

EXAMINING BARK BEETLE ATTACK IN GIANT SEQUOIA



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The primary goal of this project is to investigate fundamental interactions between beetle biology, tree ecophysiology, and defense against attack to inform management strategies aimed at conserving giant sequoia ecosystems in a changing climate.

Where do GSB (Giant Sequoia Beetle) overwinter?

The study predicts beetles overwinter in tree canopies. Observers will sample branches pre- and post-summer to test this hypothesis.

How does beetle attack impact tree carbon and water status?

The Study predicts GSB attack weakens trees, affecting water, carbon relations. Testing will link beetle activity with visible crown condition to help managers identify vulnerable trees.

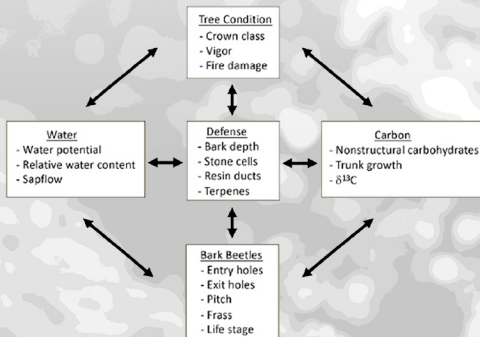
How does tree physiology and defense affect beetle behavior and survival?

The study theorizes giant sequoia defenses deter beetles but weaken under water stress. Studying tree defenses and health will help to pinpoint trees vulnerable to beetle colonization.

Methodology:

In 2024-2025, the project will study giant sequoias in four iconic groves covering a large portion of their natural range: Calaveras Groves (Calaveras Big Trees State Park), Mariposa Grove (Yosemite National Park), Giant Forest (Sequoia National Park), and Mountain Home Grove (Mountain Home Demonstration State Forest). At each site, 18 trees will be climbed, measured, and a subset outfitted with monitoring equipment to improve our understanding of beetle vulnerability.

The study design examines the connections between beetle activity, tree health, defenses, and crown condition. The information collected will be used to develop predictive models of GSB attack to allow for preventative interventions.



Summary of Study Measurements designed to assess how tree carbon and water relations mediate interactions between tree crown conditions, tree defense, and beetle attack.

Outcomes & Benefits

Inform critical knowledge gap for conserving giant sequoia ecosystems. Research will be presented to the Giant Sequoia Lands Coalition, published in peer-reviewed journals, and provide the basis for future scientific exploration of this topic.

Understanding threats such as bark beetle infestation and drought is crucial for ensuring the long-term resilience and survival of these iconic trees, which provide essential ecosystem services, support biodiversity, and attract tourism.

Predictive models will allow land managers to identify giant sequoias vulnerable to GSB attack and test preventative actions to safeguard these iconic trees.

