



## Research Brief for Resource Managers

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## Endemic Walking-sticks Persist Through Chaparral Fire

Sandoval, C. 2000. Persistence of a walking-stick population (Phasmatoptera: Timematodea) after a wildfire. *The Southwest Naturalist* 45:123-127.

To persist after a stand replacing chaparral fire, local insect populations must either recolonize a newly burned area or survive the wildfire. By observing similar color morph frequencies in a relatively sessile population both before and after a June 27 wildfire, Cristina Sandoval demonstrated that walking sticks (*Phasmatoptera: Timematodea*), survived a summer wildfire while they were in their egg stage and insulated by soil. It is likely that if the fire had burned out of season, in the winter or spring, it would have exterminated this flightless population in the more vulnerable nymph and adult stages.

The population studied was burned in the 1,700 ha Painted Cave fire in 1990, 10 km outside of Santa Barbara, CA. The particular walking stick (*Timema cristinae*) comes in four colors, green, red, beige, and gray, and two patterns, with or without dorsal white stripe on green morphs. These polymorphic traits are genetically linked to separate gene loci on only a few alleles, so gene flow can be observed between populations.

Before the burn, walking stick color morph frequencies had been recorded at three different locations. The burn site was isolated from the other two populations by 800m and 2km of unsuitable habitat (farmland and non-host plant species). The color morph frequencies of the population at the burned site was measured two years after the fire using repeat sampling. Color

### Management Implications

- Endemic chaparral walking sticks persist in chaparral after surviving a summer wildfire in a fire resistant life-stage, the egg (life cycle timing strategy), rather than by immigration (spatial strategy).
- Five easily observed color and pattern morphs make gene flow between these relatively sessile populations easy to monitor.
- The non-flighted nymph and adult stages are not protected from fire, so wildfires or prescription burning in the winter and spring would likely kill local populations.

morph frequencies were compared over time within populations and between the burned and unburned sites. Within each site, there was no significant difference in the frequencies between the two sampling years, and the color morph frequencies on the burned plot remained significantly different from the two unburned plots. The conclusion is that the individuals in the post-burn population were from individuals that survived the fire and not immigrants from adjoining populations.

With a mark-recapture study, individual walking sticks were observed to travel up to only 8m per week, validating the conclusion that the post-burn population was indeed a persistent population, rather than an immigrant one.