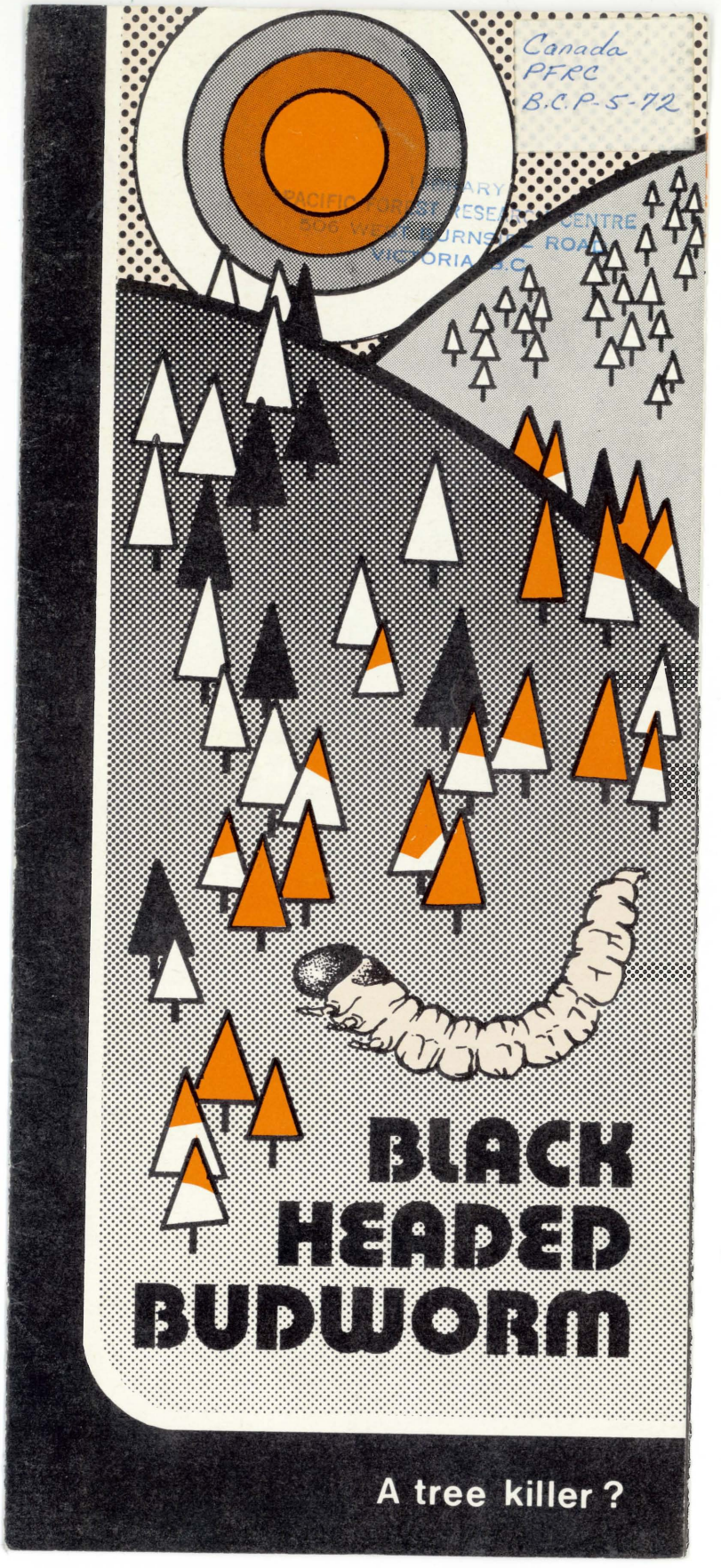


BLACK HEADED BUDWORM

A tree killer ?

BLACKHEADED BUDWORM

The current outbreak of the blackheaded budworm on Vancouver Island is causing considerable concern. So far this year, more than 400 thousand acres of hemlock and balsam forests have been defoliated, almost three times the amount of last year. The insect is present in significant numbers in almost every western hemlock stand.

In the Prince Rupert Forest District, large numbers of budworms are present and outbreaks will likely occur in several coastal locations in 1973.

On southern Vancouver Island, defoliation occurs from 1,500 to 3,000 feet elevation, and on the northern end, from sea level to 2,500 feet elevation.

LIFE HISTORY

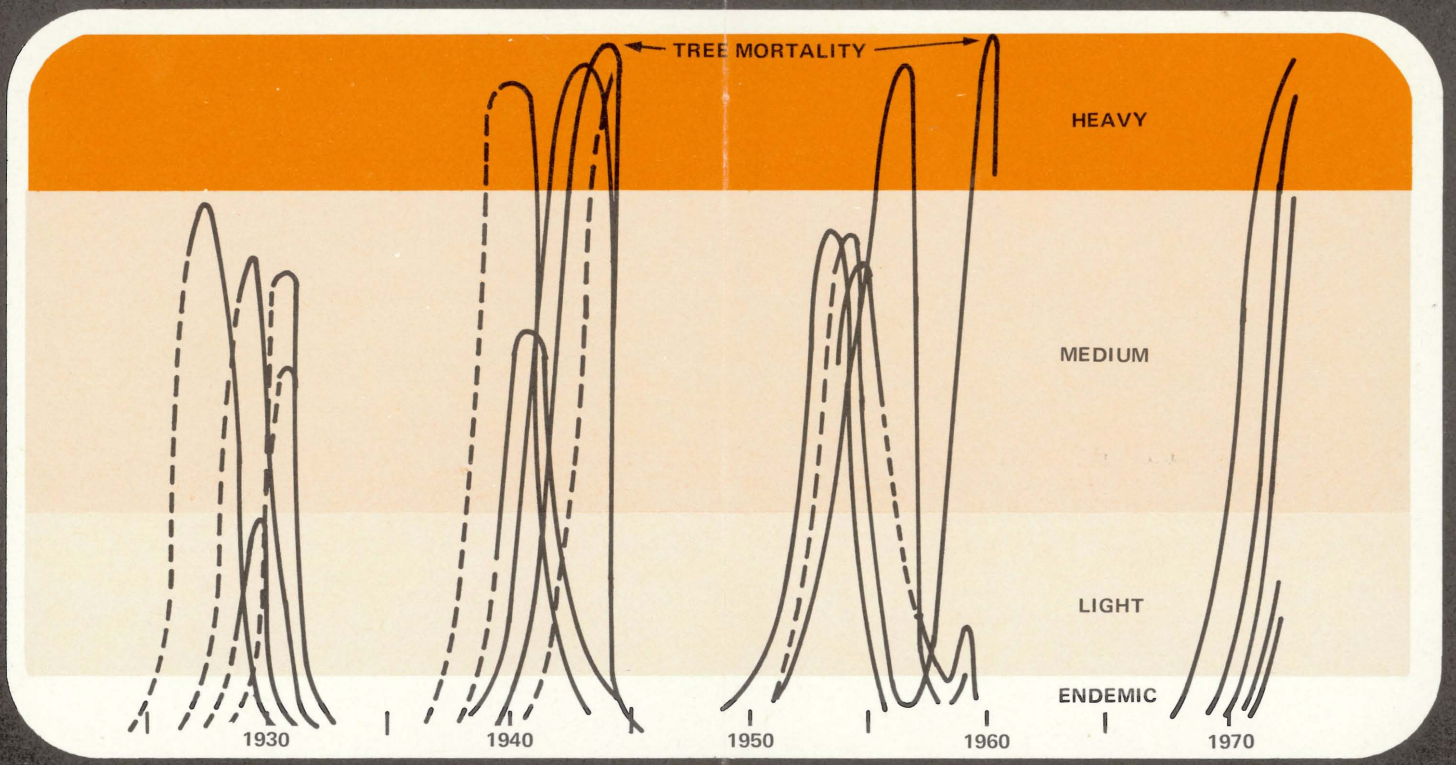
Budworm moths fly at night during September and October, and lay yellowish eggs on the underside of needles, preferably in the upper crowns. After the eggs hatch, from late May to early June, the caterpillars feed on developing buds. New foliage is consumed first, followed by older foliage. Caterpillars form a shelter of silk and chewed needles, which discolor and give a red-brown appearance to the trees. Caterpillars complete their feeding, and pupate on the foliage from late July to early August; moths emerge two weeks later.

OUTBREAK CYCLE

Characteristically, the blackheaded budworm increases to outbreak level in surprisingly few years. For example, in 1968, a few caterpillars were found in routine survey collections for the first time in five years around Lake Cowichan. Eggs were plentiful in the autumn of 1970, and by 1971 defoliation was severe. Defoliation usually recurs in a given locality for two or three years and then the population declines rapidly. If the outbreak lasts longer, the risk of tree mortality becomes high. A large volume of timber was killed in the Sayward Forest during the 1939-46 outbreak, but only a small amount was killed on the Queen Charlotte Islands during the last epidemic, 1952-60.

In the current epidemic on southern Vancouver Island, the budworm is in the third year of extensive moderate to severe defoliation. Previous outbreaks have been short-lived on the south end of the Island and damage was slight but the present cycle is more prolonged.

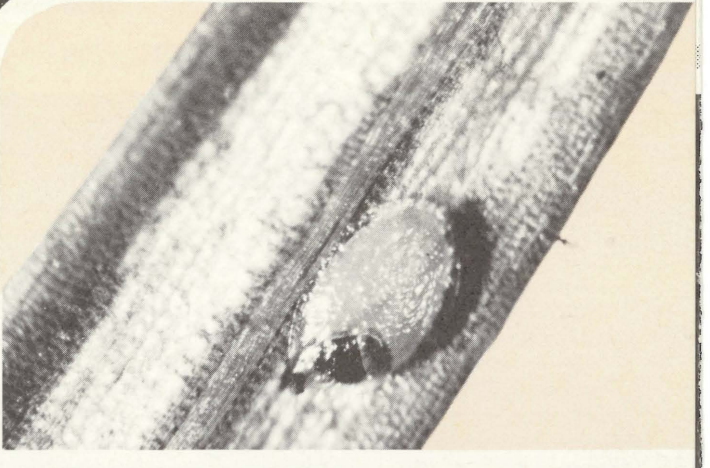
On the northern portion of Vancouver Island, outbreaks have been more severe; 1972 was the first year of extensive defoliation, and increased damage is anticipated before the outbreak is exhausted.

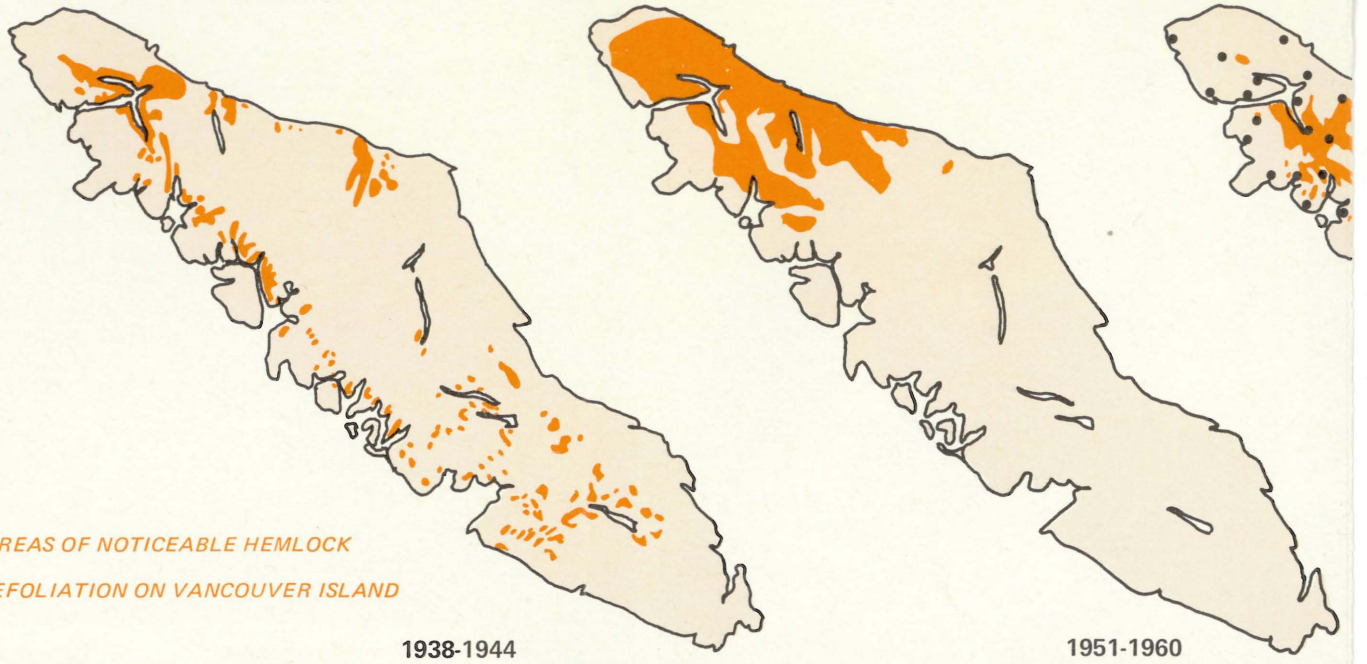


PROSPECTS

The amount of damage that will occur depends upon the intensity and duration of defoliation before the outbreak collapses. Three or four successive years of severe defoliation can cause significant tree mortality.

Knowledge as to why past populations of black-headed budworm collapsed is incomplete; therefore, a prediction of such a collapse is unreliable. Natural control factors such as parasites and a polyhedral virus, detected in the current populations, are still insignificant, and the budworm population generally seems healthy. Early studies demonstrated the importance of weather in fluctuation of budworm populations; therefore, a warm, sunny autumn and mild winter would allow optimum egg laying and winter survival, followed by probable increased defoliation in 1973.





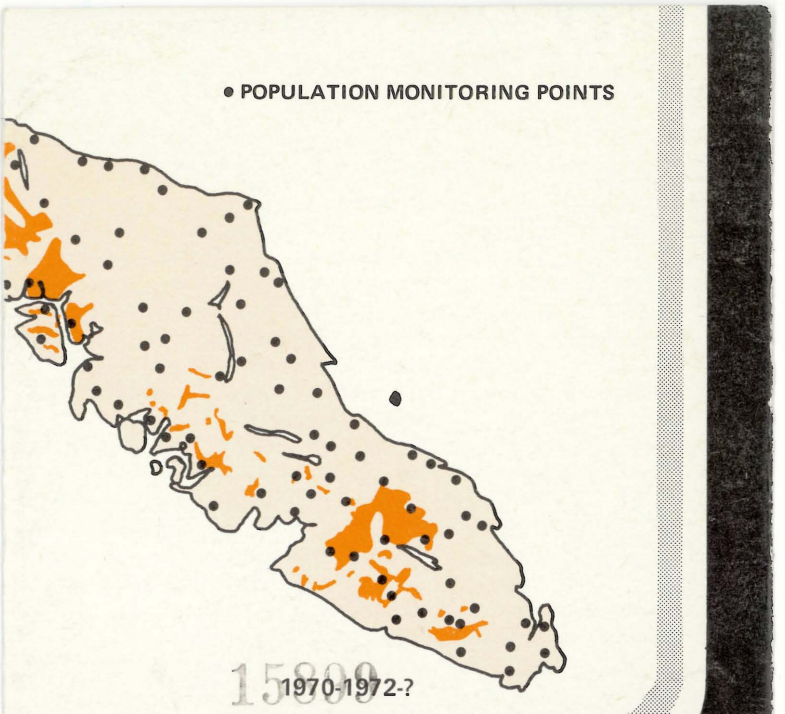
AREAS OF NOTICEABLE HEMLOCK DEFOLIATION ON VANCOUVER ISLAND

DAMAGE

Hemlock is the preferred host, although amabilis fir, Sitka spruce and Douglas-fir trees are also defoliated when mixed with hemlock. At high elevations, mountain hemlock seems to be as palatable as western hemlock. Stands composed mostly of mature hemlock with large exposed crowns seem to be the centers of high populations. Such susceptible stands often occur at the heads of high valleys. Defoliation tapers off rapidly in younger stands with an even crown structure, although spill-over effects are sometimes noticeable from mature stands at high elevations into lower stands of regeneration.

New foliage is eaten first, followed by old foliage. Most of the feeding takes place during the last two weeks of larval life, in late July and early August. Thus, stands discolor quickly and early surveys can completely miss detection of heavy defoliation.

Mature hemlock, unlike Douglas-fir, appears to have a poor capability for recovery from defoliation and feeding on the buds. Douglas-fir produces an abundance of adventitious buds and can quickly regenerate its crown. Hemlock does not produce adventitious buds as readily and the effects of defoliation are more severe. When trees are partially defoliated, growth rates will be reduced and, because the upper crown suffers most, dieback of the terminals can be expected. When the trees are totally defoliated and the buds destroyed by feeding larvae, the trees will probably die.



SURVEYS AND RESEARCH

Our predictive capability for this insect is limited, partly because its numbers change so rapidly, and because studies have not been sufficiently detailed. Extensive sampling is carried out in autumn to determine egg densities, and in summer for caterpillar counts. This is followed by an aerial survey where all defoliated stands are mapped and classified into three intensities of defoliation.

The effects of weather, parasitism, disease and defoliation upon population trends will be investigated at specific sites throughout Vancouver Island. This will increase our predictive ability and help pinpoint likely biological control possibilities.

Research is also underway on effective biological and chemical control agents. A bacterium, *Bacillus thüringiensis*, as well as a number of chemicals appear promising.

The influence of different degrees of defoliation upon growth and dieback as related to site and stand densities is being investigated. Through simulation, projections will be made as to the influence of today's defoliation upon tomorrow's forest.

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