



South Sierra Service Area Forest Health Protection



Trip Report

FHP Report No. SS08-03

File No. 3420

DATE OF TRAVEL: May 28, 2008

LOCATION: Devils Postpile National Monument (T3S, R26E, Sections 3,10,15;
NAD83 37°37.846N, 119°05.132W).

PURPOSE: Evaluation of recent tree mortality and current stand conditions.

AGENCY PERSONNEL: Deanna Dulen, Park Supervisor; John Fernandes, Resource Assistant.

OTHER ATTENDEES: Bob Meadows, Sequoia-Kings Canyon National Park forester;
Brian Mattos, Yosemite National Park forester.

EXECUTIVE SUMMARY: South Sierra Service Area FHP personnel were requested by park personnel to evaluate recent tree mortality at Devils Postpile National Monument. Some tree mortality was observed in the main campground and nearby administration housing, primarily mature lodgepole pine. Signs of successful bark beetle attacks were observed in fading trees. However, most attacks appeared to be two or three years old, with only two trees with current brood. Other pines and firs along trails had been dead for three or more years. Few signs of recent insect infestation were found. In summary, current bark beetle activity was deemed low and other forest health issues were minor. Additional recommendations were discussed concerning hazard tree evaluations, and management strategies for reducing future susceptibility to bark beetle-caused tree mortality.



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Background:



Figure 1. Columnar Basalt formations at Devils Postpile National Monument.

The Devils Postpile National Monument (*Figure 1*) is located in between the Inyo and Sierra National Forests, on the east side of the Sierra Nevada range. The park encompasses 798 acres, most of which is not easily accessible due to the buttresses mountain range in the southern half of the park. The main service areas are

located at 7,500 feet elevation in dense lodgepole pine (*Pinus contorta*) stands. Mature Jeffrey pines, (*Pinus jeffreyi*), white fir (*Abies concolor*), and western white pines (*P. monticola*) occur along the hiking trails and do not typically mix with the lodgepole pines. In 1992 the Rainbow fire burned a total of 6000 acres – 655 acres inside park boundaries. The burned areas of the park are located to the southeast, near Rainbow Falls.

According to park personnel, trees – particularly lodgepole pine – appeared to be rapidly declining in recent years. Individual trees or scattered groups of mortality had been observed since 2006. Park staff concluded the increase of tree mortality was a possible indication that background insect or disease activity may be increasing above previous levels and wished to know if there was a developing bark beetle outbreak.

Observations: *FHP & NPS FH professionals evaluated the NPS campground, nearby administration structures, and trails to Devils Postpile and Rainbow Falls. Most dying trees were found in the campground and staff housing areas.*

Vegetation and understory trees in the campground and around administrative buildings are minimal. Groups of predominantly mature lodgepole pines line the creek bed, persist on road and border “islands”, and surround the campground. Lodgepole pines in the campground are primarily large, with an average diameter of 13 inches and full crowns. Dwarf mistletoe (*Arceuthobium armericanum*) was prevalent in the stand although no heavy brooming was evident. Older infections of western gall rust (*Peridermium harknesii*) had caused swollen bole cankers on some trees; however, most trees were still considered fairly stable upon examination. One half of a split-topped tree had broken off the day before and was quickly becoming infested with pine engraver beetle (*Ips pini*).

Park personnel had observed numerous dead lodgepole branch tips (*Figure 2*) and were concerned that they were observing the beginnings of a serious mortality event. On cutting open dead twigs a minute twig miner beetle was found in the twig pith. Samples were sent to the CDFA lab in Sacramento for identification.



Figure 2. Lodgepole pines branch tips affected and dying.

In the fall or early spring the insect –caused injury on the twig terminals of lodgepole pine may be obvious. However, in many cases, as summer approaches and shoot growth commences the dead branch tips are shed fall to the ground and appear as a halo dead branch tips around the tree (*Figure 3*). Apart from the smaller lodgepole trees having a bushy appearance the impact of this insect would be easily overlooked.

Based upon observations from the fall of last year, on the Eldorado NF (along Hwy 88), the tip injury caused is more aesthetic than detrimental. If lab identifications reveal that both sets of observations were caused by a twig pruning beetle it is possible that there had been a minor increase in the populations of a minor forest insect, which would have normally gone undetected.



Figure 3. Shed dead lodgepole branch tips.



Figure 4. Mountain Pine beetle attacks on lodgepole pines.

Recent and older mountain pine beetle (MPB) (*Dendroctonus ponderosae*) attacks (*Figure 4*) were found on the boles of several small groups of lodgepole pines. The largest group had eight trees – one with last year attacks, the remaining were attacked in previous years. Another 5 scattered individuals in the campground were found with unsuccessful attacks on the lower boles. Two trees adjacent to staff housing had live MPB larvae

under the bark from successful attacks in 2007 and additional older attacks. Another couple of pines located near the park entrance had bark beetle attacks from previous years in areas along the boles where mechanical injuries had occurred. Examination of adjacent host trees to infested ones found little to no current attacks.

Next Steps and Future Implications: Aside from the few group kills of lodgepole pines by bark beetles, insect and disease activity was minimal. The park is efficient in prompt removal of potential tree hazards to visitors and personnel. Dead or dying trees deemed lower risks were recorded and noted for later removal. Biomass was either chopped as firewood, or kept as road barriers.

Many of the lodgepole pine trees that we examined meet the characteristics of being highly susceptible to mountain pine beetle attack: greater than 8" DBH, greater than 80 years old, and existing in pure or nearly pure lodgepole type with a history of mountain pine beetle infestation in surrounding areas. Land managers should be aware that mountain pine beetles will probably continue to attack and kill the larger diameter trees with higher levels of tree mortality occurring during protracted dry periods.

Additional recommendations to prevent *Ips pini* buildup in fresh slash would be activities that hasten wood drying such as bark scarification or removal, cutting smaller bolts (three foot lengths maximum), or scattering slash in full sun. Annual examination of trees for signs or symptoms of bark beetles (pitch tubes, frass, beetles under tree bark, etc.) would help monitor beetle activity and identify trees that may have succumbed to attack. Basal area reduction in high density areas would be the most effective management to reduce future bark beetle-caused tree mortality, in addition to decreasing hazardous fuel loads. Reducing inter-tree competition improves individual tree vigor and growth, makes trees less susceptible to insect or disease infestation and also promotes healthier stand conditions.

Management Alternatives

1. **Do nothing.** Mountain pine beetle will continue to remain active in these stands as long as the trees are suitable for successful attack. Over time the beetle has reduced the stocking, predominantly in the larger DBH trees. The result of this alternative will be continued mortality at current or increasing levels, unplanned openings and the continued risk associated with hazard trees.

2. **Direct Control.** There is no general agreement regarding the effectiveness of direct control of mountain pine beetle, however there may be limited application to the campgrounds. To implement this alternative a complete survey of every lodgepole pine tree in the campgrounds would be necessary to determine which trees have been successfully attacked during 2008. These trees would require removal, or some other type of method to destroy the beetles, by May 15, of next year (prior to beetle emergence). Yearly treatment and surveillance would be required dependent upon beetle activity. It is important to note that the trees will remain susceptible to mountain pine beetle until conditions are altered by long-term management. Several options for direct control are available and further information can be provided if the park chooses to implement this alternative.

3. **Salvage.** Implementation of this alternative would result in the removal of all dead trees in the campgrounds and surrounding perimeter areas. This appears to be the current method of management for trees in these areas. Value from fuelwood sales may be realized and the immediate threat of hazard trees is reduced, however the underlying causes of stand/tree susceptibility are not altered to prevent/reduce mortality. Mountain pine beetle would continue to cause mortality in the older, large diameter classes. Because of the "group kill" characteristic in these stands there may be openings larger than desired after salvage removal. Some type of revegetation in these areas may be desirable.

4. **Prevention.** The objective of management opportunities that incorporate prevention are to reduce the susceptibility of the trees to mountain pine beetle attacks. Preventive treatments can include thinning to promote tree growth and vigor and/or insecticide treatment to prevent successful attacks.

A. **Thinning.** Thinning could be used to reduce the stocking in the clumps of lodgepole. Based on additional surveys, silviculture prescriptions can be developed to meet the overall objectives of maintaining tree health. Treatment of fresh conifer stumps with a registered borate compound to reduce the probability of annosus root disease infection is required for all conifer stumps in recreation areas (R-5 FSM 2303).

A vegetation management plan that would incorporate planned thinnings, regeneration of open areas and take into account campground management goals and objectives would be useful for both sites. Thinnings should be implemented with the goal of creating mosaics of various ages, size classes and species.

B. **Insecticide treatment.** All noninfested lodgepole pines greater than 8"DBH in the campgrounds would be treated with a registered insecticide by spraying as much of the bole as possible. Treated trees would be protected from adult beetle attack. Trees would need to be treated prior to mid-May, 2009. Insecticide treatments can provide protection up to two years and give the park time to develop and implement long-term strategies to reduce overall stand susceptibility. Consideration needs to be given to the choice of insecticide if selected trees were near sources of running water.

5. **Pheromone-based strategies**

Identification of aggregation pheromones and field experiments using synthetic components have given insect management specialists a better understanding of the behavior of many bark beetles. Bark beetles engage in mass attacks that are mediated by complex pheromone systems. These chemical signals also provide potential tools for monitoring and direct control in insect management programs. Pheromone based strategies can be used as part of an integrated management program incorporating mass trapping, monitoring of beetle flights, and inhibition/disruption of beetle infestations.

Further discussions and clarification of management objectives would be necessary if the District is interested in pursuing a pheromone-based strategy.

Conclusions

Current incidence of insects and diseases were found to be low, and not indicative of building populations. However, recent climatic data show trends of decreases in annual precipitation and above-average warming during winter months. Trees can become severely stressed and weak during prolonged drought periods, which in turn make them highly susceptible to bark beetle attack. Dead or dying trees in administrative sites create hazardous conditions to public and personnel.

While FHP staff have no authority on a NPS site and they are aware that the parks service has a comprehensive Hazard Tree Policy in place, from a forest health perspective they would like to have the Park consider the application of borax to the cut surface of any hazard tree removals.

To reduce/limit unacceptable levels of mountain pine beetle-related mortality in the campground and administrative areas, thought should be given to the implementation of one or more of the above alternatives. Forest Health Protection (FHP) can assist in the further development and implementation of any of the described alternatives. In addition, FHP prevention/suppression funds can be used for some of the treatments, but cannot be used to remove dead and/or hazard trees. If you are interested in pursuing suppression/prevention funding, have any questions regarding this evaluation or need further assistance please contact the FHP staff at 209-532-3671.

It was a pleasure to meet with Deanna and John – their assistance and warm hospitality during our service visit was most appreciated. Please do not hesitate to contact us if there any further questions or concerns.

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