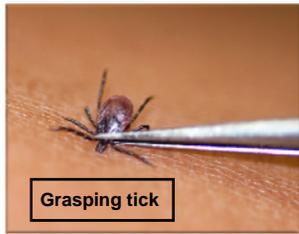


## PREVENTATIVE MEASURES TO PROTECT AGAINST TICKS

Individuals who venture into wooded areas and leaf litter should be aware of the hazard associated with tick bites and make it a habit to regularly check their bodies and their pets for ticks. Other personal protective measures should include:

- Wear light colored clothing so ticks can be seen and removed.
- Wear long pants and long-sleeved clothing.
- Tuck pants into socks or boots, and shirt into pants.
- Use approved repellents.
- Choose wide trails and walk in the center. Avoid bushy and grassy areas as well as off-the-trail hikes.
- Inspect yourself and others (including pets) thoroughly for ticks at least once an hour while walking in suspected tick infested areas, and for the next couple days after an excursion.

## TICK REMOVAL



Grasp the embedded tick with fine-tipped tweezers (never with bare hands) as close to your skin with a steady pull

Fig. 1



Grasping the tick up on it's body can squeeze the body fluids into bite site. Do not apply alcohol, fingernail polish, heat from a lit match, or petroleum jelly to the tick

Fig. 2

## REPELLENTS

**DEET** ~ the only skin-use repellents approved by the FDA to repel ticks. Products containing 20%-30% DEET are the most effective. Higher concentration of DEET in the products may provide longer protection, and some of the micro-encapsulated formulas may have the longest effective duration. Always read the product labels and follow the instructions carefully.

**Permethrin** ~ repellants specifically formulated to be used on fabric and clothing and *are not* for use on the skin. These products that can be very effective when applied properly to clothing, tents, sleeping bags, footwear and other garments. Following the label carefully can safely provide prolonged protection from ticks that attempt to climb on your outerwear, or camp gear!



**ALAMEDA COUNTY  
DEPARTMENT OF ENVIRONMENTAL HEALTH  
VECTOR CONTROL SERVICES DISTRICT**

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Alameda, CA 94502-6577  
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## Lyme Disease in Alameda County



**Lyme disease** is the most reported vector-borne disease in the United States and is a potentially debilitating infection transmitted to humans and other animals by ticks. The disease is caused by a spirochete, a corkscrew-shaped bacterium. Of the 48 tick species found in California, the **Western Black-legged Tick** is the tick known to be mostly responsible for transmitting the spirochete to people.

## TICK-BORNE DISEASES IN CALIFORNIA

Ticks are blood-feeding parasites of mammals, birds, and reptiles. They are in the class of Arachnids, and are in the same sub group as mites. Both of them have eight legs as nymphs and adults where the larvae have six-legs. In California ticks are the vectors of *Tick-borne Relapsing Fever, Rocky Mountain Spotted Fever, Tularemia, Anaplasmosis, Ehrlichiosis, Babesiosis, Bartonella, and Lyme Disease*. In addition, people and domestic animals can develop *Tick Paralysis* from a tick bite.



Western Black-legged Tick (female)

American Dog Tick (female)

Pacific Coast Tick (female)

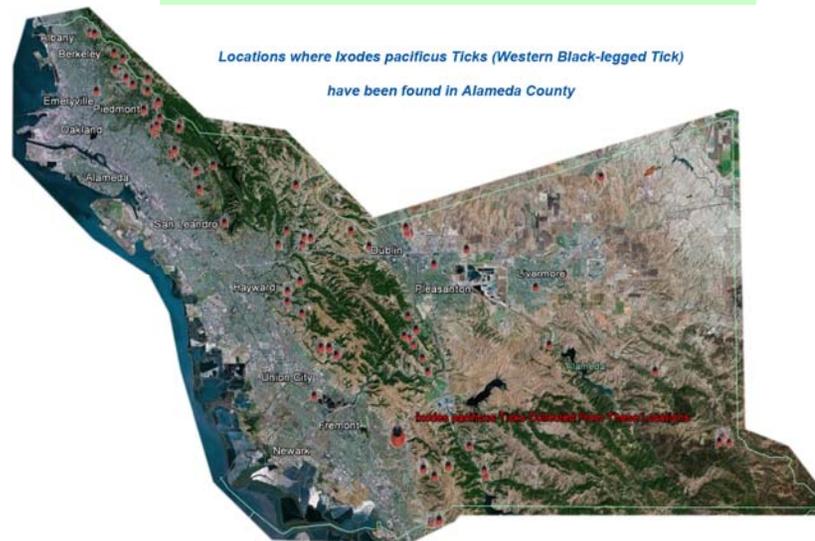
## WESTERN BLACK-LEGGED TICK

Western Black-legged Ticks have four life stages; egg, larva, nymph and adult. Except for the egg, all the other three stages need to feed on the blood of a vertebrate to develop into the next stage, or egg production. Each female tick can produce thousands of eggs after a blood meal. The six-legged larval tick is very tiny (1 mm), sometimes compared to a poppy seed in size. They are light beige in color and are difficult to see without a magnifier. The nymphs are less than 2 mm long about the size of a pin head; the adult female is about 3.2 mm long and has a dark brown head/thorax and reddish brown body with black legs. The male is smaller and entirely brownish-black.

## DISEASE TRANSMISSION

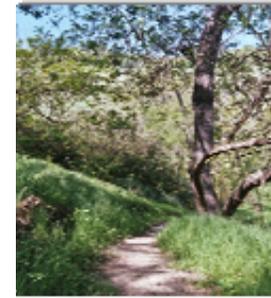
The spirochetes that cause *Lyme disease* are maintained in reservoir hosts, on which the larvae, nymphs and adult ticks feed. The larval, nymphal or adult ticks pick up the disease organisms when they feed on the blood of infected animals. After feeding, ticks drop off to molt into next stage or for egg development. If the tick is infected, the spirochetes multiply and pass on to the next stage.

In California, the nymphal Western Black-legged Tick commonly feeds on cold blooded lizards. The lizard blood contains a protein that destroys Lyme spirochetes in the midgut of feeding nymphs. An infected nymph can become a non-infected adult after feeding on the lizard. This may explain the reason why the prevalence of infection with Lyme spirochetes in the nymphal Western Black-legged Tick usually exceeds adult tick infection in California. On average, about 1 to 2% of the adult ticks and 2-15% of the nymphs are infected in California. In Alameda County, our surveillance has shown a 3.4% average infection rate in adult ticks—with a range of 1-7.7%, and a 5.9% infection rate in nymphal ticks—with a range of 1.7-11%.



## AREAS WHERE THE WESTERN BLACK-LEGGED TICKS ARE PREVALENT

The American Dog Tick, Pacific Coast Tick and Western Black-legged Tick are the three ticks commonly encountered in Alameda County. Each species has preferred ecological settings, and are abundant at different times of the year.



Upper. Trails where adult ticks are abundant

Bottom. Leaf litter area where nymphal ticks are prevalent

Left. In Alameda County Western Black-legged Ticks have been collected from the areas with tick markers

Western Black-legged Ticks are found in 56 of the 58 counties in California. It is common in the humid coastal areas and on the western slope of the Sierra Nevada mountain range. They prefer cool, moist areas and are commonly found in wooded areas associated with oaks, madrone, and redwood. This tick is common along the hills in the western part of Alameda County.

Adult ticks climb to the tip of vegetation along trails and wait for a host to brush against them. They are most active from fall through early spring. Nymphs are found in low moist vegetation such as leaf litter and on logs. They are active primarily in the spring and summer months. In some areas in Alameda County, the nymphs were found through late October. Nymphs pose a greater risk of transmitting Lyme disease to humans in California, because nymphal ticks have higher infection rates, are so tiny and very difficult to see, and usually do not hurt when they bite. Many Lyme patients were infected by the nymphal ticks who did not recall the exposure to tick bites, and most likely delayed the medical treatments in the early disease stage.