

**RESULTS OF FOREST INSECT
AND DISEASE SURVEYS IN THE
NORTHEAST REGION OF ONTARIO,
1994**

*Forest Districts: Hearst, Cochrane,
Wawa, Chapleau, Timmins,
and Kirkland Lake*

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SURVEY HIGHLIGHTS

There was one change to the Forest Insect and Disease Survey (FIDS) Unit staff in the Northeast Region in 1994. Chuck Jones replaced Wayne Ingram.

This report reviews the more important insect, disease, and abiotic conditions encountered during aerial and ground surveys in the Northeast Region of Ontario. Four major hardwood pests, forest tent caterpillar, early aspen leafcurler, birch skeletonizer, and large aspen tortrix, persisted at damaging levels. The area of moderate to severe defoliation caused by the forest tent caterpillar, the early aspen leafcurler, and the birch skeletonizer, however, decreased to 166,060 ha, 153,560 ha, and 2,498,978 ha, respectively. The area of medium to heavy infestation caused by the large aspen tortrix increased to 193,687 ha.

The region hosted two major conifer pests at damaging levels, the eastern spruce budworm and the jack pine budworm. The spruce budworm infested area decreased from 1,650,677 ha in 1993 to 283,590 ha in 1994. Moderate to severe defoliation by the jack pine budworm was mapped in the Timmins District. This is the first occurrence of high populations of this pest in the region since the mid-1980s. It damaged 3,450 ha. Little change is forecast for populations of the spruce budworm for 1995; however, numbers of the jack pine budworm are likely to increase in some areas of the Timmins District.

Armillaria root rot and the western gall rust caused damage in young conifer plantations. Insect pests and disease organisms affecting young plantations were also assessed. The results are presented in this report.

The eight Acid Rain National Early Warning System (ARNEWS) plots were re-evaluated. An additional 12 eastern spruce budworm study plots were established and those set up previously were reassessed. Assessments were carried out in the 25 jack pine budworm study plots already established under a project funded by the Northern Forestry Program (NFP) of the Northern Ontario Development Agreement (NODA).

Insects and diseases described in this report are categorized as follows:

Major Insects/Diseases

capable of causing serious injury to, or death of, living trees or shrubs.

Minor Insects/Diseases

capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs.

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pest:

- (1) those that are of minor importance and have not been known to cause serious damage to forest trees, and
- (2) those that are capable of causing serious damage but, because of low population levels or for other reasons, did not cause serious damage in 1994.

The valuable assistance and cooperation extended to the authors by the Ontario Ministry of Natural Resources (OMNR) staff and woods industry personnel during the 1994 field season are gratefully acknowledged.

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INSECTS

Major Insects

Black Army Cutworm, *Actebia fennica* (Tausch.)

The black army cutworm, a periodic pest of burned areas in the region, destroyed thousands of seedlings planted over a 220-ha area in Hambleton Township, Wawa District.

In May 1994, an area that underwent a prescribed burn the previous year was planted with 2-0 black spruce (*Picea mariana* [Mill.] B.S.P.) and jack pine (*Pinus banksiana* Lamb.). Large numbers of cutworms destroyed approximately 90% of the 29,000 black spruce seedlings in one area, while 35 and 68% of the 101,200 and 51,000 jack pine stock, respectively, were killed in two separate blocks.

Elsewhere in the Wawa District, light defoliation (6%) was reported at jack pine and black spruce planting sites in prescribed burns north of Dubreuilville.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

During 1994, the area infested by the birch skeletonizer continued to decrease. This year it affected 2,498,978 ha, a decrease of 45,491 ha from 1993.

All size classes of white birch (*Betula papyrifera* Marsh.) were infested, and complete foliar browning and premature leaf fall were common throughout the affected area.

The current infestation occupied a small area in the southern part of the Cochrane District, almost all of the Kirkland Lake District, a large part of the Timmins District, and a small intrusion in the Folyet area of the Chapleau District (Fig. 1).

Further declines are expected to occur in 1995 in the northern and western parts of this area of damage.

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.)

Infestation by this pest was first reported in the summer of

1993. By 1994, the size of the affected area more than quadrupled to a total of 193,687 ha.

The major area of infestation was situated in the northeast corner of the Wawa District (Fig. 2). This expansion resulted in defoliation as far east as Barclay and Calais townships in the Missinaibi Lake area of the Chapleau District. Two large pockets of moderate to severe damage, totaling 8,910 ha and 4,810 ha, respectively, were mapped in this area. The infestation also expanded northward across the Chapleau District boundary as far north as Walls Township in the Hearst District.

A breakdown of the affected area shows 158,752 ha, 17,481 ha, and 17,454 ha of moderate to severe defoliation in the districts of Wawa, Chapleau, and Hearst, respectively.

Although defoliation levels varied widely, with moderate to severe damage being the norm, large tracts of aspen were sufficiently stripped to initiate refoliation.

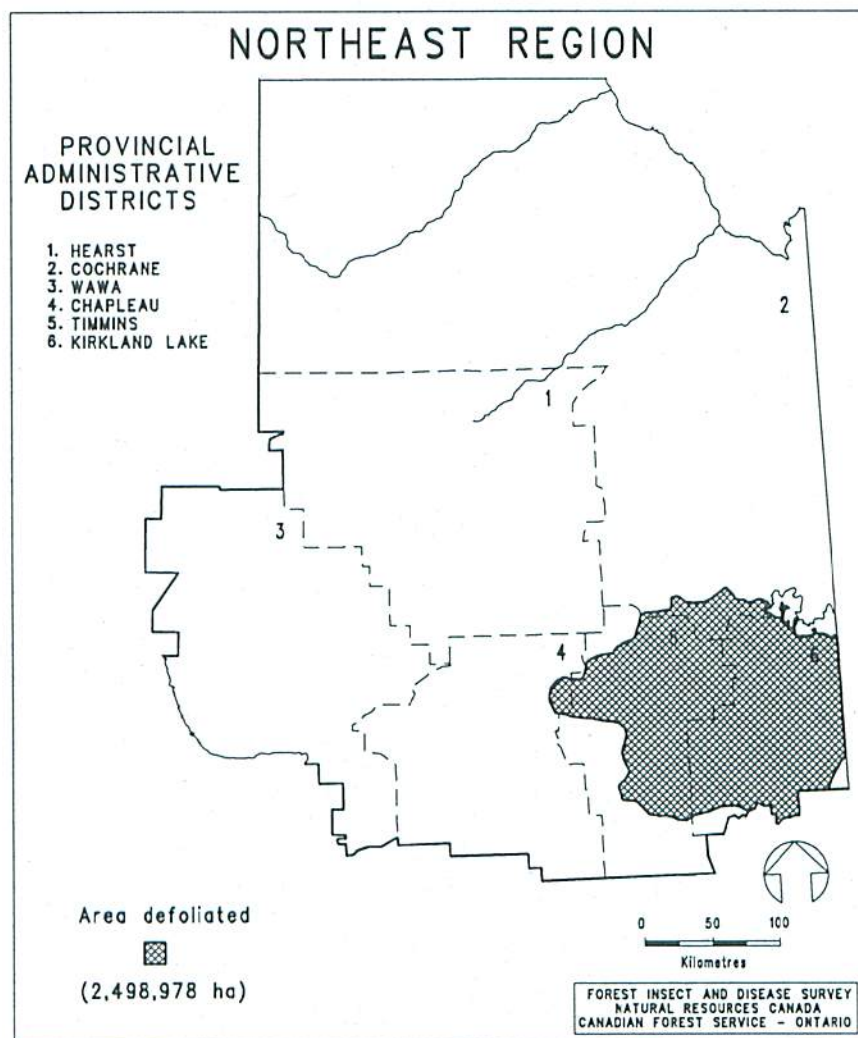


Figure 1. Areas of moderate to severe defoliation caused by the birch skeletonizer (*Bucculatrix canadensisella* Cham.) in 1994.

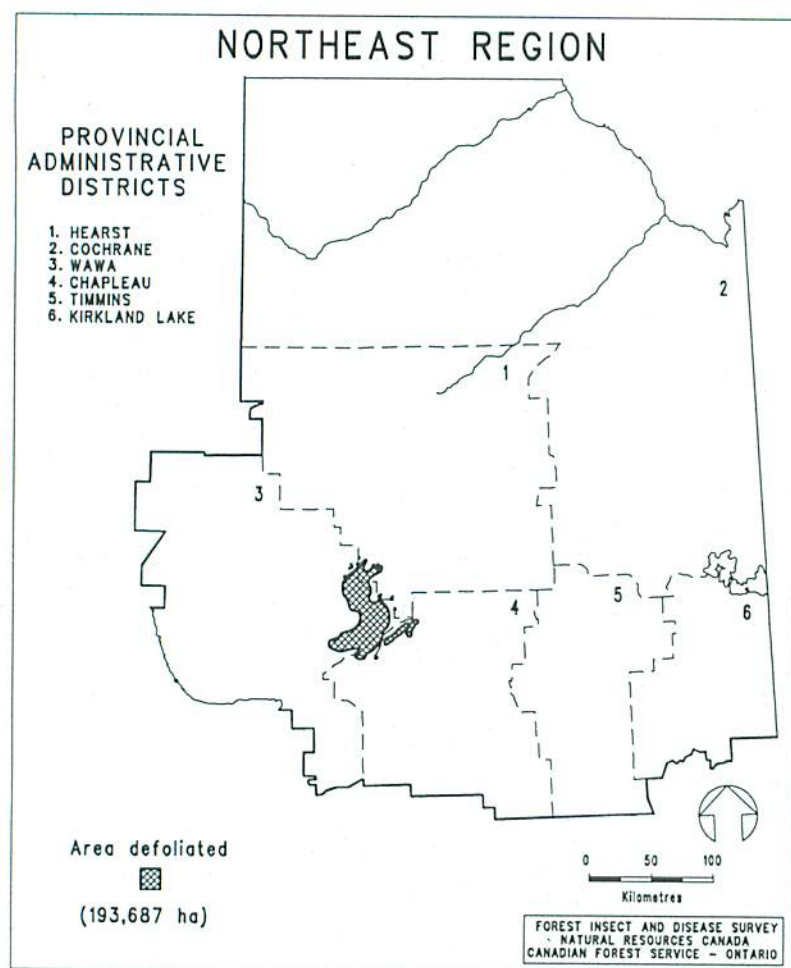


Figure 2. Areas of moderate to severe defoliation caused by the large aspen tortrix (*Choristoneura conflictana* [Wlk.]) in 1994.

Eastern Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Provincial Situation

In 1994 the eastern spruce budworm outbreak in Ontario declined for the second consecutive year. A total of 4,266,656 ha of moderate to severe defoliation was mapped across the province in 1994. This compared with 8,991,177 ha in 1993 (Table 1). The majority of the decrease occurred east of Lake Nipigon in the Nipigon District of the Northwest Region (Fig. 3). Significant decreases were also recorded in the Dryden, Kenora, Red Lake, and Sioux Lookout districts. The only exception was the Fort Frances District, where an increase in the area of spruce budworm damaged stands was recorded.

In the Northeast Region, the large infestations recorded last year in the Wawa and Hearst districts disintegrated into numerous small pockets. In the Cochrane District all populations collapsed.

Across the Central Region, budworm populations more than doubled in all of the districts, with the exception of the Sault Ste. Marie District where a marked decrease occurred.

A slight increase in the number of stands experiencing moderate to severe defoliation was noted in the Southern Region.

Spruce budworm induced mortality of balsam fir (*Abies balsamea* [L.] Mill.) and white spruce (*Picea glauca* [Moench] Voss) increased in 1994 to encompass approximately 7,783,343 ha across the province. This represented a significant increase over the 1993 level of 3,061,503 ha (Fig. 4).

Northeast Region

A significant reduction occurred in the total area of moderate to severe defoliation documented (Fig. 5). The singular, large infestation of 1993 (1,650,677 ha) broke into numerous smaller pockets, which totaled approximately 283,580 ha in 1994 (Table 2).

The largest area of severe defoliation extended west from the town of Dubreuilville to the Pukaskwa National Park, then north to the Granite Lake area, and as far east as the Kabinakagami Lake area. A second significant area of severe damage extended north from the town of Manitouwadge to the Stevens and Hillsport stops on the CNR tracks.

Two other noteworthy pockets of defoliated trees were documented. One was located between the town of Hornepayne and the Nagagamisis Provincial Park; the

Table 1. Gross area of moderate to severe defoliation caused by the eastern spruce budworm in Ontario from 1992 to 1994.

Region	Area of moderate to severe defoliation (ha)		
	1992	1993	1994
Northeast	2,090,080	1,650,677	283,590
Northwest	7,438,833	7,295,736	3,873,424
Central	30,775	44,662	108,955
Southern	24	102	687
Total	9,595,762	8,991,177	4,266,656

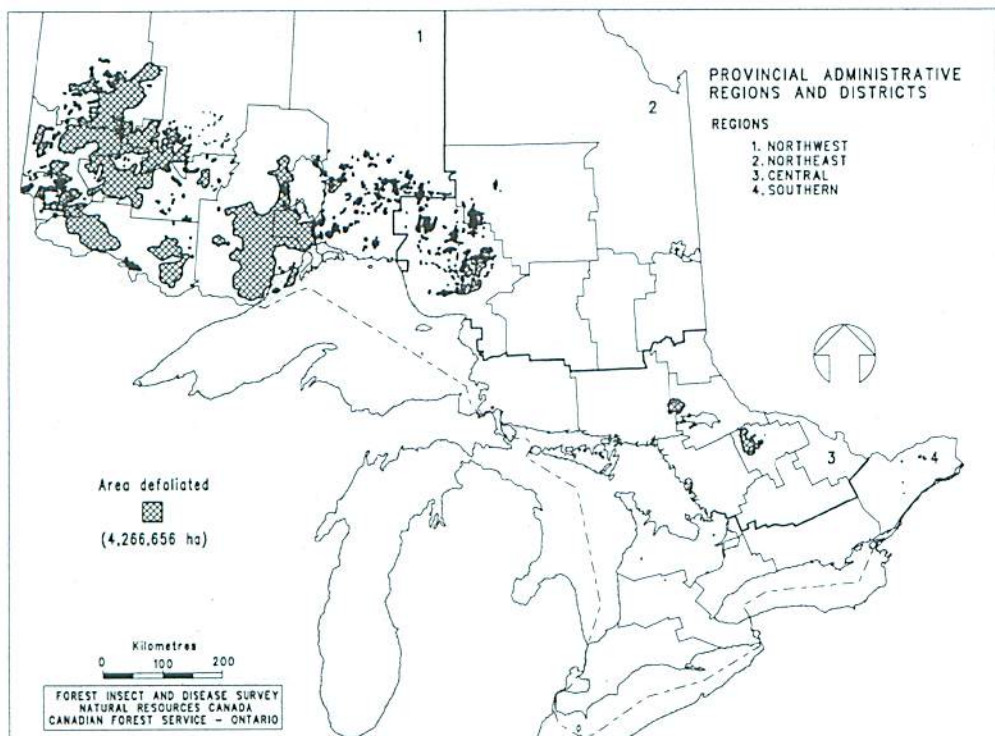


Figure 3. Areas of moderate to severe defoliation caused by the eastern spruce budworm (*Choristoneura fumiferana* [Clem.]) in 1994.

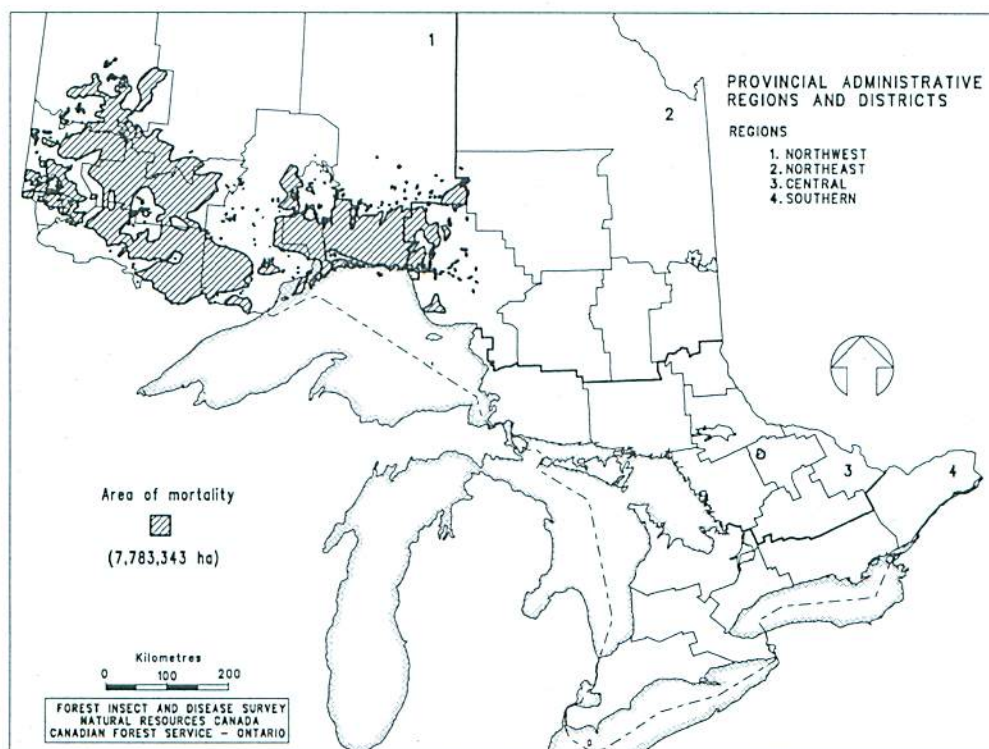


Figure 4. Areas within which the eastern spruce budworm (*Choristoneura fumiferana* [Clem.]) caused whole-tree and top mortality in balsam fir in 1994.

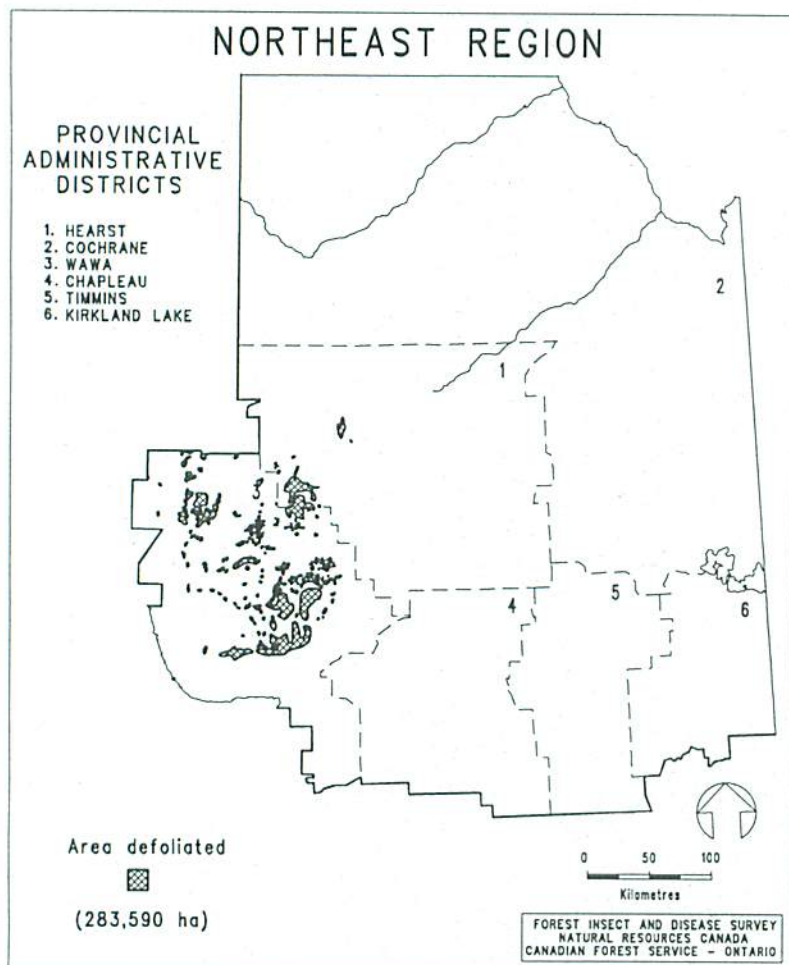


Figure 5. Areas of moderate to severe defoliation caused by the eastern spruce budworm (*Choristoneura fumiferana* [Clem.]) in 1994.

second was situated north of the town of Calstock in Rogers Township. Numerous small pockets of damaged trees were scattered between all of the aforementioned areas.

Across the Northeast Region, an additional 53,086 ha of new budworm induced mortality brought the regional total to 418,266 ha. Currently, all of the documented tree mortality in the region lies east of Highway 631, and is situated southwest and northwest of the town of Hornepayne. In many areas, the level of balsam fir mortality is quite high. Associated tree mortality of balsam fir at two Northern Ontario Development Agreement (NODA) study plots in Leslie Township, Wawa District, was 67 and 100%, respectively.

During 1994 egg-mass sampling was conducted at 122 locations across the region (Table 3). Forecast results indicate similar or reduced infestation levels in 1995. Only small increases are forecast in Franz and Frost townships in the Hearst District. Similar increases are also expected in Dumas Township and south of the town of Caramat in the Wawa District.

The pheromone trapping program was expanded to 70 locations in 1994. Results of this program are listed in Table 4.

Light traps were operated at the Chapleau Nursery in the Chapleau District and at Remi Lake near Kapuskasing in the Hearst District. Low numbers of eastern spruce budworm moths were recorded at both locations for the fourth consecutive year.

Table 2. Gross area of moderate to severe defoliation caused by the eastern spruce budworm in the Northeast Region of Ontario in 1993 and 1994.

District	Area of moderate to severe defoliation (ha)		
	1993	1994	Change in ha
Hearst	268,208	42,245	-225,963
Moosonee	11,647	0	-11,647
Wawa	1,370,822	241,335	-1,129,487
Total	1,650,677	283,580	-1,367,097

Table 3. Northeast Region – Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1994, and infestation forecasts for 1995.

Location	Host ^a	Estimated defoliation in 1994 (%)	Number of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1995 ^b	Accumulated damage ^c
<i>Chapleau District (17 locations)</i>					
*Birch Township	bF	0	0	N	0
	wS	0	0	N	0
*Blamey Township	bF	0	0	N	0
*Dupuis Township	bF	0	0	N	0
*Fawn Township	bF	0	0	N	0
	wS	0	0	N	0
Hall Township	bF	2	23	L-M	0
*Ivanhoe Township	bF	0	0	N	0
Lloyd Township	wS	0	0	N	0
*Neelands Township	bF	0	0	N	0
*Peters Township	bF	0	0	N	0
	wS	0	0	N	0
*Racine Township	bF	0	0	N	0
*Sandy Township	bF	0	0	N	0
	wS	0	0	N	0
*Shipley Township	bF	0	0	N	0
	wS	0	0	N	0
<i>Cochrane District (10 locations)</i>					
*Dempsey Township	bF	0	0	N	0
*Freele Township	bF	0	6	L	0
*Homuth Township	bF	0	0	N	0
*Laughton Township	bF	0	0	N	0
	wS	0	0	N	0
*Nesbitt Township	bF	0	0	N	0
	wS	0	0	N	0
*Potter Township – Stand 2365	bF	0	0	N	0
*Potter Township – Stand 9186	bF	0	0	N	0
	wS	0	0	N	0
<i>Hearst District (45 locations)</i>					
Burrell Township	bF	18	34	L-M	2
Cumming Township	wS	0	7	L	0
*Ford Township	bF	0	0	N	0
*Franz Township	bF	8	74	M	0
*Frost Township	bF	94	204	S	3
	wS	82	1,428	S	3
*Fushimi Township	bF	6	0	N	1
	wS	4	0	N	1
*Fushimi Provincial Park	bF	15	32	L-M	1
*Fushimi Provincial Park	wS	7	0	N	1
*Hanlan Township	bF	6	0	N	0
	wS	11	0	N	0
Kohler Township	bF	9	31	L-M	3
*Landry Township	bF	2	0	N	1
	wS	4	0	N	1
McFarlan Township	bF	0	20	L-M	1
*McMillan Township	bF	42	0	N	2
	wS	32	64	M	2

(cont'd)

Table 3. Northeast Region – Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1994, and infestation forecasts for 1995. (cont'd)

Location	Host ^a	Estimated defoliation in 1994 (%)	Number of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1995 ^b	Accumulated damage ^c
<i>Hearst District (concl.) (45 locations)</i>					
*Neely Township – Stand 1156	bF	0	0	N	0
	wS	0	8	L	0
*Orkney Township	bF	1	0	N	0
	wS	2	0	N	0
*Oscar Township	bF	0	0	N	0
	wS	0	0	N	0
*Pearce Township – Stand 4542	bF	0	0	N	0
	wS	0	0	N	0
*Pearce Township – Stand 5461	bF	0	0	N	0
	wS	0	0	N	0
*Ritchie Township	bF	3	0	N	1
	wS	2	0	N	1
*Rogers Township – Stand 4306	bF	55	509	S	2
	bS	26	461	S	2
*Seaton Township	bF	0	0	N	0
	wS	0	0	N	0
*Shearer Township – Stand 5391	bF	1	0	N	0
	wS	1	0	N	0
*Staunton Township – Stand 45	bF	3	0	N	1
	wS	2	0	N	1
Studholme Township	wS	3	42	L-M	1
*Teetzel Township – Stand 2335	bF	0	0	N	0
	wS	0	0	N	0
*Templeton Township – Stand 93	bF	2	0	N	0
	wS	0	0	N	0
*Township 238 – Stand 4594	wS	0	0	N	0
*Township 238 – Stand 4843	bF	4	8	L	1
<i>Kirkland Lake District (9 locations)</i>					
*Arnold Township	bF	0	0	N	0
Bannockburn Township	bF	2	0	N	0
*Elliot Township	bF	0	0	N	0
*Lamplugh Township	bF	0	0	N	0
*Maisonville Township	bF	0	0	N	0
*Mickle Township	bF	1	0	N	0
*Pacaud Township	bF	0	0	N	0
	wS	0	0	N	0
*Tyrrell Township	bF	0	0	N	0
<i>Timmins District (16 locations)</i>					
*Doyle Township	bF	0	0	N	0
	wS	0	0	N	0
*Edinburgh Township	bF	0	0	N	0
*Eldorado Township	bF	0	0	N	0
*Enid Township	bF	0	0	N	0
	wS	0	0	N	0
Garibaldi Township	bF	0	0	N	0
*Hazen Township	bF	0	0	N	0

(cont'd)

Table 3. Northeast Region – Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1994, and infestation forecasts for 1995. (concl.)

Location	Host ^a	Estimated defoliation in 1994 (%)	Number of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1995 ^b	Accumulated damage ^c
<i>Timmings District (concl.) (16 locations)</i>					
*Invergarry Township	bF	0	12	L	0
*Marquette Township	bF	0	0	N	0
*Massey Township	bF	0	0	N	0
*Noble Township	bF	0	0	N	0
*Sewell Township	bF	1	0	N	0
	wS	0	0	N	0
*St. Louis Township	bF	0	0	N	0
	wS	0	0	N	0
<i>Wawa District (25 locations)</i>					
Bayfield Township	bF	6	56	M	2
Breckenridge Township	wS	60	479	S	2
Dambrossio Township	bF	58	206	M-S	3
Derry Township	bF	2	24	L-M	2
*Dumas Township	bF	69	165	M-S	2
	wS	72	440	S	2
Esquega Township	bF	0	0	N	0
Foch Township	bF	31	155	M-S	2
Gowan Lake	bF	13	65	M	8
*Hunt Township	wS	20	0	N	1
Industrial Road – south of Caramat	bF	74	456	S	2
Industrial Road – Camp 15	bF	17	18	L-M	1
*Laberge Township	bF	51	240	M-S	2
*Lalibert Township	bF	3	0	N	0
*Leslie Township – Stand 266	bF	18	48	L-M	3
	wS	26	96	M-S	2
*Leslie Township – Stand 352	bF	8	0	N	7
Osawin Lake	bF	4	55	M	2
Pearkes Township	bF	81	166	M-S	2
*Wickstead Township – Stand 156	bF	48	249	S	2
	bS	4	105	M-S	2
*Wickstead Township – Stand 521	bF	11	47	L-M	3
	wS	38	45	L-M	3
*Wickstead Township – Stand 552	bF	11	28	L-M	2
	wS	32	110	M-S	2

^a bF = balsam fir, wS = white spruce.

^b S = severe, M = moderate, L = light, N = nil.

^c Accumulated Damage: 0 = undamaged, 1 = light damage, <25% total defoliation, usually one season of severe defoliation; 2 = moderate damage, 25 to 60% total defoliation, two or three seasons of severe defoliation; 3 = severe damage, 60 to 80% total defoliation, three to five seasons of severe defoliation, will recover; 4 = moribund or dying, 80 to 100% total defoliation, crowns gray in appearance, 50–150 cm top dead or bare; 5 = <25% of stand dead; 6 = 25 to 50% of stand dead; 7 = 50 to 70 % of stand dead; 8 = >70% of stand dead; 9 = <25% of stand dead, no significant (0–25%) defoliation for several years; + = 25 to 50% of stand dead, no significant defoliation for several years; – = 51 to 50% of stand dead, no significant defoliation for several years.

* SBW NODA Impact Plot.

Table 4. Captures of male eastern spruce budworm moths in pheromone traps across eight districts of the Northeast Region of Ontario, 1991–1994. (Three traps were located at each location.)

Location (Township)	Total number of moths captured			
	1991	1992	1993	1994
<i>Chapleau District</i>				
Abney	— ^a	—	780	735
Barclay	—	581 ^b	332	520
Birch	—	—	—	188
Echum	—	—	—	1,025
Genier	—	271 ^b	106	201
Hall	—	—	—	1,010
Ivanhoe	—	709	847	38
Lloyd	—	469	40	54
Neelands	—	1,069	85	194
Noble	—	—	—	71
Peters	109	704 ^b	279	273
Racine	—	330	0	102
Sandy	—	—	34	171
<i>Cochrane District</i>				
Fournier	—	1,084	206	101
Laughton	—	1,021	112	88
Marathon	—	285	45	112
Nesbitt	—	1,533	165	61
<i>Hearst District</i>				
Arnott	—	961 ^b	1,088	517
Cumming	—	833 ^b	538	245
Ford	—	—	—	25
Franz	—	—	—	919
Frost	2,906	2,999	2,555	2,549
Kohler	—	4,486	959	593
Landry	—	1,322 ^b	395	560
McMillan	—	—	—	1,106
Oscar	—	—	—	361
Pearce	—	—	—	72
Ritchie	—	—	—	193
Rogers	—	—	—	1,976
Seaton	—	—	—	72
Staunton	—	1,867	187	105
<i>Kirkland Lake District</i>				
Bannockburn	—	79	22	25
Dack	—	334	208	73
Lamplugh	—	321	55	50
Maisonville	301	229	60	98
Mickle	—	345	147	143
Pacaud	247	260	101	91
Tyrrell	—	502	190	257

(cont'd)

Table 4. Captures of male eastern spruce budworm moths in pheromone traps across eight districts of the Northeast Region of Ontario, 1991–1994. (Three traps were located at each location.) (concl.)

Location (Township)	Total number of moths captured			
	1991	1992	1993	1994
<i>Timmins District</i>				
Doyle	–	–	–	118
Edinburgh	–	637	246	156
Eldorado	–	370	93	77
Enid	–	712	146	170
Garibaldi	–	518	74	82
Kelvin	–	–	174	118
Marquette	–	–	–	134
Sewell	–	702	89	102
Silk	–	–	130	68
Thomas	–	580	105	122
<i>Wawa District</i>				
Barbara Lake	–	6,140	3,275	2,437
Breckenridge	–	1,728	2,912	2,893
Camp 15 Road Junction	–	–	–	444
Cecile	–	4,467	2,893	674
Dahl	–	4,738	2,291	1,885
Dambrossio	2,414	8,529	4,002	2,704
Esquega	–	544	208	981
Lalibert	781	3,260	1,470	543
Leslie	–	–	–	521
Lipton	–	1,474 ^b	585	882
Maness	–	326	307	185
Mikano	–	7,210	1,656 ^b	641
Nickle	–	3,930	910	281
Ossawin Lake	–	–	–	265
Pearkes	–	5,880	1,495	3,189
Stevens	–	3,551 ^b	1,162	907
Tedder	–	3,959	650	2,855
Wickstead	1,699 ^b	3,239	507 ^c	756

^a Data unavailable.

^b One trap destroyed.

^c Two traps destroyed.

Jack Pine Budworm, *Choristoneura p. pinus* Free.

Provincial Situation

Provincewide, the total area of moderate to severe defoliation attributed to the jack pine budworm increased 48% over the summer of 1993 to include a total area of 419,344 ha in 1994.

The majority of the increase occurred in the Central Region, primarily throughout the Sudbury, Parry Sound, and North Bay districts. Smaller infestations were documented in the Pembroke, Sault Ste. Marie, and Temagami districts (Fig. 6).

Northeast Region

In the Timmins District, a single infestation, totaling 2,120 ha, was noted in the northeast corner of Westbrook Township on 17-m-tall trees. Further south in the same district, aerial surveys revealed 1,300 ha of similar damage in portions of Breadner and Battersby townships (Fig. 7). This damage also extended into the Timmins District as the northernmost point of a Sudbury District infestation. Elsewhere in the region, low budworm numbers were en-

countered in Cane, Corkill, and Mickle townships, Kirkland Lake District. One or more years of severe defoliation, as shown in Figure 8, can cause top or tree mortality.

Egg-mass samples collected at 25 locations across the region indicate that light defoliation can be expected in Bazett Township in the Chapleau District in 1995. High larval numbers and damage are forecast for three areas in the Timmins District (Table 5).

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

A total of 22 jack pine plantations were surveyed for shoot damage (Fig. 9) across four districts. Shoot borer populations were low at virtually all locations examined. The results of the 1994 surveys are summarized in Table 6.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Provincial Situation

In 1994, the forest tent caterpillar population continued to decline in Ontario. The total area of moderate to severe defoliation was recorded at 166,060 ha, down from the

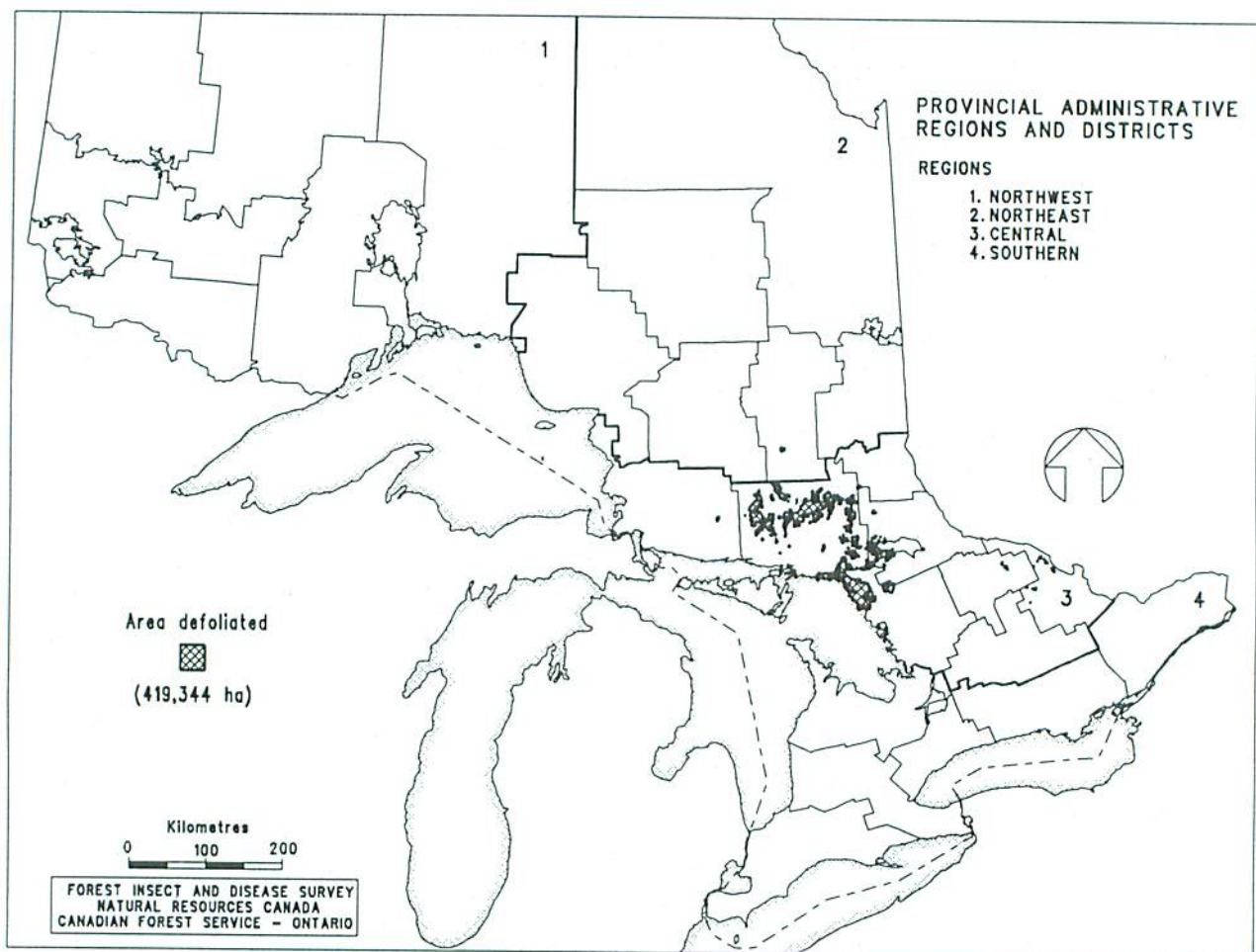


Figure 6. Areas of moderate to severe defoliation caused by the jack pine budworm (*Choristoneura pinus pinus* Free.) in 1994.

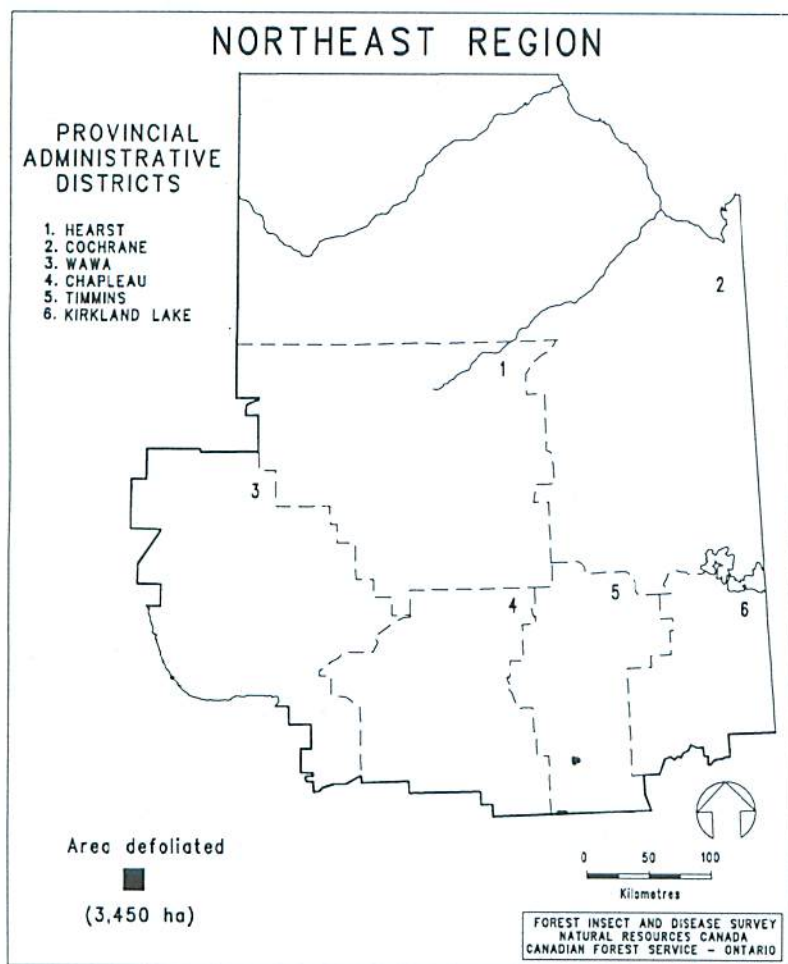


Figure 7. Areas of moderate to severe defoliation caused by the jack pine budworm (*Choristoneura pinus pinus* Free.) in 1994.

532,907 ha reported in 1993. All of the 1994 infestation was confined to the Hearst and Cochrane districts in the Northeast Region. Damage in these districts totaled 49,340 ha and 116,720 ha, respectively (Table 7). Infestations noted in 1993 in the Sudbury, North Bay, and Bancroft districts of the Central Region, as well as those in the Kemptville and Tweed districts of the Southern Region, experienced a total collapse.

Northeast Region

The 1994 forest tent caterpillar infestation straddled the Hearst and Cochrane district boundaries (Fig. 10). The western boundary (in the Hearst District) lies just east of the town of Moonbeam and forms a line between Machin Township in the north to Stringer Township in the south. From there the medium to heavy damage was mapped eastward across the aforementioned district boundary to a line between Colquhoun and Nansen townships. A second, smaller pocket of defoliated trembling aspen (*Populus tremuloides* Michx.) was mapped in Lamarche, Hanna, and St. John townships immediately south of the town of Cochrane. Finally, a small patch of damage was documented in Brower Township southeast of Cochrane. A limited number of egg-band counts taken throughout the infested areas indicate a continued decline in populations for 1995.



Figure 8. Severe crown defoliation of jack pine (*Pinus banksiana* Lamb.) caused by the jack pine budworm (*Choristoneura pinus pinus* Free.).



Figure 9. A young jack pine (*Pinus banksiana* Lamb.) damaged by the eastern pine shoot borer (*Eucosma gloriola* Heinr.).

Table 5. Northeast Region – Jack Pine Budworm: Summary of defoliation estimates and egg-mass counts in 1994 and infestation forecasts for 1995.

Location (Township)	Estimated defoliation in 1994 (%)	Total number of egg masses on six 61-cm branch tips	Infestation forecasts for 1995 ^a
<i>Chapleau District</i> (15 locations)			
*Bazett	0	1	L
*Deans – Stand 103	0	0	N
*Dupuis	0	0	N
*Edith	0	0	N
*Fawn – Stand 157	0	0	N
+*Fawn – Stand 177	0	0	N
+*Fawn – Hong Kong Road	0	0	N
*Fingal	0	0	N
*Hall – Stand 340	0	0	N
*Ivy – Stand 65	0	0	N
*Ivy – Stand 311	0	0	N
+*Kaplan – Stand 345	0	0	N
+*Kaplan – Stand 458	0	0	N
*Nimitz – Stand 149	0	0	N
*Osway	0	0	N
<i>Timmins District</i> (10 locations)			
*Invergarry – Stand 90	0	0	N
+*Invergarry – Stand 121	0	0	N
*Macmurchy – Stand 2389	0	0	N
*Paudash – Stand 298	0	0	N
*Stetham – Stand 211	0	0	N
*Vrooman – Stand 95	0	2	L
*Westbrook – Stand 67	1	13	H
*Westbrook – Stand 72	0	2	L
+*Westbrook – Stand 72	0	7	H
+*Westbrook – Stand 98	2	12	H

^a N = nil, L = light, M = moderate, H = heavy.

* JPBW NODA PLOT.

+ Immature jack pine stand.

Crown dieback and mortality of trembling aspen, the result of successive years of moderate to severe defoliation, perhaps combined with other factors such as drought, were mapped over 54,080 ha in the Wawa District (Fig. 11). A large area of such decline was recorded south of White Lake, in areas that had experienced up to 6 years of medium to heavy infestation. A 50-tree assessment at one location in this area disclosed that 24% of the trembling aspen were dead. Crown dieback averaged 28% on the remaining trees. Wood borers and *Armillaria* root rot were found in association with the dead trees. In the Hearst and Cochrane districts crown dieback was observed in numerous stands of trembling aspen previously infested by high numbers of forest tent caterpillar.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.)

High populations of the yellowheaded spruce sawfly and accompanying moderate to severe defoliation of open-growing roadside, ornamental, and plantation spruce (*Picea* spp.) were reported at a number of locations in the region.

Moderate to severe current defoliation of up to 95% of 2.0-m roadside white spruce was noted in Sewell, Stock, Thornloe, Tisdale, and Whitney townships, Timmins District. Associated tree mortality was recorded in Thornloe Township. Elsewhere in the region, black spruce family test sites in Denton and Egan townships and a seed orchard in Evelyn Township were evaluated. Damage was negligible except at the Evelyn Township location. Here, defoliation ranged from 5–20%, but averaged 10% overall on 4% of the 0.9-m black spruce.

Similar damage levels were found in the Kirkland Lake District, where 60 to 100% current defol-

iation of 2- to 4-m roadside white spruce was recorded in Arnold, Barber, Cane, Catharine, Gauthier, Harley, Lebel, McGarry, and Teck townships. Assessment of 50, open-grown, field white spruce in Barber Township disclosed 76% of the 2-m trees were damaged. Defoliation ranged from 5–100%, but averaged 40%. Surveys in black spruce seed orchards in Chamberlain and Playfair townships and at a family test site in Kimberly Township revealed low sawfly numbers at the Chamberlain Township location. Although up to 15% individual tree defoliation occurred; overall, 9% of the 1.9-m trees experienced an average of 6% foliar loss.

Table 6. Damage caused by the eastern pine shoot borer at 22 locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected jack pine trees at each location.)

Location (Township)	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Trees affected (%)	Leaders attacked (%)
<i>Chapleau District</i>					
Dalmas	2.9	1,585	33	0.0	0.0
Hutcheon	4.9	2,200	14	0.6	0.0
McNaught	2.0	2,450	12	0.6	0.0
Nimitz	4.3	600	5	0.0	0.0
Reaney	2.1	2,350	3	2.0	1.3
Triquet	3.0	2,500	10	0.0	0.0
<i>Kirkland Lake District</i>					
Flavelle	2.6	3,300	2	2.7	1.3
Mickle	2.0	7,100	5	2.7	2.7
Pontiac	2.4	3,125	50	4.7	4.7
Tyrrell	2.0	2,500	25	7.3	7.3
<i>Timmins District</i>					
Battersby	2.8	2,475	24	1.2	0.0
Denton	2.1	3,300	2	2.0	2.0
Invergarry	2.7	2,400	5	0.6	0.6
Londonderry	4.2	2,350	11	0.0	0.0
Macklem	3.7	3,300	4	2.0	2.0
Macmurchy	1.7	2,400	16	0.0	0.0
<i>Wawa District</i>					
Chabanel	1.7	2,000	10	0.0	0.0
Chenard ^a	3.9	1,800	4	0.7	0.7
Finan ^b	2.9	2,500	8	1.3	1.3
Noganosh	1.4	3,500	10	4.0	4.0
Stoney	1.6	3,300	20	0.7	0.7
Vasiloff	4.0	1,500	5	0.0	0.0

^a Seed Orchard.

^b Family Test.

Table 7. Gross area of moderate to severe defoliation by the forest tent caterpillar in the Northeast Region of Ontario from 1991 to 1994.

District	Area of moderate to severe defoliation (ha)			
	1991	1992	1993	1994
Chapleau	0	0	1,520	0
Cochrane	0	541,507	141,389	116,720
Hearst	1,902,728	3,103,653	358,541	49,340
Moosonee	90,015	92,092	0	0
Timmins	495	0	0	0
Wawa	1,428,838	1,742,229	31,457	0
Total	3,422,076	5,479,481	532,907	166,060

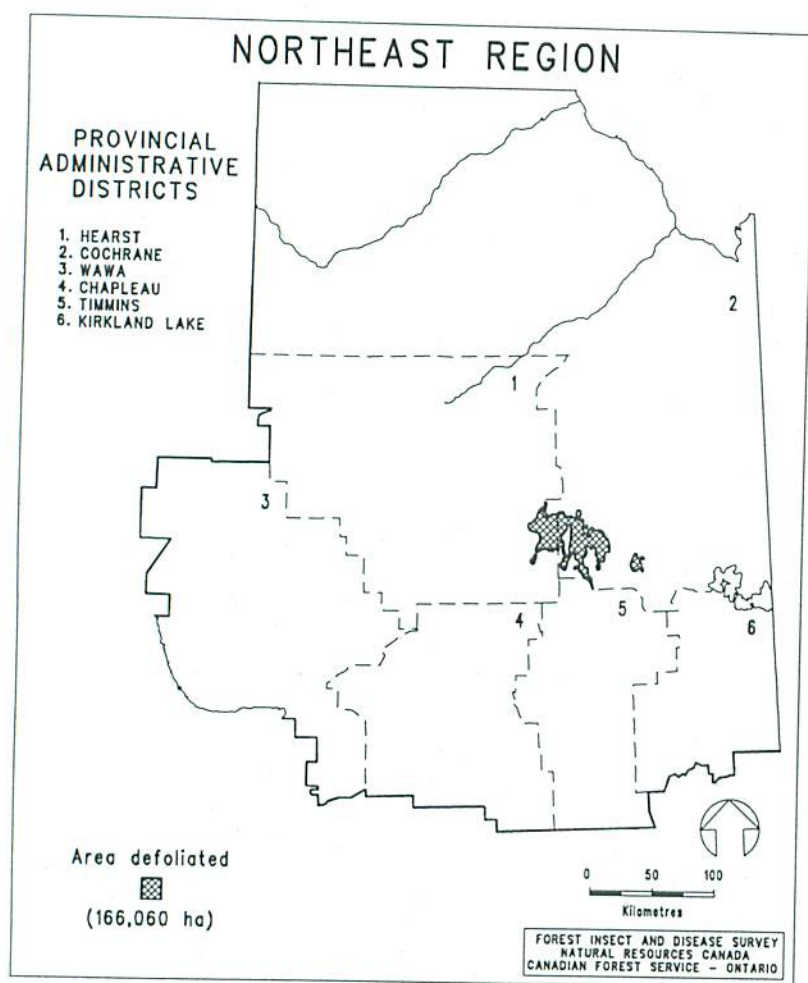


Figure 10. Areas of moderate to severe defoliation caused by the forest tent caterpillar (*Malacosoma disstria* Hbn.) in 1994.

High populations were also noted in Lendrum Township, Wawa District. These caused 60% current defoliation to forty 1-m roadside black spruce. Light damage to ornamental spruce was common in the town of Wawa.

A single location of moderate damage occurred in Franz Township, Hearst District, where defoliation averaged 60% to a number of 2-m roadside white spruce. Low sawfly numbers were detected in a black spruce family test site in Teeffy Township, Cochrane District. Defoliation averaged 6% on 5% of the 0.9-m trees.

White Pine Weevil, *Pissodes strobi* (Peck)

The white pine weevil is a perennial problem of conifer plantations in the Northeast Region (Fig. 12). In 1994, damage assessments were conducted in areas of jack pine or black spruce at 38 locations. A number of these sites were high value seed orchards or family test sites (Table 8). Damage encountered on the survey plots

ranged as high as 11.3%. A comparison by tree species indicated that the average incidence of damaged leaders was slightly higher in the areas of black spruce (3.4%) than in the jack pine (2.7%).

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.)

Moderate defoliation, as high as 60%, of American mountain-ash (*Sorbus americana* Marsh.) by the mountain-ash sawfly was observed throughout the occurrence of 1.5- to 4-m host in the Kirkland Lake and Timmins districts. Damage was observed at a number of locations including Denton, Doyle, Enid, and Massey townships, Timmins District and Alma, Cairo, Dack, and Mickle townships, Kirkland Lake District. Somewhat lower levels of defoliation, up to 20%, were encountered in the Cochrane District. Elsewhere in the region the pest was absent or occurred in low numbers.

Early Aspen Leafcurler, *Pseudexentera oregonana* (Wlsm.)

The summer of 1994 saw the second year of significant reduction in the total area of forest damaged by early aspen leafcurler. The total area of moderately to severely defoliated trembling aspen fell from 839,840 ha in 1993 to 153,560 ha in 1994. All size classes of trees were affected.

The largest remaining pocket of medium to heavy damage (116,810 ha) was centered roughly on Lillabelle Lake, just north of the town of Cochrane. From its western edge in the Greenwater Provincial Park, this infestation ran as far north as Marven Township and as far east and south as Kennedy and Mann townships, respectively (Fig. 13). Smaller infestations straddled the Cochrane, Timmins, and Kirkland Lake district borders near the towns of Monteith and Val Gagne. Infestations were also noted on the eastern shores of Lake Abitibi.

The large areas of moderate to severe defoliation previously recorded in the Kirkland Lake and Timmins districts collapsed or were reduced to small pockets of damage. Damage was confined mainly to fringe trees,

poorly stocked stands, or areas of aspen regeneration. In the Kirkland Lake District, 950 ha of small remnant pockets occurred in Chamberlain, Dack, and Evan-turel townships. Similar damage levels affected over 17,000 ha of aspen in the Timmins District, along Highway 101 from Highway 144 east to Night Hawk Centre, north of the city of Timmins, in the Night Hawk Lake area. In the southern part of the district more than 20 pockets of damage were identified.

The remainder of the defoliation documented, over 10,000 ha, was comprised of numerous small pockets centered on the Biscotasi Lake area in the southern portion of the Chapleau District.

Minor Insects

Red Pine Cone Beetle, *Conophthorus resinosae* Hopk.

Detection of this tip beetle in seven of the 25 areas of young jack pine (5 m or less in height) surveyed, reflected the continued low numbers encountered in most parts of the region. Two exceptions were the family test sites in McEwing and Stoddart townships, Hearst District. Here, 33.3 and 21.3%, respectively, of the trees were infested. At all locations damage was confined to an average of one or two laterals per tree (Table 9).

Northern Pitch Nodule Moth, *Petrova albicapitana* (Bsk.)

A limited number of surveys for this pest of jack pine revealed incidence levels from 0.7 to 7.3%. Generally, populations were confined to trees 3 m or less in height and trace damage levels were noted on lateral branches only. Damage to the main stem was noted at a single location in Tyrrell Township, Kirkland Lake District, where 2% of all the trees examined hosted one nodule or more per tree.

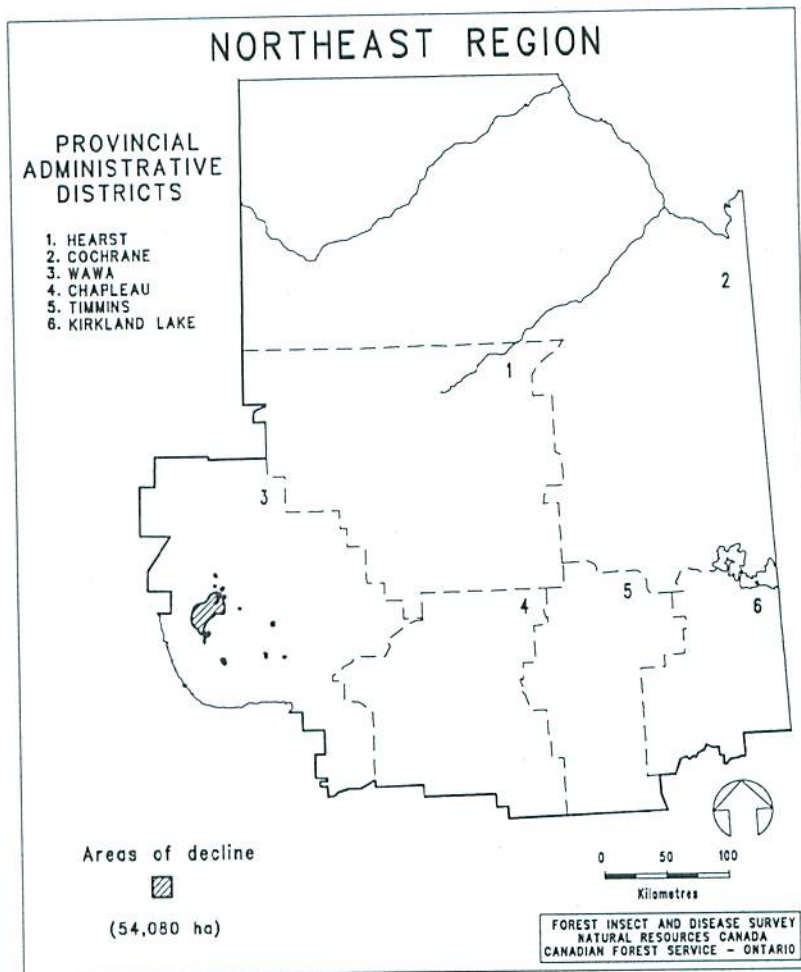


Figure 11. Areas within which decline of trembling aspen (*Populus tremuloides* Michx.) occurred in 1994.



Figure 12. A young jack pine (*Pinus banksiana* Lamb.) damaged by the white pine weevil (*Pissodes strobi* [Peck]).

Table 8. Damage caused by the white pine weevil at 38 locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected trees at each location.)

Location (Township)	Tree species ^a	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Trees affected (%)
<i>Chapleau District</i>					
Dalmas	jP	2.9	1,585	33	5.3
Dalmas ^b	bS	1.4	2,450	34	9.3
Hutcheon	jP	4.9	2,200	14	0.0 ^c
McNaught	jP	2.0	2,450	12	5.3
Nimitz	jP	4.3	600	5	9.3
Reany	jP	2.1	2,350	3	4.0
Triquet	jP	3.0	2,500	10	8.7
<i>Cochrane District</i>					
Kennedy	bS	1.4	2,000	10	2.0
Kennedy	bS	1.4	2,000	10	2.7
Kennedy	bS	1.4	2,000	10	2.7
Teefy ^d	bS	0.9	2,000	15	0.7
<i>Hearst District</i>					
Fintry	bS	1.8	2,000	100	0.7
Fushimi	bS	2.3	2,200	100	1.3
Hopkins	bS	2.0	2,500	100	0.0 ^c
McEwing ^d	jP	3.8	2,500	10	0.7
Nansen	bS	1.7	1,800	100	2.7
Stoddart ^d	jP	4.2	2,500	5	0.0 ^c
<i>Kirkland Lake District</i>					
Chamberlain ^c	jP	5.0	2,950	5	2.0
Chamberlain ^c	bS	1.9	2,500	13	0.0 ^c
Flavelle ^d	jP	2.6	3,300	2	1.3
Kimberly ^d	bS	1.2	3,840	5	7.3
Mickle	jP	2.0	7,100	5	1.3
Ossian ^d	jP	2.5	3,300	5	0.7
Playfair ^c	bS	0.9	3,125	7	2.0
Pontiac	jP	2.4	3,125	50	2.0
Tyrrell	jP	2.0	2,500	25	4.0
<i>Timmins District</i>					
Denton ^d	jP	2.1	3,300	2	3.3
Denton ^d	bS	1.2	3,125	7	11.3
Egan ^d	bS	1.0	3,100	7	8.7
Evelyn ^c	bS	0.9	3,125	12	0.0 ^c
Evelyn ^d	jP	1.9	3,300	5	0.0 ^c
Macklem ^d	jP	3.7	3,300	4	0.7
<i>Wawa District</i>					
Chabanel	jP	1.7	2,000	10	0.7
Chenard ^c	jP	3.9	1,800	4	0.0 ^c
Finan ^d	jP	2.9	2,500	8	1.3
Noganosh	jP	1.4	3,500	10	0.7
Stoney	jP	1.6	3,300	20	0.7
Vasiloff	jP	4.0	1,200	10	1.3

^a bS = black spruce, jP = jack pine.

^b Tree improvement area.

^c White pine weevil damage observed off plots.

^d Family test.

^e Seed orchard.

Table 9. Damage caused by the red pine cone beetle at seven locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected jack pine trees at each location.)

Location (Township)	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Laterals affected (%)	Terminals affected (%)
<i>Hearst District</i>					
McEwing ^a	3.8	2,500	10	33.3	0.0
Stoddart ^a	4.2	2,500	5	21.3	0.0
<i>Kirkland Lake District</i>					
Chamberlain ^b	5.0	2,950	5	3.3	0.0
Ossian ^a	2.5	3,300	2	2.7	0.0
<i>Timmins District</i>					
Denton ^a	2.1	3,300	2	2.7	0.0
<i>Wawa District</i>					
Lane ^a	3.5			0.0	2.0
Vasiloff	4.0	1,200	10	1.3	0.0

^a Family test.

^b Seed orchard.

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.)

Generally, low numbers of aspen leafblotch miner were encountered in the region in 1994. Areas of moderate to severe foliar damage were recorded, but these were often widespread and discrete. Within the areas affected, trees were often less than 6 m in height, the incidence of affected trees was 90 to 100%, and foliar damage ranged from 25 to 100%.

Areas of high populations were observed south of the town of Chapleau, along Highway 129. Similar populations were found in the western half of the Hearst District and the northern part of the Wawa District. In other parts of the region moderate to severe damage was noted in Flavelle Township, Kirkland Lake District and McEvan and Egan townships, Timmins District.

Other Forest Insects

Various other forest insects were encountered during the course of regular surveys. Information on these is provided in Table 10.

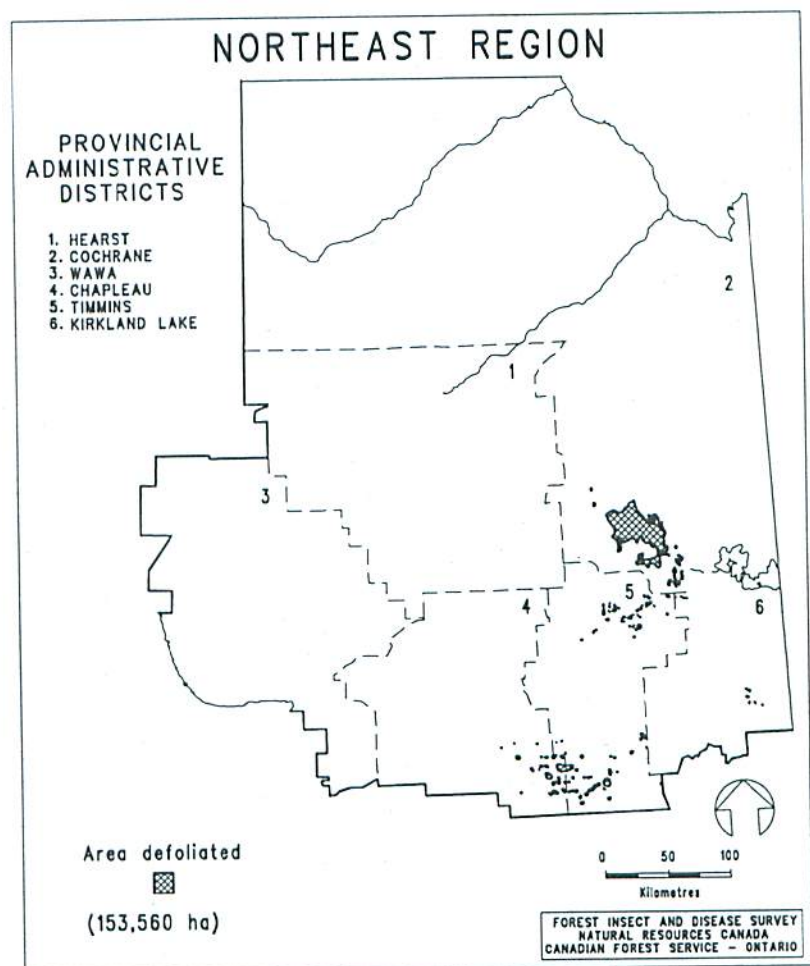


Figure 13. Areas of moderate to severe defoliation caused by the early aspen leafcurler (*Pseudexentera oregonana* [Wlsm.]) in 1994.

Table 10. Other forest insects.

Insect	Host(s) ^a	Remarks
<i>Adelges lariciatus</i> (Patch) Spruce gall adelgid	bS	Low numbers of galls were encountered on 3% of all 1.9-m-tall seed orchard trees examined in Chamberlain Township in the Kirkland Lake District.
<i>Aphrophora cribrata</i> (Wlk.) Pine spittlebug	jP	Trace populations and foliar damage (<1%) was noted on young regeneration (<3 m tall) in both Battersby and McNaught townships in the Chapleau District.
<i>Cephalcia fascipennis</i> (Cress.) Spruce web-spinning sawfly	bS	Trace numbers and levels of damage were documented in 2.3-m-tall trees over a 100-ha plantation in Fushimi Township in the Hearst District.
<i>Datana ministra</i> (Drury) Yellownecked caterpillar	wB	Severe defoliation (80%) was noted on a single 2.5-m-tall tree in Pontiac Township in the Kirkland Lake District.
<i>Hylobius radialis</i> Buch. Pine root collar weevil	jP	A mortality rate of 1% was assessed in 3-m-tall trees across a 1.5-ha family test plot located in Stoddart Township in the Hearst District.
<i>Monchamus</i> spp. Sawyer beetles	jP	Approximately 300, 18-m jack pine were killed along the edge of cutover areas at two locations in Cooper and Mathews townships, Wawa District.
<i>Neodiprion nanulus nanulus</i> Schedl Red pine sawfly	jP rP	Trace defoliation was evident on mature island and shore-line red pine (26 m tall) along Brunswick Lake in Ericson Township in the Hearst District. Similar damage levels were also noted on occasional 3-m-tall jack pine regeneration in Arnold Township in the Kirkland Lake District.
<i>Neodiprion pratti banksianae</i> Roh. Jack pine sawfly	jP	Seed orchard trees (5 m tall) situated in Chamberlain Township in the Kirkland Lake District suffered trace levels (<5%) of defoliation on <1% of all trees examined.
<i>Pristiphora lena</i> Kinc. Little spruce sawfly	wS	Opengrown trees (20 m tall) averaged <5% current defoliation across Chamberlain Township in the Kirkland Lake District.
<i>Rhabdophaga swainei</i> Felt Spruce bud midge	bS	This insect was noted at half of all plantations evaluated, most notably at a single 100-ha plantation in Fintry Township in the Hearst District. Here, 5.3% of all 1.8-m-tall trees suffered significant bud damage.

^a bS = black spruce, jP = jack pine, wB = white birch, wS = white spruce.

TREE DISEASES

Major Diseases

Armillaria Root Rot, *Armillaria ostoyae* (Romagn.) Herink

A total of 40 plantations in the Northeast Region were assessed for the incidence of *Armillaria* root rot. Mortality

of jack pine, black spruce (*Picea mariana* [Mill.] B.S.P.), and eastern white pine (*Pinus strobus* L.) was noted at 23 of these plantations (Table 11). Incidence rates at infected sites averaged 0.7%. Figure 14 shows the lower section of a young jack pine killed by *Armillaria* root rot and the white mycelial fan typical of the fungus.

Table 11. Mortality caused by *Armillaria* root rot at 40 locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected trees at each location.)

Location (Township)	Host ^a	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Current mortality (%)
<i>Chapleau District</i>					
Dalmas	jP	2.9	1,585	33	0.7
Dalmas ^b	bS	1.4	2,450	34	0.0
Hutcheon	jP	4.9	2,200	14	0.0
McNaught	jP	2.0	2,450	12	0.7
Nimitz	jP	4.3	600	5	0.0
Reaney	jP	2.1	2,350	3	0.7
Triquet	jP	3.0	2,500	10	0.0
<i>Cochrane District</i>					
Kennedy	bS	1.4	2,000	10	0.7
Teefy ^c	bS	0.9	2,000	15	1.3
<i>Hearst District</i>					
Fauquier ^d	bS	1.3	2,300	5	0.7
McEwing ^c	jP	3.8	2,500	10	1.3
Nansen	bS	1.9	2,500	10	0.7
Stoddart	bS	1.5	2,500	20	0.7
Tetzzel	jP	3.6	2,500	1.5	1.3
Tetzzel	bS	1.9	2,500	20	1.3
<i>Kirkland Lake District</i>					
Arnold	jP	1.0	2,560	3	0.0 ^e
Chamberlain ^d	bS	1.9	3,125	13	0.0
Flavelle ^c	jP	2.6	3,300	2	0.0 ^e
Kimberly ^c	bS	1.2	3,840	5	2.0
Lawson	jP	2.4	3,850	10	0.7
Mickle	jP	2.0	7,100	5	0.0 ^e
Ossian ^c	jP	2.5	3,300	5	0.0
Playfair ^d	bS	0.9	3,125	7	1.3
Playfair ^d	jP	2.0	4,100	10	0.0
Tyrrell	jP	2.0	2,500	25	0.7
<i>Timmins District</i>					
Battersby	jP	2.8	2,475	24	0.7
Denton ^c	bs	1.2	3,125	7	0.7
Denton ^c	jP	2.1	3,300	2	0.0
Egan ^c	bS	1.0	3,100	7	0.7
Evelyn ^d	bS	0.9	3,125	12	0.0
Evelyn ^c	jP	1.9	3,300	5	0.7
Invergarry	jP	2.7	2,400	5	0.0
Londonderry	jP	4.2	2,350	24	0.0
Macmurchy	jP	1.7	2,400	16	0.7
<i>Wawa District</i>					
Chenard ^d	jP	3.9	1,800	4	0.0
Chubanel	jP	1.7	2,000	10	0.7
Finan ^c	jP	2.9	2,500	8	0.0
Noganosh	jP	1.4	3,500	10	1.3
Stoney	jP	1.6	3,300	20	0.7
Vasiloff	jP	4.0	1,200	10	0.0

^a bS = black spruce, jP = jack pine, wP = white pine.

^b Tree improvement area.

^c Family test.

^d Seed orchard.

^e Mortality observed off plots.



Figure 14. Basal section of a young jack pine (*Pinus banksiana* Lamb.) killed by *Armillaria* root rot (*Armillaria ostoyae* [Romagn.] Herink) and showing typical white mycelial fan.

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary var. *ledi*, *Chrysomyxa ledicola* (Peck) Lagerh.

Light infections of spruce needle rust were found wherever the hosts, white spruce and black spruce, occurred. One notable exception, however, was reported in a 15-ha stand of white spruce and black spruce in Lendrum Township, Wawa District. Here, for the second consecutive year, medium to heavy foliar infections were recorded on the white spruce component. Foliar damage averaged 40% on trees up to 10 m in height.

The results of surveys in a number of black spruce plantations indicated a high incidence of needle rust, up to 100%, but corresponding light foliar damage, in most instances 2% or less (Table 12).

A suspected spruce needle rust parasite, *Fusarium avenaceum*, was found in most of the areas where its host occurred.

Pine Needle Rust, *Coleosporium asterum*, (Dietel) Syd. & P. Syd.

A cool, wet spring in some areas provided ideal conditions for the development of pine needle rust. As indicated

Table 12. Damage caused by the spruce needle rust at 14 locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected black spruce trees at each location.)

Location (Township)	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
<i>Cochrane District</i>					
Kennedy	1.4	2,000	10	100	15
Kennedy	1.4	2,000	10	100	14
Kennedy	1.4	2,000	10	99.3	1
Teefy ^a	0.9	2,000	15	99.3	1
<i>Hearst District</i>					
Fintry	1.8	2,000	100	43.3	1
Fushimi	2.3	2,200	100	65.3	1
Hopkins	2.0	2,500	100	100	2
Nansen	1.7	1,800	100	100	2
<i>Kirkland Lake District</i>					
Chamberlain ^b	1.9	2,500	13	43.3	1
Kimberly ^a	1.2	3,840	5	70	1
Playfair ^b	0.9	3,125	7	80	2
<i>Timmins District</i>					
Denton ^a	1.2	3,125	7	52	1
Egan ^a	1.0	3,100	7	44.7	1
Evelyn ^b	0.9	3,125	12	100	2

^a Family test.

^b Seed orchard.

by the results presented in Table 13, many areas experienced a high incidence of infection (100%) although corresponding foliar damage was generally low.

Commandra Blister Rust, *Cronartium commandrae* Peck

Although surveys were carried out in a number of areas of jack pine regeneration, Commandra blister rust was detected at only two locations, both of which were in the Kirkland Lake District. Branch infections were recorded on 0.7% of the trees in both the Ossian Township jack pine family test site and in the Playfair Township jack pine seed orchard (Table 14). No associated branch mortality was observed at either location.

Sweet Fern Blister Rust, *Cronartium comptoniae* Arthur

Assessments for the sweet fern blister rust canker were conducted at 25 locations of young jack pine. This stem rust was detected on survey plots at two locations and off plots at another, all in the Kirkland Lake District (Table 14). The highest incidence of attack, 5.3%, occurred in a 3-ha plantation of 1.0-m jack pine in Arnold Township. Associated tree mortality averaged 0.7%.

Tar Spot Needle Cast, *Davisomyces ampla* (J. Davis) Darker

Tar spot needle cast, a disease that attacks the old foliage of jack pine, was found at low to moderate levels in

Table 13. Damage caused by the pine needle rust at six locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected jack pine trees at each location.)

Location (Township)	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
<i>Chapleau District</i>					
Nimitz	4.3	600	5	0.7	1
Réaney	2.1	2,350	3	18	1
<i>Hearst District</i>					
Stoddart ^a	3.0	2,500	2	100	15
Teetzel ^a	3.6	2,500	2	100	9
<i>Kirkland Lake District</i>					
Mickle	2.0	7,100	5	28.7	5
Tyrrell	2.0	2,500	25	100	5

^a Family test.

Table 14. Damage caused by the commandra blister rust or sweetfern blister rust at five locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected jack pine trees at each location.)

Location (Township)	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Commandra blister rust	Sweetfern blister rust	
				Trees affected (%)	Trees affected (%)	Mortality (%)
<i>Kirkland Lake District</i>						
Arnold	1.0	2,560	3	0.0	5.3	0.7
Lawson	2.4	3,850	10	0.0	0.0 ^a	0.0
Mickle	2.0	7,100	5	0.0	1.3	0.0
Ossian ^b	2.5	3,300	5	0.7	0.0	0.0
Playfair ^c	2.0	4,100	10	0.7	0.0	0.0

^a Observed off plots.

^b Family test.

^c Seed orchard.

1994 in a number of areas of jack pine regeneration. The incidence of trees affected ranged up to 30%; corresponding foliar damage was as high as 35% (Table 15).

Western Gall Rust, *Endocronartium harknessii*
(J.P. Moore) Y. Hirats.

Results of surveys carried out for the western gall rust at 23 locations within the region show a relatively low incidence of infected trees. The gall rust is capable of girdling a branch or the main stem, thereby killing the part distal to the gall (Fig. 15). In the most noteworthy plantation assessed, a young jack pine stand in Maness Township in the Wawa District, 16.7% of all trees examined had damaging levels of galls. The percentage of damaged trees at infected plantations did not change significantly over the previous summer (3.2% in 1993 versus 3.7% in 1994). Table 16 summarizes the results of all evaluations conducted across the region in 1994.

Scleroderris Canker, *Gremmeniella abietina*
(Lagerb.) M. Morelet

A number of areas of young red pine and jack pine were surveyed for the presence of scleroderris canker. The North American race of this fungus was recovered from three locations.

The disease was found in the jack pine family test site in Evelyn Township, Timmins District. A survey of the 1.9-m trees disclosed a very low incidence (<1%). No associated tree mortality was observed at this location.

This canker-causing disease also infected 0.7% of the 3-m jack pine in a small plantation in the south end of the Swastika Nursery, Kirkland Lake District.

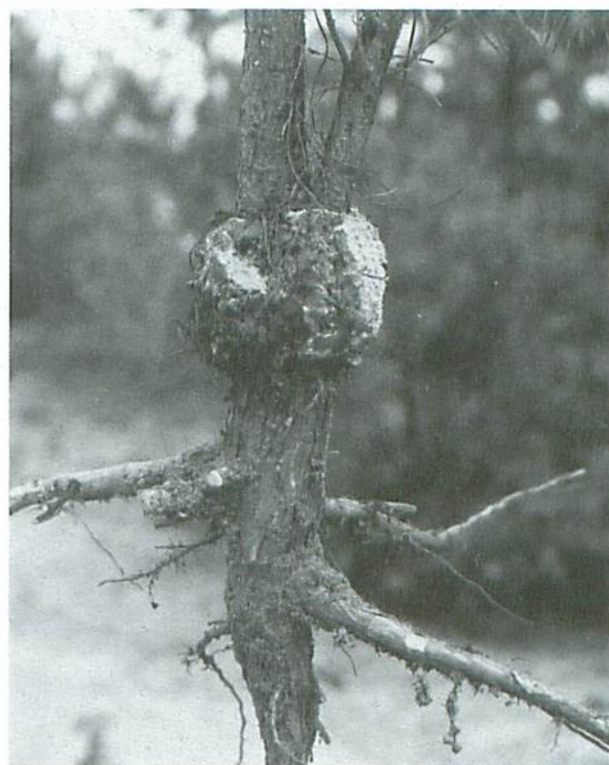


Figure 15. Lower section of a young jack pine (*Pinus banksiana* Lamb.) showing a basal stem attack by the western gall rust (*Endocronartium harknessii* [J.P. Moore] Y. Hirats.).

A survey was carried out in a 9-ha plantation of 2.8-m red pine in Skead Township, Kirkland Lake District, where the disease has been present for a number of years. Here, 22% of the trees were diseased, but no associated tree mortality was observed.

Table 15. Damage caused by the tar spot needle cast at eight locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected jack pine trees at each location.)

Location (Township)	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
<i>Chapleau District</i>					
McNaught	2.0	2,450	12	0.7	1
Nimitz	4.3	600	5	4.6	1
<i>Timmins District</i>					
Denton ^a	2.1	3,300	2	24.7	15
Invergarry	2.7	2,400	5	2.6	1
Londonderry	4.2	2,350	11	2.6	1
<i>Wawa District</i>					
Chenard	3.5	2,500	1	5.0	35
Finan	2.3	2,800	4	30.0	27
Vasiloff	2.7		5	8.7	24

^a Family test.

Minor Diseases

Linospora Leaf Blight, *Linospora tetraspora* G.E. Thoms. and Septoria Leaf Spot, *Mycosphaerella populicola* G.E. Thoms.

Linospora leaf blight and/or Septoria leaf spot caused moderate to severe discoloration and premature leaf drop of all size classes of balsam poplar in the region. The most severe damage, including complete foliar infection, occurred across much of the Hearst and Wawa districts.

Elsewhere, in the Cochrane, Kirkland Lake, and Timmins districts, somewhat lower levels of infection were encountered and up to 60% foliar damage was observed. Affected stands were generally less than 5 ha in size.

Other Forest Diseases

A number of other forest diseases were encountered during the course of regular surveys. Information on these pests is provided in Table 17.

Table 16. Damage caused by the western gall rust at 23 locations in the Northeast Region of Ontario in 1994. (Counts are based on an examination of 150 randomly selected jack pine trees at each location).

Location (Township)	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Trees affected (%)	Trees severely affected (%)
<i>Chapleau</i>					
Dalmas ^a	2.9	1,585	33	0.0	0.0
Hutcheon	4.9	2,200	14	6.6	0.6
McNaught	2.0	2,450	12	4.0	0.0
Nimitz	4.3	600	5	9.3	1.3
Reaney	2.1	2,350	3	0.6	0.6
Triquet	3.0	2,500	10	0.0	0.0
<i>Kirkland Lake</i>					
Chamberlain ^b	5.0	2,950	5	2.0	0.0
Flavelle ^c	2.6	3,300	2	0.7	0.0
Lawson	2.4	3,850	10	0.7	0.7
Mickle	2.0	7,100	5	3.3	1.3
Ossian ^c	2.5	3,300	5	1.3	0.0
Playfair ^b	2.0	—	10	6.7	0.7
Tyrrell	2.0	2,500	25	4.0	1.3
<i>Timmins</i>					
Battersby	2.8	2,475	24	0.0	0.0
Denton ^c	2.1	3,300	2	1.3	0.0
Evelyn ^c	1.9	3,300	5	1.3	0.7
Invergarry	2.7	2,400	5	0.0	0.0
Londonderry	4.2	2,350	11	0.6	0.0
Macklem ^c	3.7	3,300	4	7.3	0.7
Macmurchy	1.7	2,400	16	0.0	0.0
<i>Wawa</i>					
Finan ^c	2.3	2,800	4	0.7	0.7
Maness	2.3	3,100	12	16.7	0.0
Recollet	1.5	2,800	8	4.0	2.0

^a Tree improvement area.

^b Seed orchard.

^c Family test.

Table 17. Other forest diseases.

Disease	Host(s) ^a	Remarks
<i>Cenangium</i> sp. Cenangium canker	mAs	A single incidence of canker induced mortality was observed on an ornamental in the town of Chapleau in the Chapleau District.
<i>Chrysomyxa pirolata</i> G. Winter Spruce cone rust	wS	A total of 26% of all cones collected from a single site in Sewell Township in the Timmins District were infected.
<i>Ciborina whetzelii</i> (Seaver) Seaver Ink spot of aspen	tA	Trace to low levels of foliar damage (6–25%) were noted on scattered trees in Neely and Shearer townships, Hearst District and in Suganaqueb Township, Wawa District.
<i>Cronartium ribicola</i> J.C. Fisch. White pine blister rust	wP	A low incidence (<1%) of this rust was reported in an area of 4-m trees in Deans Township, Chapleau District. A survey disclosed 90% of the 2.5-m trees in a 12-ha area in Suganaqueb Township, Wawa District, were also infected.
<i>Marssonina populi</i> (Lib.) Magnus Poplar Marssonina	bPo	Foliar damage levels, averaging 50%, were routinely noted in 1-ha pockets throughout Hanna Township in the Cochrane District.
Mouse damage	jP	Mice were responsible for severe damage to 25% of the 0.3-m regeneration in Carney Township, Wawa District.
<i>Pucciniastrum epilobii</i> G.H. Outh. Fireweed rust	bF	High levels of foliar damage (76–100%) were documented across the southern half of the Hearst District on young, 2- to 4-m-tall trees.
<i>Rhizosphaera kalkhoffii</i> Bubák Needle blight	wS	Foliar losses averaged 33% on 17% of all 7-m-tall trees surveyed at the Barbara Lake Seed Production Area in the Wawa District.
<i>Venturia macularis</i> (Fr.:Fr.) E. Müll. & Arx	tA	Low damage levels (5%) occurred on 80% of the 2-m-tall regeneration across a 2-ha plantation in Nansen Township in the Hearst District. Trace damage levels (2%) were also noted on 30% of all similar sized trees inspected along Highway 11 in Calder Township in the Cochrane District.

^a bF = balsam fir, bPo = balsam poplar, jP = jack pine, mAs = mountain-ash, tA = trembling aspen, wS = white spruce.

ABIOTIC CONDITIONS

Balsam Fir Mortality

Single-tree mortality of balsam fir has spread noticeably in the last year to encompass the entire Wawa and Hearst districts as well as the northern portion of the Cochrane District.

The highest incidence of dead trees was noted along the major rivers and their tributaries; most notably the Moose, Mattagami, Missinaibi (downstream of Mattice), and the northern portions of the Abitibi.

This mortality could not be attributed to a single causal organism, whether insect, disease, or abiotic in origin.

Jack Pine Mortality

The area of dead and declining jack pine delineated in the northeastern corner of the Wawa District in 1993 continued to host low numbers of new trees with decline symptoms. While cumulative mortality rates on 18-m-tall trees totaled 34% in 1994, the rate of new dead trees is expected to slow in the future and mortality rates should return to normal or insignificant levels.

Wind Damage

On July 17 a severe thunderstorm accompanied by 150 km/hr winds damaged trees in Ingram and Martle townships, Kirkland Lake District. Damage was characterized by single or small groups (up to 7 trees) of trees being snapped off or blown down intact. Trembling aspen, 12–15 m in height, were broken off or bent over in areas of poor stocking or around stand openings. Single and groups of 16- to 18-m jack pine were also snapped off or blown down intact. Typically, 12-m black spruce growing along stand edges were also laid down. Groups of two or three 16-m balsam poplar and 12-m fringe balsam fir were similarly damaged.

FOREST HEALTH

Acid Rain National Early Warning System (ARNEWS)

The eight ARNEWS plots currently located throughout the Northeastern Region were monitored for insect and disease activity, tree abnormalities, or changes in crown

configuration. Analysis of ground vegetation and regeneration was also conducted.

To date, no symptoms attributable to acid rain deposits have been recorded in any of the monitored plots. During the course of the 1994 growing season no significant insect, disease, or abiotic factors were identified at any of the eight locations.

SPECIAL SURVEYS

Gypsy Moth Pheromone Trapping

During 1994, adult captures of the gypsy moth (*Lymantria dispar* [L.]) were at their lowest levels in the last 5 years (Table 18). With the exception of a single moth recovered at the Spanish Chutes crossing in the Missinaibi Wild River Provincial Park, Chapleau District, all other trap results were negative. Hyper-cold temperatures across the Northeast Region last winter undoubtedly accounted for increased mortality levels in the overwintering egg masses.

Table 18. Results of gypsy moth pheromone trapping in the Northeast Region of Ontario from 1990 to 1994.

Location	Number of moths trapped				
	1990	1991	1992	1993	1994
<i>Chapleau District</i>					
Ivanhoe Lake Provincial Park	0	3	6	0	0
Missinaibi Lake Provincial Park	0	0	1	0	0
Missinaibi Wild River Provincial Park	1	0	0	1	1
Shoals Provincial Park	0	0	0	1	0
Wakami Lake Provincial Park	0	0	9	0	0
<i>Cochrane District</i>					
Greenwater Provincial Park	0	0	4	0	0
<i>Hearst District</i>					
Cecil Trailer Park	0	0	0	0	0
Fushimi Lake Provincial Park	0	1	0	0	0
Nagagamisis Provincial Park	0	0	0	0	0
Remi Lake Provincial Park	1	2	1	0	0
<i>Kirkland Lake District</i>					
Esker Lakes Provincial Park	13	3	4	0	0
Kap-Kig-Iwan Provincial Park	14	1	27	0	0
<i>Timmins District</i>					
Dublin Township, Muldrew Lake	—	4	1	1	0
Kettle Lake Provincial Park	2	0	4	0	0
<i>Wawa District</i>					
Obatanga Provincial Park	0	0	2	0	0
White Lake Provincial Park	0	0	0	0	0

Northern Ontario Development Agreement (NODA)

As mentioned previously, with the signing of the Northern Ontario Development Agreement (NODA) in November 1991, the Northern Forestry Program (NFP) was provided with \$50 million over a 4-year period for economic development in forestry in northern Ontario. The NFP is a joint venture between the Ontario Ministry of Natural Resources (OMNR) and the Canadian Forest Service. Emphasis has focused on obtaining information to develop better tools and ultimately result in better decisions in the management of Ontario's forests for economic, social, and environmental prosperity.

Development of an Eastern Spruce Budworm Hazard Rating System for the Forests of Northern Ontario NFP Project No. 4210

The objective of this project is to provide forest managers with a spruce budworm hazard rating index system for rating the vulnerability and susceptibility of different forest stands to spruce budworm attack.

Stand selection for the study plots was based on three stand variables: balsam fir/spruce composition, balsam fir age, and site class. Attempts were made to install study plots in stands with balsam fir/spruce composition from 10 to 30%, 31 to 60%, and over 60% in all the various site classes (X to 4). Balsam fir was broken down into three age groups: 20 to 40 years, 41 to 60 years, and over 60 years. In some cases not all of the parameters could be met.

A total of 66 study plots have been established across the Northeast Region, including 12 established in 1994. Some of the plots were installed within the area currently infested by the eastern spruce budworm, but a number were also put in susceptible stands outside the infested area. Personnel from the OMNR and forest industries played a significant role in helping FIDS Unit staff find suitable stands in which to establish the plots.

The plot network was assessed in 1994 for such variables as defoliation, tree condition, and tree mortality. As well, egg-mass samples were taken. In a large number of plots, pheromone trap results were also tabulated.

Management Guidelines for Jack Pine Budworm NFP Project No. 4033

Objectives for this project are similar to those for the eastern spruce budworm project, i.e., to provide information on jack pine budworm and its impact on the forest. Guidelines will be generated to enable forest managers to predict a number of variables, such as growth loss, top kill, decay, and tree mortality.

The project was initiated in 1992. Areas selected for plot installation were pure or nearly pure stands of jack pine. Site class coverage was from X to 3; age requirements were 1 to 40 years, 41 to 80 years, and over 80 years. When

possible, stands that had been previously infested with jack pine budworm were utilized.

There is a total of 25 plots located in the Chapleau and Timmins districts. All plots were visited in 1994 and assessed for such variables as defoliation, presence and density of flowers, and tree condition. Egg-mass samples and L₂ samples were also collected at each study plot.

In 1994 one study plot, in Westbrook Township, Timmins District, was within the area of moderate to severe defoliation caused by the jack pine budworm. Another two plots were just outside this area.

Swastika Tree Nursery Report

Several visits were made to the Swastika Tree Nursery over the course of the summer. The most common problem in the nursery compartments was a number of root rots, *Cylindrocarpon* spp., *Cylindrocladium scoparium*, *Morgan* spp. and *Fusarium* spp. Singly or together, they were responsible for growth reduction and/or tree mortality to approximately 1% of the black spruce or white spruce host in Compartments B13, D8, D12, and E10. One exception to this level of damage occurred in Compartment H8. Here *Cylindrocarpon* spp. and *Fusarium* spp. were associated with 12% mortality.

Frost damage was present in most compartments of spruce. A survey of black spruce in Compartment J13 revealed that 38% of the trees were affected and had 1 or 2 dead buds per tree. Another abiotic condition, winter drying, caused discoloration of 5% of the white spruce in Compartment B8; however, <1% of the terminal buds were destroyed.

Heavy fruiting attributed to *Kabatina thujae* R. Schneid. & Arx and *Phomopsis juniperovora* G.H. Hahn caused moderate to severe discoloration and associated branch mortality to the 2-m eastern white cedar (*Thuja occidentalis* L.) windbreak along the north side of Compartments D3 and D4.

Porcupine damage was evident in the jack pine archive, where 9% of the 4.5-m trees were partially or completely girdled. This resulted in top mortality to 3% of the trees. Scleroderris canker infected 0.7% of the 3.0-m jack pine in a plantation in the south end of the nursery. Assessment at a jack pine family test, Compartment K15, revealed a low incidence (<1%) of *Armillaria* root rot off the survey plots.

A number of insect pests were recovered from areas outside the compartments. These included low numbers of the spruce gall adelgid *Adelges lariciatus* (Patch), found on the white spruce windbreak on the west side of Compartment D13. Bark beetles, *Pityophthorus* spp., which caused branch mortality to 20% of the 3.0-m jack pine outplanting at the south end of the nursery, were also responsible for branch mortality to 2.7% of the 4.5-m jack pine archive trees.

Assessments carried out in two black spruce family tests, one in Compartment K15 and the other in Compartment K16, disclosed infestation levels of 2.0 and 3.3%, respectively, of the white pine weevil, *Pissodes strobi*.

Climatic Data

Temperature and precipitation can have a profound effect on the development of insect and disease organisms,

and can greatly facilitate or hinder their development from year-to-year. Adverse weather conditions (hail, wind, snow, drought) can also cause abiotic damage to host trees and predispose them to insect or disease attack.

Therefore, current weather data (temperature and precipitation) from representative weather stations across the work area have been included in Table 19. For ease of comparison, 30-year normals and the current deviation from normal figures are also listed.

Table 19. Mean temperatures and total precipitation at three locations in the Northern Region of Ontario in 1994.

Location	Month	Mean temperature (C°)		Deviation from normal (C°)	Total precipitation (mm)		Deviation from normal (mm)
		Normal	Actual		Normal	Actual	
Chapleau Airport	January	-16.9	-23.2	-6.3	46.9	58.7	+11.8
	February	-15.8	-16.2	-0.4	34.5	30.6	-3.9
	March	-8.3	-5.7	-2.6	56.2	77.6	+21.4
	April	0.6	-0.6	-1.0	59.3	63.6	+4.3
	May	8.6	8.7	+0.1	73.8	52.8	-21.0
	June	14.3	16.1	+2.2	100.4	32.8	-67.6
	July	16.8	16.9	+0.1	81.8	141.2	+59.4
	August	15.4	14.8	-0.6	86.2	120.4	+34.2
	September	10.4	12.4	+2.0	101.5	34.0	-67.5
	October	4.9	8.2	+3.3	75.7	47.6	-28.1
	November	-3.5	-1.0	+2.5	64.2	56.4	-7.8
	December	-12.8	-5.1	+7.7	53.5	21.5	-32.0
Earlton Airport	January	-16.3	-24.7	-8.4	56.4	35.7	-20.7
	February	-14.1	-16.7	-2.6	47.2	34.0	-13.2
	March	-7.6	-5.5	+2.1	58.0	33.2	-24.8
	April	1.9	1.2	-0.7	50.0	38.2	-11.8
	May	9.8	9.1	-0.7	61.3	58.0	-3.3
	June	15.2	16.3	+1.1	89.2	87.6	-1.6
	July	17.7	18.0	+0.3	80.8	58.6	-22.2
	August	16.2	15.0	-1.2	83.4	77.6	-5.8
	September	11.1	12.5	+1.4	99.1	78.0	-21.1
	October	5.4	7.0	+1.6	70.0	45.2	-24.8
	November	-2.5	-0.2	+2.3	70.6	58.1	-12.5
	December	-12.6	-6.0	+6.6	65.3	26.8	-38.5
Kapuska- sing Airport	January	-18.6	-26.5	-7.9	53.6	32.8	-20.8
	February	-16.2	-17.7	-1.5	43.0	11.8	-31.2
	March	-9.4	-6.0	-3.4	55.4	30.6	-24.8
	April	0.5	-1.2	-0.7	53.2	85.1	+31.9
	May	8.3	7.9	-0.4	74.3	53.2	-21.1
	June	14.1	15.6	+1.5	84.7	45.6	-39.1
	July	16.8	17.2	+0.4	96.3	201.5	+105.3
	August	15.3	13.6	-1.7	92.5	138.4	+45.9
	September	10.0	11.7	+1.7	94.4	72.0	-22.4
	October	4.4	6.9	+2.5	77.4	45.0	-32.4
	November	-2.4	-1.3	+1.1	80.1	63.7	-16.4
	December	-16.4	-6.6	+9.8	53.3	34.2	-19.1