
- We used forceps to remove the ticks from the cloth, and then we put them in vials filled with 70 % ethanol (Russel, 2016).
- We sorted the ticks by sex, location, and species.
- We took nine female Western Black-Legged ticks to the Sonoma County Public Health Laboratory to test for Lyme disease using Indirect Fluorescent Antibody tests (IFA).



Figure 1: Evelyn Kim collecting ticks from the first date at Fairfield Osborn Preserve



Figure 2: Evelyn Kim dragging the cloth at Pepperwood Preserve

Results

Tick Species	Fairfield Osborn Preserve	Pepperwood Preserve
American Dog	4F / -	1F / -
Pacific Coast	- / 1M	- / 1M
Western Black-Legged	1F / 2M	- / -

Table 1: Number of adult ticks collected at each preserve on 4.14.19.

We found all adult ticks and no nymphs at both locations. We found a very low abundance of ticks at Pepperwood Preserve and a higher abundance at Fairfield Osborn Preserve. In February we found more Western Black-Legged ticks ($n = 13$) at Fairfield Osborn Preserve but in April we found more American Dog ticks at the Preserve.



Figure 3: Sonoma County Public Health Laboratory

The results from the Sonoma County Public Health Lab suggested that there was no Lyme disease detected in nine female Western Black-Legged ticks tested from Fairfield Osborn Preserve.

Conclusion & Discussion

We found evidence that partially supports our hypothesis because more ticks were found at Fairfield Osborn Preserve.

- Fairfield Osborn Preserve has a higher abundance of ticks of all species compared to Pepperwood Preserve.
- Fairfield Osborn Preserve also contains more Western Black Legged ticks than Pepperwood Preserve, which had none, thus having a higher potential to have Lyme disease.

There was no Lyme disease detected. This could be due to:

- The Fairfield Osborn Preserve could have low infection rates.
- The ticks being stored in ethanol for over a month. Thus, possibly leading to the bacterial proteins breaking down and resulting in a false negative IFA test.

Pictures



Figure 4: Map of Turtle pond site at the Fairfield Osborn Preserve on 4.14.19



Figure 5: Map of Pepperwood Preserve sites near the Bechtel House on 4.14.19



Figure 6: Some of the female Western Black-Legged ticks that we brought to the Sonoma County Public Health Center



Figure 7: Siah Baakoi identifying the ticks

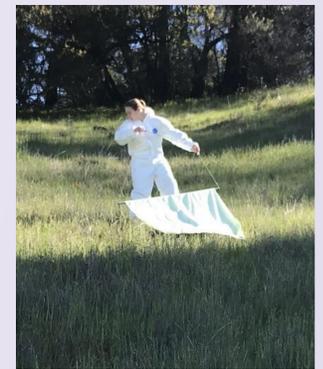


Figure 8: Olivia Benedetti dragging the cloth at Pepperwood Preserve

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Acknowledgements

We would like to thank Rachel Rees and Lisa Critchett from the Sonoma County Public Health Laboratory, Suzanne DeCoursey from the Fairfield Osborn Preserve, Nathan Rank, Martha Shott, Melina Konzanitas, and Kristen Holt