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DETECTION AND EVALUATION OF SOUTHERN PINE BEETLE
INFESTATIONS ON THE
GREAT SMOKY MOUNTAINS NATIONAL PARK

By

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U. S. Forest Service
Asheville, North Carolina



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ABSTRACT

An outbreak of the southern pine beetle, *Dendroctonus frontalis* Zimm. has developed in the Great Smoky Mountains National Park. At present, the infestation is limited to the Cades Cove area in the western end of the Park. This is the first buildup of beetle populations since a large epidemic in the late 1950's. The present level of infestation is 8.4 infested pitch and Virginia pine per M acres with an estimated 4,287 trees over the 511,714 acres surveyed. High ratio of increase and the high number of large spots indicate a potential for greatly increased damage. Based on an evaluation of the impact of the infestation on the aesthetic values in this remote portion of the Park, control measures are not recommended at this time.

INTRODUCTION

This outbreak is a second indication of the increase to epidemic proportions of southern pine beetle populations in the Southern Appalachian Mountains. Beetle populations in the region have been at endemic levels since the last epidemic ended in 1959-60. A recent outbreak of the southern pine beetle on the Nantahala National Forest, North Carolina (Rauschenberger and Bell, 1967) was the first indication of the return to epidemic status of this insect in the Southern Appalachians.

Aerial and ground surveys of barkbeetle infestations on the Great Smoky Mountains National Park were made December 4, 12, and 13, 1967. Participants in the surveys were J. L. Wiggins, National Park Service; R. F. Bassett, H. L. Lambert and W. H. Clerke, Division of Forest Pest Control.

SURVEY METHODS

AERIAL SURVEY - A reconnaissance survey of the pine-type within the Park boundary indicated that the infestation was limited to the Cades Cove area of the Park. An intensive sketchmap survey was conducted in this section of the Park (Fig. 1). Flight lines were spaced at approximately 1-mile intervals in an northeast-southwest direction to give 100 percent coverage of the infested area. A Cessna 182 aircraft was used to sketchmap all red-topped and fading pines within a one-half-mile strip on each side of the plane. Aerial survey data were corrected (Aldrich *et al.* 1958) to compensate for observer error.

GROUND SURVEY - Eleven multiple tree spots, including one spot of 250 trees, were examined to determine causal agent and proportion of green trees containing southern pine beetle brood.

Estimates of brood density and ratio of increase were made from bark samples collected in actively infested southern pine beetle spots.

TECHNICAL DATA

CAUSAL AGENT - The primary causal agent is the southern pine beetle, *Dendroctonus frontalis* Zimm. (Coleoptera: Scolytidae).

HOST TREES DAMAGED - Pitch pine, *Pinus rigida* Mill. and Virginia pine, *Pinus virginiana* Mill. were the species attacked.

TYPE OF DAMAGE - The southern pine beetle is capable of 6 ± 1 generations per year in mountainous areas. Rapid dying of the trees is due to disruption of the cambium caused by the construction of barkbeetle egg galleries in combination with the penetration of blue stain fungi.

BIOLOGICAL DATA - An average of 80 percent of the trees in the spots examined contained southern pine beetle brood. The dense brood (Table 1) and high ratio of increase indicate a high potential for increased damage from the following generation. At the time of the survey less than five percent of the infested trees were still green.

Woodpeckers have stripped the bark from a high proportion of the infested trees. However, it is unlikely that this activity will significantly reduce the barkbeetle populations (Dixon and Osgood 1961).

GREAT SMOKY MOUNTAINS NATIONAL PARK

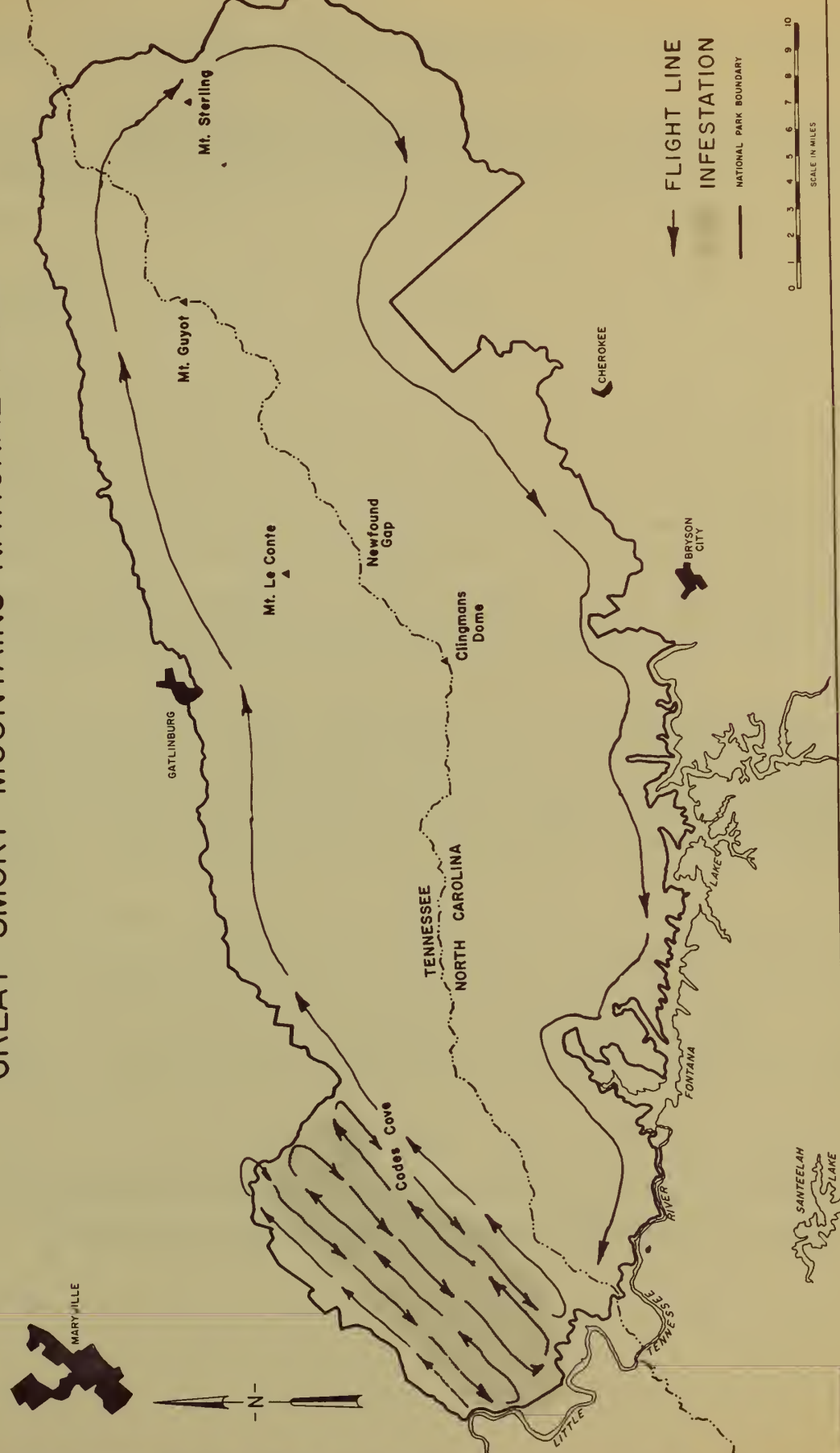


FIG. 1 AERIAL SURVEY OF DEC. 4, 1967

Table 1 - Brood density and ratio of increase of the southern pine beetle, Great Smoky Mountains National Park.

Stem Section	: Attack Density : (Insects/ft. ²)	: Mean Brood Density : (Live Insects/ft. ²)	: Percent Mortality :	: Ratio of Increase (Parent:Brood)
Top	40	390	3	1 : 9.7
Middle	40	680	3	1 : 17
Bottom	40	410	4	1 : 10.2
Over-all	40	493	3.3	1 : 12.3

LOCATION AND INTENSITY OF THE OUTBREAK - At the present time southern pine beetle activity is localized within 18,765 acres in the Cades Cove section of the Great Smoky Mountains National Park.

One hundred and two spots containing 4,117 red-topped and fading trees were detected during the 100 percent aerial survey of the 18,765 acres in the Cades Cove infestation. Corrected for observer error, it is estimated that there are 129 spots containing 4,279 red and fading trees within the Park boundary (Table 2). This total represents an average of 8.4 trees per M acres within the Park.

Table 2 - Summary of aerial survey data - Great Smoky Mountains National Park^{1/}

Singles :	2 - 5		6 - 20		21 - 50		50+		Total	
	Spots:	Trees :	Spots:	Trees :	Spots:	Trees :	Spots:	Trees :	Spots:	Trees
22	26	100	33	527	23	1,015	25	2,615	129	4,279

^{1/} Corrected for plotting error according to Aldrich *et al.*, (1958).

DISCUSSION

The infestation is currently limited to the western end of the Park. The Cades Cove area was the first section of the Park to show epidemic populations in the last southern pine beetle epidemic in the Great Smoky Mountains National Park. Southern pine beetle populations will probably increase in areas of susceptible type throughout the Park during the coming year.

The present infestation is centered in a remote portion of the Park. Pine-type occurs mainly on the upper portions of the south-facing slopes, with hardwoods covering the remainder of the area. Losses in this area from the southern pine beetle infestation will not significantly detract from the aesthetic value of the area.

Only an extensive control operation would have any chance of reducing losses in the remote roadless sections of the Park. While it is possible that barkbeetle infestation could spread from the Park to adjoining forest lands, it is more likely that any outbreaks on adjoining areas would result from a buildup of resident endemic populations.


RECOMMENDATIONS

1. The initiation of a southern pine beetle suppression project is not recommended at this time. The area, presently infested, is remote (steep and rocky terrain) and cost of suppression would be high in comparison to the aesthetic and recreational values involved. Personnel of the Great Smoky Mountains National Park and Division of Forest Pest Control concur on this recommendation.
2. The Division of Forest Pest Control will keep this area and adjacent areas of pine-type under close surveillance. The first evaluation is scheduled for July 1968.
3. The Division of Forest Pest Control should conduct a training session for Park Service personnel to familiarize them with the life cycle and detection of southern pine beetle.

REFERENCES

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