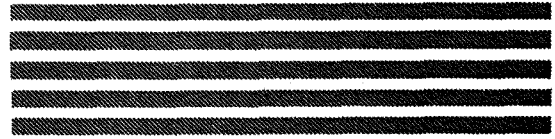


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1970 SPRUCE BEETLE SURVEY OF THE CROWSNEST FOREST, ALBERTA

by
L. Safranyik and J. Petty

**FOREST RESEARCH LABORATORY
EDMONTON, ALBERTA
INTERNAL REPORT A-41**

**CANADIAN FORESTRY SERVICE
DEPARTMENT OF FISHERIES AND FORESTRY
JANUARY, 1971**

SUMMARY

In 1971, the incidence of spruce beetle attacks in the Crowsnest Forest, Alberta, is expected to be about the same as that in 1970 with perhaps a slight increase in the South Castle and Bunny Creek stands. Incidence of attack in 1970 was about one-third of that in 1969. In the 12 stands examined, the average percentage of volume successfully attacked in 1970 was 1% and the largest percentage of volume attacked (South Castle River) was 2.75%. Although beetle activity in the outbreak areas declined during the past two years, current population levels still constitute a potential hazard to the residual and uninfested mature spruce stands in southwestern Alberta. A continuance of salvage operations to remove infested trees is recommended. In our view, prompt salvage-logging to date has resulted in significant saving of lumber that would otherwise have been killed by the beetles.

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L. Safranyik¹ and J. Petty²

The 1970 appraisal of Engelmann spruce (Picea engelmanni Parry) stands infested by the spruce beetle (Dendroctonus obesus Mann.) in the Crowsnest Forest, southwestern Alberta, was carried out in a manner similar to those in the past two years³. An aerial survey was conducted by helicopter in mid-September to locate new areas of infestation and to note changes in tree mortality and beetle activity in the known infested stands. Two previously unknown infested stands were observed, one along the upper Lost Creek and the other along the lower end of Cummings Creek in the southern part of the Bow Forest. In the Crowsnest Forest, all known mature spruce stands were inspected but no new infested areas were discovered and only few recently killed trees were observed in old infestations. Ground surveys were conducted in 12 areas. Of these, 11 areas had been surveyed previously: 9 in 1968 and 1969 and 2 in 1968.

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³ For details of survey procedure see Robins, J.K. 1968. Report of the spruce beetle outbreak, Crowsnest Forest, 1969. Unpublished Station Report, Canadian Forestry Service, Edmonton, Alberta.

One new cruise line was established in 1970. The ground surveys consisted of recording data relevant to tree condition, measurement of DBH, and estimates of volume/acre by point sampling techniques at 2 chain intervals along cruise lines traversing the selected stands.

RESULTS

The results of the survey expressed in percentages of F.B.M./acre are given in Table 1. Plot locations are shown on the attached map (Fig. 1). The following is a summary of the important findings of the 1970 ground survey.

- (1) Attack intensity in 1970 was about one-third of that in 1969 (col. 3-5 vs. col. 6-7, Table 1).
- (2) Although attacks in 1970 occurred in 8 areas, trees with successful attacks⁴ were recorded from only 5 of these areas (col. 3-5, Table 1).
- (3) Trees with successful attacks comprised about 1% of the volume of the stands examined; four-fifths of this volume consisted of trees which had been attacked previously (col. 3 and 4,

⁴ Successful attack is defined as hatching of at least some of the eggs in an egg gallery on an attacked tree and presence of live larvae under the bark at the time of sampling (i.e., in mid-September, 1970). Most trees with successful attacks distributed all around the stem die because the blue stain fungi, carried to the tree by the beetles, will kill the living (i.e., parenchyma) cells of the stem.

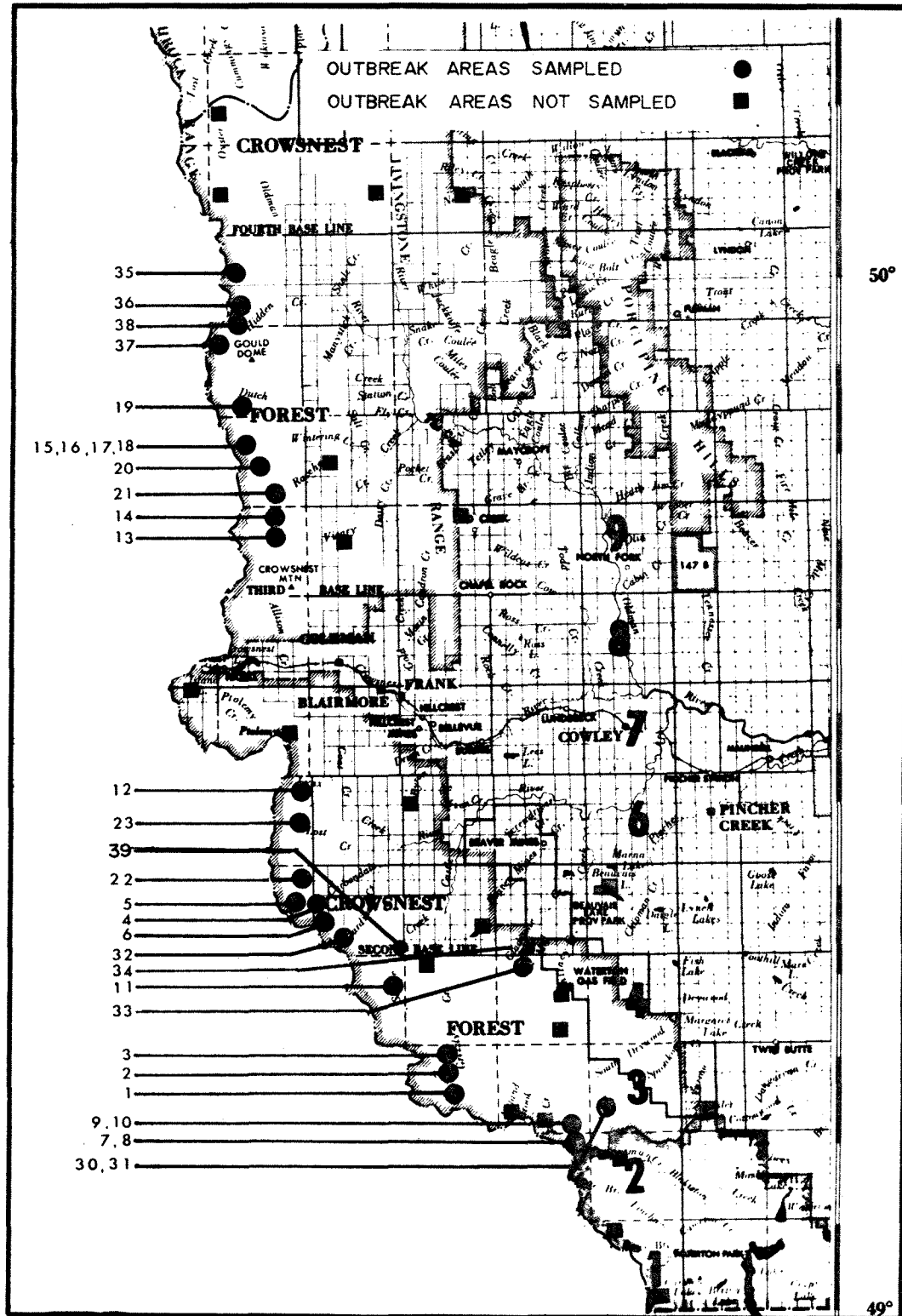


Fig. 1. Map of spruce beetle infested area of the Crowsnest Forest illustrating the locations of survey lines established from 1968 to 1970. (The numbers on left-hand side of map are identification codes for cruise lines).

since the original lines were either logged in 1970 or were scheduled for logging in 1970-71.

Table 1 gives average percentages for attacked volumes/acre of the stands examined without regard to tree size. For a more meaningful insight into the distribution of the volumes infested, the percentages of attacked volumes were examined over the DBH range of the sampled stands. There is a curvilinear relation between the percentage of volume/acre which had been successfully attacked in a DBH class, up to the time of the 1970 survey, and DBH (Fig. 2). While none of the 8-inch trees had been attacked, all trees greater than 34 inches in DBH were attacked and the broods were established.

The relative volume distribution (e.g., volume/acre of trees in a DBH class expressed as a proportion of the combined volume/acre over all DBH classes 8 inches and larger in the stand) of spruce trees in the sampled areas is given in Figure 3. Figures 2 and 3 can be combined to estimate what percentage of the stand volume/acre is represented by the attacked volume/acre in a specific DBH class. For example, it is seen from Figure 2 that 10% of the volume/acre of trees in the 14-inch-DBH class is attacked and Figure 3 indicates that this DBH class represents 0.115 of the stand volume/acre of trees 8 inches and greater in DBH. Consequently, successfully attacked trees in the 14-inch-DBH class represent $10 (0.115) = 1.15\%$ of the stand volume/acre of trees 8 inches and greater in DBH in the sampled areas.

Under epidemic conditions, it is reasonable to assume that all or most of the attacked trees will eventually die mainly because these trees

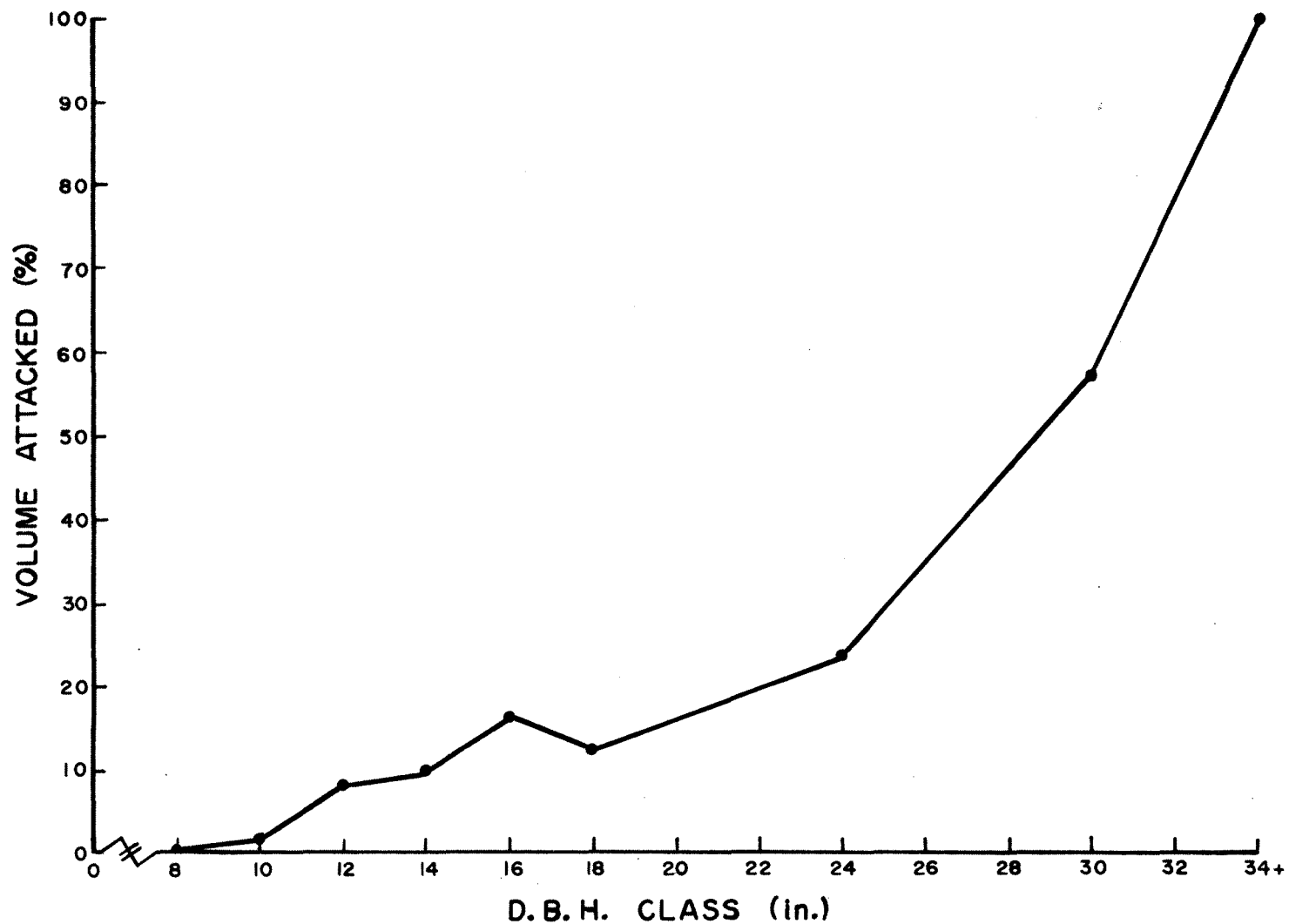


Fig. 2. Relation between tree diameter and percentage of volume/acre in each diameter class successfully attacked by the spruce beetle in 12 areas of the Crowsnest Forest up to the fall of 1970.

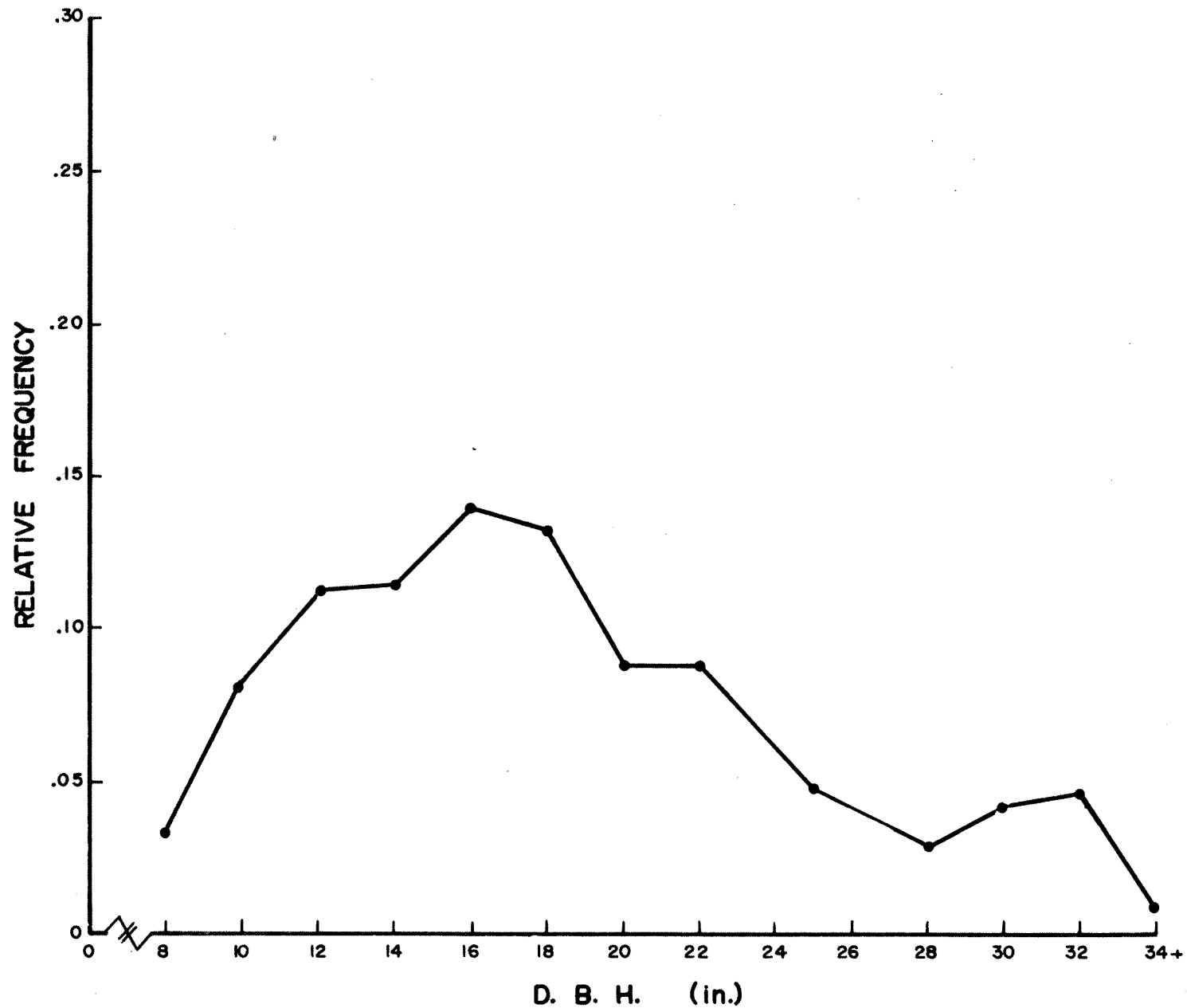


Fig. 3. Relative volume distribution of spruce stands for trees 8 inches in DBH and larger in 12 infested areas sampled in the Crowsnest Forest in 1970.