

Southern Pine Beetle Management At Hot Springs National Park

By Neil Korsmo

The southern pine beetle (SPB), *Dendroctonus frontalis zimmerman*, one of more than 12 American species of *Dendroctonus*, is a primary bark beetle pest, which attacks coniferous tree species throughout its range. It is capable of rapidly building up population levels to epidemic proportions in forested areas occupied by its preferred hosts, shortleaf and loblolly pines. Attacking adult beetles bore through the bark and construct S-shaped egg galleries in the cambium layer. Developing larvae feed on the cambium and then pupate in the bark. The girdling of the cambium, and the introduction of blue stain fungus by southern pine beetles always results in death of the tree.

Researchers have identified conditions that may influence susceptibility of coniferous trees to southern pine beetle infestation: drought or flooding conditions, mild winters, over-mature trees, unfavorable soil-moisture relationships, dense stands of mature pines (versus mixed pine-hardwood stands), lack of fire, lightning, and mechanical injury. The lands within the boundaries of the park have experienced all of these conditions in the past, and will continue to experience most.

In the spring of 1986, several infestations of southern pine beetles were found near Hot Springs, Ark., in Garland County. Initial inspection of the park in July of 1986 by Arkansas Forestry Commission personnel, U.S. Forest Service (USFS) entomologists, and NPS Rangers identified 14 sites with over 550 infested and dead trees. Hot temperatures and lack of rain contributed to a rapid increase in the number of infested trees. USFS computer projections of SPB growth for these sites indicated that from 3,000 to 5,000 trees would be affected by the fall of 1986 if no control action were taken.

Park personnel researched available data from the USFS, and from other NPS areas on the SPB problem, and on control measures available to meet the problem. A Southern Pine Beetle Management Plan was prepared by park personnel and approved by the NPS Southwest Regional Office for action during the summer and fall of 1986. Control of the infestation was necessary to prevent the southern pine beetles from moving out of the park lands and into nearby commercial and residential pine stands.

The USFS provided the park with emergency funds to purchase equipment and supplies to be used in the control effort. All control activities would be guided by the criteria outlined in the 1982 NPS Management Policies. The control action decided upon was that of cut-and-leave, since it could be applied quickly by a two or three person crew with minimal cost, was the least disruptive to the environment, avoided using toxic chemicals, and would disrupt the advance of the southern pine beetles to other pines. Nutrients are returned to the soil, and an increase in the natural predators of the southern pine beetle has been found in areas where this technique had been applied.

The cut-and-leave technique of direct control was decided upon as a spot disruption measure. Continued site growth requires three factors: emerging beetles, nearby pine trees, and a source of secondary attractants. Cutting the most recently attacked trees on the edge of the site eliminates the attractant source, the dropped trees in the buffer strip eliminate nearby pine trees, and beetles emerging from infested trees tend to disperse in the absence of attractant.

Aerial and ground monitoring were conducted to locate suspected infestation sites. After determining the direction of the infestation movement at the site, ranger personnel marked the last infested trees at the site and also marked a buffer of uninfested trees at each site. The buffer was essentially in the shape of a half moon, and extended a distance of about 50 to 100 feet beyond the last infested tree in the direction of spread of the infestation ... a distance recommended by USFS researchers.

All the marked trees were then cut, being sure that all the cut trees fell toward the center of the infested site. Some of the active sites were treated by only cutting the last infested trees, and not cutting a buffer strip of uninfested trees. This technique was tried in an attempt to save as many as possible of the pine trees that were not infested.

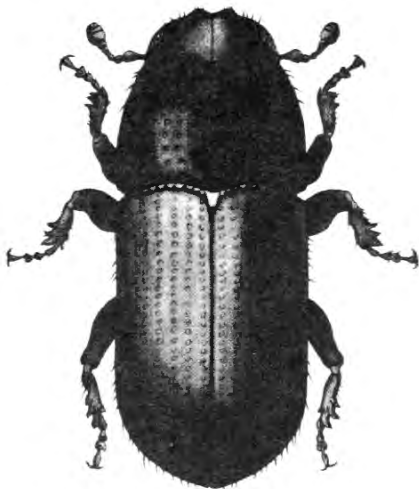
Very close monitoring of the sites was conducted to see if retreatment was necessary. One site treated using this technique required cutting of new infested trees four additional times before going inactive. Other sites were left to develop and/or die on their own as an experiment in control techniques. All sites treated in this manner went inactive on their own.

As the temperatures cooled in September, the SPB activity stopped. A total of 832 pines were infested during the 1986 season, and a total of 361 pines were cut during control activities. Results of the 1986 season indicated that there was no way to predict which sites would continue to grow and/or die without treatment, or how large of a buffer strip would be adequate to stop the spread of the infestation at a site.

Hot Springs NP, and all of Arkansas experienced a comparatively mild 1986 - 1987 winter. Based on that fact, and information gathered about SPB activity, it was predicted that 1987 could be a year of greater infestation and tree destruction. The USFS again provided funds, and training for the park staff on how to identify and control the southern pine beetle. The park was able to hire two seasonal employees devoted exclusively to SPB control efforts. A Youth Conservation Corps (YCC) enrollee also worked on the project this year.

Initially, the SPB crew was involved with the cutting of dead, hazard trees at the SPB sites of 1986. The crew also conducted a regular, and extensive monitoring of the park lands to spot, locate, and identify suspected SPB sites. Many SPB sites from the previous year that had gone undetected, but were now inactive, were found and documented. In June, as the hot weather settled in for the summer, anticipation ran high that there would be a large outbreak soon. In July, the new infestations began to appear, with the pine needles fading to yellow and red in numerous small spots in all sections of the park.

In all, 37 sites were identified in 1987. Almost all the spots were very small, some with only one or two trees infested. Most of these sites were allowed to develop without treatment, and all the untreated sites went inactive without control measures being taken. Two new sites became quite large, and the cut-and-leave control technique using buffers was initiated on those sites. One of the two sites presented a difficult control problem. The beetles managed to get past the original 50 foot buffer, and continued to infest more pines. A second buffer of a 100 foot width was cut to attempt to halt the spread. The



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beetles then went around the end of the buffer in a completely different direction. Another 50 foot buffer was cut to stop the spread in the new direction. Due to the control problems at this site, it was decided to cut a 50 foot buffer completely around the uncontrolled portions of the site. This site has now gone inactive. All sites found during 1987 have gone inactive as of October.

A total of 385 pines were infested during 1987, and 360 pines were cut during the control activities undertaken this year. The southern pine beetle has infested trees on 45 acres of park land during 1986 and 1987. Through our control activities, we have prevented the spread of the beetle to adjacent commercial and residential pine stands.

Researchers are no closer to determining why the SPB sites grow and then become inactive with or without treatment. If the winter of 1987 proves to be as mild as last winter, it is anticipated that 1988 will be another year of numerous infestations. Control measures will be taken based on what has been learned during the past two years of experience, and on any new information supplied by the U.S. Forest Service.

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