

Report No. 70-1-47

March 1970

5230

AN EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS,
GREAT SMOKY MOUNTAINS NATIONAL PARK
IN TENNESSEE AND NORTH CAROLINA

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AN EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS,
GREAT SMOKY MOUNTAINS NATIONAL PARK
IN TENNESSEE AND NORTH CAROLINA

By

J.D. Ward and W.E. McDowell

U.S. Forest Service
Asheville, North Carolina

ABSTRACT

An aerial photographic and ground survey of southern pine beetle, *Dendroctonus frontalis* Zimm., infestations was conducted in the Cades Cove section of the Great Smoky Mountains National Park during February and March of 1970. Results of the survey revealed a marked decrease of beetle activity on this 69,000 acre area due to sub-zero temperatures in January 1970.

This evaluation was conducted as a follow-up supplement to Report No. 70-1-46 which presented the initial and broad status of cold weather beetle mortality in the Southern Appalachians.

INTRODUCTION

An evaluation of the southern pine beetle was conducted on 69,000 acres of the Great Smoky Mountains National Park in February and March of 1970. The purpose of this evaluation was to determine the current status of the southern pine beetle which has been epidemic in this area since 1968.

Results of the September 1969 evaluation revealed a high level of infestation with some indication that the epidemic may have reached its peak (Ward *et al.*, 1969). Since the last evaluation an unusually cold winter has affected the southern pine beetle population considerably.

The current survey was conducted by J.D. Ward, W.E. McDowell, E.T. Wilson and R.F. Bassett of the Division of Forest Pest Control with the assistance of Dennis Huffman, Bud Phillips and Guy Cable of the Great Smoky Mountains National Park.

METHODS

Aerial-photographic and ground surveys were conducted on February 25 and March 3-5, 1970. Thirty-eight 200-acre plots were photographed from an Aero Commander aircraft using a K-17C camera with a 12-inch focal length lens. The film-filtercombination used was Kodak infrared Aero Film Type 8443 with a Wratten No. 15 and Corning 3966 filters. Plots were arranged in a systematic manner along five flight lines and provided 11 percent coverage of the 69,000-acre survey area (Fig. 1).

Processing and photo interpretation were performed at the Asheville Office, Division of Forest Pest Control.

Interpretation of photographs consisted of marking the boundaries of a 200-acre plot in the center of the overlap area of each stereo pair of photographs. A photo interpreter recorded the number of beetle spots and number of trees in each spot for each photo plot. Acreage of host type was estimated using a modified grid. Host type is defined as any stand containing 25 percent or more of pine.

Twelve spots were ground checked to determine the number of green infested trees and the condition of the beetle brood. Bark samples containing beetle brood were taken from four spots and returned to the Asheville Office for radiographing. The radiographs were interpreted to obtain estimates of brood density.

RESULTS

Results of this survey revealed a drastic reduction in the southern pine beetle population on the Great Smoky Mountains National Park. Although the number of spots and dying trees has remained about the same as found

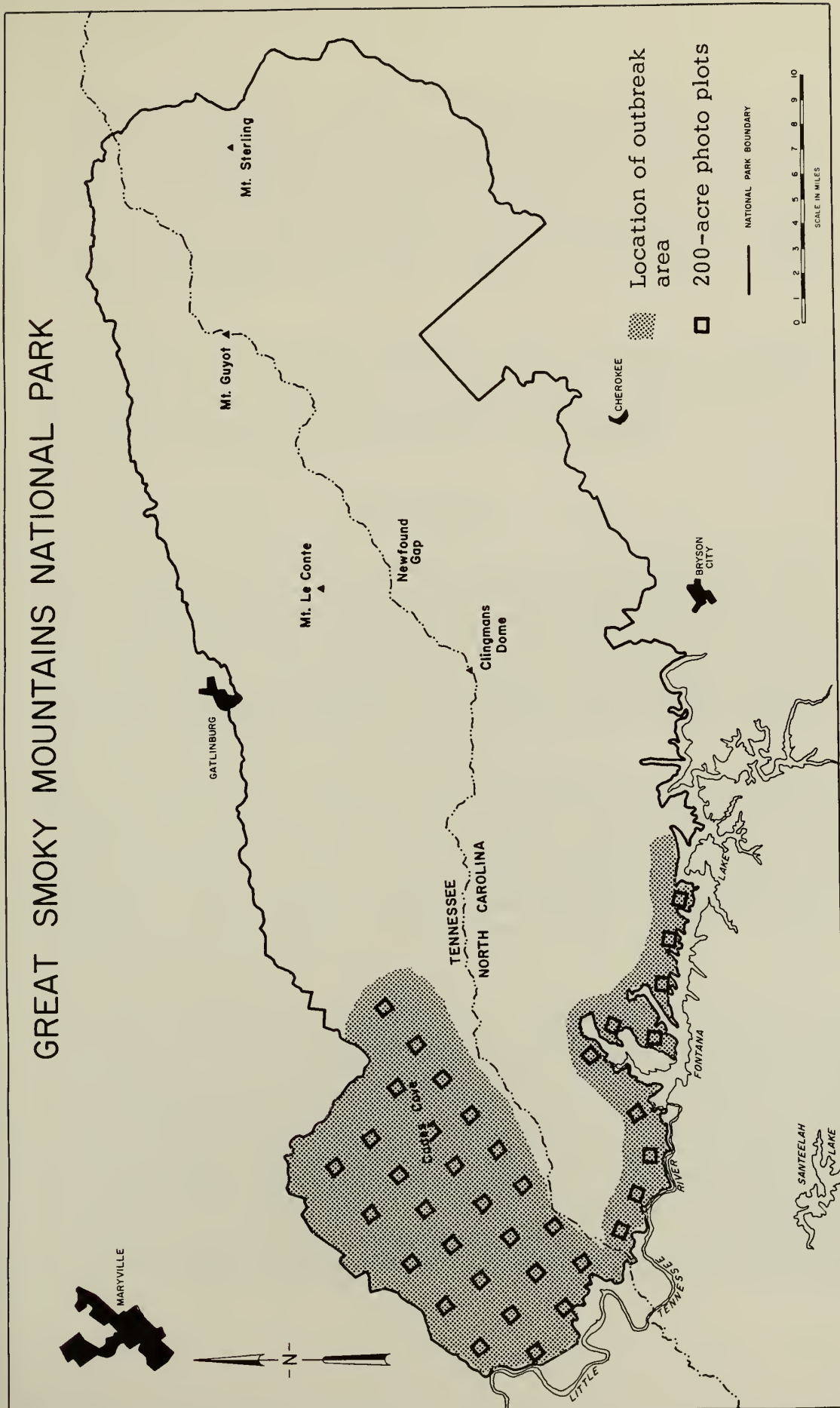


Fig. 1 Location of southern pine beetle infestation on the Great Smoky Mountains National Park, February, 1970.

on the last survey, the number of actively infested trees has decreased substantially (Table 1). Furthermore, those trees found actively infested contained few living brood as the result of the sub-zero temperatures recorded in January 1970. Surviving beetles were found to be restricted primarily to the lower four feet of the bole and were generally confined to the outer bark on the southern side of thick-barked pitch pine, *Pinus rigida*, Mill. exceeding 12-inches in DBH.


Woodpeckers caused heavy beetle mortality directly by predation and indirectly by removing the thick layers of outer bark and exposing the brood to the cold weather above four feet. Brood densities averaged 153 beetles per square foot of bark surface.

DISCUSSION

For more than two years the southern pine beetle outbreak in the Great Smoky Mountains National Park has been allowed to " run its course " because the application of suppression measures could not be justified. This decision was based on the high cost of suppression due to inaccessibility of the outbreak area and because the Park is managed primarily for aesthetic and recreation values rather than commercial timber production.

Based on the results of the current evaluation the southern pine beetle population has been reduced to an endemic level by sub-zero temperatures in January 1970. In fact, the effect of the cold was even more significant than the current level of infested trees per M acres would indicate. The (20 ± 11) infested tree figure is misleading since live broods were observed only in a very limited area of the bole of infested trees.

Although this evaluation indicates the collapse of the outbreak on the Park, one should not underestimate the capacity of the beetle population to recover. The southern pine beetle has a high reproduction potential; it is widely distributed in this area and it has demonstrated that some of the population did survive sub-zero weather. No attempt has been made to assess the losses resulting from the infestation but as much as 1,400 acres of host type were destroyed in the survey area prior to September 1969 (Ward *et al.*, 1969). Understory hardwoods will probably conceal most of the dead pine stands in two to three years therefore loss of aesthetic values will be only temporarily affected.



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Table 1. Level of southern pine beetle infestation, Great Smoky Mountains National Park - February 1968 - February 1970 1/.

Time of	Total Area Surveyed	Number of Spots per M Acres Host Type	Number of Red and Faders per M Acres Host Type	Number of Actively infested Trees per M Acres Host Type
February 1968	18,765	7 \pm 3	50 \pm 8	39 \pm 25
August 1968	58,000	25 \pm 7	495 \pm 266	- - -
April 1969	69,000	18 \pm 4	387 \pm 179	81 \pm 52
September 1969	69,000	12 \pm 5	385 \pm 278	95 \pm 87
February 1970	69,000	16 \pm 1	247 \pm 383	20 \pm 11 <u>2/</u>

1/ 90 percent confidence limits.

2/ Living brood constitutes only a small percentage of the total in all trees examined but these trees were tallied as actively infested.

RECOMMENDATIONS

1. Park Service personnel should maintain close field surveillance for any increase in southern pine beetle activity.
2. An aerial reconnaissance survey should be flown in the summer of 1970 to determine the status of the southern pine beetle in remote sections of the Great Smoky Mountains National Park.

REFERENCES

Ward, J.D., K.H. Knauer and P.J. Barry. 1969. An evaluation of southern pine beetle infestations, Great Smoky Mountains National Park in Tennessee and North Carolina. USDA, USFS, SA, S&PF, Div. FPC, Asheville, N.C. Rpt. No. 70-1-30.

More detailed information can be obtained by writing to the Forest Pest Control Division Field Offices listed below or to the Atlanta Office.

FIELD OFFICES

Asheville Office

John L. Rauschenberger, Supervisor
Division of Forest Pest Control
SA, State & Private Forestry, U.S.F.S.
Post Office Box 5895
Asheville, North Carolina 28803

Phone: (704) 254-0961 Ext. 625

FOR STATES OF

Florida
Georgia
Kentucky
North Carolina
South Carolina
Tennessee
Virginia

Alexandria Office

William M. Ciesla, Supervisor
Division of Forest Pest Control
SA, State & Private Forestry, U.S.F.S.
2500 Shreveport Highway
Pinesville, Louisiana 71360

Phone: (318) 445-6511 Ext. 311

Alabama
Arkansas
Louisiana
Mississippi
Oklahoma
Texas

AREA OFFICE

Russel K. Smith
Assistant Area Director
Division of Forest Pest Control
Suite 800
1720 Peachtree Road, N.W.
Atlanta, Georgia 30309

Phone: (404) 526-5189



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