



**PRELIMINARY SURVEY OF SPRUCE BEETLE
POPULATIONS IN LOGGING SLASH
IN THE PRINCE GEORGE FOREST DISTRICT
AUGUST, 1964**

by

R. O. Wood and O.S. Ruth

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Introduction

The current infestation of spruce beetle, Dendroctonus obesus (Mann.) has caused concern about the potential populations of the insect in logging slash, particularly in areas where salvage logging operations are in progress. A preliminary study was initiated in 1964 for two purposes: first, to obtain information on the breeding potential of the beetle in stumps and different types of slash, and second, to develop methods suitable for a more comprehensive study.

Three areas were selected for the projects the Naver Forest Development Road south of Hixon; TFL #29 northwest of Eaglet Lake; and the Tacheeda Lake Road, 60 miles north of Prince George. Trees at the Naver plot were felled in December 1963; those at the other two plots in January 1964. It became apparent, however, in subsequent studies that some material had been attacked previous to this time.

Methods

The survey was done by a two-man crew in the latter part of August and required 14 days to complete. A one-chain square plot was established in each of the three areas. The top and bottom circumference and height of all stumps in the plot were measured, as were the circumferences and lengths of all cull logs and tree tops down to a four-inch diameter. The bark area in the plot was calculated from these measurements. A six-inch wide strip of bark the full height of stumps on four quadrants was removed and the numbers of eggs, larvae, pupae and adults in and beneath the bark were counted. Cull logs were examined by removing a 6 x 12 inch sample of bark on four sides of the top, middle and butt, section. On logs 10 feet or shorter, only the top and butt sections were sampled. In each plot a minimum of six stumps, four cull logs and six tops were selected at random for

sampling. At two plots the number of cull logs and tops examined was increased to 6 and 12, respectively. In all areas it was necessary to go outside of the plot boundary to find sufficient culls and/or tops. In some areas, it was feasible to sample only the east and west quadrants of stumps,

The time for each stage of the project (plot layout, bark measurement and beetle sampling) varied in the different areas in relation to the amount of slash present. The average number of man-hours required were as follows: plot layout - 2; bark measurement - 3; beetle sampling - 4.

Results

There appeared to be no uniform pattern for spruce beetle development in the three areas sampled; all stages of development were present at each plot in varying proportions. At the most southerly plot, on the Naver Access Road, cull logs contained 55% of the eggs and stumps contained the remainder. On TFL #29, Eaglet Lake, all the eggs were in the stumps and appeared to be either infertile or diseased. At the Tacheeda Lake plot, stumps contained 79% of the eggs, and tops contained 21%. It was noteworthy that almost all the eggs and most of the small larvae found in the stumps were down near the base where they would have maximum protection from low temperatures by snow during the winter. It was assumed that most of the sound eggs would hatch before winter,

Only a small number of spruce beetle pupae were found in the three areas sampled and these were mostly in the tops. Small numbers of teneral adults were found, suggesting that some material had been attacked prior to the previous winter either as standing trees or as slash. Adults in samples at the Naver plot were mostly in the stumps with a maximum of 15 per half square foot. On TFL #29, Eaglet Lake, stumps, culls and tops contained about equal numbers of adults. At the Tacheeda Lake plot most were in two tops with a maximum number of 77 per half square foot being found. These tops appeared to have been infested either before felling or as tree length logs during right-of-way logging prior to the winter. The tops were approximately six inches in diameter and probably would not have been suitable for beetle development if attacked after having been cut. Another contributing factor to the large population in the tops in this plot was the amount of branches and debris from the logging operation which covered them, thus providing a damp, shaded environment suitable for beetle development. Tops which were exposed to sunlight contained very few beetles. This also applied to the culls with the exception of those which had bark thick enough to retain moisture,

Beetle larvae, pupae and adults were fairly evenly distributed around all quadrants of the stumps (Table 1). Cull logs and tops were, in most cases, lying in an east-west direction, exposing their sides to north and south aspects. They were examined to see if there was a predominance of stages present in any of four sides: upper, lower, north or south (Table 2). In TFL #29, however, most of the tops examined were lying in a north-south direction and were excluded from the data. Broods were most abundant on the cull logs on the Power and north quadrants. On the tops, however, the greatest percentage of beetles occurred on the upper and south

quadrants at Naver and on the lower and south quadrants at Tacheeda Lake, Nineteen sixty-four was a cool, wet year; a greater abundance of sunshine during the beetle flight might have better emphasized differences of beetle selection and survival on variously shaded sites within the slash,

Spruce beetle mortality reached 65% in the larval stage, 14% in the pupal stage and 37% in the adult stage, including parent and brood mortality. Table 3 gives the calculated number of living larvae, pupae and adults per acre disregarding future mortality,

Other beetles found in the plots were: Trypodendron lineatum (Oliv.) (up to 89 holes per half square foot in stumps), Polygraphus rufipennis (Kby.), Dryocetes affaber Mann., D. septentrionis Mann., Pisaodes alaskensis Hopk., Tetropium sp.

Summary

Large populations of spruce beetle existed in logging slash in the three localities examined; the greatest breeding potential was in stumps and in tops and small logs buried or partially buried by branches or by needles and earth. Beetle populations were able to survive in host material that had been buried to a depth of 6 to 12 inches. Tops and small logs exposed to light and air sufficient to dry the bark contained few beetles. Beetles found in these tops and logs were mainly concentrated in portions of the material which were shaded or in contact with the ground. Logs of 16 inches diameter or over and which had thick enough bark to retain moisture provided the most suitable conditions for population build-up,

Table 1

Percentage of Spruce Bark Beetle Brood in Quadrants of Stumps
at Three Locations in the Prince George
Forest District, August 1964

Plot Location	<u>Percentage of Beetles in Quadrants</u>			
	North	West	South	East
Naver	30	26	25	19
TFL #29	24	22	18	34
Tacheeda L.	44	42	15	29

Table 2

Percentage of Spruce Bark Beetle Brood in Cull Logs and Tops
at Three Locations in the Prince George
Forest District, August 1964

Plot		<u>Percentage of Beetles in Log Quadrant</u>			
		North	Upper	South	Lower
Cull logs	Naver	34	2	16	48
	TFL #29	33	16	7	44
	Tacheeda L.	7	5	13	75
Tops	Naver	13	45	38	4
	Tacheeda L.	10	4	38	48

Table 3

Population Potential of Spruce Bark Beetle in 1/10 Acre Plots of 1963-64 Winter Logging
Slash at Three Locations in the Prince George Forest District, August 15 to September 3, 1964

Location	Material Examined	No. Examined	Total Sq. Ft. of Bark Examined	Av. No. Living per Sq. Ft.				Total Sq. Ft. of Bark Area in 1/10 Acre Plot	Calculated No. Living per Acre		
				Eggs	Larvae	Pupae	Adults		Larvae	Pupae	Adults
Naver Road	Stumps	6	20	8.2	109.1	0.04	7.5	88.5	96,553	35	6,637
	Cull logs	4	22	9.3	2.4	0.0	1.1	194.5	4,668	0	2,139
	Tops	6	24	0.0	29.8	0.4	1.0	563.7	167,982	2,254	5,637
								Totals	269,203	2,289	14,413
TFL #29 Eaglet Lake*	Stumps	6	45	000	9.2	0.6	0.7	90.2	8,298	541	631
	Cull logs ⁺	6	32	0.0	27.6	1.8	0.7	0.0	-	-	-
	Tops	12	58	000	24.8	1.5	0.6	49.6	12,300	744	297
								Totals	20,598	1,285	928
Tacheeda Lake	Stumps	7	28	1.9	12.2	0.2	0.3	112.4	13,712	224	337
	Cull logs [#]	6	34	000	1.7	0.0	1.4	169.3	2,878	0	2,370
	Tops [#]	12	62	0.2	0.5	0.2	12.1	322.4	1,612	644	39,010
								Totals	18,202	868	41,717

* Not representative of logged areas.

+ Sampled 300 to 400 yards from stumps in plot.

Some may have been infested before they were felled or as tree-length logs from right-of-way logging.