

FIRE FUELS REDUCTION AND BARK BEETLES

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The current condition of our forests, threats to those forests from disturbance agents (i.e., fire, insects, and diseases), our increasing human demands on the forest, plus funding opportunities have led to more fuels reduction work than ever. This work results in the creation of slash, mulch, logs, and other types of woody debris. The potential for problems with bark beetles in conifers is significant, and these comments are intended to minimize complications during fuels reduction work.

The primary issue is insect colonization of woody material created during fuels reduction work and/or subsequent colonization of standing trees within or near the fuels reduction area. The insects involved are mostly bark beetles, primarily *Ips* spp. (particularly *I. confusus* in pinyon and *I. pini* in all pines and occasionally in spruce), and twig beetles, primarily *Pityophthorus* spp. and *Pityogenes* spp. When working in pinyon-juniper habitats, the potential to see cedar bark beetles, *Phloeosinus* (pronounced “flea-o-sign-us”) spp., in junipers also exists. The infamous bark beetles in the genus *Dendroctonus*, such as mountain pine beetle, Douglas-fir beetle, spruce beetle, and red turpentine beetle are mixed in their response to fuels mitigation work. Woodborers (longhorned and flatheaded woodborers and wood wasps) are secondary and a lesser issue. They usually only require interpretation, rather than specific actions.

Time of Year Cutting Work is Performed — As a general guide, cutting work should be timed to achieve: 1) the least amount of resin volatiles and 2) the quickest drying of phloem. This is particularly critical when the beetles are flying. The insects mentioned above fly during the warm months. Depending on the year and location within Colorado, this could be anytime between late March and early November. **Regardless of the insects involved, November and December are good months to do cutting (beetle flights for the year are over, material will dry before they resume in spring).** Because many bark beetle behaviors, including aggregation, are regulated by pheromones chemically similar to conifer resins, fresh cutting activity can attract beetles. Thus, it is preferable to do fuels work outside the flying time of the particular insect(s) of concern. If possible, cutting should be completed a month or so before expected flight and not resumed until after flight for insects like the *Dendroctonus* group, which have one or two-year life cycles and predictable flight times. It is not practical to avoid all cutting for other insects with multiple life cycles per year that are apt to fly throughout the warm months. **THIS SAID, THE NEED TO PERFORM MITIGATION WORK TRUMPS THE POTENTIAL ATTRACTION OF INSECTS, AND ONLY IN VERY RARE INSTANCES WOULD THIS POTENTIAL BE A REASON TO POSTPONE OR NOT PERFORM THE PROJECT.**

Treatment of Wood Resulting from Fuels Mitigation — Regardless of how the fuels work is performed, the avoidance of wounding to “leave” trees should receive high consideration. Wounded and otherwise weakened standing trees are more prone to attack by local beetles. Logs resulting from thinning or TSI type work should be removed from the site in timely fashion to reduce production of bark beetles, woodborers, and decay. Slash may or may not be colonized by bark beetles. In general, the greener the wood (i.e. the wetter the phloem), the bigger the piece of wood, and the greater the

extent of in-tact bark, the greater the likelihood of bark beetle colonization. The “Cedar-Eater” generally produces finer pieces of wood than “Hydro-Axe” type machines. All things being equal, the former should result in fewer bark beetle build-ups. Scattering slash to facilitate drying is preferable to piling, particularly if the piles will not be burned later. Obviously, piles burned before they produce a crop of beetles lead to fewer problems. Conversely, green piles are more difficult to burn than cured piles. Chipping causes a sharp spike in resin-volatile production, but produces wood of no use to bark beetles. The diameters of wood produced from pinyon and juniper projects lend themselves to chipping better than the larger conifers. In general, it is NOT a good idea to stack slash or logs against live trees.

How to Recognize Problems — As stated above, colonization of bark beetles in fresh slash produced during the warm months is probably inevitable. In projects of more than a few acres, subsequent attack of standing trees within and around the edge of the project should also be expected. (If loss of any or certain individual “leave” trees is unacceptable, see below).

From a distance, the appearance of a “bathtub ring” of red, dead trees around the mitigation area is an indicator that a bark beetle build-up has occurred and is spreading into nearby, live trees. Because the insect species involved typically are not all that aggressive, this is usually a temporary phenomenon that carries momentum for only a year or two. However, when drought, excessive mistletoe infestation, or other stresses affect live trees outside the mitigation area, the build-up of bark beetles initiated by the fuels-reduction activity can have lasting impacts. When this occurs, all factors should be considered before beginning the fuels work.

Up close, external indications of insect invasion of slash, logs, or standing, live trees usually produces piles of “**boring dust**” and/or masses of coagulated pitch called “**pitch tubes.**” Bark beetle dust is dark tan to cinnamon. It appears at scattered attack points a few inches apart and accumulates at the tree bases or under prostrate wood pieces. Dust from woodborers will be coarse (small wood fibers will be evident) and often is lighter in color because they are boring in the wood, not just through the bark. Ips and twig beetles rarely produce pitch tubes (pinyon ips, excepted). Dendroctonus bark beetles normally produce pitch tubes and boring dust only in standing, live trees. They do not attack slash as a rule. Only the spruce beetle (and Douglas-fir beetle to some extent) attacks downed logs and standing trees. Log attacks are usually confined to the underside. Another important insect indicator is evidence of woodpeckers. Their feeding results in large, rough holes or patches pecked in the bark. As such, woodpeckers are beneficial.

Based on the above external signs/symptoms, it is possible to confirm further confirmation of suspected insect activity by removing bark from the trunk or branch material. Key internal indicators of bark beetles and borers include:

- ✍ characteristic tunnels called “galleries”
- ✍ the insects themselves in various developmental stages
- ✍ stained wood (usually blue-gray or light brown).

Bark Beetle Prevention for Nearby Live Trees — For projects yielding big volumes of coarse slash, or where buildups of tree-killing bark beetles occur, it may be justifiable to spray valuable, live

trees nearby. It is important to do preventive treatments before the live trees are attacked. Carbaryl (= Sevin) and permethrin (= Astro) are approved products. For small conifers like pinyon, treatments may be required in April and August for protection through the flight season.