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Pest Report 91-21

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WESTERN SPRUCE BUDWORM IN BRITISH COLUMBIA 1991 AND FORECAST FOR 1992

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DAMAGE

FORESTRY CANADA --
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Western spruce budworm, Choristoneura occidentalis, populations increased in the Cariboo, Kamloops, Nelson, and Vancouver forest regions, defoliating Douglas-fir over 395 500 ha in more than 810 separate infestations. This is more than double the 193 000 ha defoliated in 1990, but less than the peak of over 800 000 in 1987 (Figure 1). Severe defoliation covered 13% of the area, up 11% from 1990, with moderate over 60% and light over the remainder.

CARIBOO FOREST REGION

Increased populations very lightly defoliated mostly understory Douglas-fir over about 10 ha near Cavanaugh Lake west of Clinton in the 100 Mile TSA. This was the first defoliation recorded in the region since 1988, when stands over 8000 ha were defoliated near Horsefly and Mahood lakes.

KAMLOOPS FOREST REGION

The area of defoliation in the Kamloops Region doubled to 385 600 ha from 188 150 ha in 1990, in 767 separate patches. The majority of the increase was in the Kamloops TSA, however, defoliation was most widespread in the Okanagan TSA. The area of severe defoliation increased 11%, moderate 36%, but the area of light defoliation decreased 47%, (Figure 2). The impact of increased defoliation will likely be greater due to the increase in the severity levels.

Kamloops TSA

The area of defoliation in the Kamloops TSA increased nearly eightfold to 69 550 ha, up from only 8 850 ha in 1990. Defoliation was severe over 11 550 ha, moderate on 31 650 ha, and light over 26 350 ha.

Major expansions in area and defoliation intensity occurred along the upper slopes of the South Thompson Valley between Chase and Kamloops, along the North Thompson River north to McLure, and north and south of Kamloops Lake. These included the Tranquille River drainage, Carabine Hills, Sabiston, Durand, and Duffy creeks, and along the Deadman River Valley. Defoliation also increased south of Kamloops along Campbell Creek to Stump Lake. The most severely impacted areas, with the potential for significant damage including tree mortality include the Martin Mountain and Monte Hills area, Pemberton Hill, Shumway Lake, Duffy and Beaton creeks, Tranquille River Valley, and Sabiston Creek.

Okanagan TSA

The area of defoliation in the Okanagan TSA increased by 35% to 236 000 ha up from 154 450 ha in 1990. Severe defoliation increased 87% to 26 900 ha (12% of the area), moderate increased 44% to 149 200 ha (63%), and light defoliation declined 10% to 59 900 ha (47%).

While defoliation intensity decreased infestations were larger between Osoyoos and Penticton. Areas of moderate defoliation increased between Penticton and Glenemma on the west side of Okanagan Lake with large pockets of severe defoliation up to 1000 ha scattered throughout. Infestations expanded slightly on the east side of Okanagan Lake, north to Mara Lake with the most significant between Mission Creek and Postill Lake, and Coldstream to Mara. Defoliation was mostly moderate with pockets of severe defoliation particularly northeast of Swan Lake near Vernon. A new infestation lightly defoliated Douglas-fir north of Beachcomber Bay, near Vernon. Elsewhere in the North Okanagan-Shuswap, the area and severity of defoliation increased with 54% of the severe defoliation in the TSA recorded in this area. The most extensive was in the Salmon River Valley and Monte Hills area, Chase Creek, and Turtle Valley, where numerous young managed stands are at risk from budworm feeding.

Tree mortality, top-kill, and bud-kill of both understory and mature Douglas-fir occurred at 19 of 27 locations surveyed throughout the Okanagan TSA. This followed 2-7 consecutive years of defoliation. Mortality of understory trees averaged 25% at 6 sites (range 5% at Postill Lake to 60% at Lambly Creek), and up to 10% of the mature trees were killed at 4 plots, with a range of 5-10%. Top-kill occurred at 13 sites, averaging 8% with a range of 5% at Postill Lake to 25% at Apex-Yellow Lake.

Lillooet TSA

Infestations in the Lillooet TSA expanded more than threefold to 78 250 ha, with severe defoliation over 11 150 ha, moderate on 42 550 ha and light over 24 550. Most of the expansion was west of Lillooet along Seton, Anderson, and Carpenter lakes, and south at Cayuse Creek and Fountain Valley. Elsewhere, defoliation increased up to 50% in areas defoliated in 1990, including the Bridge and Yalakom river drainages, the Fraser River south of Lillooet to Kwoiek Creek, in the Stein River Valley, and in the Thompson River Valley between Lytton and Twaal Creek.

Defoliation was most severe in Fountain Valley where tree mortality, die-back, and top-kill were more common than in recent years. Additional tree mortality and top-kill can be expected to occur at Marshall Creek and at Mission Pass, both areas of previously chronic infestations.

Merritt TSA

The area of defoliated Douglas-fir expanded to 1800 ha from 250 ha in 1990. Populations declined in previously infested stands in the Soap Lake and Gordon Creek area, but moderate defoliation occurred over 1700 ha near Peter Hope Lake, and severe defoliation over 100 ha in the Winters Creek drainage of the Similkameen Valley.

NELSON FOREST REGION

Defoliation of Douglas-fir in the Nelson Region was mapped in the Boundary TSA in 48 infestations over 4035 ha, about a four-fold increase from 12 infestations over 1160 ha in 1990. Patches of mostly light defoliation occurred from Anarchist Mountain to Baker Ridge and Fisherman Creek near Grand Forks. Defoliation was considerably less than expected due to a high rate of larval mortality which was attributed to a disease, and to unusually cool weather during June.

VANCOUVER FOREST REGION

Populations increased throughout most of the Vancouver Region with defoliation in 28 separate infestations totaling 5850 ha, up from 3825 ha in 1990, throughout the Pemberton, Birkenhead and Lillooet River Valleys, but declined slightly near Boston Bar in the Fraser Canyon. Defoliation was light on 4740 ha with moderate over 1210 ha.

PARASITISM

Larval parasitism determined from 18 late-instar collections in British Columbia averaged 6%, and ranged from 0% at Apex-Yellow Lake in the Kamloops Region, to 21% at Bridesville in the Nelson Region. However, these are still too low to effectively reduce the population. Disease in the population was also noted in several locations sampled, with larval infection ranging from 1% to 85%; the highest at Conkle Lake in the Nelson Region and Fountain Valley in the Kamloops Region.

FORECAST

CARIBOO FOREST REGION

Populations at Cavanaugh Lake southwest of Clinton in the 100 Mile TSA, are forecast to moderately defoliate Douglas-fir in the area in 1992.

This is the first increase since defoliation occurred in the region over 8000 ha in 1988 (Figure 3).

KAMLOOPS FOREST REGION

Based on a 40% increase in egg mass numbers from 1990 (Table), and egg mass samples from 46 locations in the region, defoliation in 1992 is predicted to be severe at 35 sites, moderate at 9, and light at 2 (Figure 3). These predictions preclude adverse climatic conditions affecting a decrease in overwintering larval survival rates.

Kamloops TSA

The number of egg masses collected at 12 sites in the TSA increased 51% from 1990 levels and predict severe defoliation at 9 sites, moderate at 1, and light at 2 sites. Stands at Monte Lake, Sabiston Creek, and Duffy and Beaton creeks, already severely impacted by successive years of budworm feeding, will likely deteriorate further following additional severe defoliation.

Okanagan TSA

Severe defoliation is forecast at 23 of 27 sites and moderate at the remainder. The number of egg masses increased 36% with an average of 285 per 10/m² of foliage in 1991, up from 188 in 1990. Increased defoliation intensity is forecast, with the most severe at Falkland, Equesis Creek, Postill Lake, Darke Lake, and Blind Creek, where the number of egg masses more than doubled. Although population pressure and lack of host material may increase larval mortality at several locations, populations will likely remain high enough throughout the TSA to cause extensive defoliation and result in tree mortality, top-kill, and bud-kill.

Lillooet TSA

Severe defoliation is predicted in 2 of 6 areas sampled, with moderate at the remainder. This follows the trend elsewhere in the region, of continued increases in population levels leading to further expansion of infestations in 1992. Although a larval disease was found in parts of the Fountain Valley infestation it was too low to reduce the forecast of severe defoliation, which is expected to cause additional tree mortality and growth loss of Douglas-fir stands in this area.

Merritt TSA

Egg masses collected near Peter Hope Lake predict severe defoliation in 1992, and the possible expansion of existing populations elsewhere.

NELSON FOREST REGION

Boundary TSA

The number of egg masses declined at 8 of 10 sites by an average of 40% compared to 1990 (Table). This was probably due to the relatively high larval mortality and subsequent reduced flight in 1991. However, the numbers of egg masses were still sufficient to predict severe defoliation in 1992 at 5 sites and moderate at the remainder (Figure 3).

Revelstoke TSA

Egg sampling at Eagle Pass to detect any dispersal from outbreaks in the Kamloops Forest Region found only small numbers indicating only minor feeding should occur in 1992 (Table, Figure 3).

VANCOUVER FOREST REGION

Soo TSA

Egg mass surveys at 5 locations near Pemberton indicated fewer numbers of eggs, however, populations are forecast to continue in 1992 with light defoliation predicted for 2 locations, moderate defoliation for 2 locations and severe defoliation predicted at one area (Table, Figure 3).

Table. Average number of western spruce budworm egg masses on Douglas-fir from 1988-1991, and predicted defoliation in British Columbia in 1992.

Region, TSA and Location	Predicted Defoliation '92	No. of Egg Masses Per 10m ²			Foliage 1991	% Change (90-91)
		1988	1989	1990		
CARIBOO REGION						
100 Mile TSA						
Cavanaugh Lake	moderate	-	-	-	104	-
KAMLOOPS REGION						
Kamloops TSA						
Adams River	light	9	37	27	37	+37
Fadear Creek	moderate	-	-	-	72	-
Paul Lake	severe	78	162	150	302	+101
Pemberton Hill	severe	-	-	960	827	-14
Martin Mountain	severe	-	-	373	739	+98
Niskonlith Lake	severe	-	-	-	184	-
Shumway Lake	severe	-	-	-	818	-
McQueen Lake	severe	-	-	-	345	-
Sabiston Creek	severe	85	123	361	472	+30
Criss Creek	severe	-	145	111	185	+67
Oregon Jack Creek	light	-	-	-	14	-
Cherry Creek	severe	43	86	105	596	+467
Average ²		54	110	298	382	+51
Okanagan TSA						
Falkland	severe	37	49	101	528	+422
Monte Lake	severe	-	-	-	613	-
Glenemma	severe	-	-	-	416	-
Skimikin	severe	-	-	-	248	-
Hunter-Blurton	severe	-	-	-	168	-
Haines Creek	moderate	-	-	137	74	-46
Bardolph Lake	severe	-	-	-	401	-
Harris Creek	severe	-	-	-	199	-
Equesis Creek	severe	43	51	87	233	+167
Whiteman Creek	severe	-	-	-	172	-
Postill Lake	severe	20	17	43	447	+939
Lambly Creek	severe	-	-	364	152	-58
Glenrosa	severe	231	143	357	370	+4
Darke Lake	severe	76	87	74	218	+194
Priest Creek	moderate	-	-	236	87	-63
Peachland Main	severe	43	51	336	306	-9

Table p. 2

Region, TSA and Location	Predicted Defoliation '92	No. of Egg Masses Per 10m ²			Foliage 1991	% Change (90-91)
		1988	1989	1990		
Chute Creek	severe	-	-	264	447	+69
McNulty Main	severe	-	-	-	367	-
Riddle Creek	severe	-	-	-	326	-
Apex-Yellow Lake	severe	99	57	222	264	+19
Taylor Lake	severe	-	-	248	325	+31
Blind Creek	severe	10	23	77	183	+137
Gregoire Creek	severe	-	-	214	238	+11
Mount Kobau	severe	661	310	521	454	-13
Roberts Creek	moderate	-	-	-	147	-
Anarchist Mountain	severe	99	-	-	256	-
Blue Lake	moderate	98	8	143	74	-48
Average		128	80	188	285	+36
<u>Lillooet TSA</u>						
Yalakom River	moderate	-	-	348	146	-58
Fountain Valley	severe	70	124	109	407	+273
Murray Creek	severe	-	-	-	200	-
Mission Pass	moderate	-	-	-	67	-
Gun Lake	moderate	-	-	-	98	-
Botanie Creek	moderate	-	-	0	74	+100
Average		70	124	230	165	+38
<u>Merritt TSA</u>						
Peter Hope Lake	severe	-	-	-	505	-
Average		-	-	-	505	-
NELSON REGION						
<u>Boundary TSA</u>						
Rock Mountain Road	moderate	-	128	551	62	-87
Johnstone Creek	moderate	359	368	400	83	-79
Phoenix Mountain	moderate	10	41	45	110	+144
Beaverdell	moderate	-	-	320	116	-64
Nicholson Creek	moderate	425	375	376	136	-64
Ingram Creek	severe	208	335	480	163	-66
Conkle Lake Road	severe	65	212	288	179	-38
Bridesville	severe	326	571	302	196	-35
Anarchist Mountain	severe	72	193	400	336	-16
McKinney Creek	severe	311	265	236	653	+176
Average		220	276	340	203	-40

.../ Table p. 3

Table p. 3

Region, TSA and Location	Predicted Defoliation '92	No. of Egg Masses Per 10m ²			Foliage 1991	% Change (90-91)
		1988	1989	1990		
<u>Revelstoke TSA</u>						
Eagle Pass	light	-	-	-	17	-
VANCOUVER REGION						
<u>Soo TSA</u>						
Haylmore Creek	light	19	0	-	28	-
Blackwater Creek	light	99	64	38	21	-45
Eight Mile Creek	moderate	-	-	-	119	-
North Creek	moderate	-	-	-	92	-
North Fowl Creek	severe	-	-	93	174	+46
Average		60	97	121	87	-34

- ¹ 1- 50 eggs/10m² - light defoliation
 51-150 eggs/10m² - moderate defoliation
 151+ eggs/10m² - severe defoliation

- ² Average for all TSA's may be based on information present in previous regional reports.

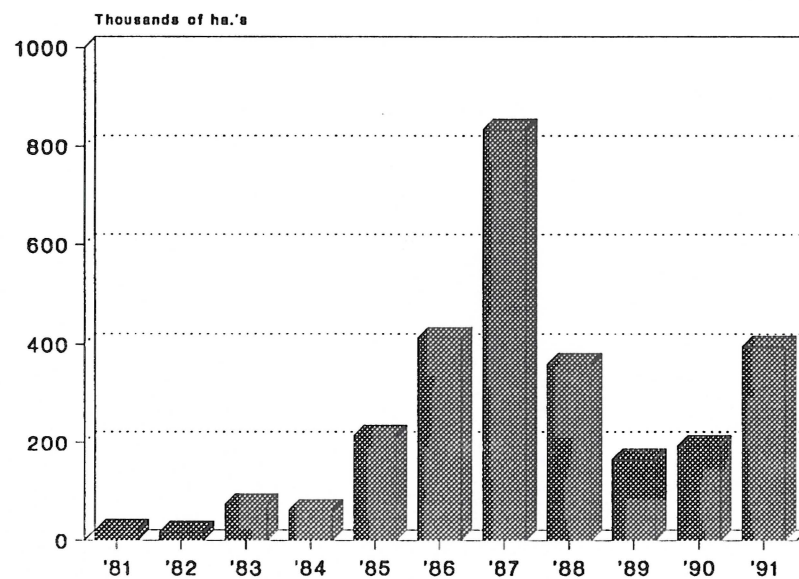


Figure 1. Western spruce budworm in British Columbia 1981-1991

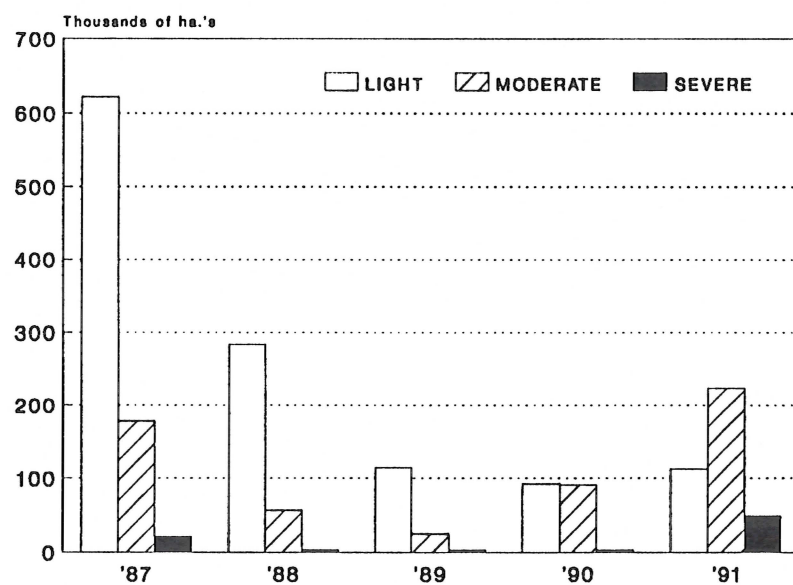


Figure 2. Western spruce budworm defoliation and severity in the Kamloops Forest Region 1987-1991.

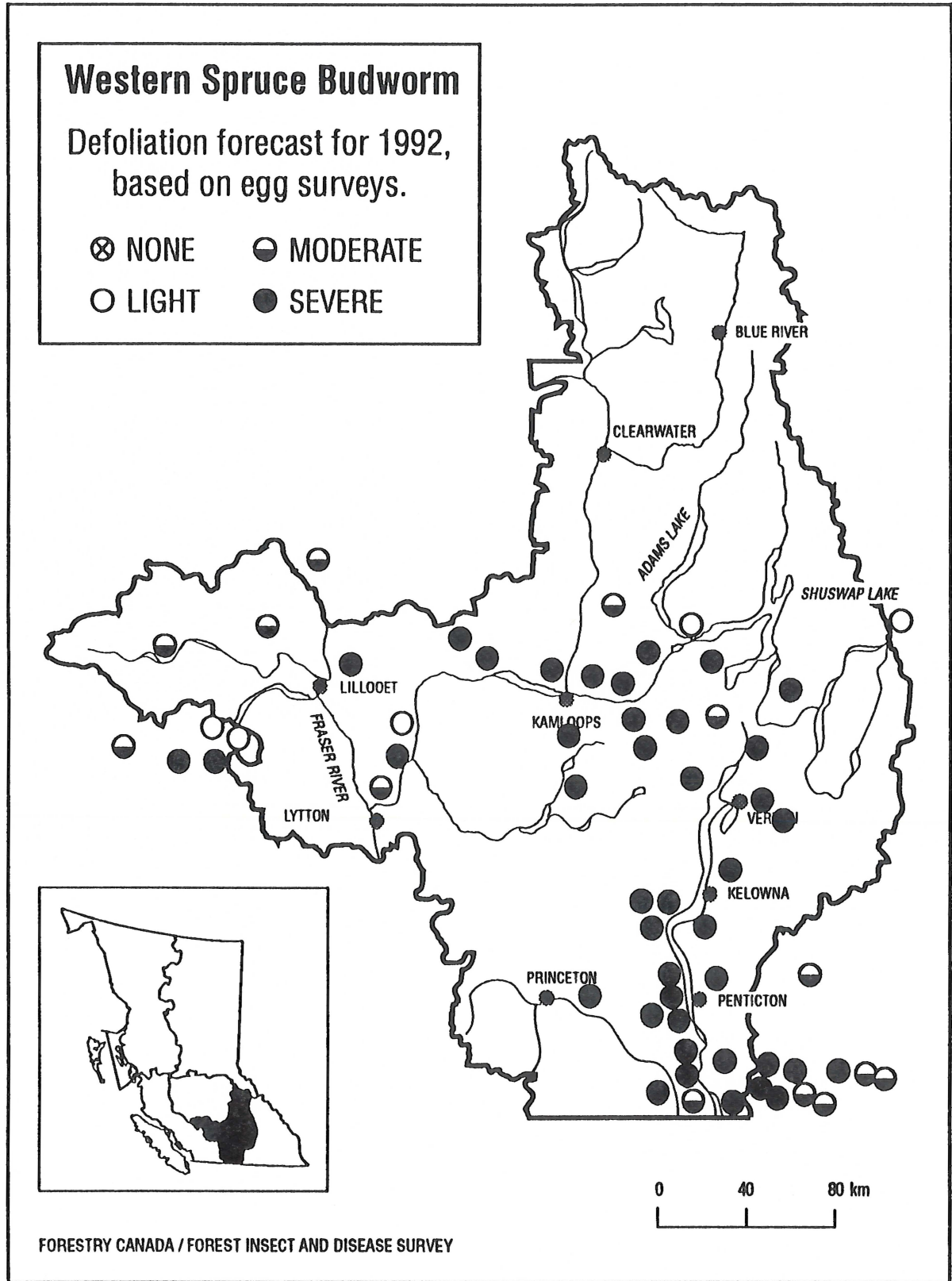


Figure 3. Predicted defoliation for 1992 in British Columbia.