# Forest Health Protection
## Pacific Southwest Region

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To: District Ranger, Feather River Ranger District, Plumas National Forest

Subject: Insect and Disease Evaluation of a Goshawk Habitat Area within the Flea DFPZ thinning project (FHP Report NE07-03)

At the request of Judy Welles, Silviculturist, Feather River Ranger District, I conducted a field evaluation of the goshawk protected activity center (GPAC), stand # 4050001, located within the Flea defensive fuel profile zone (DFPZ) thinning project on June 11, 2007. The objective of my visit was to evaluate the current forest health conditions within the stand, discuss what influence these conditions would have on stand management objectives and provide recommendations as appropriate. Judy Welles and JoAnna Arroyo, District Wildlife Biologist, accompanied me in the field.

**Background**

The Flea DFPZ thinning project area is located on the Plumas National Forest, approximately 6 miles northeast of the community of Paradise, CA (T23N, R5E, Section 17), at an elevation of 4000-4500 feet. Precipitation for the site averages approximately 60 -70 inches per year. The general project area is a Sierra mixed conifer type with ponderosa pine (*Pinus ponderosa*) making up approximately 50 – 60 percent of the 84-acre GPAC. This ponderosa pine component is found growing with other conifer species such as white fir (*Abies concolor*), sugar pine (*Pinus lambertiana*), incense cedar (*Libocedrus decurrens*), Douglas-fir (*Pseudotsuga menziesii*), tan oak (*Lithocarpus densiflorus*) and black oak (*Quercus kellogii*) or in pure or nearly pure pockets within the stand. The current stand density index (SDI) is 382 with an average diameter of 15" for trees over 10" DBH. The understory consists of scattered dense pockets of white fir and incense cedar regeneration. Past bark beetle caused mortality, likely occurring during the last drought period of 1987 – 1992, has created a couple of large patches of dead and downed

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ponderosa pine within the stand. The management objective for this stand is to create a defensible fuel profile zone (DFPZ) while maintaining, enhancing and protecting goshawk nesting and foraging habitat from the negative impacts of bark beetles and stand replacing wildfire. This will be accomplished by removing most surface and ladder fuels, reducing stand density by removing small diameter trees and maintaining canopy cover between 40 – 50%.

**Observations**

No current insect or disease problems were observed within the stand. However, past mortality events associated with the western pine beetle (*Dendroctonus brevicomis*) have created large pockets of dead and downed ponderosa pine.

No evidence of dwarf mistletoes, rusts or root diseases were found within the stand.

Pockets of current western pine beetle and Ips activity (*Ips paraconfusus*) were observed in nearby stands of ponderosa pine within the proposed Flea DFPZ project area.

**Discussion and Recommendations**

Insect and disease caused tree mortality is occurring at a very low level within the GPAC. This low level of mortality is mostly attributed to the above normal precipitation received over much of northern California during two of the past three winters and not to current stand conditions, as the stand density within most of the GPAC is above where it should be to reduce the risk of bark beetle caused mortality. During extended dry periods, these overstocked stands, especially the pure pockets of ponderosa pine, would be susceptible to bark beetle attacks and subsequent tree mortality.

A thin from below approach may be able to achieve the duel objectives of creating a DFPZ and protecting goshawk habitat if the treatments reduce stand density to a level that reduces the risk of bark beetle caused mortality. In most cases, thinning to a stand density that is 80% or less of "normal" for the site would effectively reduce tree competition for limited water and nutrients and reduce the susceptibility to future bark beetle related mortality. Thinning treatments should also be consistent with recent direction from the Regional Forester that suggests designing thinnings to "ensure that density does not exceed an upper limit (for example: 90% of normal basal area, or 60% of maximum stand density index)" and to "design thinnings to ensure that this level will not be reached again for at least 20 years after thinning." (Regional Forester letter, "Conifer Forest Density Management for Multiple Objectives", July 14, 2004). However, since this stand is considered a goshawk habitat area with higher canopy cover requirements, it will likely be necessary to try and maintain a higher stand density, closer to the upper management limit, which may require more frequent entries than the 20 year Regional Forester recommendation. If canopy cover requirements do not allow for a reduction in stand density that increases the health and vigor of residual trees, the risk for bark beetle caused mortality will remain high, especially during prolonged periods of drought. Failure to reduce the risk of bark beetle caused mortality could result in significant mortality and reduce the habitat suitability for goshawks.

When planning thinning treatments, it should be recognized that the target stand density is an average to be applied across the landscape and some variability may be desired. Individual high value trees, such as mature pines and black oaks, should benefit by having the stocking around them reduced to lower levels. Areas of pure or nearly pure ponderosa pine would also benefit from lower stocking levels as well as an increase in species diversity. Selecting for species other than ponderosa pine where they exist within these pockets will help to maintain some canopy cover should significant numbers of ponderosa pine be killed by the western pine beetle. Allowing for denser tree spacing and pockets of higher canopy cover may be desirable around potential nest trees, such as fork-topped trees or larger ponderosa pines that possess dwarf mistletoe brooms.

It is recommended that a registered borate compound be applied to all freshly cut conifer stumps >14" dbh. Since it appears that presence of annosus root disease is limited within the stand, treating all conifer stumps is recommended in order to reduce the chance of new infection centers being created through harvest activity.

If prescribed burning is planned for the GPAC in order to maintain the DFPZ than special protection should be given to important goshawk habitat structures such as snags, downed logs and potential nest trees by putting lines around them. Mature ponderosa pines are also especially susceptible to mortality during prescribed burns because of the deep duff and litter that accumulates at their base. These duff mounds typically burn at a slow rate, while maintaining lethal temperatures, causing severe cambium injury. For this reason, it may be beneficial to rake the duff away from the bases of large pines before burning.

Forest Health Protection may be able to assist with funding for thinning and removing green material from overstocked areas within this goshawk management area on a competitive basis. If you are interested in this funding please contact any of the Forest Health Protection staff for assistance in developing and submitting a proposal.

If you have any questions regarding this report and/or need additional information please contact Danny Cluck at 530-252-6431.

*/s/ Danny Cluck*

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## Western pine beetle

The western pine beetle, *Dendroctonus brevicomis*, has been intensively studied and has proven to be an important factor in the ecology and management of ponderosa pine throughout the range of this host species (Miller and Keen 1960). This insect breeds in the main bole of living ponderosa pine larger than about 8 inches dbh. Normally it breeds in trees weakened by drought, overstocking, root disease, dwarf mistletoe or fire. Adult beetles emerge and attack trees continuously from spring through fall. Depending on the latitude and elevation, there can be from one to four generations per year.

### Evidence of Attack

Initial attacks are made about mid-bole and subsequent attacks fill in above and below. Pitch tubes are formed on the tree trunk around the entry holes. The pitch tubes are red-brown masses of resin and boring dust. Relatively few, widely scattered, white pitch tubes usually indicate that the attacks were not successful and that the tree should survive. Pheromones released during a successful attack attract other western pine beetles. Attacking beetles may spill over into nearby apparently healthy trees and overwhelm them by sheer numbers.

### Life Stages and Development

These beetles pass through the egg, larval, pupal and adult stages during a life-cycle that varies in length dependent primarily upon temperature. Adults bore a sinuous gallery pattern in the phloem and the female lays eggs in niches along the sides of the gallery. The larvae are small white grubs that first feed in the phloem and then mine into the middle bark where they complete most of their development. Bluestain fungi, introduced during successful attacks, contribute to the rapid tree mortality associated with bark beetle attacks.

### Conditions Affecting Outbreaks

Outbreaks of western pine beetle have been observed, and surveys made, in pine regions of the West since 1899 (Hopkins 1899; cited in Miller and Keen 1960). An insect survey completed in 1917 in northern California indicated that over 25 million board feet of pine timber had been killed by bark beetles. Information from surveys initiated in the 1930s indicates that there were enormous losses attributed to western pine beetle around that time. During the 1930's outbreak, most of the mortality occurred in stands of mature or overmature trees of poor vigor (Miller and Keen 1960). Group kills do not typically continue to increase in size through successive beetle generations as is typical with Jeffrey pine beetle. Rather, observations indicate that emerging beetles tend to leave the group kill area to initiate new attacks elsewhere.

The availability of suitable host material is a key condition influencing western pine beetle outbreaks. In northeastern California, drought stress may be the key condition influencing outbreaks. When healthy trees undergo a sudden and severe moisture stress populations of western pine beetle are likely to increase. Healthy trees ordinarily produce abundant amounts of resin, which pitch out attacking beetles, but when deprived of moisture, stressed trees cannot produce sufficient resin flow to resist attack. Any condition that results in excessive demand for moisture, such as tree crowding, competing vegetation or protracted drought periods; or any condition that reduces that ability of the roots to supply water to the tree, such as mechanical damage, root disease, or soil compaction, can cause moisture stress and increase susceptibility to attack by the western pine beetle. Woodpeckers and predaceous beetles are natural control agents when beetle populations are low.