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ANNUAL DISTRICT REPORT  
FOREST INSECT AND DISEASE SURVEY  
BRITISH COLUMBIA, 1976  
PART I, VANCOUVER FOREST DISTRICT

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by

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PACIFIC FOREST RESEARCH CENTRE  
CANADIAN FORESTRY SERVICE  
VICTORIA, BRITISH COLUMBIA

- FILE REPORT -

DEPARTMENT OF FISHERIES AND ENVIRONMENT  
February, 1977

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## INTRODUCTION

This report outlines forest insect and disease conditions in the Vancouver Forest District and forecasts trends, emphasizing pests capable of sudden, damaging outbreaks.

Regular field work in the District commenced on May 17 and ended on September 30. Time expended on special surveys was as follows: 14 hours on aerial surveys in July and August; 4 weeks on western spruce budworm egg survey and damage appraisal in September.

A total of 570 insect and 57 tree disease collections were submitted to the Pacific Forest Research Centre. Map 1 shows regions and general location of field collection points.

The number of collections containing larvae on Vancouver Island increased from 64% in 1975 to 68% in 1976; on the Mainland there was a decrease from 80% in 1975 to 74% in 1976.

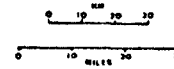
Western spruce budworm infestations, primarily in Douglas-fir stands, totalled 176,354 acres (71,423 ha), a decrease from the 1975 acreage. Mountain pine beetle infestations continued to cause extensive tree mortality in lodgepole pine stands in the Klinaklini River Valley. Douglas-fir beetle attacks occurred in spruce budworm defoliated stands in the Pemberton area. Infestations of western tent caterpillar and Bruce spanworm occurred on deciduous hosts on the southern part of Vancouver Island and Sechart Peninsula.

Adverse climatic conditions in 1972 and 1973 resulted in dieback of mature conifers in the lower Mainland and Fraser Valley. Red ring rot heavily infected a mature western hemlock stand near Beaver Cove. A canker caused dieback and brooming of young Douglas-fir in plantations at Franklin River in Knight Inlet. Dwarf mistletoe in second growth western hemlock stands, and laminated root rot in Douglas-fir stands were common at numerous locations.

Windthrow was widespread on northern Vancouver Island, and discoloration of broadleaf maple foliage was widespread throughout the District.

Details on individual insect and disease problems appear in subsequent sections.

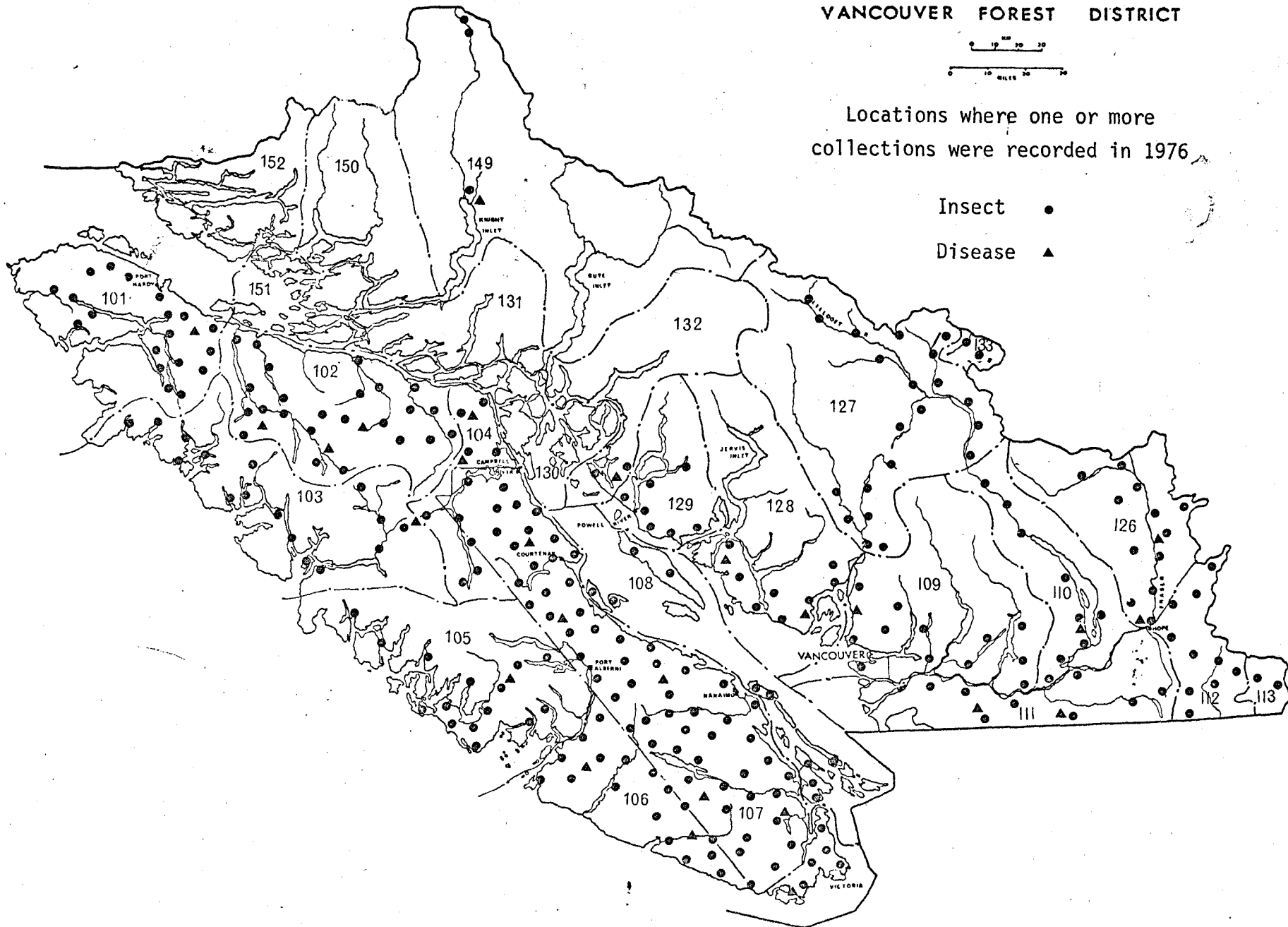
Map 1  
VANCOUVER FOREST DISTRICT



Locations where one or more  
collections were recorded in 1976

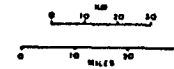
Insect •

Disease ▲

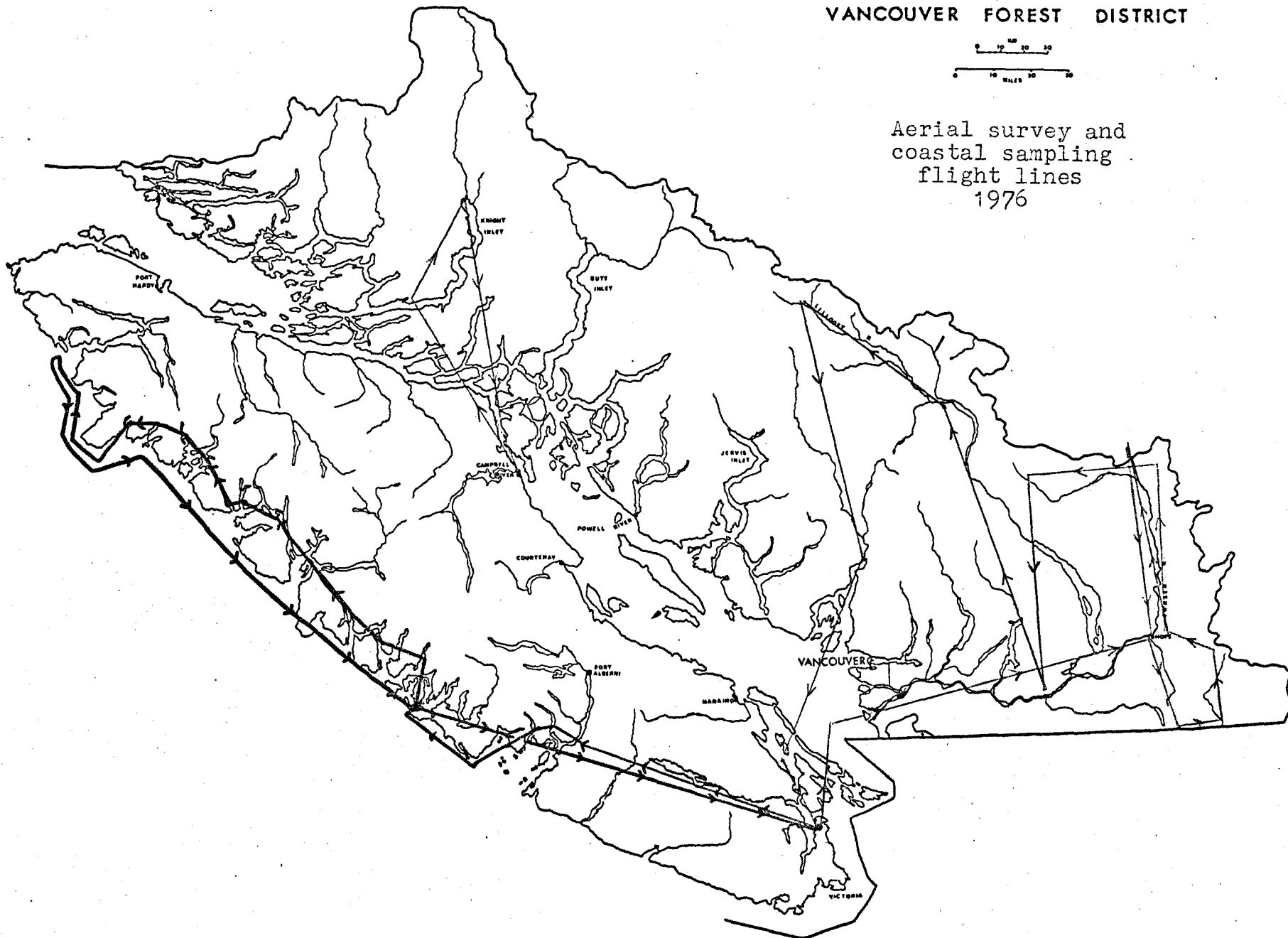


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Map 2  
VANCOUVER FOREST DISTRICT



Aerial survey and  
coastal sampling  
flight lines  
1976



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## FOREST INSECT CONDITIONS

### Spruce budworm, *Choristoneura occidentalis*

There have been three major outbreaks of spruce budworm in the past 40 years in Douglas-fir and to a lesser degree true fir stands on the Vancouver Mainland District. In 1943-44, infestations occurred in the vicinity of Pemberton and at the headwaters of the Skagit River. From 1953-58, severe infestations occurred in the Lillooet River Valley and in the Fraser Canyon. During the current outbreak, which began in 1969, infestations have occurred in the Lillooet River Valley, Fraser Canyon and Skagit River Valley.

Defoliation of Douglas-fir occurred on a total of 71 423 ha (76,354 acres) in 1976. Infestations expanded and intensified in the Fraser Canyon and along the Hope-Princeton Highway in Manning Park, and declined along the Lillooet River Valley northwest of Pemberton (Map 2).

One hundred bud counts were taken on Douglas-fir trees in infestation areas in the latter part of May, at seven localities, for a preliminary evaluation of the infestation. Table 1 shows the results of this examination.

Table 1. Percentage of Douglas-fir buds infested with spruce budworm, Vancouver Mainland District, 1975 and 1976

| Locality                          | Percentage of buds infested |      |
|-----------------------------------|-----------------------------|------|
|                                   | 1975                        | 1976 |
| <u>Pemberton area</u>             |                             |      |
| Birkenhead L                      | -                           | 40   |
| Rutherford Cr                     | -                           | 34   |
| Railroad Cr                       | -                           | 22   |
| Pemberton                         | -                           | 17   |
| <u>Hope area</u>                  |                             |      |
| Sumallo R                         | 5                           | 26   |
| Silverhope-Skagit R (mile 28)     | 4                           | 25   |
| Manning Park (Rhododendron Flats) | -                           | 20   |

Larval collections during July from Douglas-fir, ranged from over 300 larvae per 3-tree-beating sample at Anderson River in the Fraser Canyon to 150 larvae at Railroad Creek northwest of Pemberton. Table 2 shows larval collections in ten regions on Vancouver Mainland and Vancouver Island.

Table 2. Summary of spruce budworm beating collections from Douglas-fir, Vancouver Forest District, 1976

| Regions* | No. samples taken during larval period | % samples containing larvae | Avg no. larvae per positive sample | Avg no. larvae per sample |
|----------|--|-----------------------------|------------------------------------|---------------------------|
| 109      | 7                                      | 0                           | 0                                  | 0                         |
| 110      | 6                                      | 33                          | 2.0                                | 0.6                       |
| 111      | 5                                      | 20                          | 1.0                                | 0.2                       |
| 112      | 5                                      | 100                         | 68.6                               | 68.6                      |
| 113      | 3                                      | 66                          | 1.5                                | 1.0                       |
| 126      | 6                                      | 50                          | 49.3                               | 24.6                      |
| 127      | 12                                     | 91                          | 75.6                               | 69.3                      |
| 133      | 2                                      | 100                         | 58.5                               | 58.5                      |
| 104      | 10                                     | 20                          | 1.0                                | 0.5                       |
| 107      | 41                                     | 10                          | 1.0                                | 0.1                       |

\* See Map 1.

Dissection of 100 late instar spruce budworm larvae from Douglas-fir for parasitism studies was done at four localities; at Haylmore Creek 26% of the larvae were parasitized; Railroad Creek (6%); Silver-Skagit (14%) and Spuzzum Creek (12%).

Mass collections of spruce budworm larvae from nine locations in the Pemberton and Hope areas were sent to the Insect Pathology Research Institute for disease examination. Table 3 shows the results of these examinations.

Table 3. Spruce budworm sent to Insect Pathology Research Institute from Vancouver Mainland, 1976

| Location      | Date larvae collected | No. larvae | Remarks                                   |
|---------------|-----------------------|------------|---|
| Manning Park  | June 6                | 250        | No evidence of disease                    |
| Silver-Skagit | " 17                  | 100        | " " " "                                   |
| Anderson R    | July 2                | 100        | " " " "                                   |
| Pemberton     | " 5                   | 100        | " " " "                                   |
| Haylmore Cr   | " 5                   | 100        | " " " "                                   |
| Railroad Cr   | " 6                   | 100        | Infected with nuclear polyhedrosis virus  |
| Coquihalla R  | " 22                  | 100        | Infected with <i>Entomophthora</i> fungus |
| Sumallo R     | " 29                  | 75         | No evidence of disease                    |
| Silver-Skagit | August 5              | ?          | Infected with <i>Entomophthora</i> fungus |

Aerial surveys in late August showed a substantial increase in areas of heavy defoliation in 1976 compared to 1975, and a reduction in the number of acres of light defoliation (see graph). The heaviest defoliation was concentrated more in the Fraser Canyon and tributary valleys, and from Yale to Nahatlatch River and Lake with lighter defoliation occurring in the Lillooet River Valley northwest of Pemberton (Table 4).

Table 4. Areas of spruce budworm defoliation of Douglas-fir, Vancouver Forest District 1976

[illegible]

An assessment of the egg population was made in September by counting egg masses on two 18-inch branches from mid-crown of each of 10 Douglas-fir trees at each of eight locations and three Douglas-fir trees at each of 26 locations. Predictions for 1977 defoliation were based on the criterion that up to 50 egg masses per 100 ft<sup>2</sup> of foliage could result in light defoliation (up to 30% of the foliage lost), from 50 to 150 egg masses in moderate defoliation (from 35 to 70% of foliage lost) and more than 150 egg masses in heavy defoliation (more than 75% of foliage lost).

Defoliation estimates taken on trees at each of the egg sample plots showed that the heaviest defoliation occurred in the Anderson River, Alexandria, Spuzzum Creek areas in the Fraser Canyon and at Birkenhead Lake in the Pemberton area (Table 5).

Table 5. Spruce budworm egg masses and defoliation estimates on Douglas-fir trees, Vancouver Forest District, 1976

| Location                   | Avg no.<br>egg masses<br>per 100 ft <sup>2</sup><br>of foliage |       | Estimated loss<br>of current year's<br>foliage<br>% |      | Estimated<br>total<br>defoliation<br>% |      | Predicted <sup>*</sup><br>defoliation<br>for 1977 |
|----------------------------|--|-------|---|------|--|------|---|
|                            | 1975   | 1976  | 1975  | 1976 | 1975                                   | 1976 |   |
|                            |  |       |   |      |  |      |   |
| Nahatlatch L (west end)    | -  | 759   | -   | 75   | -                                      | 10   | H   |
| Nahatlatch                 | 136  | 759   | 50  | 18   | 5                                      | 13   | H   |
| Log Cr                     | -  | 481   | -   | 78   | -                                      | 10   | H   |
| Kookipi Cr                 | -  | 1,147 | -   | 75   | -                                      | 8    | H   |
| Uztlius Cr (mile 17)       | -  | 849   | -   | 93   | -                                      | 30   | H   |
| Stoyoma Cr Rd.             | -  | 804   | -   | 95   | -                                      | 26   | H   |
| East Anderson R            | 269  | 899   | 90  | 72   | 30                                     | 25   | H   |
| Anderson R (mile 5.5)      | -  | 639   | -   | 93   | -                                      | 41   | H   |
| Alexandria                 | -  | 201   | -   | 93   | -                                      | 45   | H   |
| Spuzzum Cr (mile 3)        | -  | 934   | -   | 91   | -                                      | 56   | H   |
| Spuzzum Cr (mile 10.5)     | -  | 1,031 | -   | 63   | -                                      | 15   | H   |
| Scuzzy Cr (mile 9.5)       | -  | 473   | -   | 93   | -                                      | 50   | H   |
| Sawmill Cr                 | -  | 489   | -   | 86   | -                                      | 36   | H   |
| Cedar Cr                   | -  | 644   | -   | 63   | -                                      | 31   | H   |
| Rhododendron Flats         | 213  | 230   | 75  | 84   | 10                                     | 17   | H   |
| Boston Bar Cr              | -  | 64    | -   | 86   | -                                      | 11   | M   |
| Dewdney Cr                 | -  | 247   | -   | 91   | -                                      | 20   | H   |
| Sumallo R (1) (Hope Slide) | -  | 13    | -   | 1    | -                                      | 13   | L   |
| Sumallo R (2)              | -  | 286   | -   | 91   | -                                      | 21   | H   |
| Snass Cr                   | -  | 180   | -   | 71   | -                                      | 10   | H   |
| Centennial Trail           | -  | 206   | -   | 79   | -                                      | 15   | H   |



Map 3

WESTERN SPRUCE BUDWORM DEFOLIATION  
OF DOUGLAS-FIR AND TRUE FIR  
VANCOUVER FOREST DISTRICT

1976

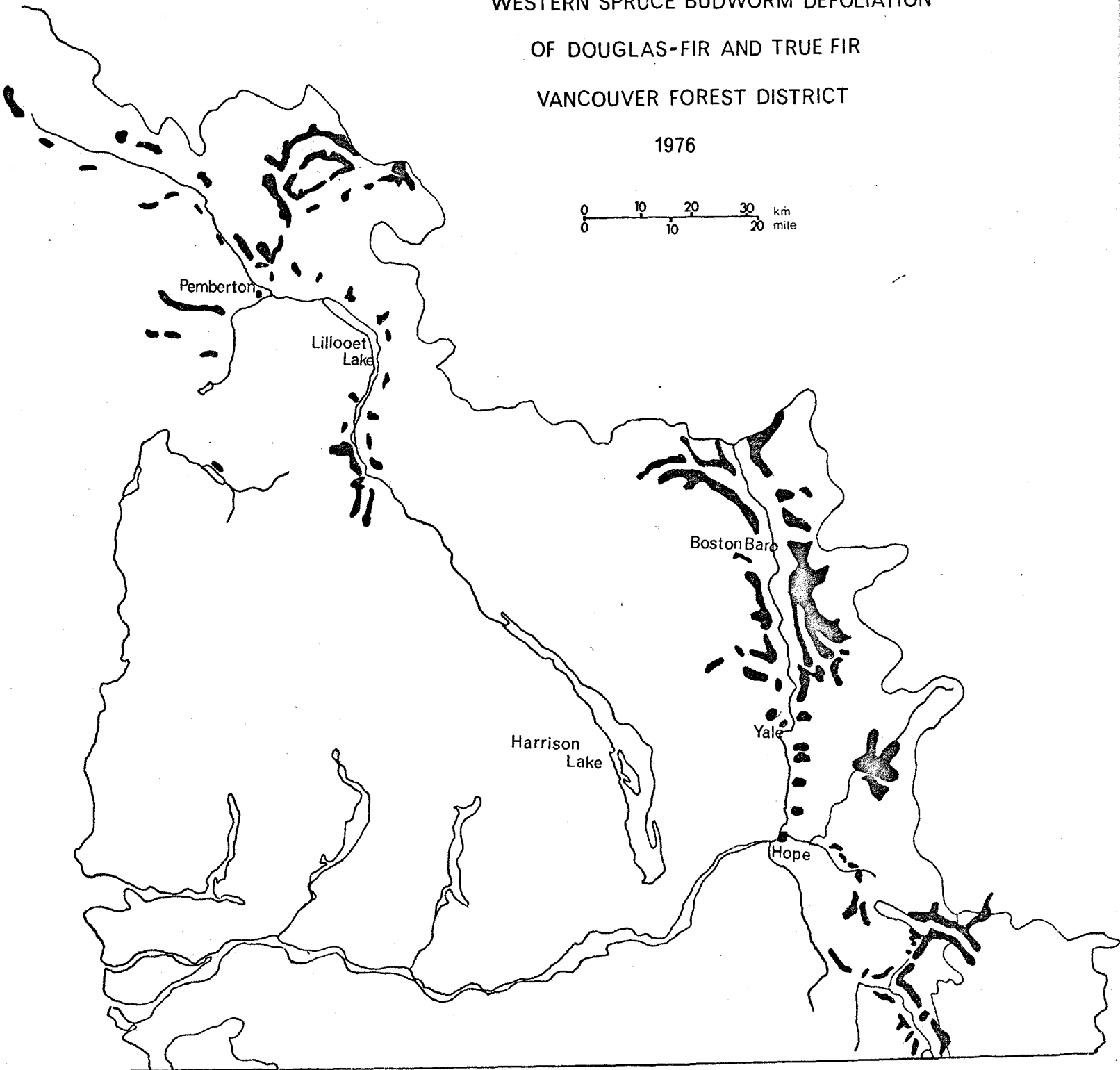
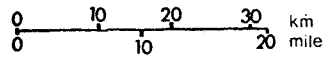


Table 5 - cont'd.

| Location                   | Avg no.<br>egg masses <sub>2</sub><br>per 100 ft <sup>2</sup><br>of foliage |       | Estimated loss<br>of current year's<br>foliage<br>% |      | Estimated<br>total<br>defoliation<br>% |      | Predicted<br>defoliation<br>for 1977<br>* |
|----------------------------|---|-------|---|------|--|------|---|
|                            | 1975  | 1976  | 1975  | 1976 | 1975                                   | 1976 |   |
| Nepopekum Cr               | -   | 34    | -   | 60   | -                                      | 5    | L   |
| Silver-Skagit Rd.(mile 28) | 153   | 169   | 55  | 60   | 10                                     | 5    | H   |
| Birkenhead L               | 300   | 398   | 85  | 94   | 35                                     | 63   | H   |
| Gates R                    | 142   | 483   | 40  | 55   | 15                                     | 13   | H   |
| Haylmore Cr                | 103   | 576   | 35  | 49   | 15                                     | 13   | H   |
| Owl Cr                     | -   | 1,403 | -   | 83   | -                                      | 11   | H   |
| Rutherford Cr              | 61  | 1,244 | 35  | 75   | 15                                     | 26   | H   |
| Green R                    | -   | 878   | -   | 85   | -                                      | 16   | H   |
| Twin Cr                    | 68  | 365   | 30  | 11   | 5                                      | 1    | H   |
| Roger Cr                   | -   | 93    | -   | 0    | -                                      | 0    | M   |
| Skookumchuck               | -   | 33    | -   | 0    | -                                      | 0    | L   |
| Railroad Cr                | 117   | 296   | 25  | 25   | 15                                     | 28   | H   |
| Hurley Mainline            | -   | 348   | -   | 5    | -                                      | 1    | H   |

\* L - light; M - moderate; H - heavy.

In areas where defoliation has occurred for up to eight successive years some tree mortality has occurred. At Rutherford Creek, near Pemberton, 54% of the Douglas-fir on approximately 200 acres has been killed; 34% at Railroad Creek, and light mortality of one to eight per cent occurred at a number of other localities. This tree mortality is being caused by a combination of spruce budworm defoliation and Douglas-fir bark beetle attacks. Dead and bare tops were also evident in the most heavily defoliated areas.

Condition of Douglas-fir trees was recorded on cruise strips in 17 localities during the summer and fall of 1976 by the damage appraisal group, B.C. Forest Service, and the District ranger. From 10 to 22 prism plots were established along random cruise lines at 80 metre intervals in infested Douglas-fir stands. Tree species, d.b.h., current defoliation level, current and past evidence of dieback and Douglas-fir beetle activity were recorded. Table 6 shows the results of these surveys.

Table 6. Condition of Douglas-fir trees in infested Douglas-fir stands, Vancouver Mainland District, 1976

| Locality                                      | % Douglas-fir trees   |                                   |                     |
|---|-----------------------|-----------------------------------|---------------------|
|   | Dead from defoliation | Dead from defoliation and beetles | green attack beetle |
| Haylmore Cr (mile 6.1)                        | 0                     | 1                                 | 0                   |
| Haylmore Cr (mile 4.2)                        | 0                     | 0                                 | 0                   |
| Railroad Cr (upper Lillooet R)                | 4                     | 9                                 | 25                  |
| Rutherford Cr (W. of Pemberton)<br>(3.3 mile) | 32                    | 11                                | 11                  |
| Rutherford Cr (W. of Pemberton)<br>(4.4 mile) | 6                     | 0                                 | 0                   |
| Anderson R (E. Anderson M/L)                  | 0                     | 0                                 | 0                   |
| Anderson R (E. Anderson M/L)                  | 0                     | 0                                 | 0                   |
| Anderson R (end E. Anderson M/L)              | 1                     | 0                                 | 0                   |
| Nahatlatch L                                  | 1                     | 0                                 | 0                   |
| Snass Cr (Hope-Princeton Hwy.)                | 0                     | 0                                 | 0                   |
| Sumallo R (Sunshine Valley<br>Devel.)         | 1                     | 0                                 | 0                   |
| Skagit R (near Centennial Trail)              | 0                     | 0                                 | 0                   |
| Skagit R ( " " " )                            | 0                     | 0                                 | 0                   |
| Birkenhead R                                  | 0                     | 0                                 | 0                   |
| Old Lillooet Trail<br>(Lower Lillooet R)      | 0                     | 0                                 | 0                   |
| Skookumchuck<br>(Lower Lillooet R)            | 0                     | 0                                 | 0                   |
| Nahatlatch R                                  | 0                     | 0                                 | 0                   |

For a more detailed report on Douglas-fir tree condition survey, see Don Collis and Allan Van Sickle report January 1977 (Appendix Damage Appraisal Cruises in Spruce Budworm Defoliated Stands, Vancouver and Kamloops Districts.

Douglas-fir beetle brood studies conducted at Railroad Creek and Rutherford Creek in October 1976 showed brood populations to be lower than expected. Railroad Creek averaged 1.0 and Rutherford Creek 2.0 (number of beetles per 14.4 square inches). The normal range is from 2.5 to 3 in a Douglas-fir beetle infestation. The attack in 1976 appears to have been late, and the percentage of progeny in the young adult and larval stage is high.

Douglas-fir beetle does not appear to be a problem at this time in spruce budworm defoliated stands, but could develop into a problem in 1977 if defoliation is heavy and weather conditions are favorable to the beetles' development.

Flight traps baited with a sex attractant, (Trans-11-tetradecenal, 3 per cent by weight), were used to assess adult male budworm populations. The attractant was impregnated into plasticized cylindrical cores 4 mm diameter, then cut into 10 mm lengths with each length containing 4 mg of attractant. One section was placed in each trap which consisted of 2-quart milk cartons with the ends cut out. Each trap was 4 x 4 x 9 5/8 inches and had a sticky trapping surface of 154 inches<sup>2</sup>. The traps were set out in mid July and retrieved in late August after the moth flight was over. Table 7 shows a comparison of the number of adults caught in 1975 and 1976.

Table 7. Western spruce budworm<sup>\*</sup> adult males in pheromone baited traps, Vancouver Forest District

| Location      | Larval population density |          | No. adults in traps |        |       |      |      |      |
|---------------|---------------------------|----------|---------------------|--------|-------|------|------|------|
|               |                           |          | range               |        | total |      | avg  |      |
|               | 1975                      | 1976     | 1975                | 1976   | 1975  | 1976 | 1975 | 1976 |
| Thetis L      | nil                       | nil      | 10-15               | 74-122 | 65    | 511  | 13   | 102  |
| Green Mtn     | nil                       | nil      | 6-16                | 8-17   | 58    | 67   | 12   | 13   |
| Fuller L      | nil                       | nil      | 7-17                | 19-60  | 60    | 160  | 12   | 40   |
| Skagit R      | moderate                  | moderate | 22-65               | 29-39  | 221   | 139  | 44   | 28   |
| Sumallo R     | heavy                     | heavy    | 33-74               | 15-27  | 221   | 86   | 44   | 17   |
| Spuzzum Cr    | light                     | moderate | 27-65               | 48-134 | 259   | 377  | 52   | 75   |
| Rutherford Cr | heavy                     | moderate | 18-48               | 35-64  | 142   | 222  | 36   | 44   |
| Haylmore Cr   | moderate                  | heavy    | 52-65               | 29-135 | 277   | 348  | 55   | 69   |
| Birkenhead L  | moderate                  | heavy    | 19-62               | 18-26  | 182   | 110  | 36   | 22   |

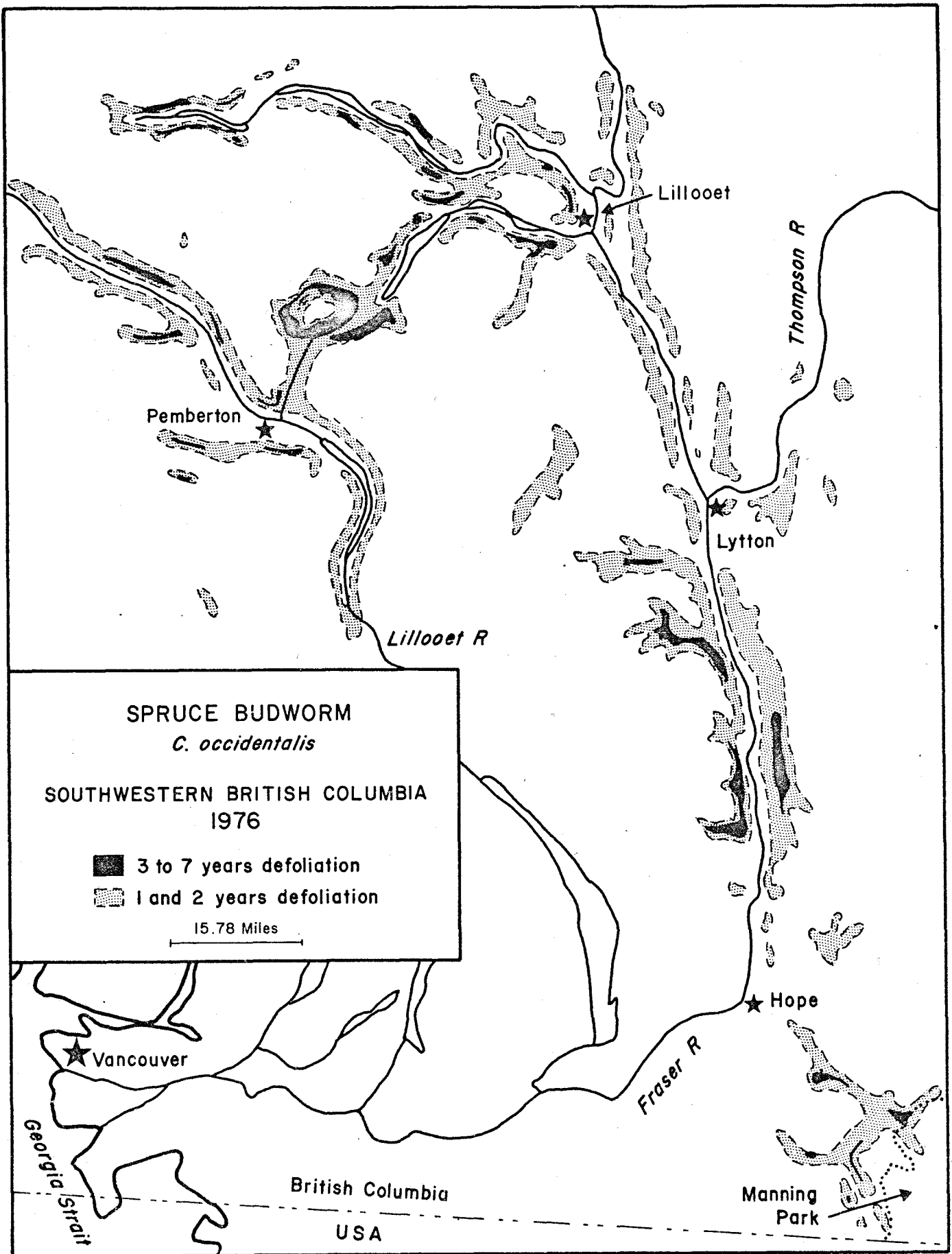
\* Assumed to be *occidentalis*.

Adult budworm populations on Vancouver Island at Thetis Lake, Green Mountain and Fuller Lake were high, but very few larvae were taken in beating samples in 1976. Egg sampling at Thetis Lake showed no spruce budworm eggs present which indicates no significant defoliation is expected in 1977.

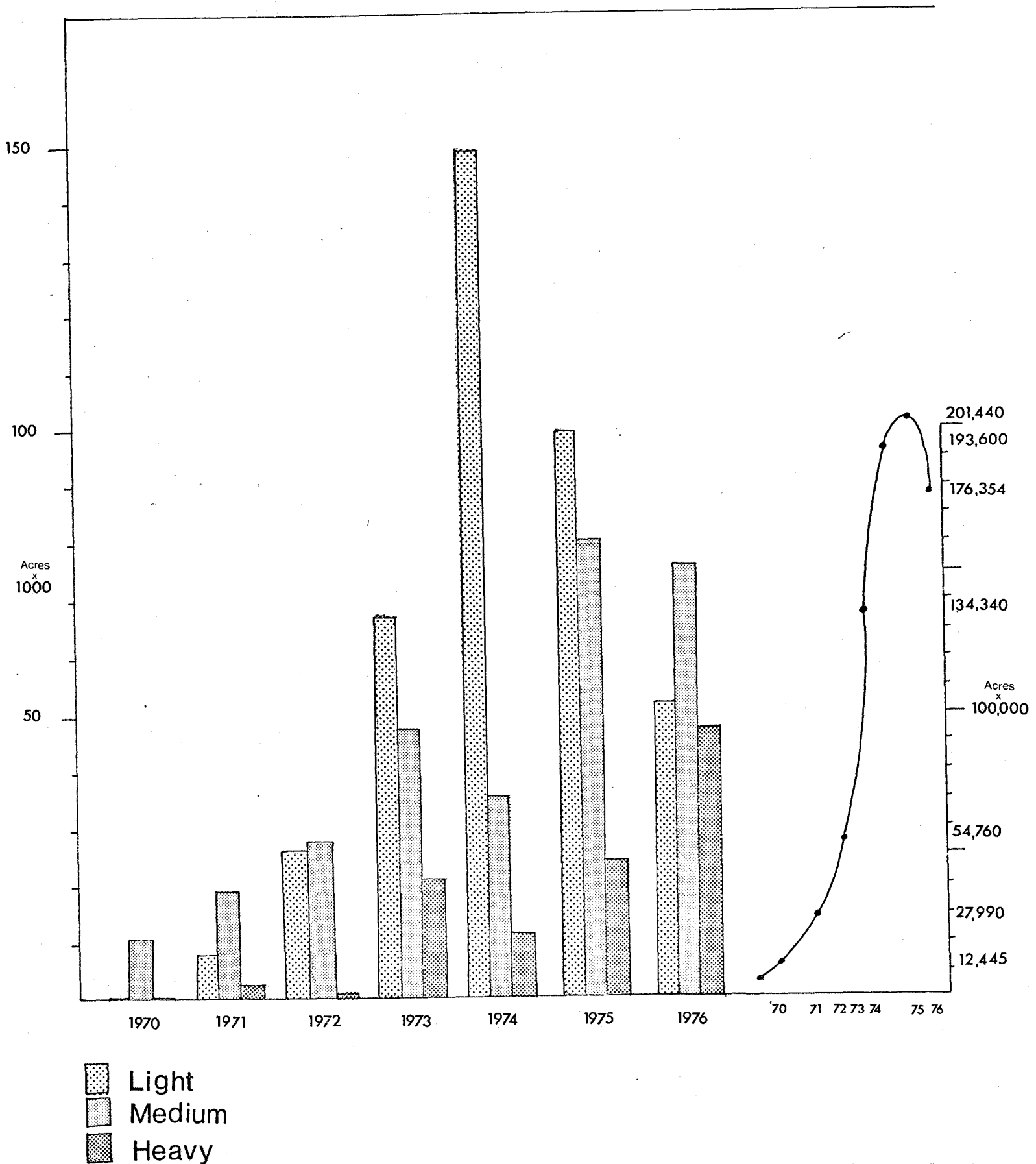
Tree mortality and top-kill has become evident in some areas, notably at Rutherford and Railroad creeks in the Pemberton area and at Trafalgar and Tsileuh creeks in the Fraser Canyon. Egg counts indicate that current populations in areas now infested will continue and, if weather is favorable to the insects' development in 1977, moderate to heavy defoliation will continue, with an increase in tree mortality. Egg samples taken in lower elevation stands (below 2,000 feet) indicate defoliation will be heavier in these stands in 1977 compared to 1976.

The British Columbia Forest Service plan to spray an insecticide on 100,000 acres in the Fraser Canyon area, primarily in the Anderson River Valley, in 1977.

MAP 4



# SPRUCE BUDWORM DEFOLIATION VANCOUVER FOREST DISTRICT 1970-1976



### Other Noteworthy Insects

#### Mountain pine beetle, *Dendroctonus ponderosae*

There was a marked decline in the number of red-top western white pine trees counted in 1976 (Table 8).

Table 8. Numbers of western white pine trees killed by mountain pine beetles, Vancouver Forest District, from surveys of red-tops 1975 and 1976

| Location                     | No. of red-tops |      |
|------------------------------|-----------------|------|
|                              | 1975            | 1976 |
| Cheakamus L and R            | 160             | -    |
| Green L and R                | 110             | -    |
| Soo R                        | 20              | -    |
| Lillooet R                   | 300             | -    |
| Meager Cr                    | 10              | -    |
| Tenquille Cr                 | 100             | -    |
| Birkenhead L - Blackwater Cr | 420             | 135  |
| Gates L and R                | 50              | -    |
| Joffre Cr                    | 150             | -    |
| Roger Cr                     | 50              | -    |
| Skagit R                     | 165             | -    |
| Sumallo R                    | 100             | 385  |
| Nahatlatch L and R           | 910             | 370  |
| Kookipi Cr                   | 800             | 100  |
| E. Anderson R                | 250             | -    |
| Totals                       | 3,595           | 990  |

In lodgepole pine stands there were an estimated 18,000 red-tops recorded along the Klinaklini River, from Klinaklini Lake to Knot Creek and from Knot Creek south 6 miles along the Klinaklini River Valley, and 250 at Haylmore Creek. On Vancouver Island, approximately 25 mature white pine were killed in a mature stand southeast of Weeks Lake, and a few white pine were attacked in a small stand in the Rheinhart Lake access road area.



Douglas-fir beetle, *Dendroctonus pseudotsugae*

Several small patches of red-top Douglas-fir trees were evident along the Chilliwack River road near Centre Creek, and along an access road up a steep hillside, near Centre Creek. Many of the "red-tops" were being currently attacked by Douglas-fir beetle on the lower bole during May. The trees had been attacked in the upper bole in 1975, which accounts for the red foliage occurring so early in 1976. The infested trees were salvaged by the B. C. Forest Service during July and August. [See Appendix, "Douglas-fir Beetle in Chilliwack River Valley 1976, L.H. McMullen, PC-06-147.]

Red-top Douglas-fir counts in other parts of the District were done during aerial surveys in August (Table 9).

Table 9. Numbers of Douglas-fir trees killed by Douglas-fir beetles, Vancouver Forest District, 1976

| Location      | No. of red-tops |
|---------------|-----------------|
| Railroad Cr   | 25              |
| Tenquille     | 10              |
| Birkenhead L  | 35              |
| Owl Cr        | 35              |
| Rutherford Cr | 55              |
| Uztlius Cr    | 75              |
| East Anderson | 125             |
| Silver Skagit | 50              |
| Snass Cr      | 25              |
| Total         | 435             |

Individual standing, windthrown and predisposed Douglas-fir trees are attacked annually at scattered locations throughout the host range on Vancouver Island, however there was no evidence of any population build-up at any one location in 1976.

See spruce budworm section for additional information on Douglas-fir beetle attacks in spruce budworm defoliated areas, and a report by D. G. Collis and A. Van Sickle titled, "Damage Appraisal Cruises in Spruce Budworm Defoliated Douglas-fir Stands in Vancouver and Kamloops Forest Districts - January 1977" [Appendix II].

Western blackheaded budworm, *Acleris gloverana*

Larval populations in former infestation areas on Vancouver Island continued at low levels since their initial decline in 1972. The highest number of larvae per beating sample was two, collected in the west coast area of Vancouver Island. No defoliation has been observed since 1972.

Testing of sex attractants to measure the male adult populations continued for the 3rd year. Nine locations were sampled with five traps containing the pheromone trans-11-tetron decenal (CSC 72) set out at each location. Results are shown in Table 10.

Table 10. Numbers of male adult western blackheaded budworms collected in pheromone traps, Vancouver Island

| Location       | Total no.<br>traps |      | Bait   | No. adults trapped |      |      |      |
|----------------|--------------------|------|--------|--------------------|------|------|------|
|                | 1975               | 1976 |        | total              |      | avg  |      |
|                |                    |      |        | 1975               | 1976 | 1975 | 1976 |
| Marshall Cr    | 5                  | 5    | CSC 72 | 7                  | 3    | 1.4  | 0.75 |
| Dunsmuir Cr    | 5                  | 5    | "      | 41                 | 5    | 8.2  | 1.0  |
| Loss Cr        | 5                  | 5    | "      | 60                 | 10   | 12.0 | 2.0  |
| Gracie L       | 5                  | 5    | "      | 14                 | 18   | 2.8  | 3.6  |
| Espinosa Inlet | 4                  | 5    | "      | 10                 | 35   | 2.5  | 7.0  |
| Kelsey Bay     | 5                  | 5    | "      | 12                 | 33   | 2.4  | 6.6  |
| Port McNeill   | 5                  | 5    | "      | 4                  | 12   | 0.8  | 2.4  |
| Port Alice     | 5                  | 5    | "      | 147                | 125  | 29.4 | 25.0 |
| Holberg        | 4                  | 4    | "      | 4                  | 12   | 1.0  | 3.0  |

Bruce spanworm, *Operophtera bruceata*

Larvae continued to cause extensive defoliation of oak, maple and fruit trees throughout the greater Victoria region for the fourth consecutive year, and in some areas, for up to seven years.

Complete defoliation of trees was common in the Oak Bay, Cadboro Bay and University areas; generally, however, defoliation varied from 10% to 75%. No tree mortality has been recorded to date; defoliated trees usually releaf by late summer.

The high numbers of larvae during the summer and equally high numbers of adult males and females in autumn, and the apparent lack of natural control, indicate a continuing larval population and damage to trees in the same areas in 1977.

Special projects on the spanworm problem in 1976 were:

1. 7,000 eggs collected for virus trials -- John Burke, I.P.R.I.  
No results to date, study is continuing.

Egg collecting methods -- S. Condrashoff and C. Wood.

- (a) Collect coupled male and female adults from tree stems during mating period in fall; place couples in quart sealer, jam, or other suitable container, and put tissue paper in the jar and seal opening with fine screen mesh. Eggs will be laid on the tissue paper and the mesh; the material can then be removed for convenient shipment or rearing purposes.  
This method is superior to (b) and (c).
- (b) Collect eggs from around the edge of adhesive "sticky band" traps. Eggs are deposited on and below the band and can be removed with some patience.
- (c) Remove branches from host trees, and remove eggs from niches and under bark, with some more patience.

2. Defoliation intensities of Garry oak -- R.L. Fiddick and C. Wood.

Defoliation was mapped from high vantage points: Gonzales Hill, Mt. Tolmie and Mt. Douglas in July

3. Summary of use of N.P. virus against the Bruce spanworm, 1976.

In April - received 10 ounces of n.p.v. in solution from Dr. V. Smirnoff.  
Kept refrigerated.

...contd.

(a) USE IN FIELD: S. Ilnytzky, R. Duncan, D.A. Ross.

Bob Duncan applied a spray of the virus as follows with a mist blower.  
(Spray had Chevron sticker and blood meal added to the solution to establish epizootic nucleus)

- 6 May - first and second instar larvae on one small oak and 2 large branches of large oak in oak grove on farm near junction of Burnside Road and Prospect Lake Road.
- 12 May - second, third and fourth instar larvae on five clumps of cherries, 2 maples, on Condrashoff farm (4 litres applied).
- 13 May - second, third and fourth instar larvae on clump of small oaks, two maple trees and lower branches of large oak, 940 Foul Bay Road.
- 7 June - larvae from sprayed maple trees on Foul Bay Road in ultimate and penultimate stage sent to I.P.R.I.
- 11 June - most of these had pupated by this morning according to John Burke at I.P.R.I. (telephone message).  
NO VIRUS IN SPECIMENS FROM MAPLES.

(b) USE IN LABORATORY: D. A. Ross.

- 10 May - R.L. Fiddick et al. collected several thousand 2, 3 and 4 instar larvae for trials in laboratory. From creekside park behind laboratory.
- 10 May - most larvae set up in 2 large screened cages in room #6 FIDS. Fed on oak and maple foliage.
- 12 May - foliage and larvae in cages sprayed with <sup>Smirnoff</sup> n.p.v. (including Chevron and blood meal).
- 11 May - two lots of seven petri dishes were set up with 20 larvae in each. One lot of 7 contained artificial medium painted with undiluted n.p.v.; the other lot acted as a check. The petri dishes of larvae were examined daily.
- 18 May - mortality and missing larvae together was about 43% in the treated, as opposed to 20% in the check.
- 19 May - prepared a solution of larvae that had fed on n.p.v. painted on artificial media, and larvae that had fed on foliage in cage sprayed with n.p.v.
- 7 June - Sent solution to John Burke, I.P.R.I.
- 11 June - NO VIRUS IN SOLUTION! according to John Burke.
- 30 May - no pupae formed in petri dishes where food was treated.
- N. B. 32 pupae formed in petri dishes in check.

...contd.

4. Distribution of O. bruceata eggs in three crown levels of one 30' Garry oak tree at 940 Foul Bay Road, Victoria; D.A. Ross.

| Crown level | Branch sample<br>length (cm) | Total lineal<br>length of sample<br>(cm) | Total no.<br>of eggs | Remarks                                      |
|-------------|------------------------------|--|----------------------|--|
| upper       | 36                           | 28                                       | 4                    | Numerous<br>Hymenoptera larvae<br>and adults |
| mid         | 30                           | 80                                       | 1                    |  |
| lower       | 41                           | 70                                       | 9                    | Cluster of 5<br>inside bud scale             |

European pine shoot moth, *Rhyacionia buoliana*

Shoot moth traps were set out in two areas in Greater Vancouver where shoot moth larvae were numerous, to test the effectiveness of a commercial pheromone with Dr. Daterman's material on trapping adult male shoot moth. At Langara Golf Course, ten traps baited with Daterman's pheromone [trans-9-dodecenyl acetate 5% by weight] and ten baited with the commercial pheromone were set out in heavily infested lodgepole pine trees. At U.B.C. Campus, five traps with Daterman's and five traps with the commercial pheromone [Farchan] were set out in moderately infested Mugho, Scots and Austrian pines. The results of the trials are shown in Table 11.

Table 11. Numbers of male adult European pine shoot moth collected in pheromone traps, Vancouver Mainland, 1976 [Pheromone from G. Daterman and Farchan Chemical Co.]

| Location                   | No. moths per trap |         |           |         | No. traps destroyed |         |
|----------------------------|--------------------|---------|-----------|---------|---------------------|---------|
|                            | July 15            |         | August 11 |         |                     |         |
|                            | Daterman           | Farchan | Daterman  | Farchan | Daterman            | Farchan |
| <u>Langara Golf Course</u> |                    |         |           |         |                     |         |
| Ontario Street             | 0                  | 2       | 28        | 14      | 1                   | 1       |
| Cambie Street              | 1                  | 0       | 51        | 2       |                     | 1       |
| 49th Avenue                | 6                  | 0       | 38        | 0       |                     |         |
| Clubhouse                  | 6                  | 0       | 6         | 0       |                     |         |
| Workshop                   | 11                 | 1       | 35        | 12      |                     |         |
| <u>U.B.C. Campus</u>       |                    |         |           |         |                     |         |
| Medical Science Bldgs.     | 10                 | 0       | 47        | 0       | 2                   | 4       |
| Totals                     | 34                 | 3       | 205       | 28      | 3                   | 6       |

Obviously the Daterman pheromone was much more effective than Farchan pheromone as an attractant.

Five traps each baited with Daterman's pheromone were set out at the B.C. Forest Service Nurseries at Surrey and Chilliwack River in lodgepole pine plantations. No shoot moth adults were trapped at these localities.

Ten traps baited with Daterman's pheromone were set out at Gorge Park, Victoria, with negative results.

Douglas-fir tussock moth, *Orgyia pseudotsugata*

There was no defoliation by tussock moths in the Vancouver Forest District in 1976.

Five traps, each baited with a pheromone, were set out at each of four locations. Each moth trap consisted of a two-quart milk carton with the ends removed. Results are shown in Table 12.

Table 12. Numbers of male Douglas-fir tussock moths collected in pheromone traps, Vancouver Forest District, 1976

| Location                          | No. adults trapped |         |
|-----------------------------------|--------------------|---------|
|                                   | Totals             | Average |
| Clearbrook Road (Clearbrook)      | 39                 | 7.8     |
| Seven Oaks (Clearbrook)           | 7                  | 2.3 *   |
| Fraser River Bridge (Hope)        | 20                 | 4.0     |
| Gorge Vale Golf Course (Victoria) | 0                  | 0       |

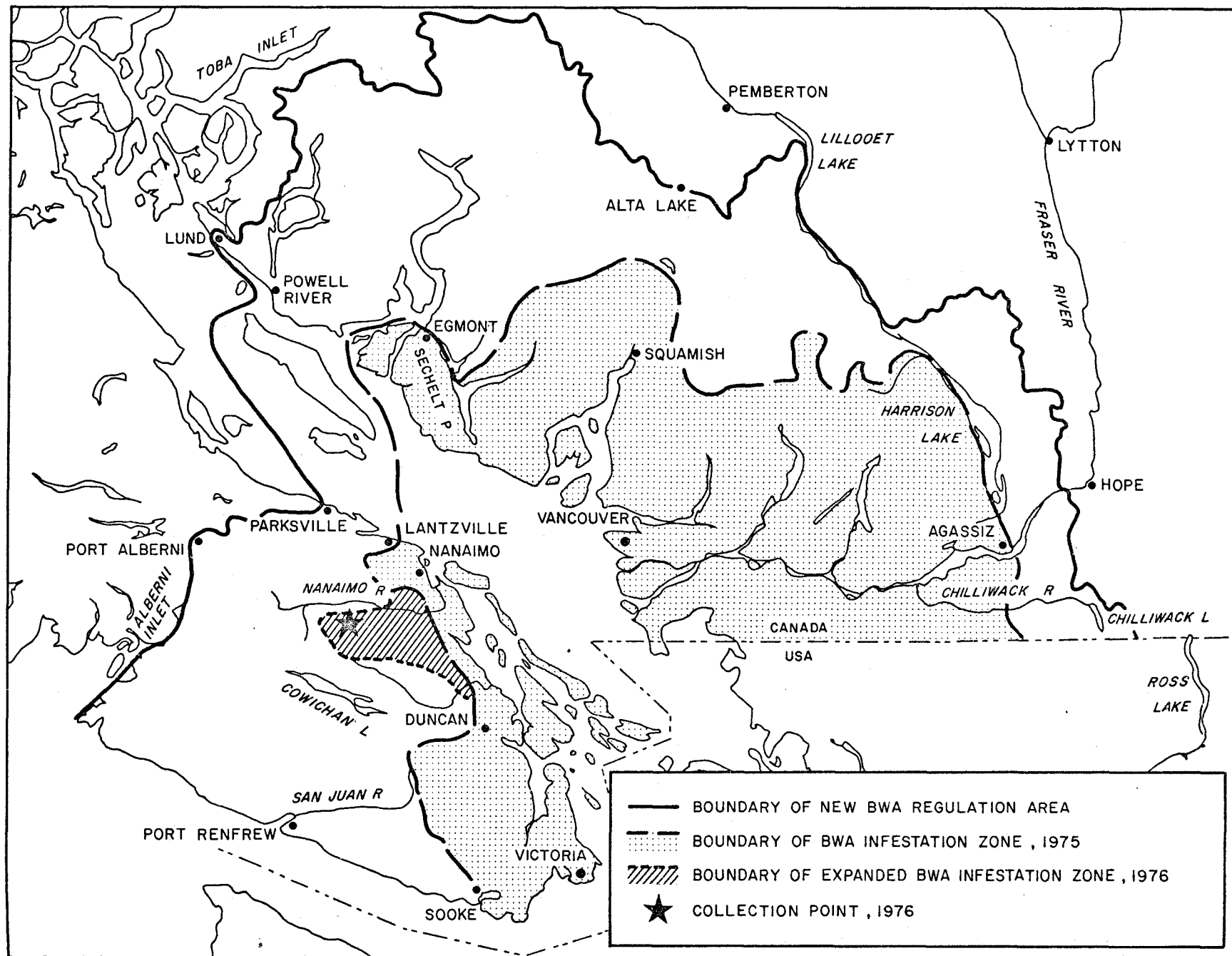
\* Two traps destroyed (?bears).

Balsam woolly aphid, *Adelges piceae*

The infestation boundary on Vancouver Island was expanded in 1976 (see Map ). A collection of aphid damaged amabilis fir was submitted by MacMillan & Bloedel forestry staff from a stand on an unnamed creek, east of Dunsmuir Creek, 2 miles southwest of Mt. Hooker in M & B's Nanaimo River Division.

A new provincial BWA regulation area boundary was legislated in 1976 (see Map ). The boundary includes a buffer zone between it and the former infestation zone boundary.

Collections are made annually by FIDS, and will continue in 1977.





Striped alder sawfly, *Hemichroa crocea*

Sawfly larvae severely defoliated red alder trees on southern Saltspring Island in the Fulford Harbour area and south to Isabella Point; 100% defoliation of all age classes of alder was common.

Overwintering pupal populations were not assessed, however, past outbreaks in coastal alder stands would indicate continuing defoliation in the same areas and spread of larval population and defoliation on Saltspring Island, and probably in southeast coastal areas and other Gulf Islands.

Tree mortality has never been recorded in defoliated alder stands as the trees releaf the following spring, and usually are only subjected to 1 year's defoliation by the sawfly populations.

A suspected area of alder sawfly defoliation was also recorded near Brackendale in Vancouver Mainland District. No specimens were collected to confirm this.

A hemlock sawfly, *Neodiprion tsugae*

Approximately 25 acres of western hemlock were heavily defoliated for the second year at Coqueis Creek on the west side of Neroutsos Inlet north of Yreka. Unconfirmed reports indicated that heavy defoliation of western hemlock also occurred in the Atkins Cove area on the east side of the inlet.

Sawfly larvae were common on western hemlock and amabilis fir in most areas of Vancouver Island, causing light defoliation of amabilis fir at scattered locations, as occurred in 1975.

A spruce tip moth, *Griselda radicana*

Larval feeding damaged an average of 30% of the new growth of Sitka spruce on the outer west coast from Ucluelet north to Cape Scott, including Pacific Rim National Park.

The damage, which also occurred in 1975, was evident on all age classes of spruce, but is not considered to be of major significance.

Pine butterfly, *Neophasia menapia*

A small population was recorded on approximately 20 exotic pine trees in Gorge (Kinsmen) Park in Victoria; larval feeding was restricted to an occasional branch. Twenty-five adults were collected for the Insectary.

Satin moth, *Stilpnotia salicis*

Trembling aspen trees, near Northridge Mall in Nanaimo, were 100% defoliated for the second year. As the trees will be felled in 1977 the population should be eradicated unless some adults disperse to surrounding host trees.

In Victoria, satin moth populations were expected to continue to defoliate poplar stands which were defoliated in 1975 at Town & Country, and at 506 West Burnside; however it is assumed that parasitism effectively reduced the population in the fourth instar after feeding had resulted in minimal skeletonizing.

Western tent caterpillar, *Malacosoma c. pluviale*

Defoliation of a variety of deciduous hosts, including alder and willow, was widespread throughout the east coastal region of Vancouver Island from Sooke to Ladysmith and the southern Gulf Islands, for the third consecutive year. Damage was generally light to moderate, with localized pockets of 100% defoliation of individual trees, particularly in the University of Victoria region. Numbers of tents varied from scattered ones and twos to 20 or more per host.

Although larval parasites were evident, infestations are expected to continue in 1977 but over a less widespread area.

Larval populations which caused extensive defoliation of alder near the Port Alice Pulp Mill in 1974 and 1975 were nonexistent in 1976, apparently as a result of fume emission, which caused moderate to severe discoloration of alder foliage on 2.5 km<sup>2</sup> north of the mill.

Moderate to heavy defoliation of red alder was evident along Highway No. 101 south of Port Mellon to Gibsons Landing. Some defoliation was also evident on other deciduous trees and shrubs.

Gypsy moth, *Porthetria dispar*

Attempts to trap male adults of the gypsy moth were made at nine locations in the District in 1976. The traps used were the 3M type and baited with a sex pheromone in a laminated strip. Traps and pheromone were provided by the headquarters office of Plant Protection, Canada Department of Agriculture.

The traps were set singly at Emory Creek and Cultus Lake Provincial Park, Sumas, Aldergrove, Douglas and Pacific Highway Canada-U.S.A. border crossings on the Mainland, and at Kamp Grounds of America at Sidney and Malahat, and at Goldstream Provincial Park on Vancouver Island. Traps on the Mainland were on site from July 10 to August 16; on Vancouver Island they were in the field from July 22 to August 11. All traps had negative results.

Striped ambrosia beetle, *Trypodendron lineatum*

Beetle attacks caused significant degrade of western hemlock and Douglas-fir logs at a dry land sort at Beaver Cove, operated by Canadian Forest Products. Approximately 80% of the logs were attacked in three "cold decks" which covered approximately 2250 m<sup>2</sup>. Bark samples contained up to 28 entrance holes per 6.5 cm<sup>2</sup>. Beetle activity was evident in windfall and felled trees in surrounding areas. However, there was no evidence of damage at any other industrial dry land sort location in the north island.

Population sampling and improved log turnover will be done in 1977.

Poplar and willow borer, *Cryptorhynchus lapathi*

Mortality of small diameter willow stems was common throughout the east coastal region for the second consecutive year. The damage is of noteworthy, but minor significance. Damage by this weevil was also evident in a number of areas in the southern part of the Vancouver Mainland District.

Secondary bark beetles, *Pseudohylesinus* spp., *Phloeosinus* spp., *Pityogenes* spp.

Evidence of beetle attacks on smaller diameter conifers was common for the second year at widespread locations on the Island. The beetles are not a primary forest problem, causing only premature mortality of trees already predisposed by other factors such as poor site and mechanical injury.

A seedling weevil, *Steremnius carinatus*

Weevils girdled and killed 20% of the Douglas-fir and western hemlock container seedlings on a site planted in early April near Ida Lake in the Kokish River Valley.

In coastal and interior wet belt sites, weevil populations have periodically killed up to 25% and damaged up to 60% of plantation stock since 1961.

Cone and seed insects

The Douglas-fir cone moth, *Barbara colfaxiana*, and a fir coneworm, *Diorctria abietivorella*, were common in Douglas-fir cones collected from widespread locations on Vancouver Island. Fifty cone samples were examined at six locations. An average of 10% of the cones per sample contained larvae.

A leaf blotch miner, *Lyonetia saliciella*

Heavy blotch mining of western white birch leaves was again evident in areas infested in 1975 in the mid Fraser Valley. Foliage damage was evident between Agassiz and Hope, and from Hope to Dogwood Valley south of Yale. Up to 100% of the leaves had been mined in many of the birch stands, giving them a brown, scorched appearance.

Black vine root weevil, *Brachyrhinus sulcatus*

Coniferous and deciduous nursery stock was killed by the weevil larvae on two occasions at the P.F.R.C., Victoria, in 1976. In March, larvae girdled and killed 20% of 2-0 Manitoba maple seedlings growing in styrofoam blocks. Malathion was applied to discarded plug soil containing larvae. In January 1977, 15% of the 1-0 western hemlock nursery stock received from B.C.F.S., Koksilah Nursery, was killed at P.F.R.C. Detailed information on stock and treatment is attached in Appendix III.

Table 13. Other insects of current minor significance

| Insect  | Host(s)                                   | Locality                              | Remarks                                    |
|---|---|---------------------------------------|--|
| <i>Adelges cooleyi</i><br>Spruce gall aphid                       | Douglas-fir<br>Sitka spruce               | Widespread                            | Sucking insect.<br>Heavy localized damage. |
| <i>Ectropis crepus-<br/>cularia</i><br>Saddleback looper          | Hemlock, western<br>Cedar, western<br>red | West coast,<br>Tofino -<br>Cape Scott | Defoliator. Increase<br>in number.         |
| <i>Halisidota<br/>argentata</i><br>Silver-spotted<br>tiger moth   | Douglas-fir                               | Victoria,<br>Saanich                  | Defoliator.<br>Few colonies.               |
| <i>Lambdina f.<br/>lugubrosa</i><br>Western hemlock<br>looper     | Conifers                                  | General                               | Defoliator.<br>Low populations.            |
| <i>Melanolophia<br/>imitata</i><br>Green-striped<br>forest looper | Hemlock, western<br>Douglas-fir           | General                               | Defoliator.<br>Increase in occurrence.     |
| <i>Pissodes strobi</i><br>Sitka spruce weevil                     | Sitka spruce                              | General                               | Terminal weevil.<br>Common.                |

Insects previously recorded as damaging in History of  
Important Forest Insects on Vancouver Island, but not  
found in 1976:

|                            |                            |
|----------------------------|----------------------------|
| Spruce aphid               | <i>Elatobium abietinum</i> |
| Hemlock needle miner       | <i>Epinotia tsugana</i>    |
| Fall webworm               | <i>Hyphantria cunea</i>    |
| Western oak looper         | <i>Lambdina somniaria</i>  |
| Rusty tussock moth         | <i>Orgyia a. badia</i>     |
| Pacific willow leaf beetle | <i>Pyrrhalta carbo</i>     |

Number of collections containing larvae  
1970 - 1976

| Insect                            | District | Year |     |      |      |      |      |    |
|-----------------------------------|----------|------|-----|------|------|------|------|----|
|                                   |          | 70   | 71  | 72   | 73   | 74   | 75   | 76 |
| <i>Acleris gloverana</i>          | VI       | 200+ | 135 | 200+ | 200+ | 30   | 5    | 4  |
|                                   | VM       | 90   | 35  | 100  | 80   | 20   | 8    | 3  |
| <i>Choristoneura occidentalis</i> | VI       | 8    | 8   | 10   | 20   | 5    | 5    | 10 |
|                                   | VM       | 30   | 50  | 60   | 140  | 150+ | 150+ | 45 |
| <i>Ectropis crepuscularia</i>     | VI       | 11   | 1   | 4    | 12   | 9    | 2    | 5  |
|                                   | VM       | 12   | 8   | 13   | 32   | 5    | 22   | 0  |
| <i>Lambdina f. lugubrosa</i>      | VI       | 21   | 9   | 10   | 9    | 2    | 0    | 2  |
|                                   | VM       | 33   | 31  | 34   | 46   | 11   | 16   | 19 |
| <i>Melanolophia imitata</i>       | VI       | 62   | 4   | 8    | 17   | 17   | 4    | 19 |
|                                   | VM       | 18   | 7   | 23   | 70   | 34   | 57   | 15 |

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Forest Disease Conditions

Currently Important Diseases

*Phellinus weiri*  
Dwarf mistletoe on western hemlock  
*Fomes pini*  
A Douglas-fir canker  
*Cytospora kunzei*

Climatic injury to conifers  
Discoloration of broadleaf maple foliage  
Wind injury to broadleaf maple  
Fume injury  
Frost injury  
Windthrow

Other Diseases of Current Minor Significance

A fir-fern rust  
A dieback  
*Armillaria mellea*  
Rhabdocline  
A pine needle cast  
A bacterial canker

## FOREST DISEASE CONDITIONS

### Currently Important Diseases

#### Laminated root rot, *Phellinus weirii*

Laminated root rot is present in most Douglas-fir stands throughout the District. Although no detailed surveys were made in 1976, field observations were made in the San Juan River Valley, where a 25-year-old, spaced, Douglas-fir stand was examined with B.C. Forest Products personnel. A total of 18 trees were dead from infection at three locations in the approximately 25-acre area examined.

Additional data on the incidence and intensity of the root rot was demonstrated by Drs. Wallis and Morrison at workshop field trips in the Squamish and Mesachie Lake regions of the District, attended by both authors (district rangers).

#### Hemlock dwarf mistletoe, *Arceuthobium tsugense*

A special survey for mistletoe in young hemlock stands was initiated by Dr. A. Van Sickle to determine frequency of mistletoe in stands, and to locate stands logged in the 50's and 60's for possible experiments and demonstrations of control by sanitation and thinning. [See 1976 Field Instructions, p. 5a, Specific Disease Problems.]

Information compiled for six areas in the forest district is listed in Table 15.

An assessment of dwarf mistletoe in a 1976 juvenile spaced western hemlock stand in the Honeymoon Bay - Caycuse summit area of Vancouver Island (Location #6, Table 1), was carried out in November by a crew under Dr. A. Van Sickle.

Five 0.02 ha circular plots were established at 80 m intervals on two lines in a badly infected 9.2 ha block within the approximately 46 ha spaced area. In each plot every standing tree and 10 felled trees were measured, rated for dwarf mistletoe infection, and the number and position of infection per crown recorded. Results are shown in Table 14.

Overall, spacing had little effect in reducing potential infection levels. However, depending on future stand development, dwarf mistletoe may be confined to the lower crown, or if infection intensity increases, growth losses could be significant. Monitoring will continue.



Table 14. Dwarf mistletoe infection in standing spaced western hemlock stand, Caycuse, 1976

| Plot | Trees        |            | Infections       |       |                 |
|------|--------------|------------|------------------|-------|-----------------|
|      | Total / plot | % infected | avg no./<br>tree | Range | Avg<br>rating * |
| 1    | 16           | 100        | 16               | 1-58  | 2.0             |
| 2    | 18           | 100        | 22               | 1-127 | 2.4             |
| 3    | 15           | 100        | 20               | 4-90  | 2.1             |
| 4    | 62           | 92         | 21               | 3-170 | 2.0             |
| 5    | 14           | 0          | -                | -     | -               |

\*0-6 classes.

Table 15. Special Survey for Dwarf Mistletoe (DM)  
in young hemlock stands,  
Vancouver Forest District, 1976

| History                     | Locations <sup>1/</sup> |         |       |       |       |           |
|-----------------------------|-------------------------|---------|-------|-------|-------|-----------|
|                             | 1                       | 2       | 3     | 4     | 5     | 6*        |
| Cut; clear, year            | 1968                    | 1969    | -     | 1963  | 1963  | 1956      |
| partial -                   | -                       | -       | -     | -     | -     | ?         |
| Burned; complete broadcast  | 1969                    | 1970    | wild  | -     | 1964  | -         |
| ; patchy "                  | -                       | -       | fire  | -     | -     | -         |
| ; spot                      | -                       | -       | 1946  | -     | -     | -         |
| not                         | -                       | -       |       | ✓     | -     | ✓         |
| Regeneration; est. age yrs. | 6-7                     | 5-6     | 15-20 | 10    | 10    | 20-37     |
| Stocking; stems/acre        | 400+                    | 400+    | 5,000 | 1,000 | 1,000 | ±4,000    |
| Acreage                     | 114                     | 162     | 100   | 200   | 150   | 115       |
| Slope %                     | 30                      | 20      | 30    | -     | -     | -         |
| Aspect                      | NW                      | W       | NW    | -     | -     | -         |
| Spaced; date                | -                       | -       | ✓     | -     | -     | 1976      |
| ; method                    | -                       | -       | -     | -     | -     | chain saw |
| ; stems/acre                | -                       | -       | -     | -     | -     | 400       |
| <u>Potential DM Sources</u> |                         |         |       |       |       |           |
| Scattered residuals         | -                       | ✓       | -     | -     | -     | 62%       |
| Single trees                | -                       | 10/acre | -     | -     | -     | ✓         |
| Small groups                | -                       | -       | -     | -     | -     | -         |
| No. of sources/acre         | -                       | -       | -     | -     | -     | -         |

### Red ring rot, *Fomes pini*

The heart rot infected 100% of the mature western hemlock stems on an 8 ha site south of Beaver Cove, which had been logged by Canadian Forest Products in 1976. Decay averaged 80% per infected stem. The stand had been cruised as decay free, however sporophores which were evident above  $\pm 12$  m had been overlooked, resulting in cruise data showing a healthy stand.

### A Douglas-fir canker

The common fungus, *Pragmopora pithya*, in association with an unidentified fungus, were responsible for top and branch dieback and the resulting brooms in a 15-year-old Douglas-fir plantation in the Franklin River area at the head of Knight Inlet. The fungi invaded 3-year-old galleries in the outer bark of the trees mined by *Laspeyresia youngana* larvae. The incidence of this miner is common, but invasion of the mined galleries by secondary fungi is rare. However, where cankers and brooms have occurred in plantations, the symptoms have disappeared within about 5 years after the worst damage was sustained. (See Appendix IV).

### A conifer branch canker, *Cytospora kunzei*

The canker was recorded on infected branches of a 6" dbh Douglas-fir in an urban location in Port Alberni and on an isolated 18" dbh Douglas-fir in Central Saanich.

Branch infection caused foliar discoloration with branch mortality of up to 10% of the total branches on each of the trees.

The canker has also been recorded in a Douglas-fir stand in the Penticton area of the Kamloops Forest District, where branch mortality was extensive.

#### Climatic injury to conifers

Terminal dieback of mature Douglas-fir, western hemlock and western red cedar occurred at several locations in the Surrey - Coquitlam - Clearbrook area. Cause of the dieback is attributed to environmental factors, primarily the effect of drying winds in the winter of 1972 followed by the summer drought of 1973.

The dieback affected only larger, mature trees in suburban and park environment; 90% of the trees with symptoms are Douglas-fir. See Appendix V).

#### Discoloration of Broadleaf Maple foliage

Anthrachnose is the suspected causal agent of moderate to severe browning of maple foliage at widespread locations throughout the District, however, no fruiting bodies were found.

Areas of severest discoloration were along Highway 101 from Sechelt to Powell River and in the Fraser River Valley from Chilliwack to Yale.

Symptoms appear as marginal necrosis in early summer, gradually spreading to the leaf centre, then the necrosis turns brown and the leaf margins wilt and dry out. The discoloration was evident on foliage in all aspects of a tree, but appeared limited to trees in exposed situations such as road edges.

Discoloration of broadleaf maple foliage has occurred in both Mainland and Island regions for the past 3 years.

#### Frost injury

Early frost damaged approximately 20% of the current year's shoots of Sitka spruce in a low lying plantation of approximately one acre east of Flora Lake in the Franklin River region.

#### Windthrow

Strong winds and above average rainfall persisted in the north Island region throughout the winter of 1975-76, resulting in 2,000 to 5,000 acres of blowdown. Areas of blowdown varied from one to a maximum of 10 acres, and affected all species in sites varying from young growth to logging operation perimeters, to pockets within mature and overmature stands. Active salvage operations were underway in early summer in most of the major company holdings.

#### Wind injury to Broadleaf Maple

Strong winds in the early summer caused tearing and subsequent browning of up to 50% of the foliage of exposed maples throughout the east coastal region. At Westholme, near Crofton, recorded gusts of up to 70 mph in late May damaged 100% of the leaves on the southwest aspect of exposed trees.

#### Fume injury

The apparent emission of  $\text{SO}_2$  fumes from the Port Alice pulpmill prior to early July caused interveinal discoloration of up to 75% of the foliage of deciduous trees and shrubs, including alder, over approximately one square mile, 1 mile north of the mill.

# Nursery Diseases

Diseases which caused noteworthy damage to seedling stock at BCFS nurseries in the Forest District in 1976: [See Appendix III - 1976 Nursery Diseases, by W. Lock.]

| Disease  | Nursery        | Stock                |
|--|----------------|----------------------|
| <i>Botrytis</i> sp.                                | Chilliwack     | 2-0 white spruce     |
| "a mold"   | "              | 2-0 Douglas-fir      |
|  | Surrey         | 1-0 Douglas-fir      |
|  | "              | 1-0 western hemlock  |
|  | "              | exotics              |
|  | Green Timbers  | 1-0 western hemlock  |
|  | Koksilah       | 1-0 mountain hemlock |
|  | Campbell River | 2-0 Sequoia gigantea |
| <i>Fusarium</i> sp.                                | Green Timbers  | 1-0 Douglas-fir      |
| "damping off"                                      |                |                      |
| <i>Sclerophoma pithyophila</i>                     | Koksilah       | 1-0 Sitka spruce     |
| <i>Sirococcus strobilinum</i>                      | Koksilah       | 1-0 white spruce     |
| shoot blight,<br>or "headlight disease<br>of VW's" |                |                      |

Table 15. Special Survey for Dwarf Mistletoe (DM)  
in young hemlock stands,  
Vancouver Forest District, 1976

|   |                   |      | Locations <sup>1/</sup> |         |         |     |       |     |       |     |       |     |           |   |
|---|-------------------|------|-------------------------|---------|---------|-----|-------|-----|-------|-----|-------|-----|-----------|---|
| History                                       |                   |      | 1                       |         | 2       |     | 3     |     | 4     |     | 5     |     | 6*        |   |
| Cut; clear, year                              |                   |      | 1968                    |         | 1969    |     | -     |     | 1963  |     | 1963  |     | 1956      |   |
| partial -                                     |                   |      | -                       |         | -       |     | -     |     | -     |     | -     |     | ?         |   |
| Burned; complete broadcast                    |                   |      | 1969                    |         | 1970    |     | wild  |     | -     |     | 1964  |     | -         |   |
| ; patchy "                                    |                   |      | -                       |         | -       |     | fire  |     | -     |     | -     |     | -         |   |
| ; spot  |                   |      | -                       |         | -       |     | 1946  |     | -     |     | -     |     | -         |   |
| not   |                   |      | -                       |         | -       |     |       |     | ✓     |     | -     |     | ✓         |   |
| Regeneration; est. age yrs.                   |                   |      | 6-7                     |         | 5-6     |     | 15-20 |     | 10    |     | 10    |     | 20-37     |   |
| Stocking; stems/acre                          |                   |      | 400+                    |         | 400+    |     | 5,000 |     | 1,000 |     | 1,000 |     | ±4,000    |   |
| Acreage                                       |                   |      | 114                     |         | 162     |     | 100   |     | 200   |     | 150   |     | 115       |   |
| Slope %                                       |                   |      | 30                      |         | 20      |     | 30    |     | -     |     | -     |     | -         |   |
| Aspect  |                   |      | NW                      |         | W       |     | NW    |     | -     |     | -     |     | -         |   |
| Spaced; date                                  |                   |      | -                       |         | -       |     | ✓     |     | -     |     | -     |     | 1976      |   |
| ; method                                      |                   |      | -                       |         | -       |     | -     |     | -     |     | -     |     | chain saw |   |
| ; stems/acre                                  |                   |      | -                       |         | -       |     | -     |     | -     |     | -     |     | 400       |   |
| <u>Potential DM Sources</u>                   |                   |      |                         |         |         |     |       |     |       |     |       |     |           |   |
| Scattered residuals                           |                   |      | -                       |         | ✓       |     | -     |     | -     |     | -     |     | 62%       |   |
| Single trees                                  |                   |      | -                       |         | 10/acre |     | -     |     | -     |     | -     |     | ✓         |   |
| Small groups                                  |                   |      | -                       |         | -       |     | -     |     | -     |     | -     |     | -         |   |
| No. of sources/acre                           |                   |      | -                       |         | -       |     | -     |     | -     |     | -     |     | -         |   |
| Dist. " / " (clumps or even)                  |                   |      | -                       |         | -       |     | -     |     | -     |     | -     |     | -         |   |
| Residuals; avg ht                             |                   |      | -                       |         | 10'     |     | -     |     | -     |     | -     |     | -         |   |
| ; ht range                                    |                   |      | -                       |         | 6-14'   |     | -     |     | -     |     | -     |     | -         |   |
| ; infected                                    |                   |      | no                      |         | no      |     | -     |     | -     |     | -     |     | 40-100%   |   |
| ; just poorly shaped                          |                   |      | -                       |         | ✓       |     | -     |     | -     |     | -     |     | -         |   |
| Adjacent stand only source                    |                   |      | heavy                   |         | heavy   |     | ✓     |     | -     |     | -     |     | -         |   |
| If infected tally 100 trees in 4 groups of 25 |                   |      | DM                      | Healthy | DM      | H   | DM    | H   | DM    | H   | DM    | H   | DM        | H |
| Residuals and Advanced regen                  | 4.5' to 10' 10' + | *2 4 |                         |         |         | ✓ ✓ |       |     |       |     |       | ✓ ✓ | ✓ ✓       |   |
| Regeneration                                  | 4.5' to 10' 10' + | 1 1  |                         | ✓ ✓     |         |     |       | ✓ ✓ |       | ✓ ✓ |       |     |           |   |

- 1/ 1. Salsbury Lake; Br 708, TSHL A00039, CPI, BCFP; Area 20, el. 2,400; 4-8-76.  
2. " " ; Br 703, " " " " ; Area 14, 1,700; -  
3. Pale Face Cr ; Catermole Tbr. Camp 2,200, 10-8-76  
4. Centre Cr;  
5. " " ;  
6. Caycuse - Honeymoon summit; Br. 21, BCFP 15-11-76

\* 0-6 classes.

Table 16. Other diseases of current minor significance

| Organism  | Host(s)               | Locality                       | Remarks   |
|---|-----------------------|--------------------------------|---|
| <i>Uredinopsis</i> sp.<br>A fern-fir rust                               | Fir, amabilis         | Mainland and<br>Island regions | Common throughout<br>host range.  |
| <i>Dermea pseudotsugae</i><br>Dieback                                   | Douglas-fir           | Victoria<br>Watershed          | 2'-4' top dieback on<br>±20 mature 100 ft+<br>trees over 10 acres.  |
| <i>Armillaria mellea</i><br>Shoestring root rot                         | Douglas-fir           | Widespread on<br>Island        | Common in planta-<br>tions. Intensity<br>to 5%.   |
| <i>Rhabdocline</i><br><i>pseudotsugae</i><br>Douglas-fir needle<br>cast | Douglas-fir           | Nimpkish,<br>Iron River        | Continuing problem<br>in Christmas-tree<br>plantations and<br>some special areas.                           |
| ? <i>Lophodermium</i><br><i>pinastri</i> complex<br>A pine needle cast  | Pine, shore           | East coastal<br>region         | Discoloration up to<br>30% needles on<br>lower 50% of<br>foliage.   |
| ? <i>Pseudomonas</i> sp.<br>Bacterial canker                            | Cottonwood,<br>Willow | Nanaimo Lakes,<br>Saanich      | Discoloration of<br>cottonwood foliage<br>causing twig<br>cankers and foliar<br>discoloration on<br>willow. |