

Tree Survey of Wrightwood, CA

3/1/2018

On January 24, 2018, CAL FIRE Unit Forester, Henry Herrera, visited the community of Wrightwood following initial concern from Kathy Smith, Wrightwood Fire Safe Council Board Member. Kathy was primarily concerned about the amount of sap the pines were dripping.

Many pines throughout Wrightwood were observed dying primarily due to bark beetle attacks. The root cause of tree die off is stress due to lack of water. When trees do not have sufficient water, they become susceptible to bark beetle attacks because they cannot produce enough resin to push out the beetles when they bore into the bark. There is no cure for bark beetle infested trees. However, some bark beetles, such as the California five-spined ips (*Ips paraconfusus*) that attacks pines and the fir engraver (*Scolytus ventralis*) that attacks white firs, sometimes only kill the top of the tree and not the entire tree. Some of the most common bark beetles attacking trees in Wrightwood include the California fives-pined ips (*Ips paraconfusus*), western pine beetle (*Dendroctonus brevicomis*) and red turpentine beetle (*Dendroctonus valens*). Prevention is key and can be achieved by thinning the tree stands. This is the best long term preventative measure.

Signs and symptoms of bark beetle activity include:



Figure 1. Pitch tubes



Figure 2. Frass (boring dust)



Figure 3. Bark beetle entry and exit holes

Figure 4. Boring galleries underneath the bark

Pitch droplets tend to be symptomatic of an insect infestation or a disease. Many insects, such as pine aphids, secrete a sweet liquid called honeydew, which drips from pines and can be confused with tree sap. Aphids tend to colonize near the shoots of needle and are therefore not easily observed in large mature trees. Pine aphids can cause growth reductions in young trees. Natural predators (i.e. ladybugs, lacewings, beetles, wasps) usually control aphid populations before they can cause significant tree damage or mature tree mortality.

A recent communication from Stacy Hishinuma (2018) stated that “...pitch streaming is caused by the California Flatheaded Borer (*Melanophila californica*)... Attacks by California flatheaded borer are not always fatal but may be if the tree is stressed. Pitching usually means that the tree is attempting to fight off the (borer) infestation...this is usually a good sign.” These borers usually start their attacks at the top of the trees. If other evidence of bark beetles such as pitch tubes is visible, then the tree may most likely die in the coming year. If no evidence of bark beetles is present, the tree may successfully fight off the flathead borer and survive.

Control Methods

When bark beetle infested trees are identified, the trees should be immediately cut to help control the spread of bark beetles. The wood should either chipped and hauled away or chipped and spread onsite to a chip depth layer of no more than 2-4 inches and should not cover more than 75% of the ground. Chips should be kept several feet (3'-5') from the base of residual trees to prevent fungi build-up and tree decay. Wood that is not chipped should be

covered with six (6) mil clear plastic as follows:

Solarization/Tarping

- Cut infested wood into firewood size lengths, pile, and cover with 6 mil ultraviolet clear plastic.
- Avoid sharp projections which may tear the plastic.
- Use soil, rocks, or other material to seal the plastic along the ground.
- Do not use black plastic because beetles are attracted to areas that are lighter in color and will chew their way out.
- Heat kills beetles
- Solar energy heats up plant material drying it faster.
- Helps control beetle spread.



California five-spined ips have the most generations in a year in Southern California. It is recommended to keep the infested wood covered to manage for this species of beetle since it has the most generations. Per a personal communication from Tom Coleman (2014), based on the ips life cycle, wood should be kept covered for certain durations depending on when the wood is cut. **Wood cut between:**

- October 1-April 30 should remain covered until July 1. This contains all the first-generation beetles which is crucial for the ips beetle.
- May 1-July 31 should remain covered until September 30. This covers two generation times.
- August 1-September 30 should remain covered until November 30. November 30 is at the end of the flight period for this generation which extends into late December. By late November, you have already contained peak adult emergence.

These dates may change as weather changes and beetles begin to fly earlier in the year or continue flying later into the fall/winter if the temperatures remain warm enough for several days.



Figure 5 & 6. CAL FIRE crews from Fenner Camp removing ips infested trees and covering the infested wood during a tree removal project in Wrightwood in 2014.

Preventive Methods

Thinning

Thinning trees to a wide spacing, approximately 20' between main stems, is the best method to prevent bark beetle attacks. Thinning increases tree vigor and health which makes trees better suited to survive droughts. Thinning reduces competition among trees for water, light, space, nutrients and other resources. As a result, trees grow faster and become better established. Prioritizing the retention of species diversity during thinning efforts will also decrease bark beetle attacks since bark beetles only attack certain species of trees. Some tree species are attacked by multiple species of bark beetles.

Deep Watering

Deep watering high value trees is another option to maintain trees healthy and decrease their likelihood of being attacked by bark beetles. Deep watering may also reduce the likelihood of tree removal costs. Watering invigorates drought stressed trees. Deep watering can be achieved by placing a drip hose under the tree's drip canopy within a "donut" shape and allowing enough water to trickle such that the water percolates into the soil and does not run off. Water until the top 18-24 inches of the soil are wet. Avoid water contact with the main stem to prevent decay. Water once a month during summer and fall months during drought years until measurable rainfall occurs.



Figure 7. Deep watering should occur under the tree's dripline within the red lines or "donut" shape.

Pesticide Application

Insecticides, such as Carbaryl and pyrethroids, may protect trees, from certain bark beetles. Since special equipment and licensed/certified pesticide applicators are needed, this treatment is generally only used on individual high value trees that are free from bark beetles. Some insecticides are applied on the exterior of the trees and others can be applied through injection. Insecticides only prevent bark beetle attacks for certain lengths of time so they must be reapplied before they are no longer effective. The state's pesticide department (www.cdpr.ca.gov) can assist in finding qualified pesticide applicators. Application of insecticides is most effective as a preventative measure and not as a control method once a tree is already infested. Treatments that have not been scientifically proven to be effective should not be relied on. It is necessary to research whether an insecticide has been scientifically proven to be effective on the bark beetle species that is attacking the tree and that it is also effective on the species of tree.

Heterobasidion root disease is a common root disease on conifers that is caused by the fungus *Heterobasidion annosum*. This disease can cause mortality of infected trees. Its spores are spread by wind and enter through freshly cut stump surfaces. The fungus grows into the roots and causes decay which leads to tree mortality. The disease can also spread from tree to tree through root contact. To prevent the disease from establishing, stumps should be treated immediately after trees are cut with a registered borate compound to prevent infection.

Broadleaf mistletoe is a severe problem in some oaks throughout the community. Trees with over 80% of the crown infected were observed. Mistletoe can greatly increase water stress to infected trees. Pruning is recommended for trees where cutting branches will remove the mistletoe without leaving a large wound on the main stem. Trees that contain multiple main stems should have infected stems removed. Stems should be cut just outside the callus ring to leave a small wound with a face perpendicular to the branch axis. This will allow the cut to seal rapidly and prevent long wounds parallel to the main stem. Complete removal of the most infected trees will benefit nearby uninfected trees or lightly infected trees by removing a source of seed of mistletoe. This will also increase water availability to the remaining trees by reducing competition. See “*Mistletoes in Southern California Forests*” attachment for more information on mistletoe.

Many of the trees are growing near roads, homes, parking lots and other infrastructure with high foot and equipment traffic that compacts nearby soil. Soil compaction results in less soil productivity due to decrease oxygen flow and less water percolation. This ultimately adversely impacts tree’s health and can make them susceptible to insect attacks or drought.

The following pictures were taken during my visit to Wrightwood:



Figure 8 & 9. Ponderosa pine (*Pinus ponderosae*) with red pitch tubes caused by red turpentine beetles (*Dendroctonus valens*) on the base of the tree. Tree is located along Highway 2 in front of the Wrightwood Community Center parking lot along the trail.



Figure 10. Dead ponderosa pines due to bark beetles near the intersection of Pine Street and Apple Avenue.



Figure 11. Dead black oak tree (*Quercus kelloggii*) due to broadleaf mistletoe near the end of Lake Drive.



Figure 12. Thinning crown of an incense cedar (*Calocedrus decurrens*) tree due to drought near Shamrock Drive and Lark Road. No insects or diseases found on incense cedars.



Figure 13. Canyon live oak (*Quercus chrysolepis*) heavily infested with broadleaf mistletoe at the end of Timberline Drive.



Figure 14. A pocket of 8-10 dead pines possibly on ANF property visible from Cardinal Road and Timberline Drive.



Figure 15. Stand of bark beetle infested pines on private property behind Timberline Drive.



Figure 16. Dead pines near Cardinal Road and Raven Road. Trees near habitable structures, roads and infrastructure pose a falling hazard and increase fire danger.



Figure 17. Large mature dead pine along Highway 2 and Rivera Drive.



Figure 18. Dead pine near Cedar Drive and Evergreen Road/Laura Street.

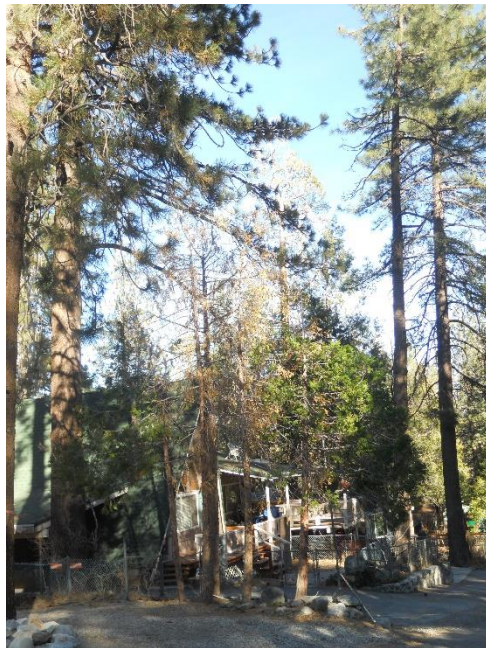


Figure 19. Dead/dying incense cedars (*Calocedrus decurrens*) due to drought. Location is near Thrush Road and Oak Street.



Figure 20. Dying giant Sequoia (*Sequoiadendron giganteum*) due to drought near East Canyon Road and Pacific Crest. This tree is most likely doing poorly because it is not adapted to this site. Redwoods prefer wooded areas and snow covered ground.



Figure 20 & 21. Signs of recently cut trees most likely due to bark beetle infestations. This is a common sight throughout Wrightwood.

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Literature Cited

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