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# WESTERN HEMLOCK LOOPER IN BRITISH COLUMBIA 1993 AND FORECAST FOR 1994

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In the fourth year of infestation, defoliation of mature to overmature western hemlock-western red cedar stands by the western hemlock looper, Lambdina fiscellaria lugubrosa, declined to 92 750 ha in 333 infestations over four forest regions (Table 1, Map 1). Fifty-one percent of the area defoliated was **severe** with the loss of most foliage on most trees, 25% was **moderate** with foliage loss extending down through the mid-crowns, and 24% was **light** with feeding limited mainly to upper crowns. Large declines occurred in the Kamloops and Cariboo regions while increases occurred in the Prince George and Nelson regions.

**Table 1.** Current defoliation by the western hemlock looper in British Columbia. Forest Insect and Disease Survey, 1993.

| Forest Region | Number of Infestations | Area defoliated (ha) Light | Moderate | Severe | **Total 1993** | Change from 1992 |
|---|---|---|---|---|---|---|
| Cariboo | 1 | 100 | - | - | **100** | -99% |
| Kamloops | 13 | 1 050 | 100 | - | **1 150** | -99% |
| Nelson | 216 | 19 900 | 16 350 | 12 250 | **48 500** | +3% |
| Prince George | 103 | 925 | 7 025 | 35 050 | **43 000** | +54% |
| **B.C. Total** | 333 | 21 975 | 23 475 | 47 300 | **92 750** | -50% |

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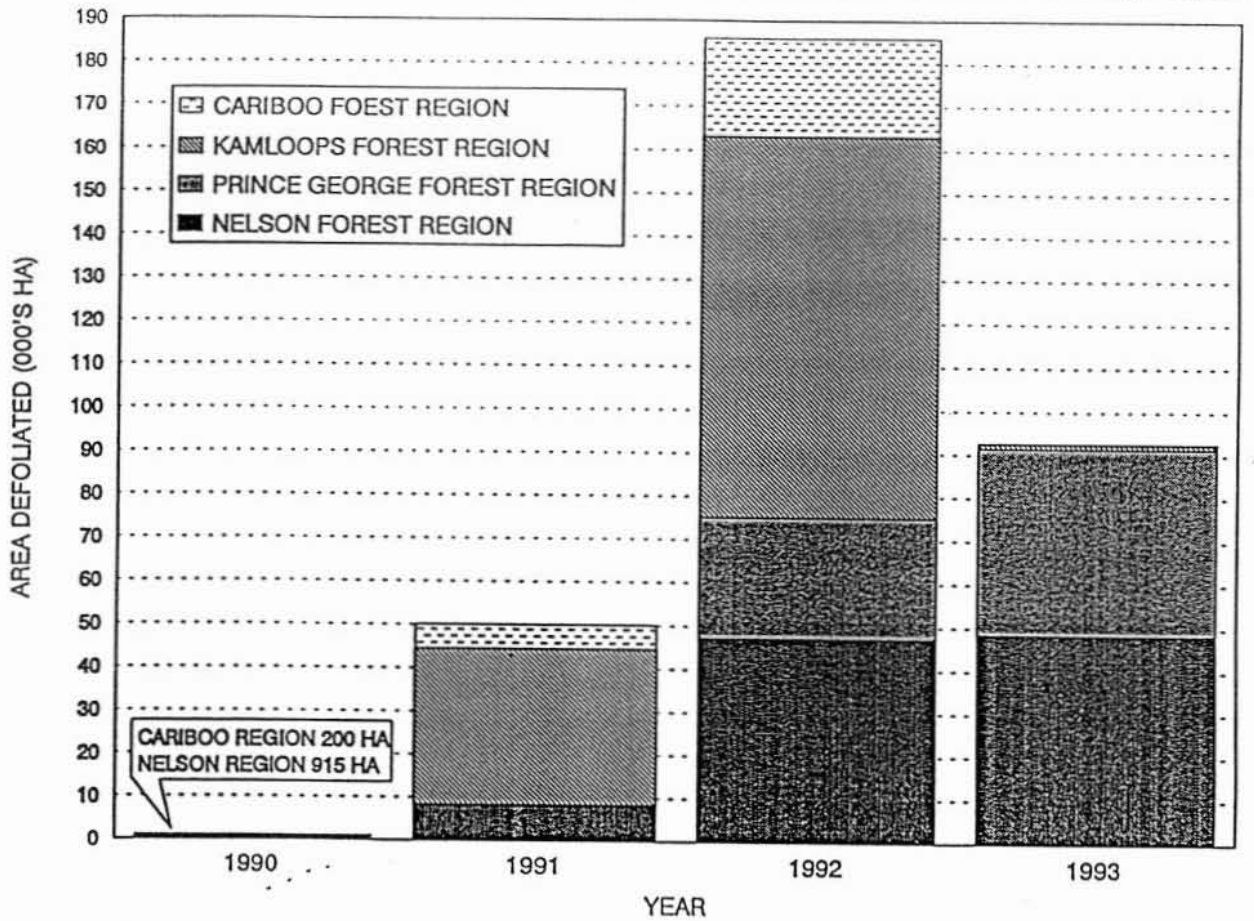
Chart 1. Chronology of defoliation in the current western hemlock looper outbreak by forest region. Forest Insect and Disease Survey, 1993.




Defoliation is forecast to decline again in 1994, with most remaining activity in the northwest quadrant of the Nelson Region and east of Prince George, based on egg sampling at 34 sites in four regions (Map 1). Details of survey results such as egg count data and local infestation information will be available in the annual regional reports of pest conditions published during the winter.

A graph of the current outbreak shows regional variations in defoliation over the last 4 years and the overall outbreak pattern (Chart 1). The extent, duration, and intensity of this outbreak are the greatest recorded in the B.C. Interior. Six Interior outbreaks have been recorded at intervals of about 8 to 9 years, each lasting 2 to 3 years before collapsing rapidly. Previous infestations have caused extensive top-kill and scattered mortality. In older stands, trees that are 100% defoliated are usually killed, while those 80% or more defoliated frequently die, or succumb to secondary agents within 3 to 5 years.

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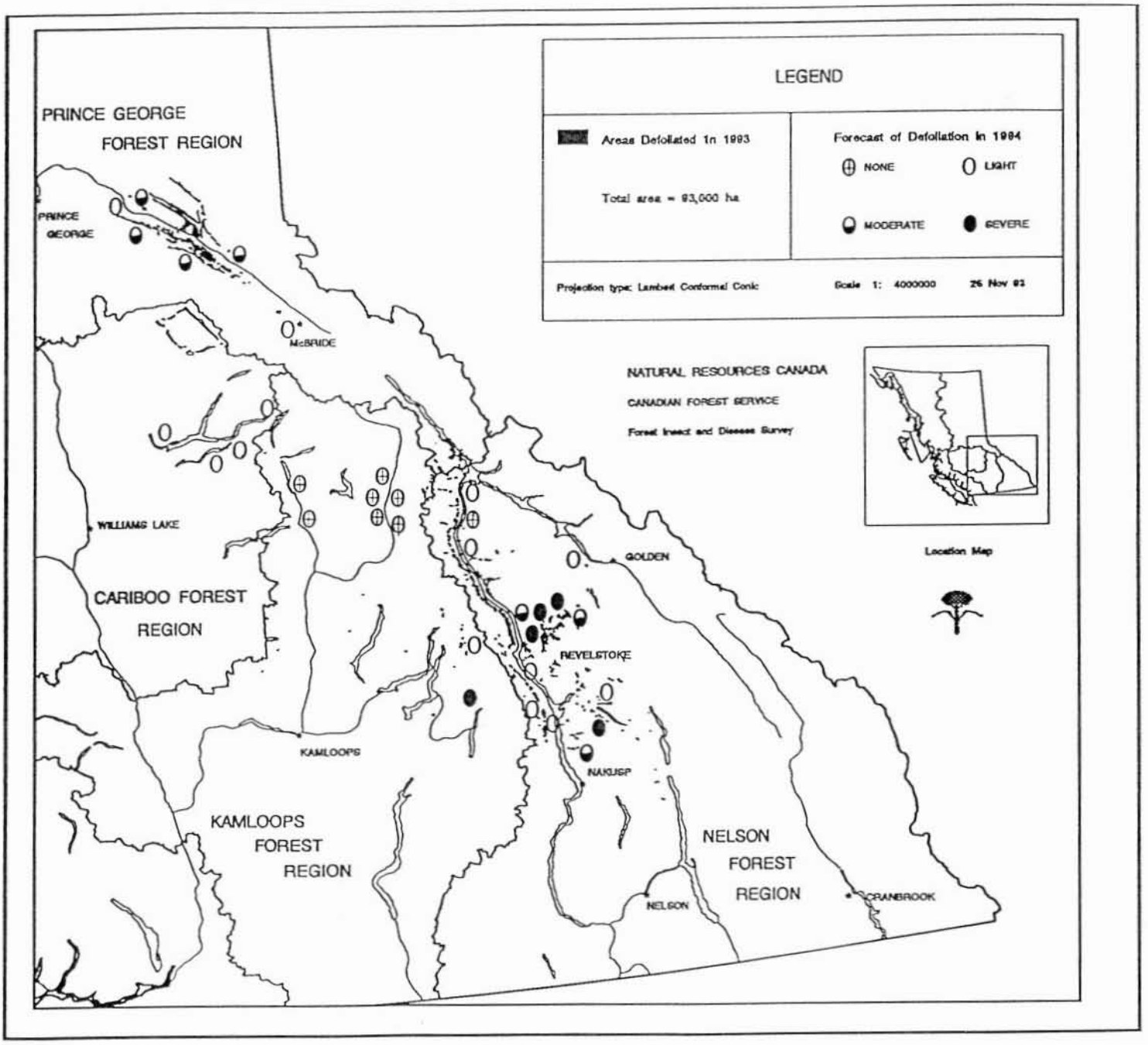
Map 1. Areas defoliated in 1993 by the western hemlock looper in British Columbia and a forecast of 1994 defoliation.

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## Cariboo Forest Region

Populations collapsed in the Cariboo Region with only 100 ha of moderate defoliation near Bowron Provincial Park. In 1992, 21 420 ha of moderate and severe defoliation were mapped near Quesnel and Horsefly lakes, the third consecutive year at some locations. Numbers of larvae declined in all current three-tree beating samples. Mass collections of larvae at three locations averaged 42% mortality from disease and 3% from parasites, mainly Hymenopterans.

## Kamloops Forest Region

Current defoliation occurred over 1150 ha, down from 88 000 ha in 1992. Infestations collapsed in the North Thompson Valley, Wells Gray Park and upper Adams River Valley. Moderate defoliation only occurred on 100 ha near East Barriere Lake. Light defoliation was mapped on 1050 ha in Salmon Arm District, mainly along Perry River where several small blocks were successfully sprayed by the B.C. Forest Service. Several pockets of light defoliation also occurred along Ratchford Creek, Scotch Creek and near Malakwa.

The decline in population appears to be the result of high parasitism, which averaged 40% in 1992, and unseasonally cool weather during larval development in 1993. Larval starvation may have been a factor in previously severely defoliated stands.

After two years of severe defoliation, extensive top-kill and tree mortality is evident in many stands near Blue River, along Clearwater and Hobson lakes and to a lesser extent in the Upper Adams River drainage. Preliminary data from damage appraisal plots in three stands indicate that up to 60% tree mortality can be expected in stands severely defoliated for two consecutive years.

## Nelson Forest Region

In the fourth year of infestation the area defoliated increased slightly to 48 500 ha, of which 25% was severe. The intensity of defoliation declined overall since 1992. Areas defoliated since the start of the outbreak, north of Revelstoke, continued to decline with most remaining feeding at light to moderate intensity in higher elevation stands. These included adjacent spruce and fir stands in the ESSF biogeoclimatic zone. Farther south, in side drainages to Arrow, Trout and upper Kootenay lakes and the Illecillewaet River, moderate to severe defoliation continued with expansion in some areas. Extensive severe defoliation was particularly conspicuous along the Trans-Canada Highway from the Tangier River into Glacier National Park.

Patches of greater than 40% stand mortality have occurred near Downie, Bigmouth, Lardeau, and Pingston creeks, and Goldstream and Illecillewaet rivers. The area of significant mortality is currently estimated at less than 5% of the area defoliated; a more accurate determination will be possible after the outbreak subsides when the extent of accumulated mortality, top dieback, and recovery can be determined.

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Larval mortality from disease and parasitism was low in areas of recent expansion. Two populations mass sampled in the Illecillewaet River drainage averaged only 6% and 3% mortality during rearing.

**Prince George Forest Region**

Current defoliation increased to 43 000 ha, from 28 000 ha in 1992. Over 80% of the area was severely defoliated. In Prince George Forest District, defoliation of 31 000 ha occurred in the ICHvk2 biogeoclimatic subzone as far west as Purden Lake and east to the District boundary. Over 12 000 ha of defoliation in the McBride District occurred in the ICHwk3 subzone, mainly between Ptarmigan and Snowshoe Creeks. The only reduction in defoliation was along both sides of McNaughton Lake, south of Grouse Creek in the ICHmm subzone.

Mortality was relatively light in 9 damage appraisal plots. After 2 years of defoliation, 5% of the western hemlock and 6% of western red cedar had died, consisting of small diameter understory trees. Over the 9 plots an average of 55% of the hemlock and cedar were over 80% defoliated for the second year, indicating that additional mortality is likely over the next few years.

## FORECAST

Another drop in the total area defoliated is forecast for 1994 with most declines expected in areas defoliated the longest. Of 34 egg sampling locations over 4 forest regions, severe defoliation is forecast at 5, mostly in the Nelson Region, moderate at 7 in the Prince George and Nelson regions, light at 14, and none in the remaining 8 areas (Map 1). Severe defoliation is forecast to occur near Sugar Lake in the Kamloops Region and continue in the Illecillewaet River and Lardeau Creek areas of the Nelson Region. Collapsing populations in the Cariboo and northern Kamloops regions are expected to remain low.

Egg parasitism, another indicator of population status, averaged 21% over the 34 locations. In general, higher incidences in areas defoliated longer are coinciding with expected population declines while egg parasitism in areas of recent expansion remains low. In previous outbreaks, when 30% or more egg parasitism occurred populations usually collapsed the following year.

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