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Department of
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Forest
Service

Intermountain
Region

Forest Health Protection
Boise Field Office
1249 South Vinnell Way, Suite 200
Boise, ID 83709-1663

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Date: JAN 19 2010

JA

Mr. John Apel, Integrated Res. Program Manager
Craters of the Moon National Monument and Preserve
P.O. Box 29
Arco, ID 83213

Dear Mr. Apel:

Enclosed is trip report, BFO-TR-2010-03, detailing the functional assistance trip regarding mountain pine beetle concerns at Craters of the Moon National Monument and Preserve. Carl Jorgensen, FHP Entomologist, and Phil Mocettini, FHP Biological Technician, met with John Apel and Steve Bekedam from the National Monument to evaluate the campground and limber pine stands for incidence of and susceptibility to mountain pine beetle infestation.

For more general information on Forest Health Protection programs and services, visit our combined Region 1 and 4 FHP Web site at: <http://www.fs.fed.us/r1-r4/spf/fhp/> or visit our national Forest Health Protection Web site at: <http://www.fs.fed.us/foresthealth/>.

Sincerely,

Mike Dudley (for)

MIKE DUDLEY
Director, State and Private Forestry

Enclosure

cc: Dayle D Bennett, Joy C Roberts, Carl L Jorgensen, Dwight Scarbrough, Laura L Lazarus
Steve Bekedam



BFO-TR-2010-03
Mountain Pine Beetle at the Craters of the Moon
Craters of the Moon National Monument and Preserve, National Park Service
October 28, 2009

On October 28, Phil Mocettini and I met with John Apel and Steve Bekedam at Craters of the Moon National Monument and Preserve office. After a brief discussion of the Craters of the Moon history, previous insect and disease evaluations, and ongoing studies and monitoring efforts within the Monument, John took us on a field tour of the sites of concern. Due to illness, Steve did not join us on the field tour. We evaluated the campground and some of the limber pine stands within the loop road for insect and disease, but our primary focus was for mountain pine beetle infestations.

Mountain pine beetle (MPB), *Dendroctonus ponderosae* Hopkins, is a native insect that infests all native and ornamental pines in western North America. Currently, there are major MPB outbreaks ongoing across western North America in Canada, South Dakota, Montana, Wyoming, Colorado, Utah, and Idaho. Since 2000, MPB outbreaks have killed primarily lodgepole and whitebark pines across southern Idaho; however, some ponderosa and limber pines have been killed as well. More information on basic MPB biology, ecology, and management can be found at: <http://www.fs.fed.us/r6/nr/fid/fidls/fidl-2.pdf>. John and Steve are aware of the ongoing MPB outbreaks in other parts of southern Idaho and requested the evaluation of potential MPB impacts they could expect in the Monument's limber pine stands and what management options they should be aware of as land-managers.

Forested areas of Craters of the Moon consist primarily of limber pine and isolated areas of Douglas-fir and aspen. Cottonwoods and willows also occur in some riparian areas. Except for the ornamental trees planted around the administrative buildings, all the conifer trees we saw south of U.S. Highway 20 along the loop road, in the campground, and in the parking areas were limber pine.

Limber pine stand characteristics varied from open stand conditions with low (less than 60 square feet per acre) basal area of scattered clumps and individual trees to scattered, isolated individual trees. There was a wide distribution of limber pine diameters from saplings to trees over 20 inches in diameter at breast height (d.b.h.). Heights were rarely more than 30 feet. Trees with d.b.h. measurements over 10 inches were common. Many of the limber pine had evidence of dwarf mistletoe infection.

We evaluated several trees that had faded foliage and trees that have died recently. In most cases, these trees were widely scattered individuals within the limber pine stands. Two of these trees were suppressed by a larger tree and two trees showed evidence of wind damage. We found some evidence of MPB galleries in these dead trees, but Buprestid beetle larval feeding was so heavy that it made it difficult to distinguish the MPB galleries. Two of these isolated dead trees also had broken limbs and evidence of wind or ice damage.

We also evaluated the green, live trees for evidence of MPB attacks around and between the dead trees. Of the few hundred green, live trees we evaluated, one tree had an unsuccessful MPB strip-attack and another had less than a dozen MPB attacks that the tree had pitched out. Both of these trees were within approximately 30 feet of one of the faded trees.

Due to time constraints, we decided to loop back to the truck and evaluate another part of the open stand. There, we found one green, limber pine currently infested with MPB. This tree was over 25 inches at d.b.h. and was one of the largest trees in the stand. One of its primary branches had broken off showing evidence of a cubicle rot. This tree also had a moderate level of dwarf mistletoe infection and a few of the secondary branches had recently broken off as well. All these factors indicate that the tree is in a state of decline. MPB took advantage of this decline and successfully infested it. We found MPB parent adults, small and large MPB larvae, as well as one Buprestid larva under the bark of this tree at breast height. A few of the attacking MPBs were pitched out, but most had made successful attacks and were producing brood within this tree. Successful MPB attacks were evident all the way up the main bole. One of the nearby trees had unsuccessful MPB attacks that were pitched out.

We also evaluated several of the older dead trees whose bark had been sloughed off. Due to the arid conditions, trees decay very slowly and scattered "ghost trees" are common throughout the area. Buprestid galleries were common, making it difficult to discern MPB galleries in these older dead trees.

All these observations indicate that there is a local endemic population of MPB that exists at Craters of the Moon Monument and Preserve. These beetles kill a few trees every year, but these trees appear to be damaged or in decline. Due to the isolated and open nature of these limber pine stands, it is very unlikely that MPB from other MPB outbreaks in southern Idaho will migrate to these stands. I do not expect MPB populations at Craters of the Moon to drastically increase in the future, but to continue fluctuating at low levels, killing a few stressed trees every year.

John and Steve said the current management for MPB is to let these beetles behave naturally and not take any action to mitigate their impacts unless a dead tree poses a risk to people or property, especially at the campground, trails, and parking areas. I agree it is prudent to identify and remove any such hazard trees. Therefore, at the sites with potential hazard trees concerns, I recommend Monument staff conduct an annual evaluation and remove any MPB-infested trees. The optimal time to identify MPB-infested trees is during the early fall (September/October) when frass and pitchtubes are most evident on the newly infested, green trees. Removal of these MPB-infested trees should occur prior to the beginning of the next beetle flight, which can begin in June. I also recommend they strive to maintain and enhance the vigor by reducing human-caused tree injury. This would reduce the likelihood of a MPB infestation within the high-use areas.

I do not expect this scenario, but if several trees become MPB-infested in the campground the use of verbenone (an anti-aggregant pheromone), or a preventive insecticide spray treatment could protect high-value live trees. High-value trees are typically trees that provide shade or screening in campgrounds, picnic areas, and other administrative sites. I also recommend the

Monument develop or update existing vegetation management plans that identify campground/administrative site objectives and management options relative to desirable vegetation and the risks associated with hazard trees.

More information regarding individual tree treatments and other MPB mitigation measures are discussed, in detail, in the Appendix. While Craters of the Moon Monument's limber pine are not typical of MPB-susceptible conditions, generalizations can be made in regards to MPB biology, ecology, and management to avoid any potential problems caused by this insect. I enjoyed meeting with Steve and John. If you have any questions or need additional assistance, please contact me or the Boise Field Office at 208-373-4227.

/s/ Carl L Jorgensen

Carl Jorgensen

Forest Entomologist

Forest Health Protection

Boise Field Office

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Appendix

Mountain Pine Beetle Management Options

These guidelines were developed to mitigate MPB concerns in lodgepole pine, but these would also be applicable to limber pine as well. Lodgepole pine stands that may experience heavy mortality from MPB are typically stands that have a basal area of greater than 120 square feet per acre and an average diameter at breast height (d.b.h.) greater than 8 inches for lodgepole pine. For MPB in the wildland urban interface (WUI) areas, near the homes and other high-use areas, there are several management alternatives that can be used individually or in combination with each other. Not all of these alternatives may be appropriate for all sites and individual site characteristics and resources need to be considered before implementation of any treatment or combination of treatments.

- 1. Silvicultural Treatment.** The first management alternative is to create stand conditions not conducive for MPB to build populations. Reducing average stand density and diameter, or converting the stand to nonhost trees can accomplish this. Studies have shown reduced MPB impacts in stands that have less than 100 square feet per acre basal area and average pine diameters less than 8 inches in lodgepole pine (Amman 1989, McGregor et al. 1987, Amman et al. 1977) and less than 44 square feet per acre basal area in whitebark pine stands (Perkins and Roberts 2003).
- 2. Individual Tree Preventive Treatments.** The second management alternative is to use a preventive treatment on healthy high-value trees to be saved. Once the tree is infested by MPB, a preventive treatment will not save it. Currently, two chemicals, carbaryl and permethrin, are registered for use under various product names. The treatment involves soaking the bark by applying the spray mixture to run-off from the base of the tree to a 5-inch bole diameter with hydraulic ground-based spray equipment. If the applicator's equipment cannot reach to where the bole is 5-inch diameter, I recommend a minimum spray height of 35 feet. It's most important to cover all surfaces of the bole. If any portion of the bole is missed, at high populations the MPB will find it and get into the phloem of the tree and possibly kill the tree.

To reduce application costs for Forest Service applications I recommend the use of carbaryl over the permethrin products that need to be applied annually, because carbaryl has shown to provide greater than 90 percent protection for 2 years (Gibson and Bennett 1985, Fettig et al. 2006). Preventative treatment using an insecticide will cost up to \$20-30 per tree, which should include a contract sprayer, chemical, and Forest Service inspecting personnel time.

A concern with the hydraulic ground-based spray treatment is the potential for spray drift and associated impacts. Fettig et al (2008) showed that spray buffers of 25 feet was sufficient to protect most aquatic organisms and a buffer of 75 feet was sufficient to protect the most sensitive aquatic insects from carbaryl spray drift. And with any insecticide treatment always follow the Label instructions.

Another method to protect healthy high value trees is to use verbenone, a behavior disrupting pheromone. A 70-80 percent success rate can be expected per year for verbenone when MPB population levels are building. However, over the course of a multi-year MPB outbreak, annual verbenone treatments may not achieve desired protection levels for the lodgepole pine (Progar 2005). The label rate of verbenone is 1 pouch per tree. Larger individual trees may require more pouches. Verbenone packets cost about \$7 per pouch and will require additional labor costs for deployment. To enhance verbenone effectiveness, a sanitation treatment should also be used in combination with a verbenone treatment.

3. **Sanitation.** The third management alternative is to remove the developing MPB brood in currently infested trees to reduce local MPB populations before the beginning of the next MPB emergence period typically in late June. This can be accomplished several ways: (1) by salvaging the infested trees to an area at least a mile from potential host trees; (2) cutting down and debarking the trees, destroying the brood by either chipping, burning, or peeling; or, (3) cutting down and piling the infested bolts, then covering the piles with clear plastic in a sunny area to create a "greenhouse" effect which heats the boles and kills the brood. The first of these sanitation methods can be used during a timber operation. The latter two can be quite expensive due to the amount of labor involved. There are advantages and disadvantages in timing and labor to each of these methods that must be weighed before implementing. Please contact me if you have any questions regarding this set of actions.
4. **No Action.** The fourth management alternative is to take "no action" and accept the MPB-caused mortality and associated impacts as a natural phenomenon. MPB populations will increase and decrease without human influence. However, under the no action alternative, there still may be concerns with increased fuel loads and hazard trees that will need to be addressed in and around high-use areas.

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