

Western Spruce Budworm on Douglas - fir



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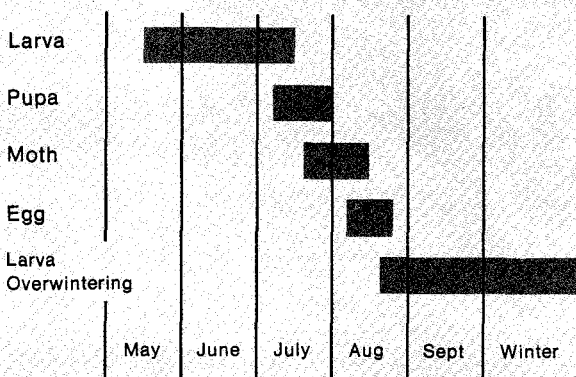
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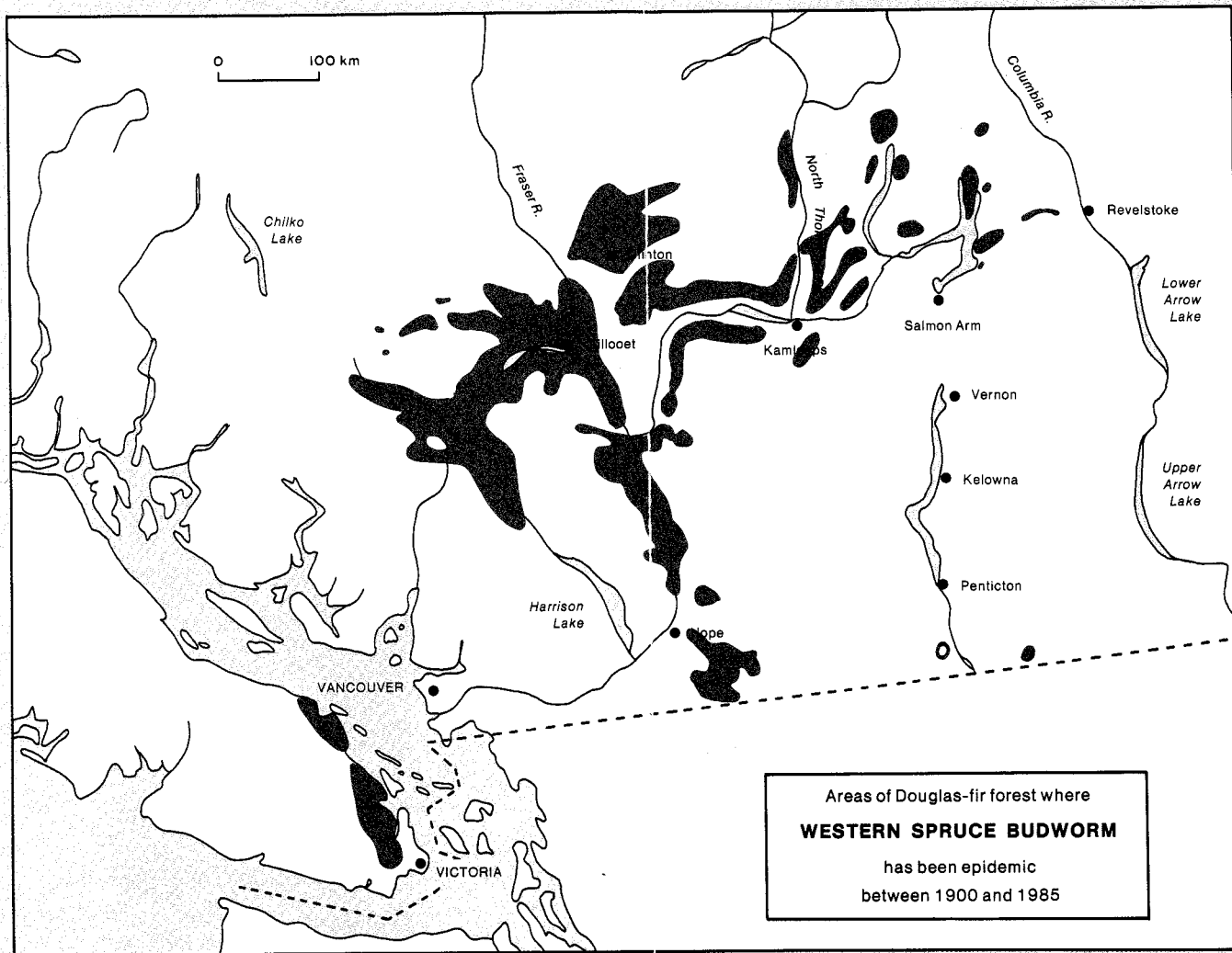
Colin Wood

The western spruce budworm, known to entomologists as *Choristoneura occidentalis* Freeman, has periodically attacked Douglas-fir forests in the Cariboo, Kamloops, Nelson and Vancouver forest regions since 1900. However, the present outbreak has lasted longer, spread farther, and damaged more trees than any previous outbreak; it began in 1968 and has spread over 210 000 ha. The most severe damage has been in the forests around Pemberton, Lillooet, Boston Bar and Lytton, and more recently around Cache Creek, Ashcroft and Savona.

Infested stands can be recognized easily. After mid-June, partially eaten, discolored needles give the forest a reddish brown appearance. After one or more years of defoliation, the partially eaten needles are washed off by rain or blown off by wind, and the forest takes on a grey color.

The western spruce budworm is primarily a pest of Douglas-fir but it also defoliates amabilis fir, grand fir and occasionally alpine fir. This species of budworm is confined to the southern half of British Columbia. Other species of budworm attack various conifers in the interior, but not Douglas-fir.





Life Cycle

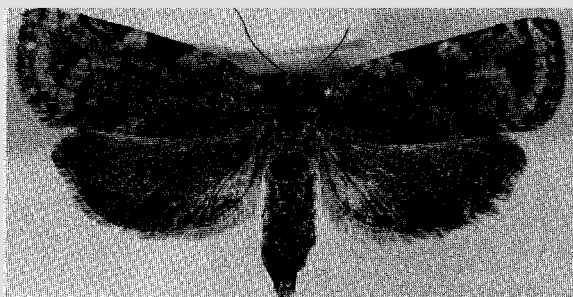
The western spruce budworm has four stages of development: adult, egg, larva and pupa.

The adult is a mottled grey or brownish moth with a wingspan of about 26 mm (1 inch). It emerges from pupal cases spun on the foliage about mid-July.

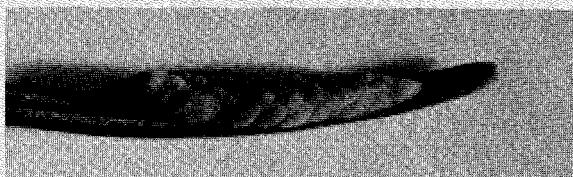
Newly laid eggs are green and are laid in a shingle-patterned mass on the underside of needles, usu-

ally after mid-July. The eggs hatch after about 10 days.

Larvae emerge from the eggs, spin a cocoon, and rest through the winter without feeding. In early spring, around May, the larvae begin feeding by mining the previous years needles or by burrowing into new buds. Following bud flush, larvae feed on new needles in a protective silken web. When the new needles are all eaten, the larvae move on to older needles; they feed for 5 to 7 weeks. Larvae are up to 26 mm (1 inch) long. They have a reddish brown head and collar, and a yellowish to reddish



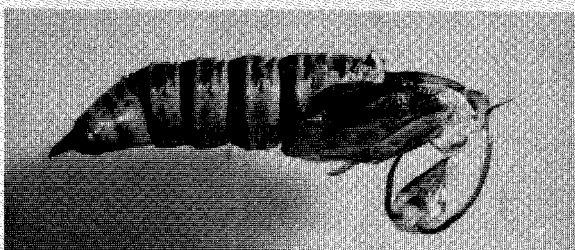
Adult



Eggs



Larva



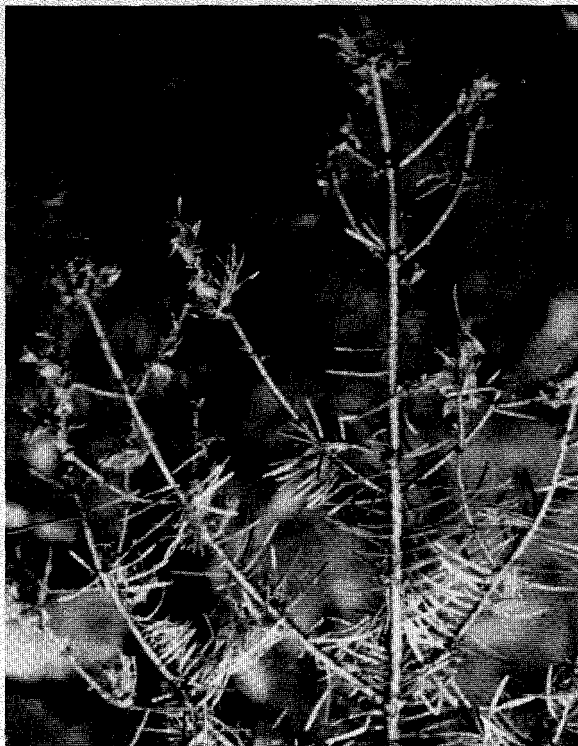
Pupal Case

brown body with rows of pale spots.

The budworm pupae are yellowish to reddish brown, about 13 mm (1/2 inch) long, and held by silk within the damaged foliage. The pupal stage lasts for about 7 to 10 days, after which the adult moths begin to emerge, usually about mid-July.

Damage

Damage to trees is caused by larvae feeding on the buds and needles. In light infestations, the damage is confined to new needles; in severe infestations the upper crown is stripped and the buds are killed. In extreme cases, the entire crown can be defoliated. Defoliation slows growth, in terms of both height and diameter. The tops of trees can be killed, and attacked trees often develop multiple leaders or forked tops. This damage reduces the value of trees.



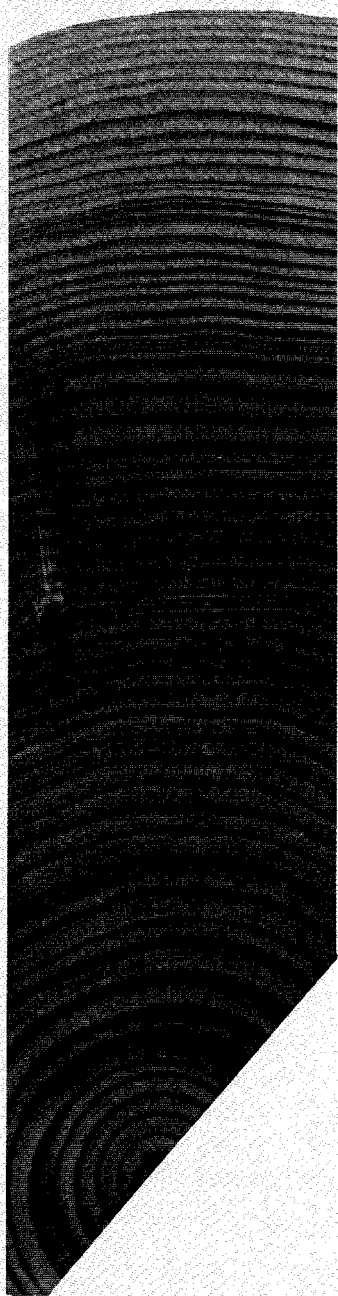
Larvae of the western spruce budworm feed on buds and needles.

1970-72

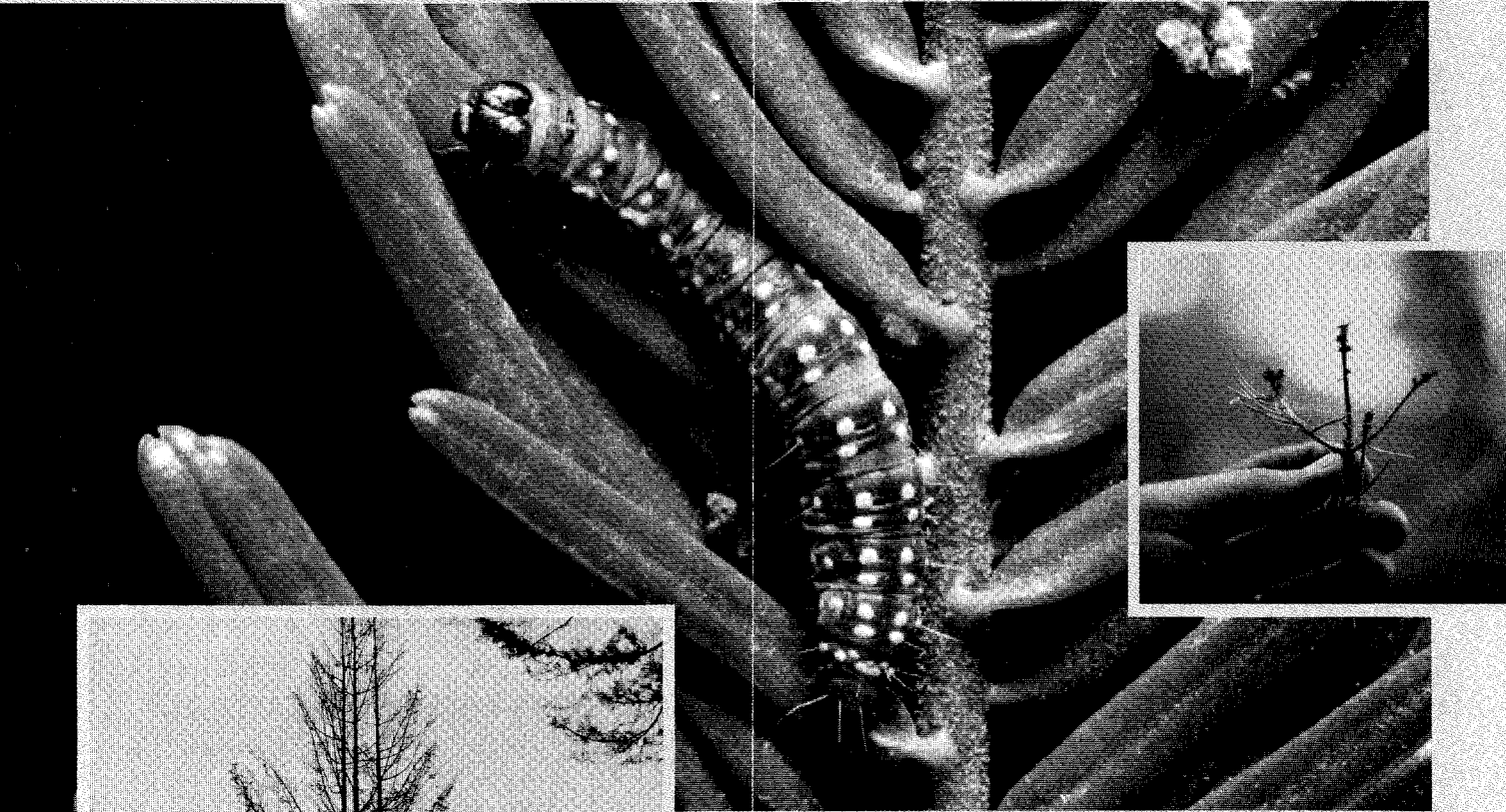
1956-59

1945-47

1931-33



The thin annual rings in this Douglas-fir log, cut in 1972, indicate four periods of reduced growth caused by budworm outbreaks.



Infestations come and go, but the damage is permanent. A budworm infestation caused a forked top in this tree many years ago.

Dispersal

The western spruce budworm disperses, or spreads, mostly in the moth stage, and with the help of wind currents can fly over long distances. Flying moths are caught in up-drafts and carried many kilometres downwind.

Larvae also spread. After emerging from overwintering they dangle from foliage on thin silken threads and are carried on air currents to nearby trees or stands.

Control

Budworm populations are controlled periodically by natural control factors. But often these natural control factors are not enough to suppress bud-

worm populations; an outbreak then occurs, and trees are severely damaged.

Researchers are developing ways to control outbreaks of the budworm using natural control factors such as bacteria, fungi, viruses, parasites, attractants and growth regulators. The bacterium *Bacillus thuringiensis* has been registered in Canada for use against the western spruce budworm, and it is now commercially available.

Treatment of infested stands with a registered insecticide may occasionally be necessary as a supplement to natural control agents. The Pesticide Control Branch of the British Columbia Ministry of the Environment, in Victoria, can provide information and recommendations on the use of insecticides.

Regardless of which control method is used, forest managers need up-to-date information on the western spruce budworm to effectively prevent or control outbreaks. Are populations increasing? Decreasing? Is a particular outbreak expected to spread? In which direction? To answer these questions, populations of the western spruce budworm are annually monitored and assessed by the Forest Insect and Disease Survey of the Canadian Forestry Service.



For more information on the western spruce budworm or other pests affecting British Columbia's forests, contact the Forest Insect and Disease Survey of the Canadian Forestry Service.

Canadian Forestry Service
Pacific Forestry Centre
506 W. Burnside Road
Victoria, B.C.
Canada V8Z 1M5

(604-388-0600)