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WESTERN SPRUCE BUDWORM IN BRITISH COLUMBIA, 1994, AND FORECAST FOR 1995

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DEFOLIATION

Based on aerial surveys, the area of western spruce budworm, *Choristoneura occidentalis*, defoliation in British Columbia declined to 16 145 ha from 43 000 ha in 1993. The majority of the 144 separate infestations in mixed age-class Douglas-fir stands occurred in the Kamloops Forest Region, the remainder in the Vancouver Forest Region. No defoliation was recorded during aerial surveys of previously defoliated stands in the Cariboo and Nelson forest regions. This is the third consecutive annual reduction in area and the smallest amount defoliated in ten years. Defoliation intensity was generally light to moderate with less than 1% in the severe category. Spruce budworm populations are forecast to continue at similar levels in 1995 in most areas sampled for eggs (Table, Map).

KAMLOOPS FOREST REGION

The area of infestation declined by nearly 65% from 1993 to 14 240 ha, of which 6725 ha were lightly defoliated, 7400 moderately, and 115 severely. The majority of feeding was in the Penticton, Merritt and Lillooet districts, mostly in areas previously defoliated. Some increases in area of infestation occurred near Pritchard in the Kamloops TSA, north of Douglas Lake in the Merritt TSA, and in the Peachland area of the Okanagan TSA. Infestations subsided noticeably in the Okanagan Valley, particularly along Okanagan Lake west of Vernon, along the Fraser and Thompson rivers and tributaries including the Stein River Valley, in the Stump Lake area and north of Cache Creek. Scattered tree mortality, top-kill and deformity of both immature and mature Douglas-fir were evident in many stands severely defoliated for successive years. Douglas-fir beetle attacks were also common in chronically defoliated stands, particularly in Kamloops and Lillooet TSAs. Aerial application of *Bacillus thuringiensis* (Bt) spray by the B.C. Ministry of Forests contributed to defoliation reduction on more than 21 500 ha in four forest districts. Experimental spray treatments of two different products were also carried out by the Canadian Forest Service on 300 ha near Merritt (results are being analyzed).

VANCOUVER FOREST REGION

Defoliation by the budworm decreased for the second consecutive year to 1900 ha, down from 2970 ha in 1993. All infestations occurred in the Fraser TSA; those in the Soo TSA collapsed following a decline in 1993. Light and moderate defoliation was recorded north of Boston Bar along both sides of the Nahatlatch River, above Nahatlatch Lakes, along the Fraser River near Mowhokam Creek, at Ainslie Creek and at Scuzzy Creek, south of Boston Bar.

CARIBOO FOREST REGION

While no defoliation was observed during aerial surveys, some light feeding on new growth was detected during ground surveys in the Clinton area, along Hart Ridge and Big Bar Lake Road. Populations declined in previously infested stands in the Kelly Lake-Cavanaugh Creek area.

PARASITISM AND DISEASE

Disease incidence and larval parasitism determined from late-instar larvae and pupae averaged 45% at five locations within the infested areas. Disease in samples averaged 19% (range 7 to 31%), down from 35% in 1992. The most common entomopathogens were bacteria and virus. A fungus, *Entomophthora* sp., was found in nearly 20% of larvae reared in a sample from the Nahatlatch River area. Parasitism by *Hymenoptera* and *Diptera* insects averaged 26% (range 12 to 57%), up from 10% in 1993. While parasitism and disease of populations collectively was considerable in areas of infestation, their incidence is still insufficient to significantly reduce spruce budworm numbers. Studies have shown that parasites in particular can be effective at controlling low populations of budworm, but have minimal influence at epidemic levels.

FORECAST

Following three consecutive years of decline in most areas sampled (Table), budworm populations are predicted to continue at levels similar to 1994. At 26 locations sampled, the number of egg masses per 10m² of foliage at each site averaged only 10% higher than 1993. Severe defoliation in 1995 is predicted at four sites: two areas near Merritt, one area west of Clinton, and one near Peachland. Moderate defoliation is forecast in areas where previous defoliation has occurred at nine locations in the three regions. Light defoliation is expected at seven sites, including the Kamloops, Okanagan, and Lillooet TSAs in Kamloops Region and the Fraser TSA in Vancouver Region. Little or no defoliation is forecast at six sites sampled, all in the Kamloops Region.

IMPACT

Due to successive years of severe defoliation, tree mortality, top-kill, increment loss and tree deformity have occurred throughout parts of the IDF zone, particularly in Kamloops Region. Monitoring of permanent sample plots in young stands has shown cumulative tree mortality to be about 11% since 1986.

With the exclusion of fire and the use of selective harvesting methods, many stands have become uneven-aged with a dense understory of Douglas-fir, which favors budworm feeding and population build-up. Where even-aged stand management is an option, this silvicultural method should be encouraged where budworm has been historically active.

Table 1. Average number of western spruce budworm egg masses on Douglas-fir from 1991-1994, and predicted defoliation in British Columbia in 1995.

	Predicted Defoliation 1995	No. of Egg Masses Per 10m ² Foliage ¹				% Change 1993-94
		1994	1993	1992	1991	
CARIBOO REGION						
100 Mile TSA						
Cavanaugh	moderate	92	100	14	104	-8
Kelly Lake	moderate	80	292	-	-	-73
Big Bar Rd	severe	219	-	-	-	-
Average		130	196			-34
KAMLOOPS REGION						
Kamloops TSA						
Pemberton Hill	light	36	10	46	827	260
Niskonlith Lake	light	35	90	32	184	-61
McQueen Lake	trace	7	0	104	345	100
Pritchard	moderate	129	-	-	-	-
Average		52	30			73
Okanagan TSA						
Skimikin	light	41	-	-	248	-
Postill Lake	light	20	73	41	447	-73
Glenrosa	trace	7	7	8	370	0
Trepanier Creek	severe	183	-	-	-	-
Darke Lake	moderate	56	29	74	218	93
Apex-Yellow Lakes	trace	8	7	50	264	14
Blind Creek	trace	7	0	20	183	100
Anarchist Mountain	trace	8	17	92	256	-53
Blue Lake	nil	0	8	12	74	-100
Average		37	20			85
Lillooet TSA						
Cayoosh Creek	light	14	30	32	-	-53
Yalakom River	moderate	114	60	135	146	90
Fountain Valley	moderate	104	20	37	407	420
Botanie Creek	moderate	74	30	54	74	147
Average		77	35			120
Merritt TSA						
Steffens Creek	severe	200	379	-	-	-47
Merritt	moderate	135	-	-	-	-
Peter Hope Lake	severe	212	20	89	-	960
Average		182	200			-9
VANCOUVER REGION						
Fraser TSA						
Hannah Creek	moderate	65	109	49	-	-40
Log Creek	light	39	-	-	-	-
Mowhokam Creek	light	40	-	-	-	-
Average		48	109			-56

1 1 - 10 eggs/10m² - trace defoliation

11 - 50 eggs/10m² - light defoliation

51 - 150 eggs/10m² - moderate defoliation

151+ eggs/10m² - severe defoliation

Western Spruce Budworm

Defoliation forecast for 1995

