RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE NORTHEAST REGION OF ONTARIO, 1992

W.A. Ingram, H. Brodersen, B.E. Smith, D.C. Constable and A. Keizer

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SURVEY HIGHLIGHTS

This report documents the insects, diseases and abiotic conditions that were observed across the Northeast Region of Ontario in 1992.

As a result of an Ontario Ministry of Natural Resources (OMNR) administrative re-organization, the former Northern Region has had its district and regional boundaries realigned (see frontispiece); this will be reflected in the regional reporting for the first time this year.

The weather conditions (i.e., cool, moist, cloudy) that persisted throughout the growing season could quite possibly be the worst experienced in at least the last decade. Host, insect and disease development were all about 3 weeks behind normal throughout the field season (May to September). Late-spring frosts and sustained cool conditions led to poor tree growth and prolonged insect and disease activity, complicating work schedules for much of the summer.

Across the northern and western portions of the region, the area of moderate-to-severe defoliation by the forest tent caterpillar increased by approximately 60%, to 5,479,481 ha from the 3,422,076 ha recorded in 1991. Forecasts based on egg-band counts call for widespread continued high population levels in the Hearst and Cochrane areas, whereas insect numbers should decrease in the older infestation areas in Wawa District.

Spruce budworm populations continued to expand throughout the region and the area of moderate-to-severe defoliation aerially mapped in the Wawa, Hearst and Moosonee districts has expanded from 716,956 ha in 1991 to 1,394,960 ha in 1992. Pheromone trapping results as well as egg-mass samples forecast severe defoliation again in the Hearst and Wawa districts, even though egg-mass densities in both areas are down by 33 and 21%, respectively.

Birch skeletonizer populations increased for the third consecutive year across the work area and skeletonizers can now be found at various levels in most large concentrations of birch and in old cutover or burned areas. The total area of moderate-to-severe defoliation increased to 7,131,439 ha from 1,869,940 ha in 1991.

The early aspen leafcurler infestation expanded to cover 1,750,335 ha of moderate-to-severe defoliation across the eastern portion of the region in the Cochrane, Chapleau, Hearst, Kirkland Lake and Timmins districts.

In a continuing effort to monitor forest health, the four ARNEWS plots established in the region in 1985 were re-evaluated. Monitoring of seed orchards and family-test sites was also continued as part of an ongoing check of young coniferous plantations in the region.

Black army cutworm plots were checked in the areas in which moths were caught in burned areas in 1991, and new pheromone trapping was deployed in new burn areas in 1992.

The same format was followed in categorizing forest pests as in the 1991 Northern Region report:

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 that 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, that did not cause serious damage in 1992.

The cooperation and assistance provided by personnel of OMNR, wood-using industries and other agencies, and of many individuals, are gratefully acknowledged.

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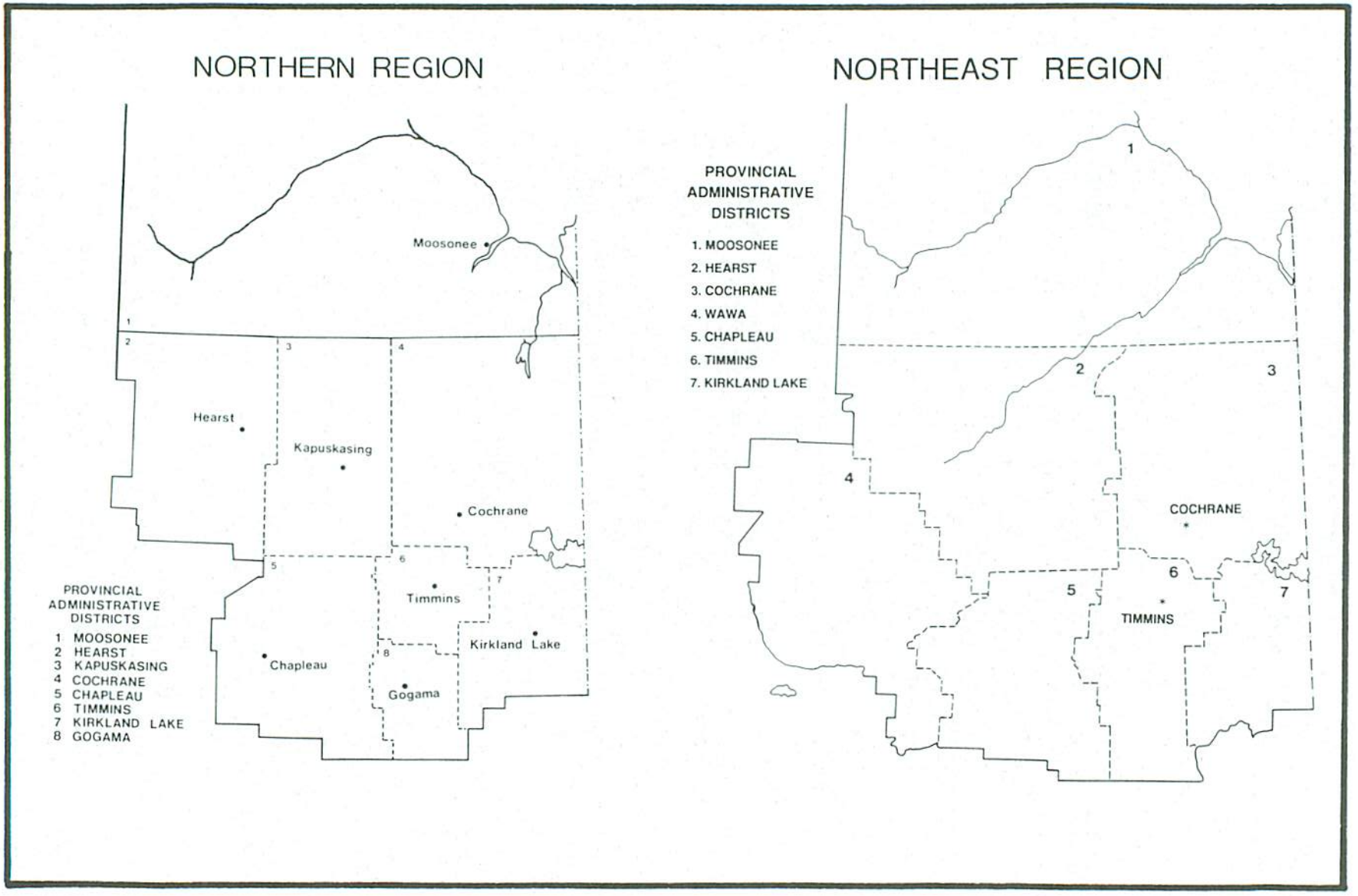

Former (left) and current (right) boundaries of OMNR's Northeast Region

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INSECTS

Major Insects

Pine Spittlebug, *Aphrophora cribrata* (Wlk.)

Damage to jack pine (*Pinus banksiana* Lamb.) regeneration decreased to its lowest levels in several years. Small numbers of larvae and trace defoliation were noted at all six locations surveyed throughout the Kirkland Lake, Timmins, Hearst and Chapleau districts. The highest incidence recorded occurred on 1.5-m-tall jack pine in Haultain Township, Kirkland Lake District, where 15% of all trees surveyed averaged 1% foliar damage.

Table 1. Summary of moderate-to-severe defoliation of white birch by the birch skeletonizer in the Northeast Region of Ontario in 1992.

District	Area affected (ha)
Chapleau	759,030
Cochrane	1,277,750
Hearst	2,560,520
Kirkland Lake	760,930
Timmins	891,780
Wawa	881,420
Total	7,131,430

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

Population levels of the birch skeletonizer increased across much of the region for the third consecutive year. The current area of moderate-to-severe defoliation encompassed approximately 7,131,430 ha of white birch (*Betula papyrifera* Marsh.) hosts (Table 1).

The infestation occurred over much of the range of birch in larger concentrations in old cutover areas (Fig. 1). The northern portion of the infestation coalesced to form one large area and generally had severe (80–100%) defoliation levels, which resulted in early leaf fall. In the southern portion of the infestation, defoliation ranged between 25 and 75% and discoloration and early leaf fall were less dramatic, particularly in the areas heavily defoliated in 1991.

Infestations tended to be more patchy in nature in 1992 and some level of defoliation was observed in most birch stands examined in late August and early September.

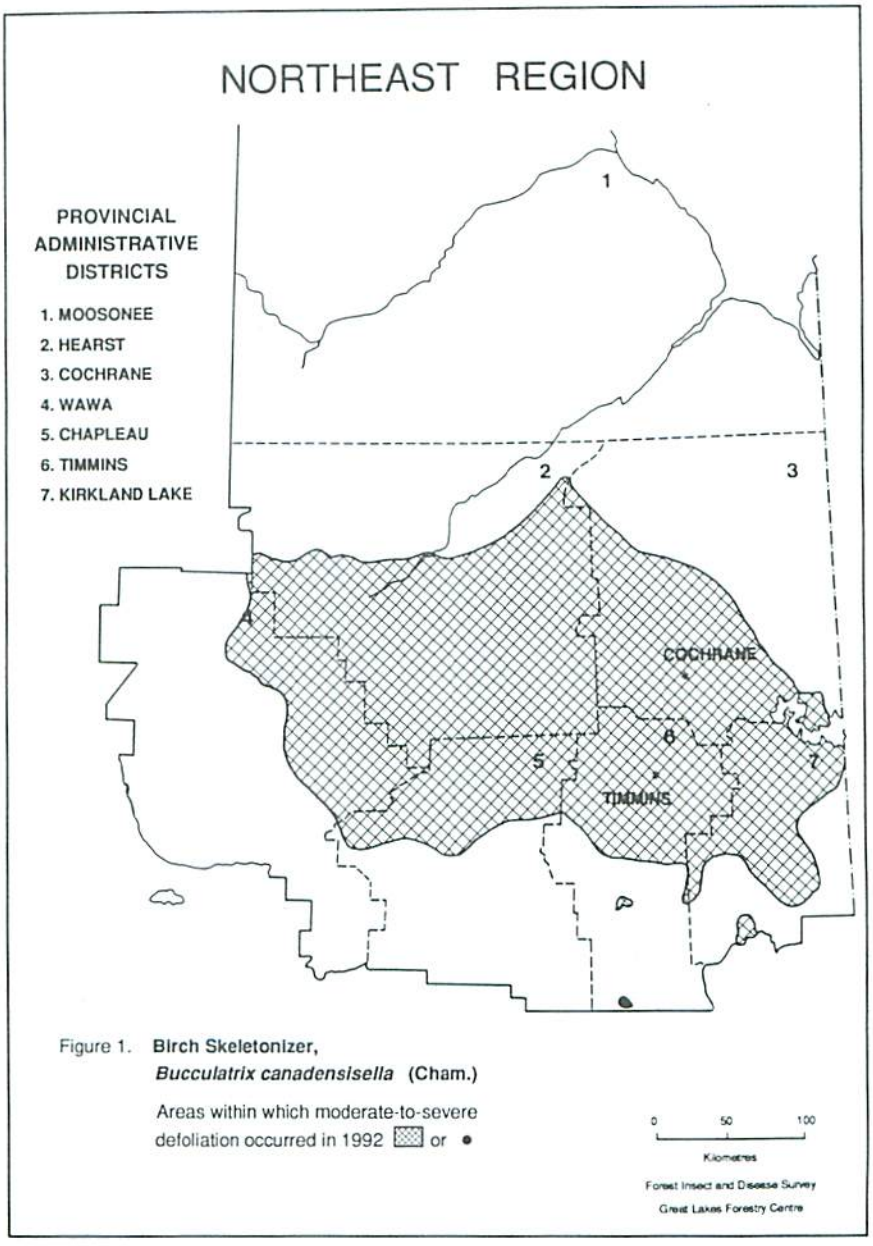

Figure 1. **Birch Skeletonizer, *Bucculatrix canadensisella* (Cham.)**

Areas within which moderate-to-severe defoliation occurred in 1992 ▨ or ●

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

Provincial Situation

A further increase in the area of moderate-to-severe defoliation caused by the eastern spruce budworm has taken place across the province.

In 1992, 9,595,762 ha were aerially mapped compared with 9,065,781 ha in 1991. The main body of the infestation now stretches from the Manitoba border eastward to Bannerman Township, Hearst District, and Dambrossio Township, Wawa District. Numerous small pockets of defoliation are scattered out in front of the main body up to Moosonee and along the northern shore of Lake Huron. A large area in the northwestern corner of Algonquin Park District has more than doubled in size this year to 26,900 ha from the 11,640 ha mapped in 1991. Severe defoliation occurred in three isolated plantations in Southern Region, one each in the Huronia, Maple and Cornwall districts (Fig. 2).

Northeast Region

Major increases have taken place in Northeast Region, with 2,091,080 ha of defoliation sketch-mapped from the air in 1992, compared with 887,010 ha in 1991. The area of severe defoliation extended from the Geraldton and Nipigon districts into Wawa District and across to White Lake, north of Leight on the CNR tracks, to just east of Klotz Lake Provincial Park. Many scattered pockets of severe defoliation occurred south of the village of White River and as far east as Kabinakagami Lake.

Moderate defoliation occurred from east of the severely affected area to just west of the ACR tracks north to Mulvey Township in Hearst District and west across the Savoff River at the CNR tracks. Many widely scattered pockets of defoliation occurred along many of the major rivers in the northern portion of Hearst District and into Moosonee District as far north as the Albany River and the village of Moosonee (Fig. 3).

Pheromone trapping was carried out on a much expanded scale this year: 192 traps were set out at 64 locations scattered across the region. Twelve of these sites have been trapped for a number of years and a comparison of population levels for the past 3 years is given (Table 2). All districts except Kirkland Lake District showed an increase in numbers.

Light traps were operated again this year at the Chapleau Nursery in Chapleau District and at Remi Lake,

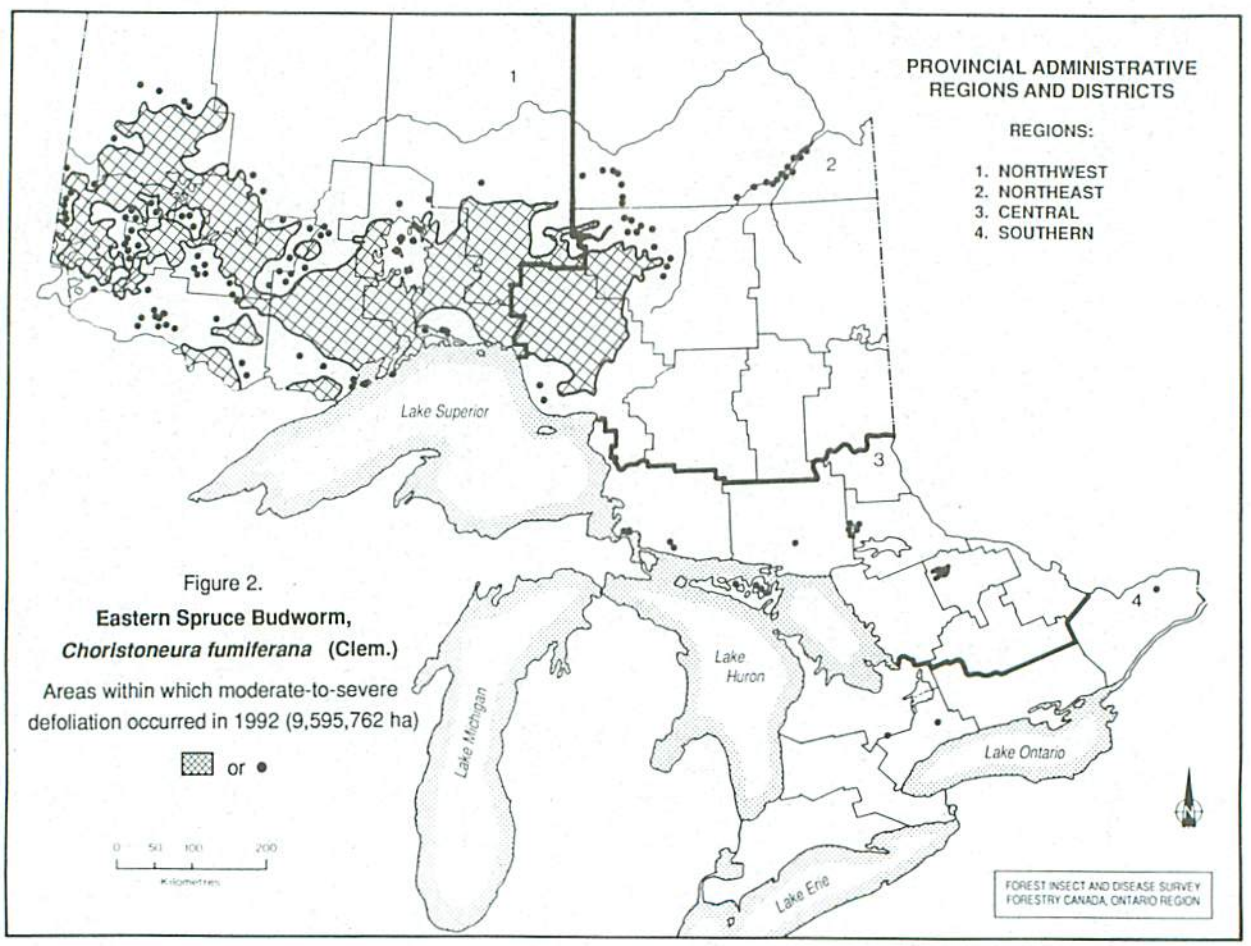

Figure 2.
Eastern Spruce Budworm, *Choristoneura fumiferana* (Clem.)
Areas within which moderate-to-severe defoliation occurred in 1992 (9,595,762 ha)
or •

near Kapuskasing in Hearst District. For the second year, very small numbers of moths were captured at Chapleau and no months were captured at Kapuskasing (Table 3).

Egg-mass sampling was carried out at 108 locations across the region (Table 4). The results indicate that severe defoliation should occur over most of Wawa District and the western, northern and central portions of Hearst District. The remaining districts should experience only moderate to no defoliation in 1993.

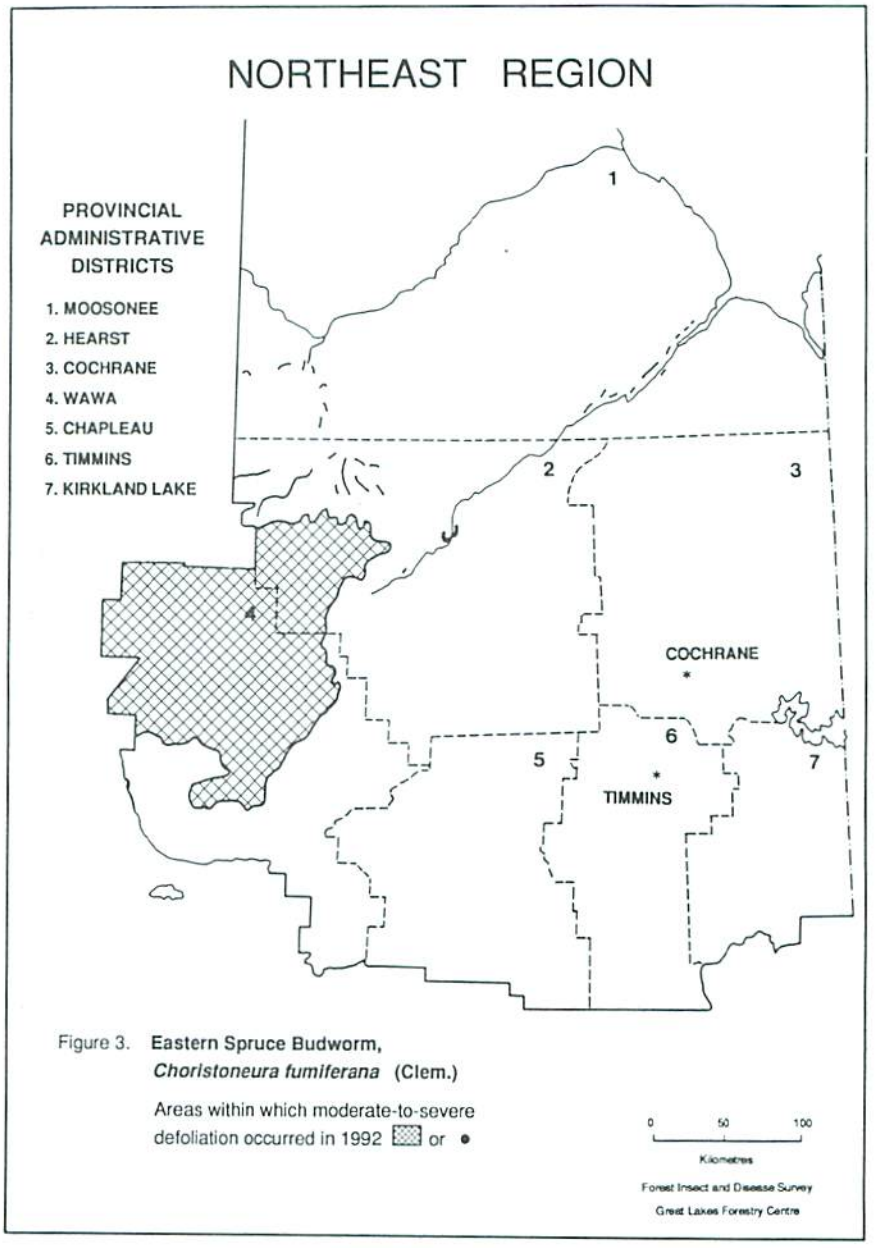

Figure 3. **Eastern Spruce Budworm, *Choristoneura fumiferana* (Clem.)**

Areas within which moderate-to-severe defoliation occurred in 1992 ▨ or ●

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

Provincial situation

Population levels of the jack pine budworm fluctuated widely across Ontario in 1992. The total area of moderate-to-severe defoliation increased to 158,704 ha from the 133,618 ha recorded in 1991.

Infestations were again concentrated in the northwest, but population levels are declining. In the central regions, population levels are increasing. New infestations occurred in the Algonquin Park, Pembroke, Bancroft and Tweed districts (Fig. 4).

Northeast Region

Population levels declined on jack pine in Northeast Region. The heaviest defoliation recorded was 5%, near Lake Pagwachuan in Wawa District. Trace populations occurred in young plantations in Evelyn and Denton townships, Timmins District, and in Chamberlain and Benoit townships, Kirkland Lake District.

Egg-mass samples collected at 42 locations across the region indicate that light infestations should occur in Neelands and Peter townships in Chapleau District, Dempsey Township in Cochrane District, and Gill Township in Hearst District in 1993 (Table 5).

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

The increased population levels noted in 1991 persisted throughout the work area in 1992. The incidence of attacked trees (examined at 38 locations) averaged 11% this year, an insignificant change from the previous year's levels.

The highest level of recorded damage occurred on 1.1-m-tall jack pine regeneration in Marathon Township, Cochrane District. At this site, 36.7% of all trees examined sustained shoot damage, with terminal shoots attacked on virtually every affected tree (32% of the total trees).

The results of the formal survey are summarized in Table 6.

Table 2. Captures of male eastern spruce budworm moths in pheromone traps in eight districts of the Northeast Region of Ontario, 1990–1992 (three traps at each location).

Location (Twp)	Total moths captured 1990	1991	1992
Chapleau District			
Borden	–	–	685
Barclay	–	–	581[b]
Deans	–	–	378
Genier	–	–	271[b]
Ivanhoe	–	–	709
Lloyd	–	–	469
Neelands	15	–[a]	1,069
Peters	31	109	704[b]
Racine	–	–	330
Reaney	–	–	458[b]
Cochrane District			
Fournier	–	–	1,084
Laughton	–	–	1,021
Marathon	–	–	285
Nesbitt	–	–	1,533
St. John	46	288	518
Sydere	–	–	1,036
Hearst District			
Abbott	–	–	2,510
Arnott	–	–	961[b]
Cumming	–	–	833[b]
Fauquier	43	709	154[b]
Fenton	–	–	596
Frost	752	2,906	2,999
Guilfoyle	33	890	883
Hayward	–	–	1,155
Kohler	–	–	4,486
Lisgar	–	–	1,539
Lowther	–	–	1,322[b]
Shannon	–	–	1,237
Staunton	–	–	1,867
Stoddart	–	–	3,534
Walls	–	–	2,298
Kirkland Lake District			
Bannockburn	–	–	79
Dack	–	–	334
Lamplugh	–	–	321
Maisonville	15	301	229
Mickle	–	–	345
Pacaud	37	247	260
Tyrrell	–	–	502
Timmins District			
Dublin	15	44	361
Edinburgh	–	–	637
Eldorado	–	–	370
Enid	–	–	712
Garibaldi	–	–	518
Hassard	–	–	734
Sewell	–	–	702
St. Louis	–	–	425[b]
Thomas	–	–	580
Wawa District			
Barbara Lake	–	–	6,140
Breckenridge	–	–	1,728
Cecile	–	–	4,467
Dahl	–	–	4,738
Dambrossio	171	2,414	8,529
Echum	–	–	236[c]
Esquega	–	–	544
Lalibert	205	781	3,260
Larkin	243	1,699[b]	3,239
Lipton	–	–	1,474[b]
Maness	–	–	326
Mikano	–	–	7,210
Nickle	–	–	3,903
Pearkes	–	–	5,880
Stevens	–	–	3,551[b]
Tedder – Stand 360	–	–	3,959

[a] data unavailable

[b] one trap destroyed by a bear

[c] two traps destroyed

Table 3. Captures of eastern spruce budworm moths in light traps at two locations in the Northeast Region of Ontario from 1989 to 1992.

Location	Total number of moths captured 1989	1990	1991	1992
Chapleau District				
Chapleau Nursery	182	159	8	13
Hearst District				
Remi Lake	75	352	7	0

Table 4. Northeast Region — Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1992, and infestation forecasts for 1993.

Location	Host	Estimated defoliation in 1992 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1993[a]	Accumulated damage[b]
Chapleau District (13 locations)					
Barclay Twp	bF	5	0	N	0
Borden Twp	bF	5	0	N	0
Deans Twp	bF	5	13	L–M	0
Fawn Twp	bF	5	0	N	0
Green Twp	bF	5	10	L	0
Hall Twp	wS	28	17	L–M	0
Ivanhoe Twp	bF	5	0	N	0
Lloyd Twp	wS	5	0	N	0
Neelands Twp – Impact Plot	bF	5	0	N	0
Peters Twp – Shoals Provincial Park	bF	5	0	N	0
Racine Twp	bF	5	0	N	0
Reaney Twp – Five Mile Provincial Park	bF	5	0	N	0
Sandy Twp	bF	5	0	N	0
Cochrane District (5 locations)					
Clute Twp – OMNR SPA[c]	wS	0	0	N	0
Fournier Twp – OMNR SPA[c]	wS	1	0	N	0
Laughton Twp	bF	0	0	N	0
Marathon Twp	bF	0	0	N	0
St. John Twp – Stand 177	bF	0	0	N	0
Hearst District (24 locations)					
Arnott Twp	bF	0	16	L–M	0
Burrell Twp	bF	23	12	L	1
Cumming Twp	wS	0	0	N	0
Elgie Twp	bF	5	0	N	1
Fauquier Twp – René Brunelle Prov. Park	bF	0	0	N	0
Frost Twp – Nagagamisis Prov. Park	bF	1	54	L–M	1
– Impact Plot	bF	8	73	M–S	1
	wS	26	243	S	2
Fushimi Prov. Park	bF	28	18	L–M	1
Fushimi Twp – plantation	wS	18	0	N	1
Guilfoyle Twp	bF	0	0	N	0
Kohler Twp	bF	33	172	M–S	2
Lowther Twp	bF	2	7	L	1
McFarlan Twp	bF	10	0	N	1
Mulloy Twp	bF	44	368	S	2
Mulvey Twp	bF	12	0	N	1
Orkney Twp	bF	5	0	N	1
Rogers Twp – Plantation 26A	bF	35	138	M–S	1
	wS	23	92	M–S	1
Shannon Twp	bF	1	0	N	1
Shuel Twp	wS	71	717	S	1
Staunton Twp	bF	0	14	L–M	0
Studholme Twp	wS	7	104	M–S	1
Walls Twp	wS	6	62	M–S	1
Kirkland Lake District (6 locations)					
Bannockburn Twp	bF	3	0	N	0
Dack Twp	wS	1	7	L	0

(cont'd)

Table 4. Northeast Region — Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1992, and infestation forecasts for 1993. (cont'd)

Location	Host	Estimated defoliation in 1992 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1993[a]	Accumulated damage[b]
Kirkland Lake District (6 locations) (concl.)					
Lamplugh Twp	bF	1	0	N	0
Maisonville Twp	bF	1	0	N	0
Mickle Twp	bF	1	0	N	0
Pacaud Twp	bF	0	0	N	0
Timmins District (10 locations)					
Dublin Twp	bF	5	0	N	0
Edinburgh Twp	bS	5	0	N	0
Eldorado Twp	bF	1	0	N	0
Enid Twp	bF	0	0	N	0
Garibaldi Twp	bF	5	0	N	0
Hassard Twp	bF	2	0	N	0
Reeves Twp – OMNR SPA[c]	wS	5	13	L–M	0
Sewell Twp	bF	2	0	N	0
St. Louis Twp	wS	5	0	N	0
Thomas Twp	wS	2	0	N	0
Wawa District (49 locations)					
Barbara Lake – SPA[c]	wS	50	348	S	1
Bayfield Twp	bF	13	55	M–S	2
Beavercross Lake – plot 5(91)	bF	21	119	M–S	1
– check plot	bF	72	282	S	1
Blue Jay Lake	bF	37	0	N	2
Breckenridge Twp	wS	18	139	M–S	1
Chelsea Twp	bF	42	0	N	1
Dahl Twp – Obatanga Provincial Park	bF	68	414	S	1
Dambrossio Twp – Impact Plot	bF	34	221	M–S	1
Dead Otter Lake	bF	50	32	L–M	2
Derry Twp	bF	73	270	S	2
Dumas Twp	bF	18	1225	S	1
Dunphy Twp	bF	60	946	S	1
Echum Twp	bF	0	7	L	0
Esquega Twp	bF	0	0	N	0
Fakeloo Lake	bF	86	258	S	4
Foch Twp	bF	98	661	S	2
Fourbay Lake	bF	72	302	S	3
Franz Twp	bF	47	257	S	1
Garnham Lake	bF	79	1187	S	4
Gourlay Twp	bF	32	84	M–S	2
Gowan Lake	bF	25	10	L	5
Hiawatha Twp	bF	56	117	M–S	2
Hwy 614 – Stand 360	bF	95	195	M–S	2
Industrial Rd – south of Caramat	bF	63	102	M–S	3
Industrial Rd – Camp 15	bF	82	540	S	2
Kagiano Lake	bF	78	604	S	4
Lalibert Twp – Impact Plot	bF	7	24	L–M	0
Larkin Twp – Impact Plot	bF	1	66	M–S	1
	wS	5	275	S	1
Leslie Twp	bF	61	199	M–S	2
Lessard Twp	bF	5	0	N	1

(cont'd)

Table 4. Northeast Region — Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1992, and infestation forecasts for 1993. (concl.)

Location	Host	Estimated defoliation in 1992 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1993[a]	Accumulated damage[b]
Wawa District (49 locations) (concl.)					
Lipton Twp	wS	11	344	S	1
Little Nama Creek	bF	66	292	S	2
Lola Lake	bF	27	157	M–S	2
Maness Twp	bF	0	0	N	0
Manitouwadge plantation	wS	5	0	N	0
McCron Twp	bF	100	969	S	0
Mikano Twp	bF	48	417	S	3
Nickle Twp	bF	92	250	S	2
Osawin Lake	bF	52	145	M–S	1
Otasawian Lake	bF	49	0	N	2
Pearkes Twp	bF	11	56	L–M	1
Pearly Lake	bF	55	41	L–M	3
Recollet Twp	bF	0	0	N	0
Stevens – Microwave Tower	bF	83	259	S	3
Tedder Twp	bF	73	73	M–S	1
White Lake Provincial Park	bF	53	630	S	2
Wickstead Twp	bF	70	151	M–S	1

[a] S = severe, M = moderate, L = light, N = nil

[b] accumulated damage codes: 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, top 50–150 cm dead or bare; 5 = <25% of stand dead.

[c] SPA = Seed Production Area

Table 5. Northeast Region — Jack Pine Budworm: Summary of defoliation estimates and egg-mass counts in 1992 and infestation forecasts for 1993 on jack pine.

Location	Estimated % defoliation in 1992	Total number of egg masses on six 61-cm branch tips	Infestation forecasts for 1993[a]
Chapleau District (15 locations)			
Cortez Twp – Stand 234	0	0	N
Cortez Twp – Stand 83	3	0	N
Deans Twp	0	0	N
Edith Twp	5	0	N
Fawn Twp – Dore Road East	0	0	N
– Dore Road West	0	0	N
– Hong Kong Road	0	0	N
Ivy Twp – Metagama Road	0	0	N
Kaplan Twp – east of Sultan	0	0	N
– north of Sultan	0	0	N
– west of Sultan	0	0	N
Neelands Twp – Stand 54	6	1	L
Peters Twp	5	1	L
Strom Twp	5	0	N
Wakami Twp	5	0	N

(cont'd)

Table 5. Northeast Region — Jack Pine Budworm: Summary of defoliation estimates and egg-mass counts in 1992 and infestation forecasts for 1993 on jack pine. (concl.)

Location	Estimated % defoliation in 1992	Total number of egg masses on six 61-cm branch tips	Infestation forecasts for 1993[a]
Cochrane District (2 locations)			
Avon Twp	0	0	N
Dempsey Twp	0	1	L
Hearst District (2 locations)			
Fauquier Twp	0	0	N
Gill Twp	0	1	L
Kirkland Lake District (3 locations)			
Chamberlain Twp	0	0	N
Clifford Twp	0	0	N
Mickle Twp – Stand 95	0	0	N
Timmins District (16 locations)			
Adams Twp – Stand 130	0	0	N
Asquith Twp	5	0	N
Evelyn Twp – Stand 51	0	0	N
Invergarry Twp – Stand 90	0	0	N
– Stand 107	8	0	N
– Stand 121	0	0	N
Mattagami Twp	2	0	N
Noble Twp	1	0	N
Paudash Twp – Stand 298	0	0	N
Robb Twp – Stand 86	0	0	N
Vrooman Twp – Stand 95	0	0	N
Westbrook Twp – Stand 31	2	4	M
– Stand 67	0	0	N
– Stand 72	0	0	N
– Stand 72 – immature	0	0	N
– Stand 98	0	0	N
Wawa District (4 locations)			
Larkin Twp	0	0	N
Manness Twp	0	0	N
Recollet Twp	0	0	N
Vasiloff Twp	0	0	N

[a] N = nil, L = light, M = moderate, H = heavy

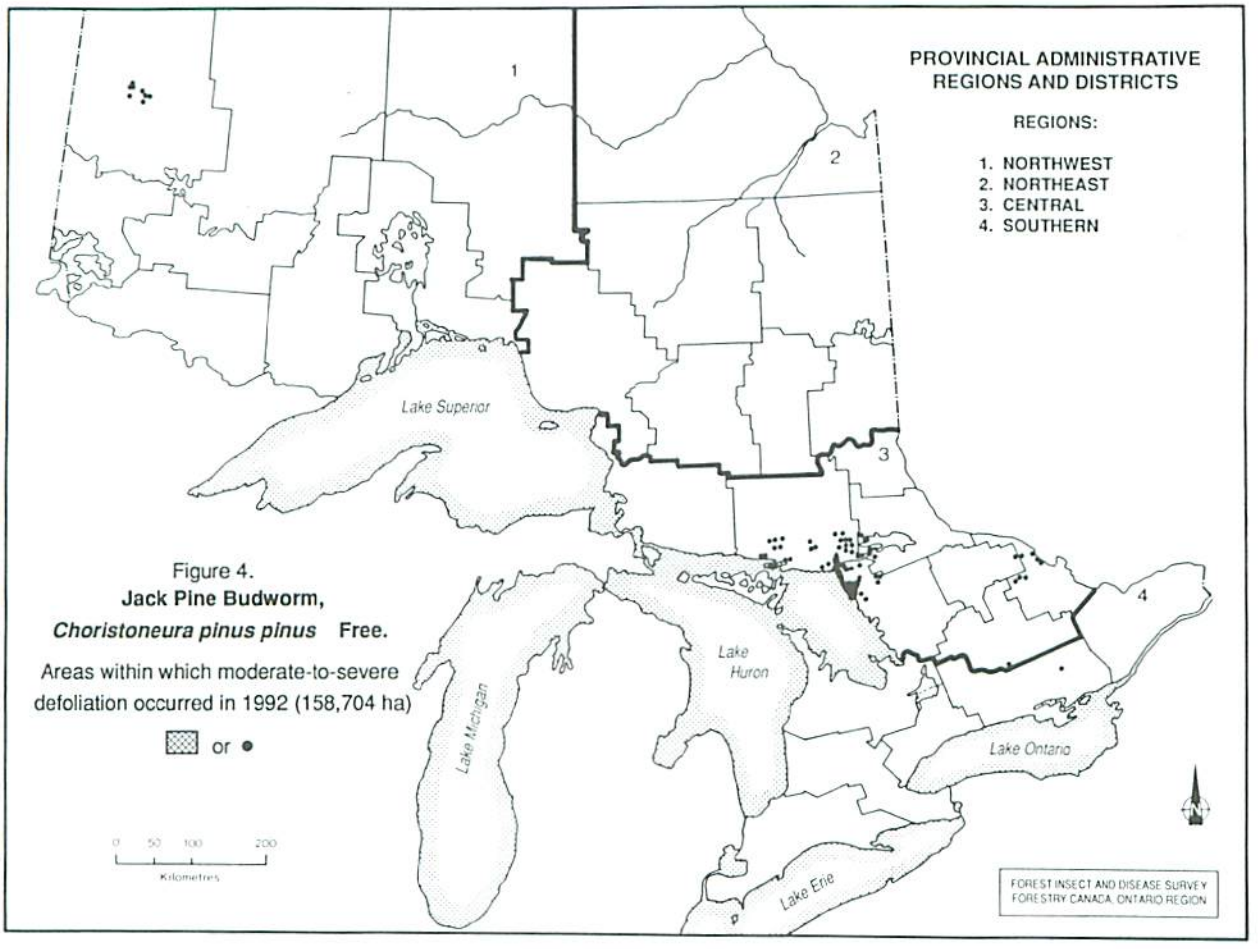

Figure 4.
Jack Pine Budworm,
***Choristoneura pinus pinus* Free.**

Areas within which moderate-to-severe defoliation occurred in 1992 (158,704 ha)

or •

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The forest tent caterpillar was responsible for a total of 16,051,424 ha of moderate-to-severe defoliation across the province in 1992 (Fig. 5). This total area represents an overall reduction in infestation of nearly 15% across the province; however, within Northeast Region, the area of infestation increased by roughly 60% (Table 7).

Within the region, infestations have now completely engulfed Hearst District and have extended into the northern portion of Wawa District, the western portion of Cochrane District and into Moosonee District along the river systems that drain into Hudson's Bay (Fig. 6).

The infestation entered all along the western boundary of Hearst District and extended throughout most stands of available hosts (*Populus* spp.) across the entire district. It also expanded into Cochrane District in the area of Greenwater Provincial Park, west of Cochrane. To the north, the infestation extended along the Missinaibi, Mattagami and Abitibi rivers as far north as the Moose River Crossing and as far up the Kenogami River as the junction with the Albany River. Areas north of the Kenogami–Albany river junction also sustained heavy damage, but a lack of available flying hours prevented further aerial mapping north of this point.

Egg-band counts conducted at 23 locations in the region revealed that moderate-to-severe defoliation should persist in most areas in 1993 (Table 8). An exception occurred in the older areas of the infestation in Wawa District, where the infestation appears to be breaking up.

Expansion of the infestation in 1993 should occur mainly in Cochrane District north and east of the town of Cochrane, but some expansion is also expected towards the south and into the Timmins and Kirkland Lake districts. At many of these locations, the insect will be feeding in conjunction with existing early aspen leafcurler populations (Fig. 7).

Table 6. Damage caused by the eastern pine shoot borer in jack pine plantations in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Township)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Leaders attacked (%)
Chapleau District					
Borden	1.1	2,400	6	2.0	0.0
Dalmas	1.7	2,500	33	1.2	0.0
Hutcheon	3.8	2,222	14	0.6	0.0
McNaught	1.4	2,600	35	2.6	0.0
Cochrane District					
Kennedy	2.1	2,100	2	30.7	15.3
Marathon	1.1	1,500	100	36.7	32.0
Raven	1.7	2,200	400	21.3	17.3
Hearst District					
Chelsea	3.1	2,500	50	1.3	0.0
McEwing	2.8	2,100	5	1.3	0.0
Stoddart	2.9	2,500	200	2.7	1.3
Kirkland Lake District					
Black	1.8	2,500	10	10.7	3.3
Chamberlain	4.2	2,500	10	14.0	2.0
Flavelle (family test)	2.2	2,450	12	24.0	12.7
Gross	2.0	4,444	50	14.0	5.3
Ossian	1.8	2,500	10	1.3	0.0
Playfair	1.3	2,500	25	24.0	18.0
Truax	1.5	4,222	50	20.0	10.0
Tyrrell	1.4	2,500	100	10.0	4.0
Timmins District					
Battersby	1.9	2,475	24	11.2	0.0
Enid	1.9	4,355	10	21.3	11.3
Evelyn (family test)	1.1	4,444	20	2.7	1.3
Garvey	2.9	2,320	4	6.0	0.0
Invergarry	1.9	2,450	12	11.9	0.0
Londonderry	3.3	2,350	10	7.2	0.0
Loveland	1.6	4,434	50	30.7	20.0
Macklem (family test)	2.9	2,500	12	23.3	6.7
MacMurchy	0.8	2,400	16	1.3	0.0
Price	2.6	3,680	200	16.0	6.0
Vrooman	8.1	2,460	16	1.9	0.0
Wawa District					
Chenard (seed orchard)	2.9	2,500	25	3.3	3.3
Esquega	2.3	2,500	400	5.3	5.3
Finan (family test)	2.8	2,500	8	18.0	18.0
Hwy #11 and Shamrock Lake	1.2	2,000	2	5.3	5.3
Lastheels	1.6	2,500	10	6.0	6.0
Ledger	5.6	3,000	1	4.0	1.3
	1.3	4,000	2	4.6	3.3
	1.2	4,000	2	3.3	2.0
Musquash	1.4	2,400	10	1.3	1.3

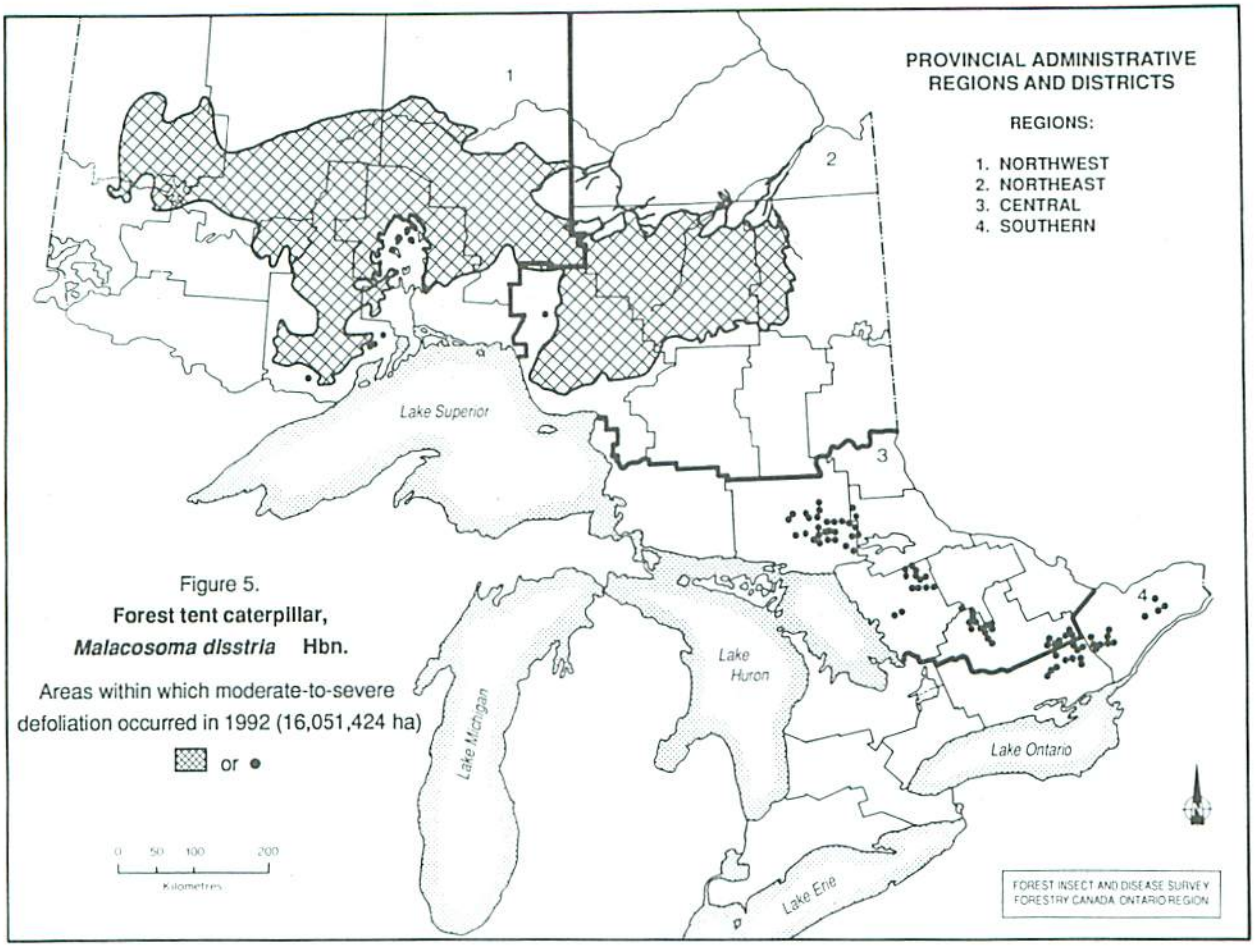

Figure 5.
Forest tent caterpillar,
***Malacosoma disstria* Hbn.**

Areas within which moderate-to-severe defoliation occurred in 1992 (16,051,424 ha)

or •

Table 7. Comparison of areas of defoliation by the forest tent caterpillar in the Northeast Region of Ontario in 1991 and 1992.

	Defoliation (ha)		
District	1991	1992	Change
Cochrane	0	541,507	+541,507
Hearst	1,902,728	3,103,653	+1,200,925
Moosonee	90,015	92,092	+2,077
Timmins	495	0	-495
Wawa	1,428,888	1,742,229	+313,391
Total	3,422,076	5,479,481	+2,057,405

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

Population levels of the yellowheaded spruce sawfly appeared lower in 1992; larvae could be collected throughout July, August and into early September (cool, wet weather retarded insect development). Once again, the most severe defoliation (100%) was observed on roadside, fringe and ornamental trees that grew in more open situations.

The plantation in Sheldon Township, Cochrane District, which was severely defoliated in 1991, experienced a virtual collapse of the sawfly population. A combination of starving insects in 1991 and early-spring frosts in 1992 reduced feeding to trace levels. Mortality in the plantation now exceeds 10% and a good proportion of the remaining trees carry no more than the current year's foliage.

In the Cochrane, Hearst, Kirkland Lake and Timmins districts, from 4 to 18% of the trees were affected, with defoliation ranging from 1 to 6.3% (Table 9). This was typical of damage throughout the rest of the region.

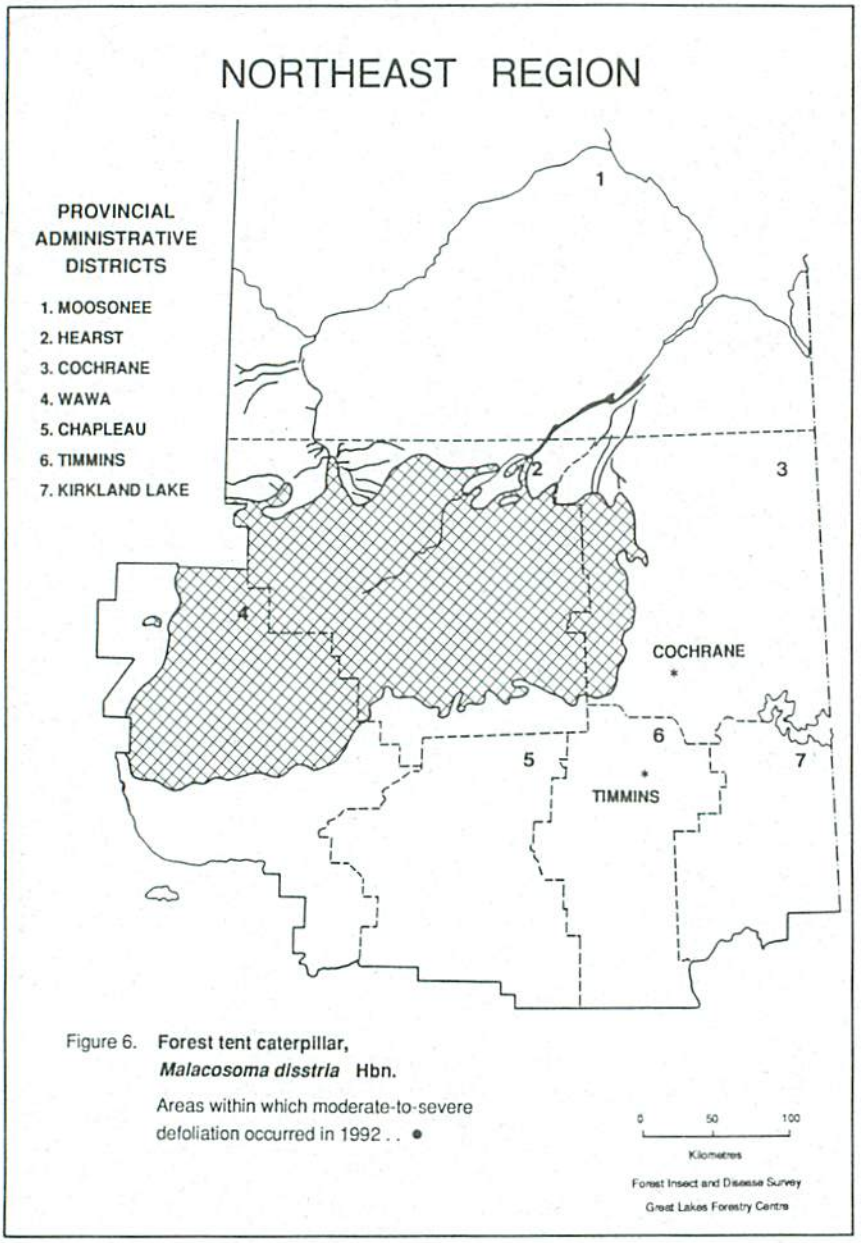

Figure 6. **Forest tent caterpillar, *Malacosoma disstria* Hbn.**

Areas within which moderate-to-severe defoliation occurred in 1992 . . ●

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

After four consecutive years of population increases, moderate-to-severe defoliation (averaging 75%) now extends throughout a total of 1,750,335 ha of mature aspen (*Populus* spp.) stands across Northeast Region.

The bulk of the defoliation occurred in a large infestation that occupied central Cochrane District, eastern Timmins District, and northwestern Kirkland Lake District, with a minor intrusion into the southwestern corner of Hearst District. A second infestation occurred across the southern portions of the Chapleau and Timmins districts. Many small pockets of defoliation too numerous to list were scattered around the main bodies of the infestation (Fig. 8).

Small numbers of leafcurlers could be found across most of the region and defoliation by this insect would have been much greater had it not been for defoliation caused by the massive infestation by the forest tent caterpillar.

Pine Tip Moths, *Rhyacionia adana* Heinr. and *R. busckana* Heinr.

Population levels of these pine tip moths are building up across the region. The heaviest damage occurred in Wawa District, with 58% of the trees affected (Table 11). The mined needles and, later, tunnelled shoots were caused by one of these two similar species.

In some plantations in the Cochrane and Kirkland Lake districts, leaders were attacked, causing deformed main stems, and side branches were also affected.

White Pine Weevil, *Pissodes strobi* (Peck)

There were no significant changes in population levels of this pest of both spruces (*Picea* spp.) and pines (*Pinus* spp.). Evaluations at 51 sites revealed an average incidence of 5.1% damaged leaders across the region.

Significant populations, causing >10% leader damage, were noted at only four locations, two in Chapleau District and two at previously damaged sites in Cochrane District. These high damage rates were recorded on white spruce (*Picea glauca* [Moench] Voss) and black spruce (*P. mariana* [Mill.] B.S.P.) as well as on jack pine (Table 10).

Table 8. Results of forest tent caterpillar egg-band counts on trembling aspen in the Northeast Region of Ontario in 1992 and infestation forecasts for 1993 (based on three trees sampled at each location).

Location (Township)	Average DBH of trees (cm)	Average number of egg bands on tree	Infestation forecast for 1993
Cochrane District			
Edwards	15.0	5	Moderate
Heighington	13.3	3	Moderate
Kendrey	15.0	130	Severe
Hearst District			
Arnott	13.9	31	Severe
Fushimi	15.0	31	Severe
Harman	16.3	303	Severe
Minnipuka	8.0	30	Severe
Shetland	13.5	53	Severe
Wawa District			
Chapais (Obatanga Provincial Park)	31.0	21	Severe
Dahl	9.0	2	Moderate
Dambrossio	11.0	1	Light
Doucett	15.0	2	Light
Dumas	9.6	5	Moderate
Huotari	10.0	5	Moderate
Lalibert	11.0	1	Light
Larkin	14.3	41	Severe
Makawa	10.0	14	Severe
Rennie	12.0	0	Nil
St. Julian	10.0	12	Severe
Tedder	16.0	16	Severe
Tilston	9.6	4	Moderate
West	12.0	1	Light
Winget	18.0	5	Light

Table 9. Damage caused by the yellowheaded spruce sawfly at seven locations across the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Township)	Tree species	Average height of trees (m)	Estimated number of trees/ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
Cochrane District						
Glackmeyer	wS	1.7	2,200	3	18.0	1.0
Sheldon	wS	2.0	2,400	200	16.0	1.0
Teefy	bS	0.4	1,000	5	4.0	1.0
Hearst District						
Fauquier	bS	1.0	2,400	5	7.3	2.4
Kirkland Lake District						
Chamberlain	bS	1.8	2,500	10	8.0	3.3
Playfair	bS	0.4	2,500	25	5.3	1.0
Timmins District						
Evelyn	bS	0.6	2,450	50	4.0	6.3

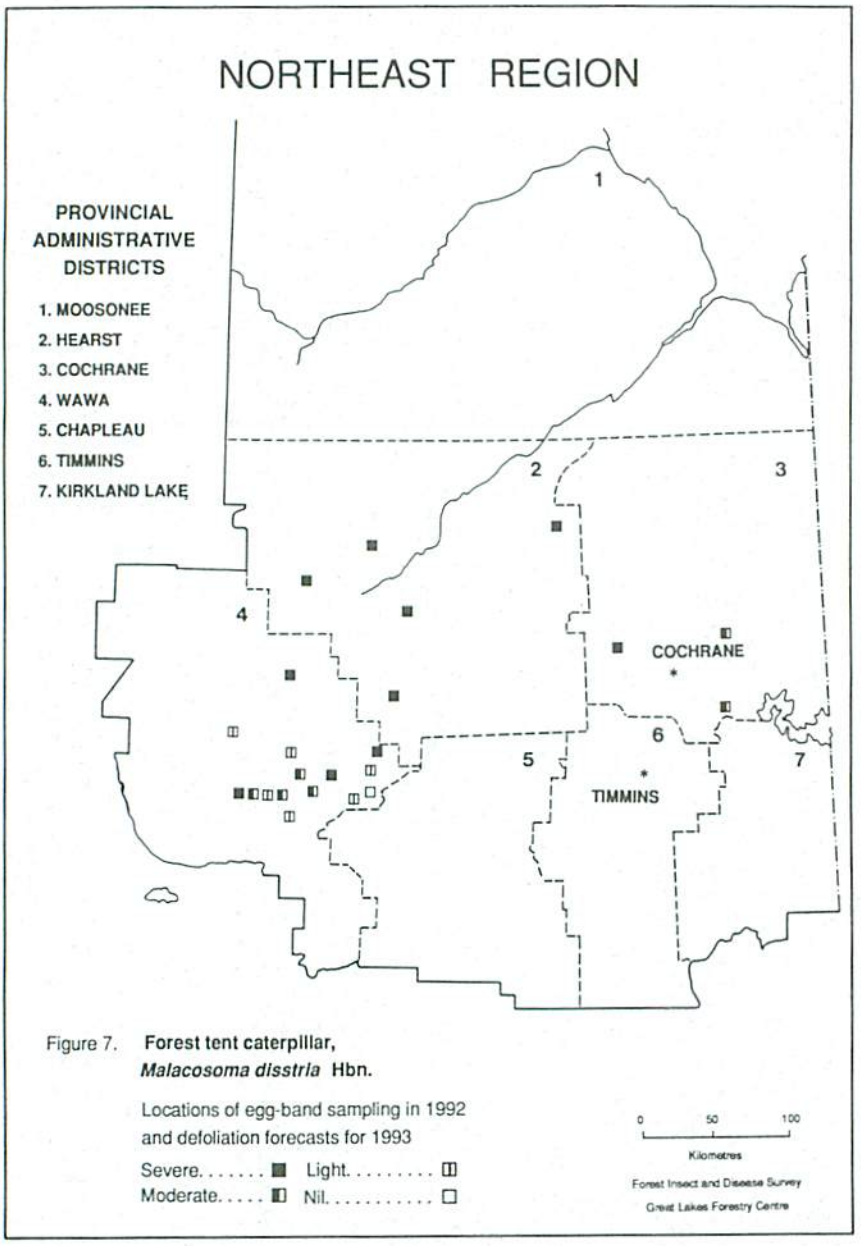

Figure 7. **Forest tent caterpillar, *Malacosoma disstria* Hbn.**

Table 10. Damage caused by the white pine weevil in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Township)	Tree species	Average height of trees (m)	Estimated number of trees/ha	Estimated area affected (ha)	Trees affected (%)
Chapleau District					
Birch	jP	0.8	2,500	8	2.0
Bordeleau	jP	4.9	2,000	14	0.0
Borden	jP	1.1	2,400	6	14.0
Dalmas	jP	1.7	2,500	33	6.6
	bS	0.9	2,450	56	13.3
Hutcheon	jP	3.8	2,222	14	0.0
McNaught	jP	1.4	2,000	35	0.0

(cont'd)

Table 10. Damage caused by the white pine weevil in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location). (concl.)

Location (Township)	Tree species	Average height of trees (m)	Estimated number of trees/ha	Estimated area affected (ha)	Trees affected (%)
Cochrane District					
Bragg	bS	2.6	2,200	200	14.7
Gladmeyer	wS	1.7	2,200	3	12.0
Kennedy	bS	0.9	2,000	15	0.7
Raven	jP	1.7	2,000	400	0.7
Hearst District					
Chelsea	jP	3.1	2,500	50	2.0
Fauquier	bS	0.8	2,300	5	0.7
Larkin	wS	2.8	2,200	200	2.0
Nansen	bS	1.2	2,100	5	1.3
Stoddart	bS	0.7	2,200	5	1.3
Teetzel	wS	1.3	2,200	5	2.7
Kirkland Lake District					
Black	jP	1.8	2,500	10	2.7
Catharine	jP	2.5	4,222	50	7.3
Chamberlain	jP	4.2	2,500	10	2.0
	bS	1.8	2,500	13	1.3
Egan (family test)	bS	0.8	1,500	20	2.7
Flavelle (family test)	jP	2.2	2,450	12	6.0
Gross	jP	2.0	4,444	50	0.7
Kimberley (family test)	bS	0.8	2,050	20	9.3
Ossian (family test)	jP	1.8	2,500	10	0.7
Playfair	jP	1.3	2,500	25	3.3
Truax	jP	1.5	4,222	50	5.3
Tyrrell	jP	1.4	2,500	100	2.7
Timmins District					
Battersby	jP	1.9	2,475	24	1.3
Denton (family test)	jP	1.2	2,500	5	6.0
Enid	jP	1.9	4,355	10	0.7
Evelyn (family test)	jP	1.1	4,444	20	0.7
Garvey	jP	2.9	2,320	4	3.3
Invergarry	jP	1.9	2,450	12	8.6
Londonderry	jP	3.3	2,350	105	6.0
Macklem	jP	3.0	2,000	4	0.7
MacMurchy	jP	0.8	2,400	16	4.6
Price	jP	2.6	3,680	200	0.7
Turnbull	wS	1.4	4,444	25	1.3
Zavitz	wS	1.4	2,400	50	3.3
Wawa District					
Chenard	jP	2.9	2,500	25	2.6
Esquego	jP	2.3	2,000	400	4.6
Finan	jP	1.3	2,500	8	1.3
Hambleton	jP	4.0	3,000	3	5.3
Hambleton (SPA)[a]	jP	0.9	4,444	3	0.0
Hambleton (SPA)[a]	jP	0.7	3,000	4	0.0
Lastheels	jP	1.6	2,500	10	9.3
Musquash	jP	1.4	2,500	10	0.0
Nadjiwon	jP	2.1	2,500	4	6.0
Odlum	jP	3.8	3,000	3	3.3

[a] seed production area

Minor Insects

Jack Pine Tip Beetle, *Conophthorus resinosae* Hopk.

Population levels of the jack pine tip beetle increased in the Kirkland Lake, Hearst and Timmins districts in 1992. Jack pine plantations averaging 2.5 m in height and extending over areas of up to 200 ha in size sustained an average of 5% damage, primarily to side branches. The area of heaviest damage was on 2.9-m trees in Stoddart Township, where 14.7% of the trees over a 200-ha area had damage recorded on side branches. Other areas of light foliar damage are listed in Table 12.

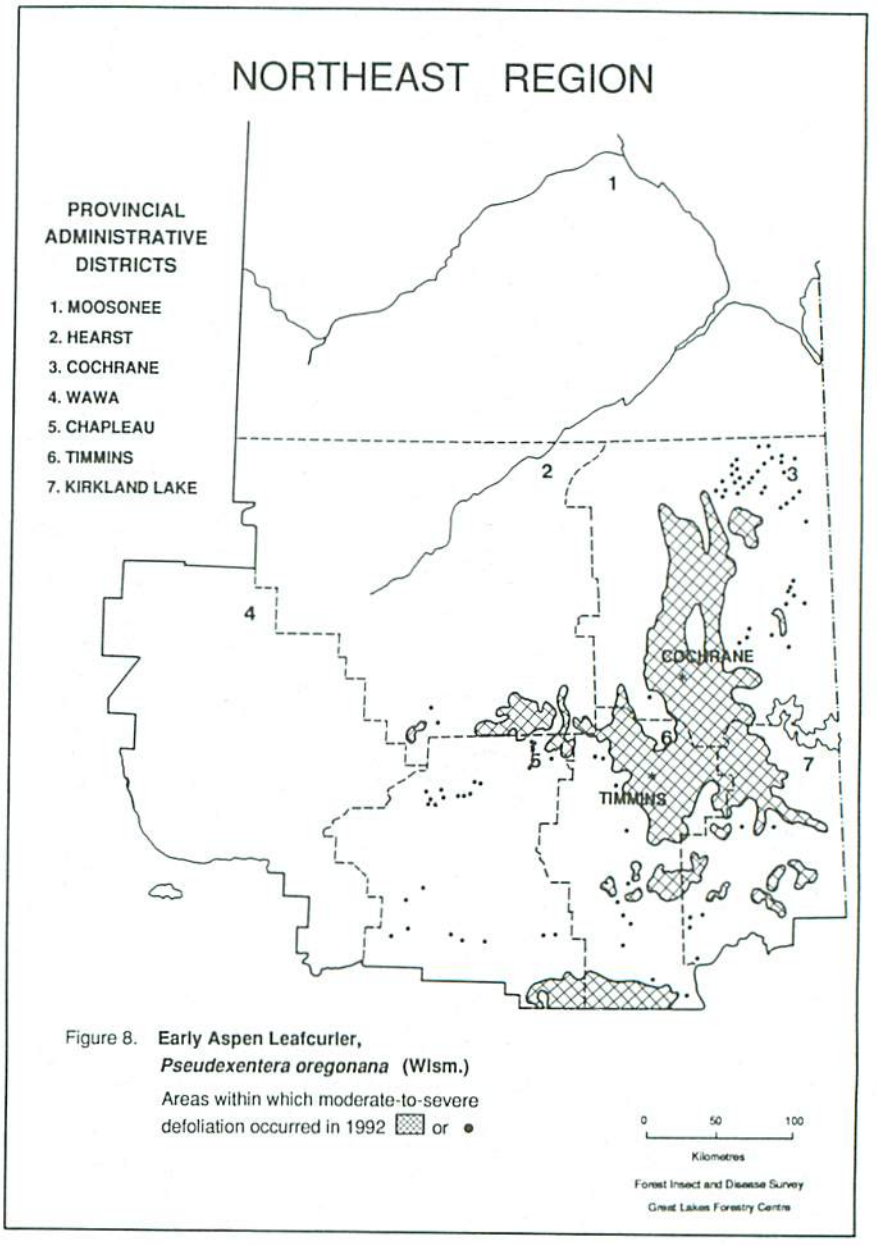

Figure 8. **Early Aspen Leafcurler, *Pseudexentera oregonana* (Wlsm.)**
Areas within which moderate-to-severe defoliation occurred in 1992 ▨ or ●

Table 11. Damage caused by pine tip moths in jack pine plantations in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Township)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Leaders attacked (%)
Chapleau District					
Birch	0.8	2,500	8	29.3	–
Hutcheon	3.8	2,222	14	0.6	–
McNaught	1.4	2,600	35	12.0	–
Cochrane District					
Kennedy	2.4	1,500	2	3.3	–
Marathon	1.1	1,500	100	30.7	1.3
Raven	1.7	2,200	400	12.7	0.7
Gogama District					
Battersby	1.9	2,475	24	6.0	–
Garvey	2.9	2,320	4	4.0	–
Londonderry	3.3	2,350	10.5	2.0	–
McMurchy	0.8	2,400	16	8.0	–
Hearst District					
Chelsea	3.1	2,500	50	55.3	–
McEwing	2.8	2,100	5	32.7	–
Stoddart	2.9	2,500	200	25.3	–
Kirkland Lake District					
Flavelle (family test)	2.2	2,450	12	7.3	–
Ossian (family test)	1.8	2,500	10	16.0	0.7
Playfair	1.3	2,500	25	5.3	–
Tyrrell	1.4	2,500	100	2.7	–
Timmins District					
Denton (family test)	1.2	2,500	5	35.3	–
Enid	1.9	4,355	10	10.7	–
Price	2.56	3,680	200	4.0	–
Wawa District					
Hambleton	0.7	3,000	13	58	–

Table 12. Damage caused by the jack pine tip beetle in jack pine plantations in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Township)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Leaders attacked (%)
Hearst District					
Chelsea	3.1	2,500	50	4.7	–
McEwing	2.8	2,100	5	2.0	–
Stoddart	2.9	2,500	200	14.7	–
Kirkland Lake District					
Burt	1.4	4,000	4	5.0	–
Chamberlain	4.3	2,000	10	7.3	–
Eby	2.0	2,500	15	10.0	–
Flavelle (family test)	2.2	2,450	12	2.7	–
Ossian (familty test)	1.8	2,500	10	3.3	–
Playfair	1.3	2,500	25	1.3	–
Timmins District					
Macklem (family test)	2.9	2,500	12	2.0	–
Price	2.6	3,680	200	2.0	1.3

Table 13. Other forest insects.

Insect	Host(s)	Remarks
Acantholyda spp. Webspinning sawflies	wP, jP	Trace levels of defoliation (1–6%) were recorded on 2- to 3-m-tall trees in Milne Twp, Temagami District; in Enid Twp, Timmins District; and in Black and Benoit twps, Kirkland Lake District.
Acleris variana (Fern.) Eastern blackheaded budworm	bS	Trace levels of defoliation were noted on >1% of all 0.5-m-tall trees in a 5-ha family-test plantation in Tweed Township, Hearst District.
Altica subplicata LeC. Alder flea beetle	Al	Heavy (26–95%) defoliation was recorded in small pockets (0.5 ha) in Chamberlain and Pense twps, Kirkland Lake District.
Coleophora laricella (Hbn.) Larch casebearer	tL	Small numbers of larvae were recorded throughout the range of host trees in the Kirkland Lake and Timmins districts. Significant foliar damage was noted on 50% of most trees located in Evanturel Twp, Kirkland Lake District, with an average of 3.1 larva per 30-cm branch tip.
Dioryctria reniculelloides Mut. & Mun. Spruce coneworm	bS	Foliar damage was noted at trace levels on 2% of the 1.2-m-tall trees in a 5-ha family test in Nansen Twp, Hearst District.
Fenusa pusilla (Lep.) Birch leafminer	wB	Generally, population levels across the region were low and infestations were widespread. With few exceptions, the resultant foliar damage averaged trace-to-light (1–25%).
Hylobius spp. Root collar weevils	jP, bS	Significant damage levels were recorded at several locations in the Hearst and Cochrane districts, most notably on 2.4-m-tall jack pine in Kennedy Twp, Cochrane District, where current mortality averaged 4.7% across a 15-ha site.
Hyphantria cunea (Drury) Fall webworm	pCh, Al	Small pockets of foliar damage (averaging 40–50%), ranging in size up to 0.2 ha, were noted in Hearst and Chamberlain twps, Kirkland Lake District.
Micrurapteryx salicifoliella (Cham.) Willow leafminer	W	Roadside trees along Hwy 11 west of Mooseland in Hearst District sustained large numbers of larvae, resulting in foliar losses as high as 35%.
Neodiprion n. nanulus Schedl. Red pine sawfly	jP	Low population levels were recorded on 3-m trees over a 1-ha area in Eby and Benoit twps, Kirkland Lake District.
Neodiprion virginiana complex Redheaded jack pine sawfly	jP	Light defoliation (approximately 4%) was recorded on 2- to 4-m trees in plantations in Hearst and Clifford twps and at the Ramore Seed Orchard, all in Kirkland Lake District.

(cont'd)

Table 13. Other forest insects. (concl.)

Insect	Host(s)	Remarks
Petrova albicapitana (Bsk.) Northern pitch twig moth	jP	Populations declined to endemic levels across the region, with one significant exception noted: at the Playfair Seed Orchard, Kirkland Lake District, 28% of the 1.3-m trees averaged 15% damage to bark tissue on the main stem.
Phyllonorycter kenora (Free.) Willow leafblotch miner	W	Heavy defoliation was recorded over a 0.5-ha area along Graham Creek in Ingram Twp, Kirkland Lake District.
Phyllonorycter nipigon (Free.) Balsam poplar leafblotch miner	bPo	Trace levels of larval damage were commonly noted throughout Kohler Twp, Hearst District;severe defoliation (80–100%) was noted in mature stands across 500 ha throughout Ingram, Pense and Benoit twps, Kirkland Lake District.
Phyllonorycter ontario (Free.) Aspen leafblotch miner	tA	Heavy populations were noted in a 5-ha area of regeneration in Macklem Twp, Timmins District, as well as on mature trees in Ingram, Gross and Benoit twps, Kirkland Lake District
Pineus similis (Gill.) Ragged sprucegall adelgid	wS	The adelgid was noted on 8% of all 2.6-m-tall plantation stock over a 25-ha area, at low damage levels, in McEwing Twp, Hearst District.
Rhabdophaga swainei Felt Spruce bud midge	bS	Young trees (1.3 m tall) at both the Nansen and Teetzel twps family-test plantations, Hearst District, hosted trace numbers of this insect on 6% of all trees examined.
Toumeyella parvicornis (Ckll.) Pine tortoise scale	jP	Low damage levels (2-6%) were noted on 2-m-tall stock in four plantations in Kirkland Lake District.

TREE DISEASES

Major Diseases

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

Across the region, 62 plantations were examined for this organism in 1992. These evaluations included jack pine, white spruce and black spruce. Mortality was recorded at 29 locations (Table 14). The average number of damaged trees at affected sites was 1.4% (down from 2.1% in 1991). The highest mortality recorded (4%) was on 2.8-m white spruce in a 5-ha plantation in McEwing Township, Hearst District.

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

Incidence levels of these disease organisms have been increasing for the past 3 years across the region. Evaluations conducted at 27 locations across the work area revealed overall incidence levels of 40% for the disease on white spruce and of 80% on black spruce. Levels of damage were generally higher on white spruce, particularly on the larger trees (Table 15).

The heaviest damage once again occurred in Kennedy Township, Cochrane District, where incidence levels have been at 99% for the past 2 years; foliar damage in 1992 was up to 56%, from 29% in 1991. Trace-to-low infection levels were recorded commonly throughout the remainder of the region.

The parasitic fungus associated with this rust was again observed in the Hearst and Cochrane districts and for the first year in Timmins District. The degree of parasitism

Table 14. Mortality caused by Armillaria root rot in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Host	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Current mortality (%)
Chapleau District					
McNaught	jP	1.4	2,600	35	0.7
Reaney	jP	0.5	2,550	2	1.3
Cochrane District					
Kennedy	jP	2.4	1,500	2	3.3
Kennedy	bS	0.8	2,000	15	1.3
Mewhinney	bS	0.3	2,000	5	0.7
Raven	jP	1.7	2,200	400	0.7
Tweed	bS	0.5	2,000	5	0.7
Hearst District					
Chelsea	jP	3.1	2,500	50	0.7
Larkin	wS	2.8	2,200	200	1.3
McEwing	jP	2.8	2,100	5	4.0
Nansen	bS	1.2	2,100	5	3.3
Teetzel	wS	1.3	2,200	5	0.7
Kirkland Lake District					
Black	jP	1.8	2,500	10	0.7
Chamberlain (seed orchard)	jP	2.2	2,450	10	1.3
Gross	jP	2.0	4,444	50	0.7
Ossian (family test)	jP	1.8	2,500	10	3.3
Playfair	jP	0.4	2,500	25	1.3
Truax	jP	1.5	4,222	50	0.7
Timmins District					
Battersby	jP	1.9	2,475	24	0.7
Enid	jP	1.9	4,355	10	0.7
Evelyn	jP	1.1	4,444	50	2.0
Fortune	wS	0.9	3,555	20	0.7
Invergarry	jP	1.9	2,450	12	0.7
Londonderry	jP	3.3	2,350	105	0.7
Loveland	jP	1.6	4,425	100	2.7
Price	jP	2.6	3,680	200	0.7
Zavitz	jP	1.4	2,400	50	0.7
Wawa District					
Finan (family test)	jP	2.8	2,500	8	0.6
Lastheels	jP	1.6	2,500	10	2.0
Nadjiwon	jP	1.9	2,500	4	1.3

ranged from a low of 10% in Turnbull Township, Timmins District, to 98.7% in Kennedy Township, Cochrane District.

Pine Needle Rust, *Coleosporium asterum* (Dietel) H. Sydow & Sydow

This needle rust organism was encountered less frequently across the region in 1992. The heaviest defoliation occurred in Cecile Township, Wawa District, where 10% of the trees had 10% foliar damage (Table 16). This disease caused premature loss of the previous year's foliage; consequently, the development of young trees may be retarded and, in extreme cases, mortality may result.

Table 15. Damage caused by spruce needle rusts in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Tree species	Average height of trees (m)	Estimated number of trees/ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
Chapleau District						
Bader	bS	12.0	1,200	16	100	1
Birch	bS	15.0	1,200	8	100	1
Hoey	bS	10.0	1,500	52	100	5
Keith	bS	20.0	1,000	16	100	1
Pattinson	bS	17.0	1,600	2	100	1
Sandy	bS	9.0	1,666	32	100	1
Cochrane District						
Bragg	bS	2.6	2,200	200	100	2.9
Kennedy	bS	0.9	2,000	15	98.7	56.0[a]
Mewhinney	bS	0.3	2,000	5	80.7	6.0
Sheldon	wS	2.0	2,400	20	19.0	8.0
Teefy	bS	0.4	2,000	5	95.0	trace
Tweed	bS	0.5	2,000	5	95.0	trace
Hearst District						
Fauquier	bS	1.0	2,300	5	82.0	trace
Larkin	wS	2.8	2,200	200	0.7	trace
McEwing	wS	2.6	1,800	25	0.7	trace
Nansen	bS	1.2	2,100	5	97.0	5.0
Stoddart	bS	0.7	2,200	5	100	3.6
Teetzel	wS	1.3	2,200	5	100	2.5
Kirkland Lake District						
Chamberlain	bS	1.8	2,500	12	64.0	4.7
Timmins District						
Dublin	bS	4.0	2,500	4	100	1
Evelyn	bS	0.6	2,450	10	3.3	trace
Fortune	wS	0.9	3,555	20	44.7	1.7
Gouin	bS	15.0	1,200	24	65	1
Turnbull	wS	1.4	4,444	25	90.0	15.2[a]
Zavitz	wS	1.4	2,400	50	100	9.2
Wawa District						
Lendrum	wS	6.5	1,500	1	24.0	95
Rabazo	wS	7.0	1,200	1	26.0	95

[a] parasitic fungus present on fruiting structures of the rust.

Table 16. Damage caused by pine needle rust to jack pine in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Leaders attacked (%)
Hearst District					
McEwing	2.8	2,500	5	100	3.8
Kirkland Lake District					
Chamberlain	4.3	2,000	10	61.3	2.7
Timmins District					
Denton (family test)	1.2	2,500	5	15.3	1.0
Wawa District					
Cecile	2.0	2,500	3	10.0	10.0

Sweetfern Blister Rust, *Cronartium comptoniae* Arthur

Infection levels by this stem disease in jack pine plantations were generally lower in 1992 than in previous years. The heaviest damage was found in Price Township, Timmins District, where 6.0% of the 2.6-m-tall trees were severely affected. Two other plantations of 2.4-m trees averaged 1% severe damage in Macklem Township, Timmins District, and Black Township, Kirkland Lake District. An evaluation of mature trees in Obatanga Provincial Park, Wawa District, revealed that 8% of the trees were severely affected.

This disease requires two hosts to complete its life cycle. The presence of the alternate hosts sweetfern (*Comptonia peregrina* Arthur) and sweetgale (*Myrica gale* L.) helps in the diagnosis of the fungus. The rust damages the tree by attacking the stem; trees up to 10 cm in diameter can be girdled and killed.

White Pine Blister Rust, *Cronartium ribicola* J.C. Fischer

Eastern white pine (*Pinus strobus* L.) regeneration, although not commonly found across the region, continues to be infected by this destructive organism.

Natural regeneration under a large pine overstory routinely exhibits mortality of up to 20% of the stock. The heaviest area of concern this year was in Seaton Township, Hearst District, where 3% of the trees were affected, 1% with main-stem infections that will cause tree mortality

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

Both the incidence of this disease and the levels of foliar damage it caused rose appreciably from the levels reported in 1991. Approximately 72% of all the jack pine plantations surveyed sustained 22% foliar damage on 28% of all trees inspected. The most notable damage recorded was on 4-m jack pine in McEvay Township, Kirkland Lake District, where 18% of all trees examined averaged 35% foliar loss (Table 17).

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

Infection levels averaged 8% at 15 of the 37 jack pine plantations surveyed across the region. Severe damage on the affected trees (trees with main-stem cankers) averaged 1.4% (Table 18). The highest incidence of branch cankers noted (50%) was on 3-m regeneration (over a 4-ha site) in Garvey Township, Timmins District. Main-stem infections, however, only affected 2% of the trees at the Garvey location.

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

Evaluations for Scleroderris canker conducted at 24 locations in both jack pine and red pine (*Pinus resinosa* Ait.) plantations revealed six locations of this disease across the region.

No evidence of the disease was found at the site of the sanitation cut to control this organism in Reaney Township, Chapleau District. This was the second year in which the area was free of infection. Areas of up to 5% damage were recorded on red pine over 5 ha in Chamberlain Township, Kirkland Lake District, and on jack pine in Maness, Vasiloff, Knowles, Musquash and Finan townships, Wawa District.

Table 17. Damage caused by tar spot needle cast in jack pine plantations in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
Chapleau District					
Birch	0.8	2,500	8	4.0	2.0
Hutcheon	3.8	2,222	14	4.6	1.0
McNaught	1.4	2,600	35	3.3	5.0
Cochrane District					
Marathon	1.0	2,500	100	8.0	trace
Kirkland Lake District					
Black	1.8	2,500	10	16.7	2.5
Burt	2.4	2,500	5	7.3	5.0
Burt (archive)	1.4	2,500	2	4.0	25.0
Catharine	2.5	4,222	50	14.7	1.7
Chamberlain (seed orchard)	4.3	2,000	10	33.3	3.9
Flavelle (family test)	2.2	2,450	12	1.3	trace
Gross	2.0	4,444	50	14.7	17.0
McEvay	4.0	4,000	–	18.0	35.0
Ossian (family test)	1.8	2,500	10	1.3	trace
Playfair (seed orchard)	1.3	2,500	25	4.0	3.0
Timmins District					
Denton (family test)	1.2	2,500	5	40.7	1.9
Enid	1.9	4,355	10	15.3	6.0
Evelyn (family test)	1.0	2,500	50	0.7	1.0
Garvey	2.9	2,320	4	4.6	trace
Invergarry	1.9	2,450	12	4.6	1.0
Londonderry	3.3	2,350	10	8.0	4.0
Macklem	2.9	2,500	12	25.3	9.0
Price	2.6	3,680	200	6.7	11.2
Wawa District					
Cecile	2.0	3,000	5	4.6	9.0
Chenard (seed orchard)	2.7	2,500	25	8.6	3.5
Esquega	2.9	2,500	400	2.6	1.4
Nadjiwon	1.8	2,500	4	4.6	2.2
Recollet	1.4	2,500	10	0.2	0.4

Table 18. Damage caused by western gall rust in jack pine plantations in the Northeast Region of Ontario in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Trees severely affected (%)
Chapleau District					
Bordeleau	4.9	2,000	140	12.0	0.0
Dalmas	1.9	2,500	33	1.3	0.0
Hutcheon	3.8	2,222	14	4.0	2.0
McNaught	1.4	2,600	35	0.6	0.6
Hearst District					
Chelsea	3.0	2,500	50	1.3	0.0
Kirkland Lake District					
Chamberlain[a]	4.3	2,500	10	0.7	0.0
Clifford	2.0	4,444	2.0	1.3	0.7
Gross	2.0	4,444	50	0.7	0.0
Playfair[a]	1.3	2,500	20	0.7	0.0
Timmins District					
Dublin	5.5	1,200	0.5	9.0	0.0
Garvey	2.9	2,320	4.0	50.0	2.0
Londonderry	3.3	2,350	10.5	0.7	0.7
Vrooman	8.1	2,460	16.0	19.3	13.0
Wawa District					
Cecile	2.0	2,100	6	2.6	0.7
Obatanga	24.3	1,000	5	23.0	0.0

[a] seed orchard

Minor Diseases

Linospora leaf blight, *Linospora tetraspora* G.E. Thompson

For the second consecutive year, damage was recorded on balsam poplar (*Populus balsamifera* L.) foliage across the northern portion of the region in the Hearst, Cochrane, Timmins and Kirkland Lake districts. Foliar discoloration and early leaf fall tended to be lower in most instances (10–40%) than the 100% defoliation recorded in 1991. Areas of damage ranged in size between 5 and 25 ha; however, trace populations were commonly observed across the region.

At many locations, the damage was caused by a combination of *Linospora* and two other leaf blight organisms: *Mycosphaerella populicola* G.E. Thompson and *Uncinula adunca* (Wallr. : Fr.) Lév.

Table 19. Other forest diseases.

Organism	Host(s)	Remarks
Apiosporina morbosa (Schwein. : Fr.) v. Arx Black knot	pCh	Widespread heavy presence of fungal fruiting bodies was recorded along roadsides and throughout new cutovers across Kirkland Lake District.
Chrysomyxa pirolata (Körn.) Winter Spruce cone rust	wS	Small numbers of infected cones (2%) were noted on young plantation stock (2.6 m) in McEwing Twp, Hearst District, and on 1.4-m stock in a 20-ha plantation in Turnbull Twp, Timmins District.
Ciborina whetzelii (Seaver) Seaver Ink spot of aspen	tA	Foliar damage averaged 5 to 10% on all small clumps of regeneration examined in Rennie Twp, Wawa District.
Gymnosporangium cornutum Arthur ex Kern Mountain-ash–juniper rust	aMo	Galls on branches accounted for moderate levels of foliar damage (50–75%) on regeneration in LaRonde and Bostwick twps, Wawa District.
Melampsora medusae Thüm. Larch–poplar rust	tL	Foliar damage averaged 5% on 100% of all 1.5-m-tall trees across a 1-ha plantation in Kennedy Twp, Cochrane District.
Septoria musiva Peck Septoria canker	tA	The incidence of cankers throughout a 0.5-ha stand of mature trees in Sydere Twp, Cochrane District, reached 80%.
Uredinopsis sp. Fern needle rust	bF	A single affected location was noted in Maisonville Twp, Kirkland Lake District, wherein 2-m-tall regeneration averaged 75 to 90% foliar damage.
Venturia macularis (Fr.:Fr.) E. Müller & v. Arx. Shoot blight of aspen	tA	Trace damage levels were commonly noted on 2-m regeneration throughout the Hearst and Cochrane districts.

ABIOTIC CONDITIONS

Frost Damage

Late-spring frosts throughout much of the region resulted in widespread foliar damage at high incidence levels but low levels of damage (Table 20).

The worst of the frost occurred between 23 and 28 May, with the most severe damage (at –3° to –4°C) occurring between 25 and 27 May. Similar cold periods occurred between 14 and 22 May, but the temperature only dipped to –2°C. In the Kapuskasing area, freezing weather also occurred on the 1 July weekend.

From the 23 evaluations conducted for frost damage, it appears that balsam fir (*Abies balsamea* [L.] Mill.) sustained by far the heaviest damage at all locations (100% incidence and 100% damage levels). Spruce plantations were the main concern, with 73 to 74% incidence levels; however, damage levels of 14.7% on white spruce and 6.7% on black spruce have had substantially less impact on the new branch shoots than the 100% damage recorded on balsam fir in the same areas.

Ice Damage

A severe ice storm on 20 and 21 April 1992 caused widespread damage in the form of badly bent and broken-topped trees in the northwestern portion of Hearst District. The most severe damage was recorded in the Shannon Lake area of Shannon Township. The affected area extended from Nagagamisis Provincial Park, east of the town of Opasatika, north into Hillmer Township and west to Fintry Township. All tree species were affected to some degree.

Table 20. Damage caused by frost in young coniferous plantations evaluated across the Northeast Region in 1992 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Host	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
Cochrane District						
Bragg	bS	2.6	2,200	200	100	7.0
Glackmeyer	wS	1.7	2,200	3	93.0	26.9
Kennedy	bS	0.8	2,000	5	81.3	28.3
Mann	bS	0.3	500	5	73.0	trace
Mewhinney	bS	0.3	2,000	5	97.0	9.5
Sheldon	wS	2.0	2,400	20	81.3	28.3
Teefy	bS	0.4	1,000	5	20.0	trace
Tweed	bS	0.5	2,000	5	28.0	trace
Hearst District						
McEwing	wS	2.6	1,800	25	6.0	trace
Nansen	bS	1.2	2,100	5	64.0	trace
Stoddart	bS	0.7	2,200	5	69.0	trace
Teetzel	bS	1.3	2,200	5	70.0	trace
Kirkland Lake District						
Chamberlain	bS	1.4	2,500	13	0.0	0.0
Egan	bS	0.8	1,500	20	100.0	26.0
Kimberley	bS	0.8	2,050	12	99.3	7.4
Playfair	bS	0.4	2,500	25	28.0	1.0
Timmins District						
Denton	bS	0.6	2,500	10	100.0	14.7
Evelyn	bS	0.4	2,500	15	16.0	1.2
Fortune	wS	0.9	3,555	40	62.0	3.7
Turnbull	wS	1.4	4,444	50	100.0	30.5
Zavitz	wS	1.4	2,400	50	100.0	9.2
Wawa District						
Hillsport	bF	0.9	500	1	60.0	100.0
Larkin	wS	2.8	2,200	200	78.7	3.2

Winter Drying

Two separate incidents of foliar damage due to this phenomenon were noted in the Chapleau and Kirkland Lake districts. The former case involved 2-m red pine plantation stock, and 16% of all trees examined averaged 4% foliar loss over a 1.6-ha area in Caverly Township. The latter incident was recorded at the Swastika Forest Tree Nursery in Kirkland Lake District, where approximately 3% of all white spruce stock through several compartments sustained trace foliar damage (1–5%) on their leaders. Eastern white cedar (*Thuja occidentalis* L.) stock intended for windbreaks also sustained foliar damage ranging between 20 and 30%.

FOREST HEALTH

Acid Rain National Early Warning System (ARNEWS)

The four ARNEWS plots established across Northeast Region in 1985 are monitored annually for insect and disease activity and for tree abnormalities or changes in crown configuration. Ground vegetation and regeneration plots are also monitored within the plot boundaries.

To date no symptoms of acid rain have been recorded in any of the four plots in the region, but insect and disease activity as well as whole-tree mortality were recorded in specific plots.

In the jack pine plot in Chapleau District (Deans Township, #509) relatively little damage was recorded. Only light damage by a gall rust was recorded in the crown of an off-plot tree.

In the black spruce plot in Hearst District (Hopkins Township, #510), two new trees that had been damaged (i.e., their crowns broken off) during a storm in 1990 died and another tree died, appearing to have been shaded out by dominant trees.

In the jack pine plot in Kirkland Lake District (Cane Township, #524) trees had been stressed by the previous year's drought conditions and the plot's sandy, well drained soils. Trees in the plot continue to display signs of stress in the form of sparse needles, small needle size and a lack of retention of any foliage older than 3 years. Two of the stressed trees died during the current growing season.

In the jack pine plot in Wawa District (Huotari Townpshi, #521) needle cast organisms probably (*D. ampla*) caused trace-to-light defoliation of old needles on one plot tree and two off-plot trees, and a gall rust was observed in the crown of another plot tree. The cause of death of another tree remains undetermined.

SPECIAL SURVEYS

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

The survey for the black army cutworm, which was first undertaken in 1990, is now in its third year. The database currently being established will form the basis for a correlation of moth captures with subsequent defoliation by cutworm larvae in an effort to develop a forecast risk index for newly outplanted seedlings (Table 21).

In all, five burned-over locations were assessed in the spring of 1992. At each of these locations, the herbaceous cover sustained various levels of defoliation. Two small burns (0.5 ha each) in the Kirkland Lake and Temagami districts averaged less than 1% foliar damage. Trace foliar damage (3.1%) was recorded at a Borden Township plot in Chapleau District. Finally, 11 and 2.1% defoliation levels were noted on broadleaved vegetation on burns in Marjorie and Haig townships, respectively, in Hearst District.

In all areas examined that had been planted with coniferous seedlings, defoliation by the cutworm was confined to herbaceous hosts.

Table 21. Results of the black army cutworm pheromone trapping program in the Northeast Region of Ontario in 1991.

Location (Twp)	Number of traps	Total number of male moths caught
Chapleau District		
Borden	2	21
Gogama District		
Gouin	2	13
Hearst District		
Haig	2	640
Marjorie	2	1,772
Timmins District		
Loveland	1	0[a]

[a] trap destroyed by bear

Forest Tree Nursery Report

During the 1992 field season, the three tree nurseries in the region (Chapleau, Gogama and Swastika) were each visited several times. During each visit, the nurseries were extensively checked for problems and nursery staff were also asked to identify any areas of concern.

At both the Chapleau and Gogama nurseries, the decision has been made to terminate stock production; this decision resulted in greatly reduced quantities of growing stock at both facilities. It is anticipated that all stock will be cleared from the nurseries by early 1993. In both nurseries, no significant insect or disease damage was recorded on the stock that remains.

The Swastika Nursery, although having reduced production quotas, remains operational and experienced several minor problems. The most common problem continues to be a root rot organism (*Cylindrocladium* sp.) that has been responsible for 2 to 3% seedling losses in portions of compartments C6, H6 and G19. Winter drying also accounted for approximately 2 to 3% terminal bud mortality, particularly in the southern portion of the nursery. Heavy winter drying was also recorded in 20 to 30% of the cedar growing stock that will be used for hedgerows between compartments.

Existing white spruce hedgerows sustained light damage (<1%) by both the yellowheaded spruce sawfly and the eastern spruce budworm, particularly around compartment H10.

Transplant stock received from the Thunder Bay Nursery, which appeared green when transplanted in two compartments, exhibited foliar browning and mortality on approximately 6% of the stock within a 2-week period. Subsequent sampling failed to detect the causal organism, but all indications suggest a storage problem in which an unknown mold organism caused complete cambial and root death prior to the actual transplanting.

Aphid damage was recorded on small seedlings with dead apical needles in greenhouse number 12.

Archival jack pine plantations adjacent to the nursery compartments once again exhibited low damage levels (<5%) by two foliar diseases, needlecast (*D. ampla*) and needle rust (*C. asterum*) as well as by the white pine weevil, the eastern pine shoot borer and the jack pine tip beetle.

Gypsy Moth Pheromone Trapping

Gypsy moth (*Lymantria dispar* [L.]) pheromone traps were deployed across the region at 14 provincial parks and three additional locations (access points). At 11 of the locations, male moths were caught (Table 22). Catches vary from year to year across the region, but have generally been low; at five of the locations, moths have been caught for 2 years now. At the two provincial parks in Kirkland Lake District, adult male moths have now been captured for five consecutive years but not in a manner that shows any consistent buildup of populations. Areas in which moths have been caught have the number of traps increased from the normal level (two traps) to 10 in the following year.

Seed Orchard Survey

The annual seed orchard assessment was once again conducted in mid-June and late July at the three orchards surveyed in 1991 (Tables 23–26). Assessments were performed on both black spruce and jack pine.

In the black spruce orchards, the only significant insect damage noted was attributed to the white pine weevil (13.3% of leaders were affected) at the Chapleau orchard. The balance of the insect damage was limited to minor foliar damage (6 to 25%) at all three orchards, as detailed in the tables. Abiotic damage stemming from site problems resulted in a significant proportion of chlorotic black spruce (12.7%) at the Kirkland Lake orchard. Pine needle rust was widespread at low damage levels in both the Kirkland Lake and Kapuskasing orchards.

Conditions searched for but not encountered at the black spruce orchards included frost, Armillaria root rot, cone rust, Diplodia tip blight and damage by the spruce bud moth.

Among the two jack pine orchards examined, significant insect damage was limited to the eastern pine shoot borer (14% incidence) and the jack pine tip beetle (7.3%), both of which were documented at the Kirkland Lake orchard. The only significant pest reported at the Island Lake seed orchard was the white pine weevil, which damaged leaders on 6.6% of the trees examined.

Forest diseases on jack pine foliage were the most visible problem, as pine needle rust, tar spot and needle cast infections were noted causing low levels of damage on 61.3 and 33.3%, respectively, of the trees at the Kirkland Lake orchard. The balance of the diseases are detailed in Table 26.

Forest pests searched for but not encountered among the jack pine evaluations include the jack pine sawfly, the jack pine budworm, Scleroderris canker and Armillaria root rot.

Table 22. Results of gypsy moth pheromone trapping in the Northeast Region of Ontario from 1988 to 1992.

District (Location)	Number of moths trapped				
	1988	1989	1990	1991	1992
Chapleau District					
Ivanhoe Lake Provincial Park	0	0	0	3	6
Missinaibi Lake Provincial Park	0	0	0	0	1
Missinaibi Wild River Provincial Park	0	1	1	0	0
Shoals Provincial Park	0	0	0	0	0
Spanish Chutes	–	–	–	0	3
Wakami Lake Provincial Park	0	0	0	0	9
Cochrane District					
Greenwater Provincial Park	0	0	0	0	4
Hearst District					
Cecil Trailer Park	0	0	0	0	0
Fushimi Lake Provincial Park	0	0	0	1	0
Nagagamisis Provincial Park	0	0	0	0	0
Remi Lake Provincial Park	0	0	1	2	1
Kirkland Lake District					
Esker Lakes Provincial Park	1	1	13	3	4
Kap-Kig-Iwan Provincial Park	1	3	14	1	27
Timmins District					
Dublin Twp, Muldrew Lake	–	–	–	4	1
Kettle Lakes Provincial Park	0	0	2	0	4
Wawa District					
Obatanga Provincial Park	1	0	0	0	2
White Lake Provincial Park	0	0	0	0	0

Table 23. Insect damage in three black spruce seed orchards in the Northeast Region of Ontario in 1992 (results based on an examination of 150 randomly selected trees at each location).

	Chapleau Island Lake TIA[a]	Kirkland Lake Aidie Creek	Kapuskasing Bonner Centre
Average height (m)	0.9	1.8	0.8
Area (ha)	56	13	6
Number of trees/ha	2,450	2,500	2,500
Spruce coneworm			
Trees affected (%)	0.0	0.0	0.0
Spruce budworm			
Trees affected (%)	3.3	0.0	2.7
Defoliation by budworm/coneworm (%)	5.3	0.0	0.0
Yellowheaded spruce sawfly			
Trees affected (%)	0.0	8.0	7.3
Defoliation (%)	0.0	3.3	2.4
White pine weevil			
Leaders affected (%)	13.3	1.3	0.7
Spruce bud midge			
Trees affected (%)	0.0	6.0	0.0
Aphids			
Trees affected (%)	0.0	0.0	10.0

[a] Tree Improvement Area

Table 24. Disease and abiotic damage in three black spruce seed orchards in the Northeast Region of Ontario in 1992 (results based on an examination of 150 randomly selected trees at each location).

	Chapleau Island Lake TIA[a]	Kirkland Lake Aidie Creek	Kapuskasing Bonner Centre
Average height (m)	0.9	1.8	0.8
Area (ha)	56	13	6
Number of trees/ha	2,450	2,500	2,500
Chlorosis			
Trees affected (%)	0.0	12.7	2.7
Foliar damage (%)	0.0	30.0	56.0
Needle rust			
Trees affected (%)	0.0	64.0	82.0
Foliar damage (%)	0.0	4.7	1.6

[a] Tree Improvement Area

Additional Seed Orchard and Family-test Surveys

Throughout the region (excluding the formal seed orchard survey in the previous section) an additional 24 randomly located evaluations were conducted on family-test sites and in seed orchards (Fig. 9). The more significant forest pests encountered are listed in the accompanying tables (Tables 27–28). Notable insect populations included the white pine weevil (9.3% leader damage) in Kimberly Township, Kirkland Lake District. The eastern pine shoot borer was noted on 24% of all jack pine examined in Flavelle Township, also in Kirkland Lake District. The highest incidence of shoot damage recorded (35.3%) was due to a tip moth (*Rhyacionia* sp.) in Denton Township, Timmins District, albeit at low damage levels.

Among the diseases listed in the accompanying tables, Armillaria root rot was the most devastating organism encountered: on young jack pine in McEwing Township, Hearst District, current mortality averaged 4%. Needle rusts and casts were commonly encountered, albeit at low damage levels. Significant frost damage was noted in Egan Township, Kirkland Lake District, where 100% of the young black spruce examined sustained 26% foliar damage.

Several noteworthy insects recorded at low damage levels but not included in the table include: the redheaded jack pine sawfly, in trace numbers and causing low damage levels in Playfair Township, Kirkland Lake District; the Warren's root collar weevil (*Hylobius warreni* Wood), which girdled 1.3% of the black spruce at a single location in Nansen Township, Hearst District; the spruce coneworm, noted damaging foliage at low incidence levels (2%) on

Table 25. Insect damage in two jack pine seed orchards in the Northeast Region of Ontario in 1992 (results based on an examination of 150 randomly selected trees at each location).

	Chapleau	Kirkland Lake
	Island Lake TIA[a]	Aidie Creek
Average height (m)	1.9	4.3
Number of trees/ha	2,200	2,500
Area (ha)	33	10
White pine weevil		
Leaders affected (%)	6.6	2.0
Pine shoot borer		
Laterals affected (%)	1.2	14.0
Leaders affected (%)	0.0	2.0
Jack pine tip beetle		
Leaders affected (%)	0.0	7.3
Pitch nodule maker		
Trees affected (%)	0.0	4.7
Aphids		
Trees affected (%)	0.0	2.7
Pine spittlebug		
Trees affected (%)	1.3	4.0

[a] Tree Improvement Area

Table 26. Disease and abiotic damage in two jack pine seed orchards in the Northeast Region of Ontario in 1992 (results based on an examination of 150 randomly selected trees at each location).

	Chapleau	Kirkland Lake
	Island Lake TIA[a]	Aidie Creek
Average height (m)	1.9	4.3
Number of trees/ha	2,200	2,500
Area (ha)	33	10
Needle rust		
Trees affected (%)	0	61.3
Foliar damage (%)	0	2.7
Needle cast		
Trees affected (%)	0	33.3
Foliar damage (%)	0	3.9
Western gall rust		
Trees affected (%)	1.3	0.7
Severely affected (%)	0.7	0.0
Chlorosis		
Trees affected (%)	0	5.3
Severely affected (%)	0	3.0
Frost		
Trees affected (%)	0	1.3
Foliar damage (%)	0	5.0

[a] Tree Improvement Area

young black spruce at the same plantation in Nansen Township; and the northern pitch twig moth, accounting for moderate levels of shoot damage (28%) on 100% of the jack pine examined at the Playfair seed orchard in Kirkland Lake District.

All other disclosures made during the course of these surveys are detailed in the respective regional write-ups.

Climatic Data

Temperature and precipitation have a great deal of influence on the presence and development of insect and disease organisms, and can facilitate or hinder their development greatly from year to year. Similarly, adverse weather conditions can cause abiotic damage (e.g., hail, blowdown, drought) to the host trees that could predispose them to insect or disease attack.

For this reason, we have included current weather (temperature and precipitation) data along with a column for the deviation from normal (30-year average) values for a representative selection of weather stations across the region (Table 29).

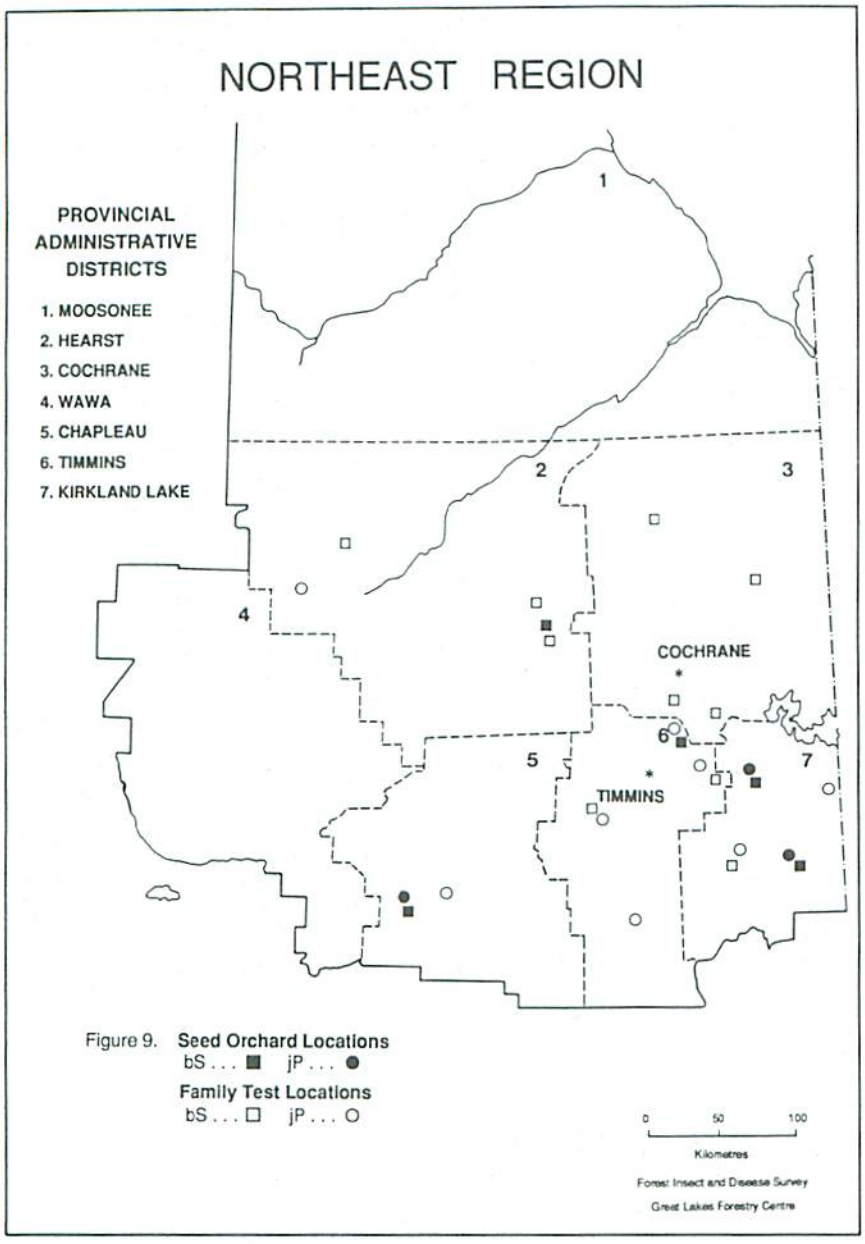

Figure 9. **Seed Orchard Locations**
bS . . . ■ jP . . . ●
Family Test Locations
bS . . . □ jP . . . ○

Table 27. Insect damage in 24 seed orchards and other family tests in the Northeast Region of Ontario in 1992 (results based on an examination of 150 randomly selected trees at each location).

District (Location)	Tree species	Estimated stand area (ha)	Estimated number of trees per ha	Avg. height of trees (m)	White pine weevil	Pine shoot borer		Jack pine tip beetle	Yellowheaded spruce sawfly		Tip moth
					Leaders attacked (%)	Trees affected (%)	Tree leaders affected (%)	Leaders affected (%)	Trees affected (%)	Foliar damage (%)	Trees affected (%)
Chapleau											
McNaught Twp	jP	35	2,600	1.4	4.0	2.6	0.0	0.0	0.0	0.0	12.0
Cochrane											
Mann Twp	bS	5	2,500	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mewhinney Twp	bS	5	2,000	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Teefy Twp	bS	5	1,000	4.2	0.0	0.0	0.0	0.0	4.0	6.8	0.0
Tweed Twp	bS	5	2,000	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hearst											
McEwing Twp	jP	5	2,100	2.7	0.0	1.3	0.0	2.0	0.0	0.0	32.7
Nansen Twp	bS	5	2,100	1.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Stoddart Twp	bS	5	2,200	0.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Teetzel Twp	bS	5	2,200	1.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0
Kirkland Lake											
Egan Twp	bS	20	1,500	0.8	2.7	0.0	0.0	0.0	0.0	0.0	0.0
Flavelle Twp	bS	12	2,450	2.2	6.0	24.0	12.7	2.7	0.0	0.0	7.3
Kimberly Twp	bS	20	2,050	0.9	9.3	0.0	0.0	0.0	0.0	0.0	0.0
Ossian Twp	jP	10	2,500	1.8	0.7	0.0	0.0	3.3	0.0	0.0	16.0
Playfair Twp[a]	jP	25	2,550	1.3	3.3	24.0	18.0	2.0	0.0	0.0	8.0
Playfair Twp[a]	bS	25	2,550	0.4	2.0	0.0	0.0	0.0	5.3	1.0	0.0
Timmins											
Evelyn Twp	jP	20	2,500	2.0	0.7	1.3	1.3	0.7	0.0	0.0	3.3
Evelyn Twp[a]	bS	50	2,550	0.4	0.0	0.0	0.0	0.0	4.0	6.3	0.0
Denton Twp	bS	5	2,075	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denton Twp	jP	5	2,500	1.2	6.0	0.0	0.0	0.0	0.0	0.0	35.3
Londonderry Twp	jP	10	2,350	3.3	6.0	2.6	0.0	0.0	0.0	0.0	2.0
Macklem Twp	jP	12	2,500	2.9	0.0	23.3	6.7	2.0	0.0	0.0	0.0
Wawa											
Chenard Twp[a]	jP	25	2,500	2.9	2.7	33.0	33.0	0.0	0.0	0.0	0.0
Finan Twp	jP	8	2,500	2.8	1.3	18.0	18.0	0.0	0.0	0.0	0.0
Hambleton Twp[a]	jP	10	4,444	0.8	0.0	53.3	42.8	0.0	0.0	0.0	0.0

[a] seed orchard

Table 28. Disease and abiotic damage in 24 seed orchards and other family tests in the Northeast Region of Ontario in 1992 (results based on an examination of 150 randomly selected trees at each location).

District (Location)	Tree species	Estimated stand area (ha)	Estimated number of trees per ha	Avg. height of trees (m)	Armillaria root rot	Western gall rust		Needle rust		Needle cast		Frost	
					Trees affected (%)	Trees affected (%)	Severely affected (%)	Trees affected (%)	Foliar damage (%)	Trees affected (%)	Foliar damage (%)	Trees affected (%)	Foliar damage (%)
Chapleau													
McNaught Twp	jP	35	2,600	1.4	0.0	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Cochrane													
Mann Twp	bS	5	2,500	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.0	8.0
Mewhinney Twp	bS	5	2,000	3.4	0.0	0.0	0.0	80.7	6.0	0.0	0.0	97.0	9.5
Teefy Twp	bS	5	1,000	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0	1.0
Tweed Twp	bS	5	2,000	4.6	0.7	0.0	0.0	95.0	1.0	0.0	0.0	28.0	1.0
Hearst													
McEwing Twp	jP	5	2,100	2.7	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nansen Twp	bS	5	2,100	1.2	0.7	0.0	0.0	97.0	0.5	0.0	0.0	64.0	1.0
Stoddart Twp	bS	5	2,200	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1.0
Teetzel Twp	bS	5	2,200	1.3	0.7	0.0	0.0	100.0	2.5	0.0	0.0	70.0	1.0
Kirkland Lake													
Egan Twp	bS	20	1,500	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	26.0
Flavelle Twp	jP	12	2,450	2.2	1.3	0.0	0.0	0.0	0.0	1.3	1.0	0.0	0.0
Kimberly Twp	bS	20	2,050	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.3	7.4
Ossian Twp	jP	10	2,500	1.8	3.3	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0
Playfair Twp[a]	jP	25	2,500	1.3	0.0	0.0	0.0	0.0	0.0	4.0	3.2	0.0	0.0
Playfair Twp[a]	bS	25	2,550	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.5
Timmins													
Evelyn Twp	jP	20	2,500	2.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0
Evelyn Twp[a]	bS	50	2,550	0.4	0.0	0.0	0.0	3.3	1.0	0.0	0.0	16.0	1.2
Denton Twp	bS	5	2,075	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	14.7
Denton Twp	jP	5	2,500	1.2	0.0	0.0	0.0	15.3	1.0	40.7	2.0	0.0	0.0
Londonderry Twp	jP	10	2,350	3.3	0.7	0.7	0.7	0.0	0.0	8.0	1.0	0.0	0.0
Macklem Twp	jP	12	2,500	2.9	0.0	4.7	1.3	0.0	0.0	25.3	9.0	0.0	0.0
Wawa													
Chenard Twp[a]	jP	25	2,500	2.9	0.0	0.0	0.0	0.0	0.0	8.6	3.5	0.0	0.0
Finan Twp	jP	8	2,500	2.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hambleton Twp[a]	jP	10	4,444	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[a] seed orchard

Table 29. Mean temperatures and total precipitation at three locations in the Northeast Region of Ontario in 1992.

Location	Month	Mean temperature (°C) Normal	Mean temperature (°C) Actual	Deviation from normal (°C)	Total precipitation (mm) Normal	Total precipitation (mm) Actual	Deviation from normal (mm)
Chapleau	January	–16.9	–14.5	+2.4	46.9	52.4	+5.5
Airport	February	–15.8	–12.3	+3.5	34.5	55.0	+20.5
	March	–8.3	–9.2	–0.9	56.2	28.0	–28.2
	April	0.6	–0.1	–0.7	59.3	47.8	–11.5
	May	8.6	9.7	+1.1	73.8	45.6	–28.2
	June	14.3	12.9	–1.4	100.4	60.6	–39.8
	July	16.8	13.7	–3.1	81.8	67.4	–14.4
	August	15.4	13.8	–1.6	86.2	66.8	–19.4
	September	10.4	10.6	+0.2	101.5	107.0	+5.5
	October	4.9	n/a[a]	n/a	75.7	n/a	n/a
	November	–3.5	n/a	n/a	64.2	n/a	n/a
	December	–12.8	n/a	n/a	53.5	n/a	n/a
Earlton	January	–16.3	–15.3	+1.0	56.4	37.0	–19.4
Airport	February	–14.1	–14.0	+0.1	47.2	43.1	–4.1
	March	–7.6	–9.9	–2.3	58.0	46.0	–12.0
	April	1.9	1.2	–0.7	50.0	49.6	–0.4
	May	9.8	10.2	+0.4	61.3	29.4	–31.9
	June	15.2	13.4	–1.8	89.2	48.9	–40.3
	July	17.7	15.0	–2.7	80.8	103.8	+23.0
	August	16.2	14.9	–1.3	83.4	116.0	+32.6
	September	11.1	11.1	0.0	99.1	121.6	+22.5
	October	5.4	3.3	–2.1	70.0	54.1	–15.9
	November	–2.5	–3.6	–1.1	70.6	70.2	–0.4
	December	–12.6	–10.3	+2.3	65.3	51.5	–13.8
Kapuskasing	January	–18.6	–16.6	+2.0	53.6	57.6	+4.0
Airport	February	–16.2	–16.4	–0.2	43.0	24.8	–18.2
	March	–9.4	–8.1	+1.3	55.4	22.1	–18.2
	April	0.5	–0.7	–1.2	53.2	79.0	+25.8
	May	8.3	9.1	+0.8	74.3	54.2	–20.1
	June	14.1	12.1	–2.0	84.7	60.2	–24.5
	July	16.8	14.7	–2.1	96.3	110.2	+13.9
	August	15.3	13.9	–1.4	92.5	78.6	–13.9
	September	10.0	10.6	+0.6	94.4	151.2	+56.8
	October	4.4	2.1	–2.3	77.4	91.0	+13.6
	November	–2.4	–5.3	–2.9	80.1	90.4	+10.3
	December	–16.4	–13.0	+3.4	53.3	100.3	+47.0

[a] n/a = not available