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SPECIAL REPORT  
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Outbreak of Green-striped Forest Looper  
on Northern Vancouver Island

by

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Green-striped forest looper<sup>2/</sup> infestations in British Columbia have been characterized by rapid population increases resulting in heavy defoliation in scattered isolated areas, followed by sudden, complete collapse of populations.

A recent outbreak occurred on the west coast of Vancouver Island in 1960 when the insect caused defoliation of western hemlock and western red cedar from Tofino Inlet to Brooks Peninsula. Heavy defoliation occurred in some areas with some mortality of trees more than 90% defoliated. The population collapsed prior to pupation in August of 1960 and only a very small percentage overwintered.

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High larval populations were encountered on the Queen Charlotte Islands in 1963, and in 1964, the population reached outbreak levels along the east coast of Graham Island causing heavy defoliation in scattered areas. Again, tree mortality occurred where defoliation of individual trees exceeded 90%. The population collapsed in late summer and there was only a low endemic population in 1965.

Small population fluctuations occurred in the following years and in 1968 there was a marked increase along the northwest coast of Vancouver Island with high populations defoliating western hemlock in small areas around Victoria Lake. Overwintering pupae in the fall of 1968 averaged 3.5 per square foot duff sample in this area, enough to produce a damaging larval population the following year. Pupae reared in the laboratory during the winter suffered high mortality from bacterial infection, suggesting effective population control. Continued rising populations in 1969, however, lead us to conclude that the laboratory results did not adequately reflect field conditions. This report gives the current status of the insect and damage and outlines the expected progress of the infestation next year.

#### ASSESSMENT 1969

##### Population measurements

Heavy moth flights occurred in the Quatsino Sound - Port Alice area in the spring of 1969 and early larval sampling revealed a high population in areas from the south end of Quatsino Narrows and Drake Island to the south end of Neroutsos Inlet and east to Victoria Lake.

Overwintering pupae were numerous, especially where heavy defoliation had occurred (Table 1). There was a high of 156 pupae in one square foot duff sample at Julian Cove and a number of samples contained more than 100 pupae each. Over 2 pupae in one square foot duff sample constitute a defoliating population if high survival rates are experienced in this and subsequent adult egg, and larval stages. Only 22 of 3,200 pupae found in samples were infected with a fungus disease; the remainder appeared healthy.

Defoliation and damage

Heavy defoliation was seen from the air in mid-July on about 1,700 acres around Kokwina, Atkins, Julian and Smith coves, between Port Alice and Victoria Lake, south of Port Alice along the east side of Neroutsos Inlet and on Ketchen Island (see map). Lighter defoliation occurred on some 10,000 acres from Coal Harbour south to Port Alice and around the north end of Victoria Lake and in several small patches southeast of Brooks Peninsula on Nasparti, Ouokinsh and Malksope inlets. Acreage estimates were made as closely as could be defined from a fixed-wing aircraft.

Defoliation estimates were made on 10 trees at each of eight sample locations and on 50 trees between Port Alice and Victoria Lake; these latter were numbered for future examination (Table 2). Defoliation was heavy at four of the sample locations: Atkins Cove, Julian Cove and between Port Alice and Victoria Lake; 35% of the trees examined in these areas were completely defoliated, 12.5% were 98% or almost completely defoliated, 7.5% were 90 - 98% defoliated and 15% were 75 - 90% defoliated.

Previous infestation and defoliation records show that trees completely defoliated can be considered as dead, those classed as 98% or almost completely defoliated will be dead before next summer and those between 90 to 98% defoliated stand little chance of recovery. Trees defoliated between 75 and 90% stand a good chance of recovery although some may die up to a few years after the infestation subsides. Below 75% defoliation, tree mortality was rare.

Much of the timber from Coal Harbour to Port Alice is classed as immature hemlock, although around Atkins, Kokwina and Julian coves it is of merchantable size. Stands on the slopes bordering Neroutsos Inlet consist of thrifty immature hemlock regeneration. Between Port Alice and Victoria Lake and around the north end of the lake there are extensive stands of mature timber, and it is in the mature and immature merchantable classes that the heaviest defoliation has occurred. Most understory and intermediate trees in these areas were almost completely stripped of foliage.

#### FORECAST FOR 1970

There was a rapid increase in the population of green-striped forest looper in western hemlock stands in the Quatsino - Port Alice area in 1969. Heavy defoliation occurred on some 1,700 acres and light to medium defoliation on about 10,000 acres. Exceptionally high numbers of overwintering pupae are present in the area. In previous infestations, notably on the Queen Charlotte Islands, an overwintering population of approximately 15 per square foot produced a population which caused moderate to heavy defoliation the following year. In the infestation area on North Vancouver Island there was an average of 33 pupae per square foot sample, considerably more than double anything found previously. Should this population survive the winter the emerging moth population will spread into and oviposit on trees in surrounding lightly or non-infested stands, many of which consist of high value regeneration up to 40 or 50 years old.

Presently heavily defoliated stands, which are reasonably accessible, may suffer up to 50% mortality, and further defoliation in 1970 could increase the amount of mortality in these areas. Heavily defoliated and dying trees will be susceptible to attack by ambrosia beetles, wood borers and decay fungi which will hasten the deterioration of the wood.

Predictions based on this fall's pupal counts may well have to be modified next spring because of the impact of factors taking effect during winter or early spring. High overwintering mortality due to unfavorable climatic conditions could still reduce populations, but at the present time there is no sign of parasitism and little evidence of disease. Weather conditions during moth flight next spring could reduce mating and oviposition and cold wet weather during the early larval period could influence feeding and larval survival. Unless populations are reduced, however, there will be an extremely high population in 1970 which should cause extensive defoliation in the area.

We recommend additional pupal counts in early spring to check survival and further mapping of the infested area by helicopter to more clearly define infestation boundaries. Larval sampling in late May or early June will give a final estimate of populations and a prediction of damage. If populations are high, any control measures considered necessary will have to be taken within a few weeks because defoliation by this insect is usually rapid.

Table 1

Average number of green-striped forest looper pupae per square foot duff sample at eight locations, North Vancouver Island, September 1969

Location	Defoliation intensity	Average number pupae/square foot			
		Tree 1	Tree 2	Tree 3	Average for 3 trees
1. Kokwina Cove	Medium	<sup>29</sup> 7.2	<sup>77</sup> 19.2	<sup>90</sup> 22.5	<sup>196</sup> 16.3
2. Atkins Cove	Heavy	<sup>149</sup> 37.2	<sup>81</sup> 20.2	<sup>81</sup> 20.2	<sup>311</sup> 25.9
3. Julian Cove	Heavy	<sup>277</sup> 69.2	<sup>318</sup> 79.5	<sup>169</sup> 42.2	<sup>764</sup> 63.6
4. North end Victoria Lake	Light	<sup>35</sup> 8.7	<sup>53</sup> 13.3	<sup>36</sup> 9.0	<sup>124</sup> 10.3
5. Pump station, Victoria Lake	Medium	<sup>167</sup> 41.7	<sup>54</sup> 13.5	<sup>160</sup> 40.0	<sup>381</sup> 31.7
6. Pipeline, Port Alice	Heavy	<sup>238</sup> 59.5	<sup>118</sup> 29.5	<sup>119</sup> 29.7	<sup>475</sup> 39.6
7. Ketchen Island, Port Alice	Medium to heavy	<sup>151</sup> 37.7	<sup>179</sup> 44.7	<sup>380</sup> 95.0	<sup>710</sup> 59.2
8. West side Neroutsos Inlet, S. of Port Alice	Medium	<sup>38</sup> 9.5	<sup>53</sup> 13.2	<sup>142</sup> 35.5	<sup>233</sup> 19.4

Table 2

Ocular estimate of per cent defoliation of western hemlock  
by crown level, North Vancouver Island, September 1969

Location	Average per cent crown defoliation		
	Top 1/3	Mid 1/3	Lower 1/3
1. Kokwina Cove	51	60	68
2. Atkins Cove	65	82	96
3. Julian Cove	73	90	100
4. N. end Victoria Lake	28	38	48
5. Pump station, Victoria Lake	60	53	53
6. Pipeline, Port Alice	88	91	93
7. Ketchikan Island, Port Alice	37	80	99
8. W. Side Neroutsos Inlet, S. of Port Alice	20	41	58
9. 50-tree plot between Port Alice and Victoria Lake	76	75	98

