

**RESULTS OF FOREST INSECT
AND DISEASE SURVEYS IN THE
NORTHEAST REGION OF ONTARIO,
1995**

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

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SURVEY HIGHLIGHTS

This report reviews the more important insect, disease, and abiotic conditions encountered during 1995 aerial and ground surveys in the Northeast Region of Ontario.

A number of hardwood pests continued to maintain a presence, albeit at reduced levels. Infestations of the birch skeletonizer and early aspen leafcurler were greatly reduced, and populations of the large aspen tortrix collapsed. The area of damage caused by the forest tent caterpillar remained relatively unchanged at 241 787 ha. Another pest of trembling aspen, the aspen twoleaf tier, was encountered at damaging levels after a 25-year absence. It was responsible for 3 008 502 ha of moderate to severe damage.

The region continued to host two major conifer pests. Although a new infestation of the eastern spruce budworm was found in the Chapleau District, the overall area of damage decreased slightly to 277 554 ha. Populations of the jack pine budworm increased, and two separate infestations totaling 4 332 ha were mapped. Little change is forecast for populations of the eastern spruce budworm or the jack pine budworm in 1996.

The following insect and disease pests were assessed in a number of young plantations: eastern pine shoot borer, yellowheaded spruce sawfly, white pine weevil, *Armillaria* root rot, spruce needle rust, pine needle rust, sweet fern blister rust, tar spot needle cast, and scleroderris canker. Drought and frost damage were two abiotic conditions encountered during routine surveys.

The extensive plot network was also revisited. This included eight Acid Rain National Early Warning System (ARNEWS) plots, 66 eastern spruce budworm study plots, and 25 jack pine budworm study plots established under a project funded by the Northern Ontario Development Agreement (NODA), Northern Forestry Program (NFP).

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)

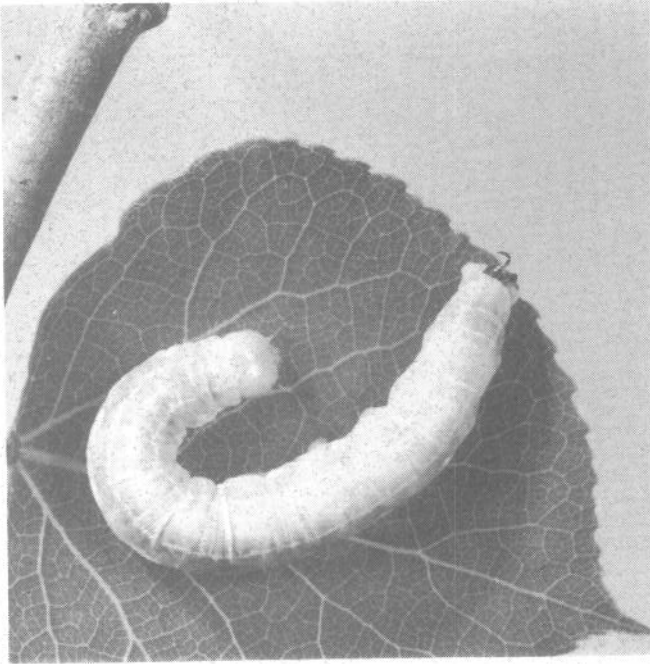
These tables provide information on two types of pest:

- (1) those that are of minor importance and 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, did not cause serious damage in 1995.

The valuable assistance and cooperation extended to the authors by Ontario Ministry of Natural Resources (OMNR) staff and woods industry personnel during the 1995 field season are gratefully acknowledged.

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FRONTISPIECE



Larva (destructive stage) of the aspen twoleaf tier, *Energia decolor* (Wlk.), which caused widespread moderate to severe defoliation of trembling aspen (*Populus tremuloides* Michx.) in 1995.



Large numbers of adults (nuisance stage) of the aspen twoleaf tier prompted numerous inquiries and complaints from parts of the Northeast Region in 1995.

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INSECTS

Major Insects

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

The area infested by the birch skeletonizer was greatly reduced in 1995. Only 59 603 ha were affected, a decrease of 2 432 152 ha from 1994.

The present area of damage within the Northeast Region was confined to the very southern part of the Kirkland Lake District, spreading southward into the Temagami District of the Central Region (Fig. 1).

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 condition of white birch trees affected by the birch skeletonizer was further compromised by drought, which caused discoloration and premature leaf fall.

A further population decline is expected to occur in 1996, and this could cause the infestation to break up into isolated pockets or to disappear completely.

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

Populations of the large aspen tortrix collapsed to near endemic levels in 1995 from the large infestation reported the previous year.

The 1994 infestation, encompassing 193 687 ha, was situated in the northeast corner of the Wawa District. In 1995 only light defoliation of trembling aspen (*Populus tremuloides* Michx.), averaging 20 percent, was noted on widely scattered trees in Winget, Rennie, and Leeson townships.

Examination of larvae in a number of affected stands revealed numerous diseased specimens, which in turn indicate a continued collapse of these residual populations.

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

Provincial Situation

For the third consecutive year, the area of moderate to severe defoliation caused by the eastern spruce budworm declined. The provincewide total in 1995, as determined by ground and aerial surveys, was 3 451 098 ha.

This represents a 815 588 ha decrease from the previous year (Fig. 2). Only the Southern Region recorded an overall increase (Table 1).

Increased populations in a number of districts, including Dryden, Hearst, and Sioux Lookout, were more than offset by large declines in the Fort Frances, Nipigon, Red Lake, and Thunder Bay districts and by smaller decreases in the Wawa and Kenora districts. In the southern part of the province declines were recorded in the Algonquin Park and Cambridge districts. Additional increases were also noted in the North Bay, Sault Ste. Marie, Sudbury, Bancroft, Pembroke, and Chapleau districts in the north and in the Kemptville and Tweed districts in the south.

Spruce budworm induced mortality of balsam fir (*Abies balsamea* [L.] Mill.) and white spruce (*Picea glauca* [Moench] Voss) increased in 1995 to

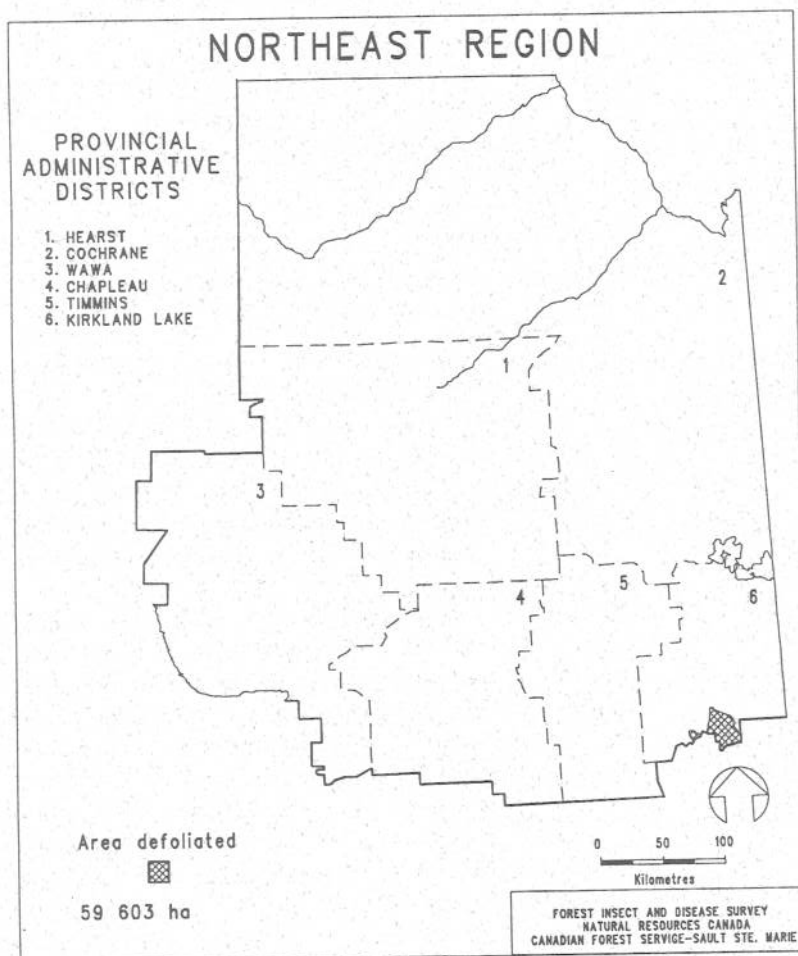


Figure 1. Areas of moderate to severe defoliation caused by the birch skeletonizer (*Bucculatrix canadensisella* Cham.) in 1995.

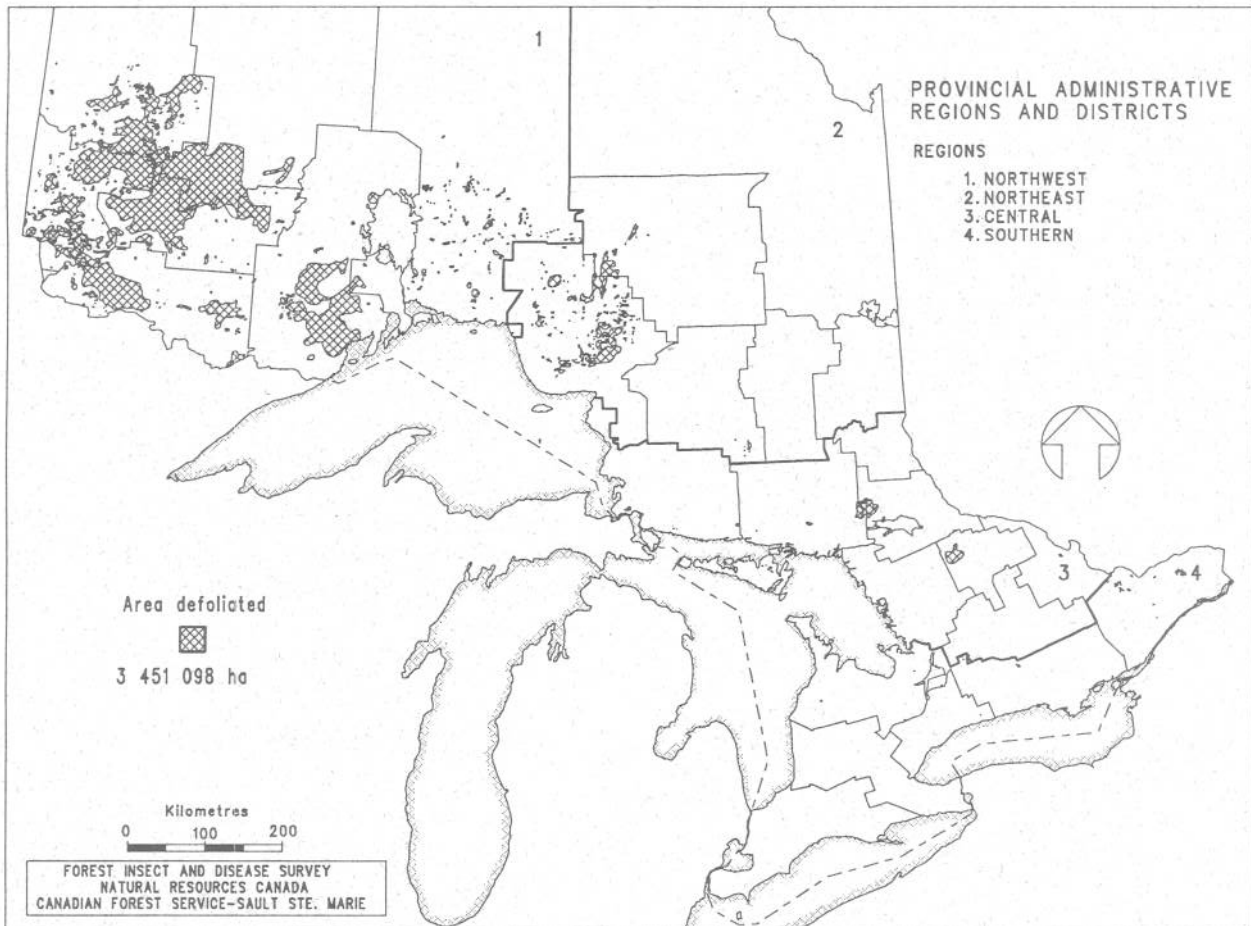


Figure 2. Areas of moderate to severe defoliation caused by the eastern spruce budworm (*Choristoneura fumiferana* [Clem.] in 1995.

Table 1. Gross area of moderate to severe defoliation caused by the eastern spruce budworm in Ontario from 1992 to 1995.

Region	Area of moderate to severe defoliation (ha)			
	1992	1993	1994	1995
Central	30 775	44 662	108 955	93 498
Northeast	2 090 080	1 650 677	283 590	277 554
Northwest	7 438 833	7 295 736	3 873 424	3 073 489
Southern	24	102	687	6 557
Total	9 595 762	8 991 177	4 266 656	3 451 098

encompass 7 910 424 ha, an increase of 127 088 ha over the previous year (Fig. 3). The largest increases were found in the Nipigon and Thunder Bay districts of the Northwest Region (Table 2).

Northeast Region

The 1995 infestation of eastern spruce budworm decreased slightly from the 283 590 ha recorded in 1994 to 277 554 ha (Table 3). Although a new infestation was mapped in the Chapleau District and some expansion occurred in the southwest corner of the Hearst District,

decreases were recorded in the northeast corner of the Wawa District (Fig. 4).

Damage, in the form of numerous pockets of moderate to severe defoliation, was mapped in the Wawa District, in the Pearly-Otter lakes area, south along the Manitouwadge Highway into Pukaskwa National Park, east to the Dubreuville area, and north to the Kabinakagami-Cameron lakes and Hornepayne area. The defoliation

also continued north into Arnott Township, Hearst District. Also in the Hearst District a single area of defoliation recurred in Rogers and Studholme townships, and three small infestations (20 ha) were mapped in Stoddart Township. A large part of the damage in the Hearst District was mapped as moderate (<75 percent defoliation). This decreased intensity coincided with an area of frost damaged balsam fir (documented later in this report). The early June frost was severe enough to kill spruce budworm larvae, and a count in Frost Township revealed 15 percent larval mortality with another 15 percent sluggish and sick looking.

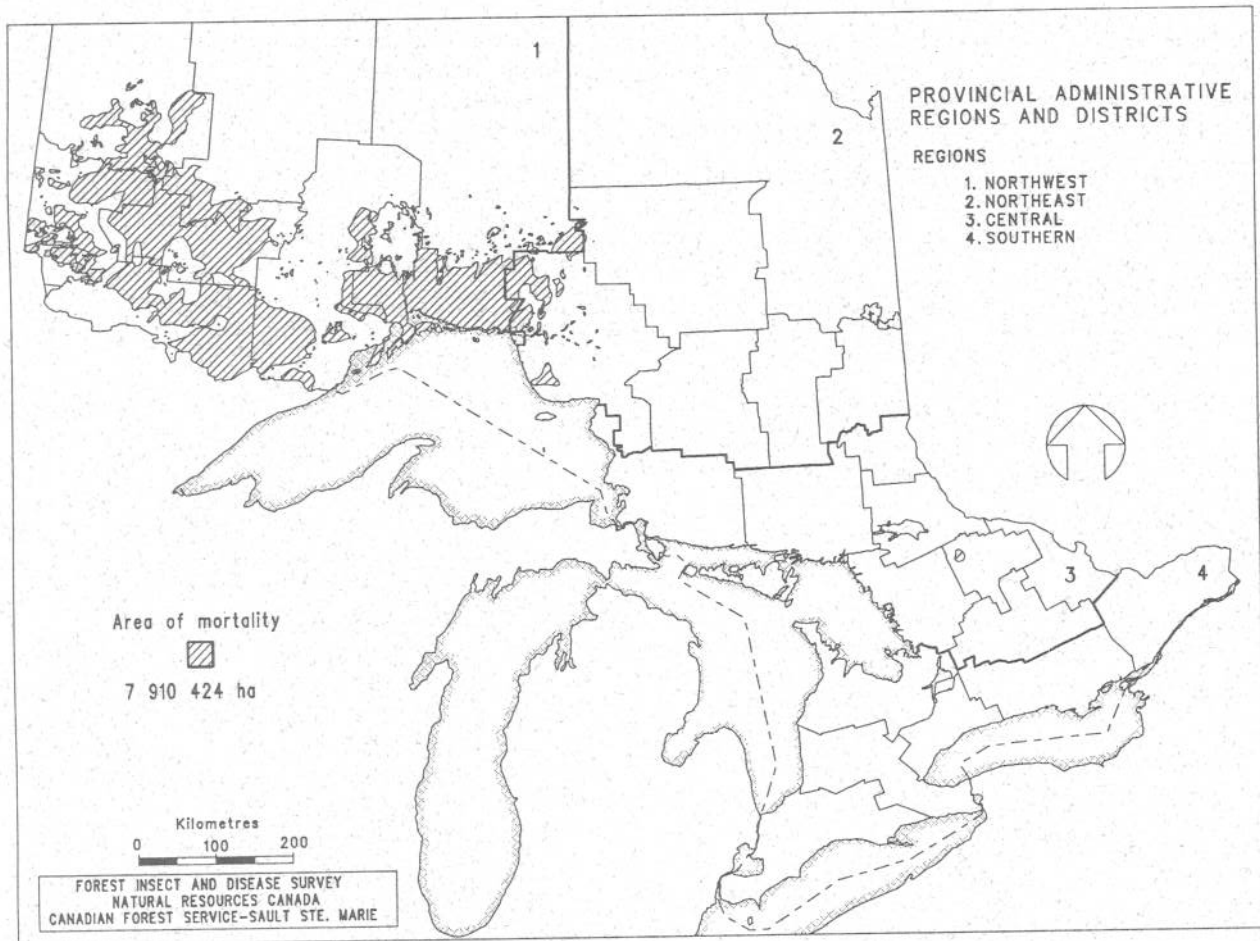


Figure 3. Areas within which the eastern spruce budworm (*Choristoneura fumiferana* [Clem.]) caused whole-tree and top mortality in balsam fir in 1995.

Moderate to severe defoliation of balsam fir and white spruce was mapped for the first time in a number of years in the Chapleau District. The largest area delineated was on the east shore of Ramsay Lake in Elizabeth and Margaret townships. Several additional pockets of damage were also recorded, thereby bringing the district total to 2 695 ha.

The area of spruce budworm induced mortality of balsam fir and white spruce increased by 3 380 ha. This resulted in a regional total of 431 802 ha. Most of the recent damage occurred in the northeast corner of the Wawa District, shared with a much larger area in the Nipigon District. Additional pockets were mapped in Mosambik and Doucett townships, Wawa District. Balsam fir tree mortality is part of the information derived from the eastern spruce budworm Northern

Table 2. Gross area of spruce budworm associated tree mortality in Ontario in 1994 and 1995.

Region (District)	Total area in hectares		Area increase in hectares
	1994	1995	
Central			
Algonquin Park	15 582	15 582	0
Northeast			
Hearst	—	10 156	10 156
Wawa	418 266	421 646	3 380
Northwest			
Dryden	1 282 939	1 289 550	6 611
Fort Frances	1 376 665	1 376 665	0
Kenora	906 587	906 587	0
Nipigon	1 704 588	1 750 261	45 673
Red Lake	631 132	631 132	0
Sioux Lookout	440 648	441 512	864
Thunder Bay	1 006 928	1 067 332	60 404
Total	7 783 336	7 910 424	127 088

Table 3. Gross area of moderate to severe defoliation caused by the eastern spruce budworm in the Northeast Region of Ontario in 1994 and 1995.

District	Area of moderate to severe defoliation (ha)		Change in ha
	1994	1995	
Chapleau	0	2 695	+2 695
Hearst	42 245	53 413	+11 16
Wawa	241 340	221 446	-19 889
Total	283 590	277 554	-6 026

Ontario Development Agreement (NODA) plots established in the region. At one NODA plot in Leslie Township, Wawa District, mortality of balsam fir increased from 67 percent in 1994 to 75 percent in 1995. Mortality averaged 69 percent at another location in Wicksteed Township, Wawa District and 45 percent at a NODA plot in Frost Township, Hearst District.

A reduced number of egg-mass locations was sampled in 1995. The majority of samples were taken from the eastern spruce budworm NODA plots. Forecast results are listed in Table 4.

The 1995 pheromone trapping program was reduced to 42 locations. A comparison of results for 1994 and 1995, as presented in Table 5, showed significant decreases in the number of male moths captured this year. Reduced catches were recorded at 29 of 31 locations trapped in both years.

Taking into account the egg-mass and pheromone trapping results, as well as the age of the infestation, a similar or reduced infestation can be forecast for the Hearst and Wawa districts. Although no egg-mass samples were taken from the infestation in the Chapleau District, it is expected to expand in 1996 because of its young age and the abundance of host in the area.

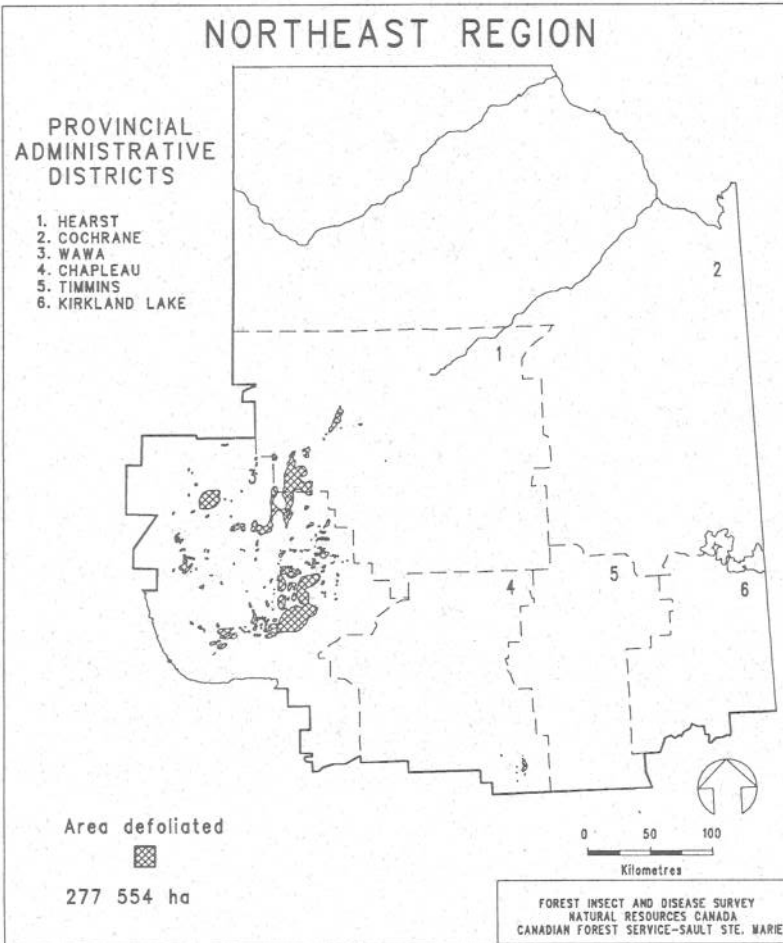


Figure 4. Areas of moderate to severe defoliation caused by the eastern spruce budworm (*Choristoneura fumiferana* [Clem.]) in 1995.

Table 4. Summary of defoliation and egg-mass counts in 1995 at 101 locations in the Northeast Region of Ontario and infestation forecasts for 1996.

Location	Host ^a	Estimated defoliation in 1995 (%)	Number of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1996 ^b	Accumulated damage ^c
<i>Chapleau District</i>					
Barclay Township	bF	2	0	N	0
*Birch Township	bF	0	0	N	0
*Birch Township	wS	0	0	N	0
*Blamey Township	bF	0	10	L	0
*Dupuis Township	bF	1	0	N	0
*Fawn Township	bF	1	0	N	0
*Fawn Township	wS	2	0	N	0
Genier Township	bF	0	0	N	0
*Ivanhoe Township	bF	0	0	N	0
*Neelands Township	bF	0	0	N	0
*Peters Township	bF	0	0	N	0
*Peters Township	wS	0	0	N	0
*Racine Township	bF	0	15	L-M	0
*Sandy Township	bF	0	0	N	0
*Sandy Township	wS	0	0	N	0
*Shipley Township	bF	2	0	N	0
*Shipley Township	wS	1	0	N	0
<i>Cochrane District</i>					
*Dempsey Township	bF	0	0	N	0
*Freele Township	bF	0	0	N	0
*Homuth Township	bF	0	0	N	0
*Nesbitt Township	bF	0	0	N	0
*Nesbitt Township	wS	0	0	N	0
*Potter Township—Stand 2365	bF	0	0	N	0
*Potter Township—Stand 9186	bF	0	0	N	0
*Potter Township—Stand 9186	wS	0	7	L	0
St. John Township	bF	0	0	N	0
<i>Hearst District</i>					
*Ford Township	bF	0	0	N	0
*Franz Township	bF	14	0	N	0
*Frost Township	bF	63	31	L-M	3
*Frost Township	wS	94	254	S	3
*Fushimi Township	bF	0	20	L-M	1
*Fushimi Township	wS	0	0	N	1
*Fushimi Township	bF	0	0	N	1
*Fushimi Prov. Park	bF	0	0	N	1
*Fushimi Prov. Park	wS	0	0	N	0
*Hanlan Township	bF	1	0	N	0
*Hanlan Township	wS	1	0	N	0
*Landry Township	bF	0	0	N	1
*Landry Township	wS	2	0	N	1
*McMillan Township	bF	0	0	N	2
*McMillan Township	wS	11	69	M-S	2
*Neely Township—Stand 1156	bF	0	0	N	0
*Neely Township—Stand 1156	wS	0	0	N	0
*Orkney Township	bF	0	0	N	0
*Orkney Township	wS	0	0	N	0

(cont'd)

Table 4. Summary of defoliation and egg-mass counts in 1995 at 101 locations in the Northeast Region of Ontario and infestation forecasts for 1996. (cont'd)

Location	Host ^a	Estimated defoliation in 1995 (%)	Number of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1996 ^b	Accumulated damage ^c
<i>Hearst District (concl.)</i>					
*Oscar Township	bF	0	0	N	0
*Oscar Township	wS	0	0	N	0
*Pearce Township—Stand 4542	bF	0	0	N	0
*Pearce Township—Stand 4542	wS	0	0	N	0
*Pearce Township—Stand 5461	bF	0	0	N	0
*Pearce Township—Stand 5461	wS	0	0	N	0
*Ritchie Township	bF	0	0	N	1
*Ritchie Township	wS	0	0	N	1
*Rogers Township—Stand 4306	bF	89	292	S	2
*Rogers Township—Stand 4306	wS	65	452	S	2
*Seaton Township	bF	0	0	N	0
*Seaton Township	wS	0	0	N	0
*Shearer Township—Stand 5391	bF	0	0	N	0
*Shearer Township—Stand 5391	wS	0	10	L	0
*Teetzel Township—Stand 2335	bF	0	0	N	0
*Teetzel Township—Stand 2335	wS	0	0	N	0
*Templeton Township—Stand 93	bF	0	0	N	0
*Templeton Township—Stand 93	wS	0	0	N	0
*Township 238—Stand 4594	bF	0	0	N	0
*Township 238—Stand 4843	wS	0	0	N	1
<i>Kirkland Lake District</i>					
*Arnold Township	bF	0	0	N	0
*Boston Township	bF	0	0	N	0
*Boston Township	wS	1	0	N	0
*Elliot Township	bF	1	0	N	0
*Lamplugh Township	bF	1	0	N	0
*Maisonville Township	bF	1	0	N	0
*Mickle Township	bF	2	0	N	0
*Tyrrell Township	bF	1	0	N	0
<i>Timmins District</i>					
*Doyle Township	bF	0	0	N	0
*Doyle Township	wS	0	0	N	0
*Edinburgh Township	bF	1	0	N	0
*Eldorado Township	bF	2	0	N	0
*Enid Township	bF	0	0	N	0
*Enid Township	wS	0	0	N	0
*Hazen Township	bF	1	0	N	0
*Invergarry Township	bF	0	0	N	0
*Marquette Township	bF	1	0	N	0
*Massey Township	bF	3	0	N	0
*Noble Township	bF	1	0	N	0
*Sewell Township	bF	0	0	N	0
*Sewell Township	wS	0	0	N	0
*St. Louis Township	bF	0	0	N	0
*St. Louis Township	wS	0	0	N	0

(cont'd)

Table 4. Summary of defoliation and egg-mass counts in 1995 at 101 locations in the Northeast Region of Ontario and infestation forecasts for 1996. (concl.)

Location	Host ^a	Estimated defoliation in 1995 (%)	Number of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1996 ^b	Accumulated damage ^c
<i>Wawa District</i>					
Beaton Township	wS	54	11	L	
*Dumas Township	bF	90	392	S	2
*Dumas Township	wS	70	430	S	2
*Hunt Township	wS	20	30	L-M	1
*Laberge Township	bF	18	0	N	2
*Lalibert Township	bF	0	0	N	0
*Lalibert Township	wS	0	0	N	0
*Leslie Township-Stand 266	bF	4	0	N	3
*Leslie Township-Stand 266	wS	5	0	N	2
*Leslie Township-Stand 352	bF	2	12	L	7
*Wicksteed Township-Stand 156	bF	14	30	L-M	2
*Wicksteed Township-Stand 521	bF	14	0	N	3
*Wicksteed Township-Stand 521	wS	37	88	M-S	3
*Wicksteed Township-Stand 552	wS	86	180	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 percent total defoliation, usually one season of severe defoliation; 2 = moderate damage, 25 to 60 percent total defoliation, two or three seasons of severe defoliation; 3 = severe damage, 60 to 80 percent total defoliation, three to five seasons of severe defoliation, will recover; 4 = moribund or dying, 80 to 100 percent total defoliation, crowns gray in appearance, 50-150 cm top dead or bare; 5 = <25 percent of stand dead; 6 = 25 to 50 percent of stand dead; 7 = 51 to 70 percent of stand dead; 8 = >70 percent of stand dead; 9 = <25 percent of stand dead, no significant (0-25 percent) defoliation for several years; + = 25 to 50 percent of stand dead, no significant defoliation for several years; - = 51 to 70 percent of stand dead, no significant defoliation for several years.

* SBW NODA IMPACT PLOT.

Table 5. Captures of male eastern spruce budworm moths in pheromone traps across six districts of the Northeast Region of Ontario, 1991–1995. (Three traps were located at each location.)

Location (Township)	Total number of moths captured					Percent change 1994–1995
	1991	1992	1993	1994	1995	
<i>Chapleau District</i>						
Barclay	–	581 ^a	332	520	97	-81
Birch	–	–	–	188	82	-56
Dupuis	–	–	–	–	67	–
Fawn	–	–	–	–	31	–
Genier	–	271 ^a	106	201	18	-91
Ivanhoe	–	709	847	38	11	-71
Neelands	–	1 069	85	194	66	-65
Peters	109	704 ^a	279	273	22	-92
Racine	–	330	0	102	–	–
Sandy	–	–	34	171	45	-74
<i>Cochrane District</i>						
Homuth	–	–	–	–	21	–
Nesbitt	–	1 533	165	61	24	-61
St. John	–	–	–	–	39	–
<i>Hearst District</i>						
Ford	–	–	–	25	17	-32
Franz	–	–	–	919	81	-91
Frost	2 906	2 999	2 555	2 549	265	-90
Landry	–	1 322 ^a	395	560	20	-96
McMillan	–	–	–	1106	50	-95
Neely	–	–	–	–	61	–
Oscar	–	–	–	361	20	-95
Pearce	–	–	–	72	11	-85
Ritchie	–	–	–	193	20	-90
Rogers	–	–	–	1 976	1 618	-18
Seaton	–	–	–	72	17	-76
Shearer	–	–	–	–	69	–
Teetzel	–	–	–	–	11	–
<i>Kirkland Lake District</i>						
Boston	247	260	101	91	122	+34
Lamplugh	–	321	55	50	87	+74
Maisonville	301	229	60	98	58	-41
Mickle	–	345	147	143	121	-15
Tyrrell	–	502	190	257	60	-77
<i>Timmins District</i>						
Doyle	–	–	–	118	56	-52
Eldorado	–	370	93	77	35	-55
Enid	–	712	146	170	35	-79
Marquette	–	–	–	134	108	-19
Sewell	–	702	89	102	82	-20
St. Louis	–	–	–	–	42	–
<i>Wawa District</i>						
Breckenridge	–	1 728	2 912	2 893	143	-95
Laberge	–	–	–	–	170	–
Leslie	–	–	–	521	96	-81
Mikano	–	7 210	1 656 ^a	641	–	–
Wicksteed	1 699 ^a	3 239	507 ^b	756	93	-81

^a One trap destroyed.

^b Two traps destroyed.

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

Provincial Situation

The provincewide total of moderate to severe defoliation caused by the jack pine budworm in 1995 declined to 293 292 ha from 419 344 ha recorded the previous year (Fig. 5). Except for 4 332 ha of medium to heavy infestation in the Northeast Region, the rest of the damage was confined to the Central Region. A large part of the decline took place in the Sudbury District. Slight population decreases were also recorded in the Temagami and Timmins districts. These decreases were offset somewhat by increases in the Algonquin Park, North Bay, Parry Sound, Pembroke, and Sault Ste. Marie districts, and by a new infestation in the Chapleau District.

In 1995, the Ontario Ministry of Natural Resources and E.B. Eddy Forest Products conducted aerial spraying operations on approximately 50 200 ha of jack pine (*Pinus banksiana* Lamb.) stands. These were located in the Upper and Lower Spanish River forest management agreement areas and in the Sudbury and Spanish River Crown management units. Foray 76 B was applied between 18 and 25 June.

Northeast Region

A total of 4 332 ha of moderate to severe defoliation was mapped in the Northeast Region in 1995. This represented an increase of 2 212 ha over the previous year. Two separate bodies of medium to heavy infestation were recorded. One, in the Timmins District, recurred for the second consecutive year. It was bisected by Highway 560 and encompassed parts of Vrooman and Westbrook townships (Fig. 6). Although expanding east and west, budworm populations decreased in the northern part of the previously infested area. This resulted in a slight decrease of 374 ha to total 3 076 ha in 1995. Defoliation estimates were carried out in four Northern Ontario Agreement Development plots; one in Vrooman Township and the others in Westbrook Township. Individual tree defoliation ranged from 10 to 90 percent, but averaged 51 percent in the stand in Vrooman Township. At the three locations in Westbrook Township defoliation ranged from 5 to 90 percent, but averaged 27, 43, and 64 percent in the respective stands. Aerial spray operations were carried out by the OMNR and E.B. Eddy Forest Products in stands of jack pine in parts of Benneweis, Champagne, Vrooman, and Westbrook townships. A total of 5 348 ha was treated using Foray 76 B.

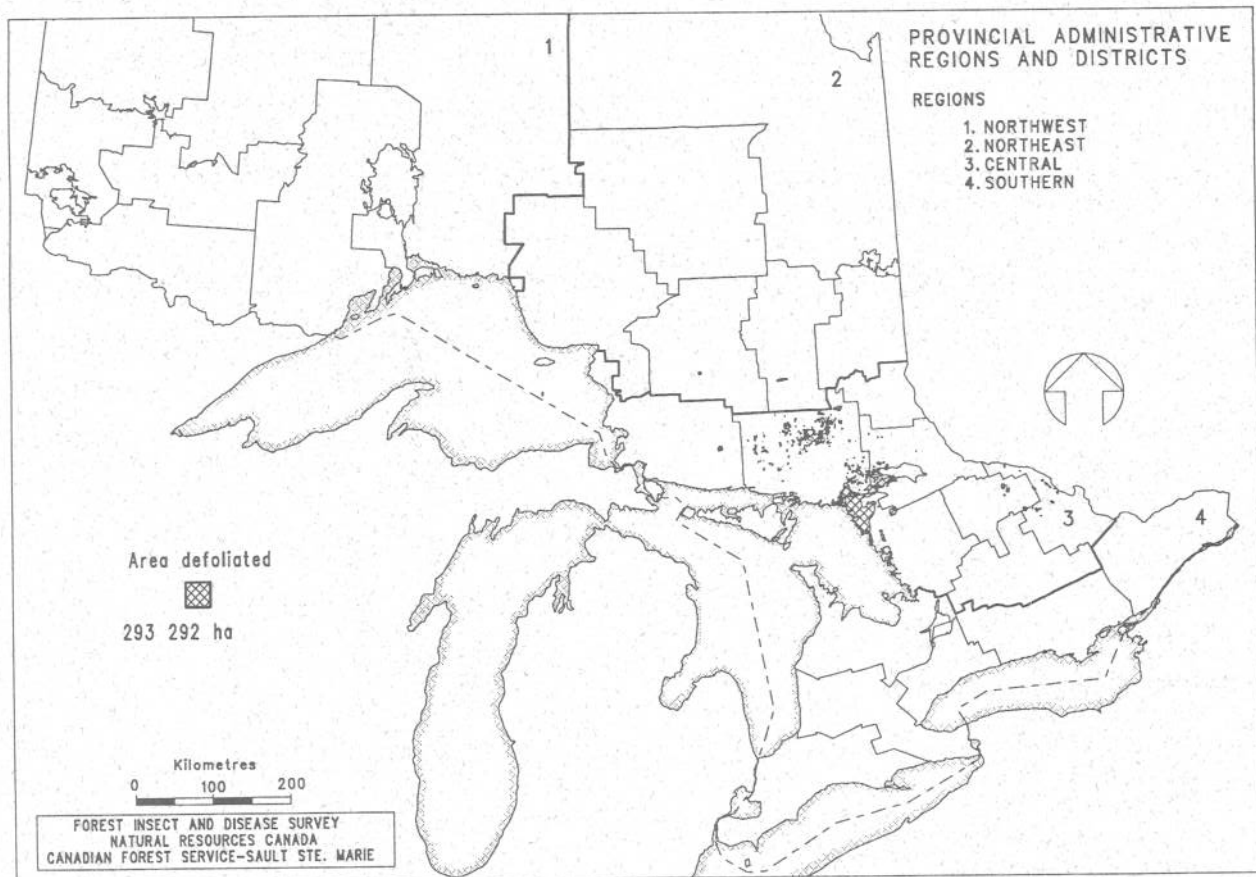


Figure 5. Areas of moderate to severe defoliation caused by the jack pine budworm (*Choristoneura pinus pinus* Free.) in 1995.

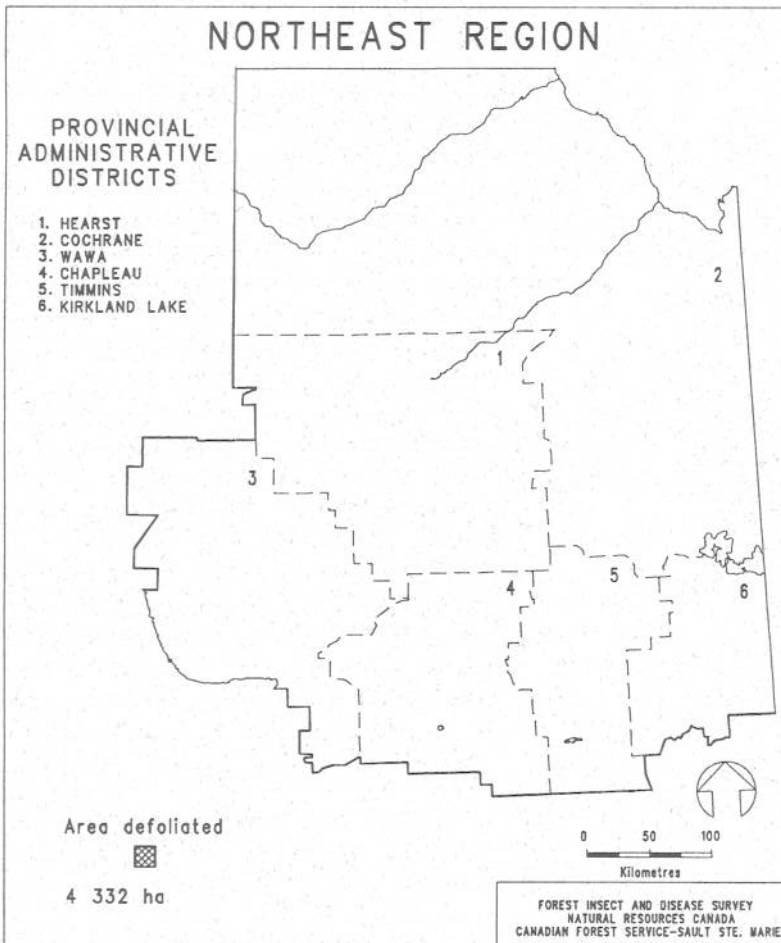


Figure 6. Areas of moderate to severe defoliation caused by the jack pine budworm (*Choristoneura pinus pinus* Free.) in 1995.

After an absence of several years, high populations of jack pine budworm were found in the Chapleau District. This infestation, comprising 1 256 ha, occupied parts of Nimitz, De Gaulle, Reaney, and Storm townships. Defoliation here was variable, but ranged as high as 85 percent for individual trees. On an overall stand level defoliation was much less, and averaged only 10 to 40 percent.

Egg-mass samples were collected at 29 locations across the region (Table 6). In the Chapleau District all 15 samples were taken in jack pine budworm NODA plots, none of which were in the area infested. However, overwintering larval samples (L2's) were taken from 15 stands of jack pine in De Gaulle, Nimitz, and Strom townships. The larval counts from these samples revealed that moderate to severe defoliation is likely in seven of the stands.

Looking at the egg-mass results from the 14 locations sampled in the Timmins District, medium to heavy infestations of jack pine budworm are forecast for Vrooman and Westbrook townships in 1996, but there should be little spread outside these areas.

Table 6. Summary of defoliation and egg-mass counts in 1995 at 29 locations in the Northeast Region of Ontario and infestation forecasts for 1996.

Location	Estimated defoliation in 1995 (%)	Total number of egg masses on six 61-cm branch tips	Infestation forecasts for 1996 ^a
<i>Chapleau District</i>			
*Bazett Township	0	0	N
*Deans Township—Stand 103	0	0	N
*Dupuis Township	0	0	N
*Edith Township	0	0	N
*Fawn Township—Stand 157	0	0	N
+ *Fawn Township—Stand 177	0	0	N
+ *Fawn Township—Stand 422	0	0	N
*Fingal Township	0	0	N
*Hall Township—Stand 340	0	0	N
*Ivy Township—Stand 65	0	0	N
*Ivy Township—Stand 311	0	0	N
+ *Kaplan Township—Stand 345	0	0	N
+ *Kaplan Township—Stand 458	0	0	N
*Nimitz Township—Stand 149	0	0	N
*Osway Township	0	0	N

(cont'd)

Table 6. Summary of defoliation and egg-mass counts in 1995 at 29 locations in the Northeast Region of Ontario and infestation forecasts for 1996. (concl.)

Location	Estimated defoliation in 1995 (%)	Total number of egg masses on six 61-cm branch tips	Infestation forecasts for 1996 ^a
<i>Timmins District</i>			
^c Garibaldi Township—Stand 4194	0	0	N
^c Garvey Township—Stand 1884	0	0	N
* Invergarry Township—Stand 90	1	1	L
+* Invergarry Township—Stand 121	5	1	L
* Macmurchy Township—Stand 2389	0	1	L
^c Miramichi Township—Stand 9606	8	1	L
^c Ogilvie Township—Stand 8481	1	0	N
* Paudash Township—Stand 298	0	0	N
* Stetham Township—Stand 211	0	0	N
* Vrooman Township—Stand 95	48	5	M
^b * Westbrook Township—Stand 67	29	6	H
^b * Westbrook Township—Stand 72	66	5	M
^b +* Westbrook Township—Stand 72	8	1	L
^b +* Westbrook Township—Stand 98	30	4	M

* JPBW NODA PLOT.

+ Immature jack pine stand.

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

^b Aerially sprayed *B.t.*, 1995.

^c OMNR request.

Aspen Twoleaf Tier, *Enargia decolor* (Wik.)

Widespread moderate to severe defoliation of trembling aspen by the aspen twoleaf tier was documented across 3 008 502 ha in the region in 1995. A continuous band of damage, mapped west from the Quebec border into the Chapleau District, occupied a large part of the Kirkland Lake and Timmins districts (Fig. 7). The last time large numbers of this pest were recorded in the region was 25 years ago.

In the current infestation all age classes of trees were damaged, although defoliation was often variable from one stand to the next or even within the same stand. In a single stand large groups of trees experienced 90 percent defoliation; others had only 10 to 20 percent defoliation.

The aspen twoleaf tier overwinters in the egg stage in the soil. Larvae emerge in the spring as the aspen leaves unfurl, fasten two leaves together with silk, and begin feeding. They feed until late July, when the pale green larvae are about 30 mm long, and then drop to the ground

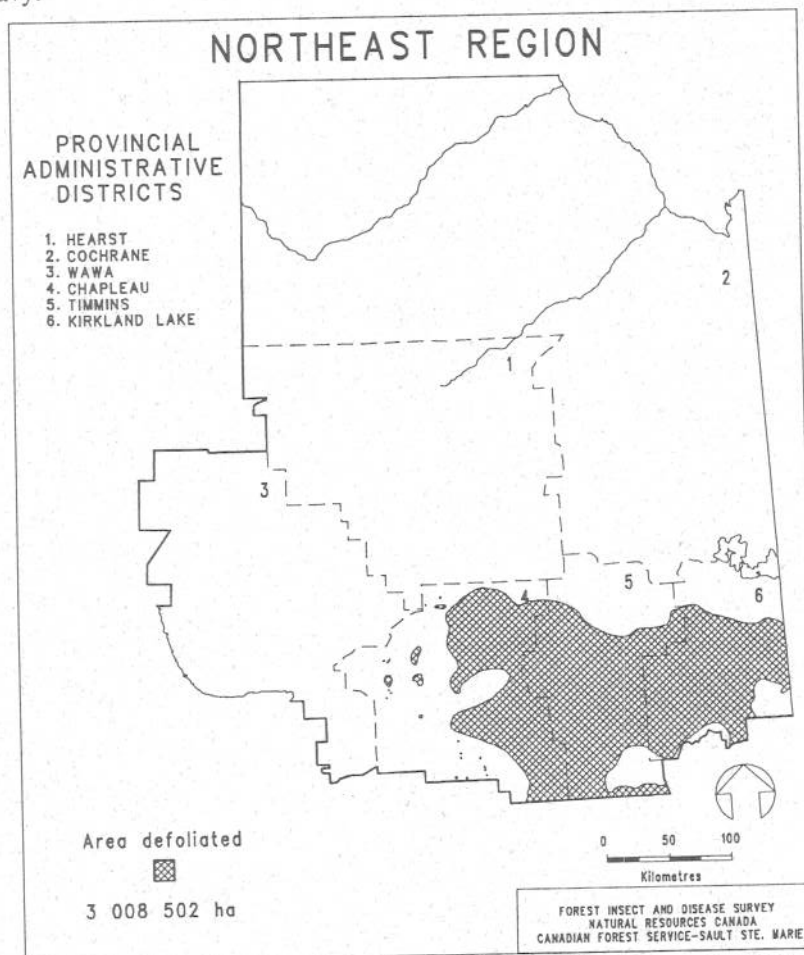


Figure 7. Areas of moderate to severe defoliation caused by the aspen twoleaf tier (*Enargia decolor* [Wik.]) in 1995.

and pupate in the soil. The moths emerge in about 3 weeks and are in flight in August and September. The extremely large moth flights associated with an infestation of this magnitude prompted numerous inquiries and complaints.

Outbreaks of the aspen twoleaf tier are usually short lived, so in 1996 the infestation should begin to decline or break up.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Populations of the eastern pine shoot borer remained relatively low and stable in 1995, as compared to those of the previous year. Leader mortality ranged as high as 10 percent, recorded in Dalmas Township, in the Chapleau District, but was absent at a number of other assessment locations. Results of the 1995 surveys are summarized in Table 7.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Provincial Situation

Numbers of the forest tent caterpillar increased slightly in 1995, a reversal of the previous trend of population declines. The provincewide area of moderate to severe defoliation totaled 243 125 ha, up slightly from the 166 060 ha recorded the previous year. The majority of damage, 241 787 ha, occurred in the Northeast Region; 1 338 ha were recorded in the Kemptville District of the Southern Region.

Northeast Region

Moderate to severe defoliation of trembling aspen stands, totaling 165 988 ha, 72 329 ha, and 3 470 ha, respectively, was delineated in the Cochrane, Hearst, and

Table 7. Damage caused by the eastern pine shoot borer at 21 locations in the Northeast Region of Ontario in 1995. (Count 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 ^a	3.7	1 585	33	0.0	0.0
McNaught	2.4	2 450	12	10.0	10.0
Reaney	2.6	2 350	3	0.6	0.6
Triquet	3.5	2 500	10	0.0	0.0
<i>Kirkland Lake District</i>					
Arnold	1.4	2 560	3	3.4	2.7
Burt ^b	1.8	3 300	1	0.0	0.0
Corkill	1.7	7 100	50+	2.7	2.7
Flavelle ^b	2.9	3 300	2	4.0	2.0
Mickle	2.7	7 100	5	3.3	3.3
Ossian ^b	2.9	3 300	5	4.0	2.7
Playfair ^c	2.6	3 100	10	4.0	1.3
Tyrrell	2.4	2 500	50+	11.4	8.7
<i>Timmins District</i>					
Battersby	3.3	2 475	24	0.0	0.0
Denton ^b	2.6	3 300	2	8.0	4.0
Evelyn ^b	1.9	3 300	5	2.7	2.0
Invergarry	3.2	2 400	5	1.2	1.2
Macklem ^b	4.3	3 300	4	2.0	2.0
Macmurchy	2.1	2 400	16	2.7	2.7
Paudash	1.2	3 000	10	6.6	6.6
<i>Wawa District</i>					
Chenard ^b	4.1	2 000	10	0.7	0.7
Finan	3.1	2 500	4	0.7	0.7

^a Tree improvement area.

^b Family test.

^c Seed orchard.

Timmins districts (Table 8). The current infestation, which closely resembles the one mapped in 1994, continued to straddle the Cochrane and Hearst district boundaries (Fig. 8). The western boundary (in the Hearst District) formed an irregular line between Shackleton Township in the north and the Cassleman–Stringer townships area in the south. The main body of infestation occurred east of this line and extended into the Cochrane District to a line from Beniah Township in the north to the Mahaffy–Nesbitt townships area in the south. Some spillover occurred into the Timmins District along the Mattagami River.

Another smaller but continuous body of medium to heavy infestation was mapped south of the town of Cochrane. It was bisected by Highway 11 and occupied parts of the following townships: Lamarche, Hanna, St. Johns, Fournier, and Reaume. The two larger bodies of damage were surrounded by a number of small satellite areas.

Light to moderate defoliation, up to 40 percent, was mapped in several small pockets northeast of the city of Timmins. In this same area low numbers of the early aspen leafcurler (*Pseudexentera oregonana* [Wlsm.]) were found feeding in conjunction with the forest tent caterpillar.

Egg-band counts were carried out at eight locations and severe defoliation in 1996 is predicted at all of them (Table 9). However, this forecast tends to overestimate defoliation in an aging infestation. Factors

such as parasitism; overwintering mortality; smaller and poorly formed egg bands; and the presence of viral, fungal, or microsporidian diseases must also be taken into

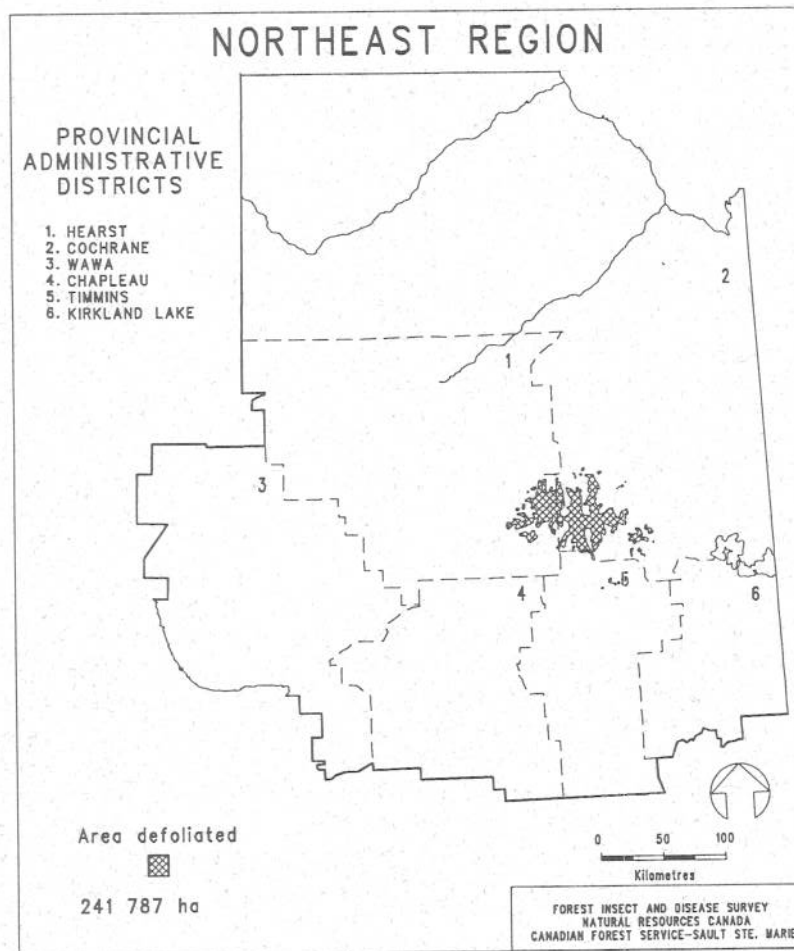


Figure 8. Areas of moderate to severe defoliation caused by the forest tent caterpillar (*Malacosoma disstria* Hbn.) in 1995.

Table 8. Gross area of moderate to severe defoliation by the forest tent caterpillar in the Northeast Region of Ontario from 1991 to 1995.

District	Area of moderate to severe defoliation (ha)				
	1991	1992	1993	1994	1995
Chapleau	0	0	1 520	0	0
Cochrane	0	541 507	141 389	116 720	165 988
Hearst	1 902 728	3 103 653	358 541	49 340	72 329
Moosonee	90 015	92 092	0	0	0
Timmins	495	0	0	0	3 470
Wawa	1 428 838	1 742 229	31 457	0	0
Total	3 422 076	5 479 481	532 907	166 060	241 787

Table 9. Forest tent caterpillar egg-band counts on trembling aspen at 8 locations in the Northeast Region of Ontario in 1995 and infestation forecasts for 1996.

Location (Township)	Average DBH ^a of sample tree (cm)	Number of trees sampled	Average number of egg bands per tree	Infestation forecasts for 1996 ^b
<i>Cochrane District</i>				
Alexandra	11.9	1	64	S
Calder	12.4	1	82	S
Fournier	13.2	1	18	S
Haggart	14.5	1	95	S
Hanna	12.8	1	91	S
Nesbitt	13.9	1	91	S
<i>Hearst District</i>				
Carmichael	11.2	1	47	S
Machin	17.2	1	109	S

^a DBH = diameter at breast height.

^b S = severe.

consideration. As a result, the continued presence of forest tent caterpillar is forecast, but the infestation is expected to break up and/or decline in size.

Crown dieback, due to repeated defoliation in conjunction with other factors, such as drought, was present in numerous stands of trembling aspen throughout the Hearst and Cochrane districts. A large area of decline (54 080 ha) was mapped in the Wawa District, south of White Lake, in 1994. Reassessment of a plot established in a mature stand showed tree mortality had increased from 24 to 32 percent, while crown dieback decreased to 13 percent from 28 percent.

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

High numbers of yellowheaded spruce sawfly and associated moderate to severe defoliation of open growing roadside, ornamental, windbreak, and plantation spruce (*Picea* spp.) were encountered at numerous locations in the region. Affected trees ranged in height from 0.8 to 3.5 m and sustained up to 100 percent current defoliation.

Moderate to severe damage was observed in the following areas: Doyle, Hazard, Hazen, German, Stock, Roblin and Whitney townships, Timmins District; Currie, Bowman, Lebel, Taylor, and Harley townships, Kirkland Lake District; Lendrum Township, Wawa District; and Ottawa Township, Cochrane District.

A survey in German Township, Timmins District, of 20 roadside white spruce averaging 1.5 m in height revealed that the entire sample was attacked. Current defoliation ranged from 2 to 100 percent, but averaged 30 percent. Repeated attacks caused the mortality of one tree and

branch mortality of 10 to 30 percent on seven others. Another assessment, this time of 1.8-m roadside white spruce in Ottawa Township, Cochrane District, disclosed that 89 percent of the trees were affected. Current defoliation ranged up to 100 percent, but averaged 40 percent.

Surveys for this pest were also carried out in black spruce seed orchards or family test sites in Burt, Chamberlain, Kimberly, and Playfair townships, Kirkland Lake District and in Egan, Evelyn, and Denton townships, Timmins District.

Damage was recorded at three sites, all in the Kirkland Lake District; at the seed orchard in Chamberlain Township and at the two family test sites at the Swastika Nursery in Burt Township. The incidence of trees affected was 20.7 percent at the seed orchard and 12.7 and 7.3 percent, respectively, at the two family test sites. Although single-tree defoliation of up to 90 percent was found at all three areas, current defoliation averaged 8 percent or less.

White Pine Weevil, *Pissodes strobi* (Peck)

In 1995, damage assessments were conducted in areas of jack pine, black spruce (*Picea mariana* [Mill.] B.S.P.), and eastern white pine (*Pinus strobus* L.) at 39 locations. A number of these sites were seed orchards or family test sites (Table 10). Populations were comparable to the previous year, with the incidence of leader damage ranging as high as 8 per-cent. As mentioned in the regional report for 1994, a comparison by tree species indicated that the average incidence of damaged leaders was slightly higher in the areas of black spruce (2.8 percent) than in the areas of jack pine (1.8 percent).

Table 10. Damage caused by the white pine weevil at 39 locations in the Northeast Region of Ontario in 1995. (Counts are based on an examination of 150 randomly selected trees at each location.)

Location (Toenship)	Tree species ^a	Average height of trees (m)	Estimated trees per ha	Estimated area affected (ha)	Trees affected (%)
<i>Chapleau District</i>					
Dalmas ^b	jP	3.7	1 585	33	2.0
Dalmas ^b	bS	1.9	2 450	34	2.7
McNaught	jP	2.4	2 450	12	5.3
Reany	jP	2.6	2 350	3	5.3
Triquet	jP	3.5	2 500	10	2.0
<i>Cochrane District</i>					
Mann	bS	1.9	2 350	20	0.7
Tweed	bS	0.9	1 800	10	0.0
<i>Hearst District</i>					
Fauquier	bS	1.7	3 200	20	34.7
Hopkins	bS	2.1	2 500	100	0.0
Nansen	bS	1.8	2 900	150	6.7
Teetzel	bS	1.8	2 600	50	4.7
<i>Kirkland Lake District</i>					
Arnold	jP	1.4	2 560	3	3.3
Burt ^c	bS	1.6	3 300	1	2.7
Burt ^c	bS	1.0	3 300	1	0.0
Burt ^c	jP	1.8	3 300	1	1.3
Corkill	jP	1.7	7 100	50+	1.3
Chamberlain ^d	bS	1.9	2 950	13	0.7
Flavelle ^c	jP	2.9	3 300	2	0.7
Kimberly ^c	bS	1.6	3 840	5	6.7
Mickle	jP	2.7	7 100	8	0.7
Ossian ^c	jP	2.9	3 300	5	0.0
Playfair ^d	bS	1.0	3 125	7	3.3
Playfair ^d	jP	2.6	3 100	10	0.0
Tyrrell	jP	2.4	2 500	50+	1.3
<i>Timmins District</i>					
Battersby	jP	3.3	2 475	24	1.3
Denton ^c	jP	2.6	3 300	2	1.3
Denton ^c	bS	1.5	3 125	7	7.3
Egan ^c	bS	1.7	3 100	7	3.3
Evelyn ^d	bS	1.1	3 125	12	0.7
Evelyn ^c	jP	1.9	3 300	5	0.0
Invergarry	jP	3.2	2 400	5	0.6
Macklem ^c	jP	4.3	3 300	4	0.0
McMurphy	jP	2.1	2 400	16	8.0
Paudash	jP	1.2	3 000	10	2.0
<i>Wawa District</i>					
Chenard ^d	jP	4.1	2 000	10	0.0
Finan ^c	jP	3.1	2 500	4	0.7
Hambleton	jP	1.8	500	5	0.7
Magone	jP	3.0	1 500	10	4.7
Noganosh	wP	1.2	2 000	12	7.3

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

^b Tree improvement area.

^c Family test.

^d Seed orchard.

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

Populations of the early aspen leafcurler continued to decline for the third consecutive year, dropping from 153 560 ha in 1994 to 300 ha in 1995. Previous areas of moderate to severe foliar damage in the Cochrane and Kirkland Lake districts collapsed. The remnant area of moderate to severe leaf curling consisted of 29 separate pockets of damaged aspen (*Populus* spp.) north of the city of Timmins.

Small (<1 ha) areas of light to moderate (<75 percent) defoliation were also encountered at a number of locations in Leitch, Nesbitt, and Clute townships, Cochrane District.

Minor Insects

Red Pine Cone Beetle, *Conophorus resinosae* Hopk.

Cone beetle damage to the developing shoots of young jack pine was detected on the survey plots at nine of 33 plantations examined (5.0 m or less in height). This reflected continued low numbers in the region. Except for one location, the incidence of affected trees ranged from 0.7 to 8 percent (Table 11). The exception occurred in the jack pine seed orchard in Chamberlain Township, Kirkland Lake District, where 23.3 percent of the trees were infested. Terminal shoot damage was encountered at only three locations and 0.7 percent of the trees were affected.

Fall Webworm, *Hyphantria cunea* (Drury)

Light to moderate defoliation was observed throughout much of the Kirkland Lake District. A number of hardwood hosts, including white birch, willow (*Salix* spp.), pin cherry (*Prunus pensylvanica* L.f.), black ash (*Fraxinus nigra* Marsh.), balsam poplar (*Populus balsamifera* L.), and trembling aspen, were damaged. Affected trees ranged from 1–10 m in height and associated defoliation ranged from 10–40 percent. Occasional smaller trees experienced up to 90 percent defoliation.

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

The aspen leafblotch miner was present in most stands of trembling aspen across the region. Associated foliar damage was generally light, displaced in large areas by the aspen twoleaf tier. The only area of moderate to severe damage was encountered in several aspen stands in Strickland Township, Wawa District.

Other Forest Insects

Various other forest insects were encountered during the course of regular surveys. Information on these is provided in Table 12.

Table 11. Damage caused by the red pine cone beetle at nine locations in the Northeast Region of Ontario in 1995. (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>Cochrane District</i>					
Calvert	1.1	1 800	10	0.0	0.7
<i>Kirkland Lake District</i>					
Chamberlain ^a	5.0	2 950	5	23.3	NA
Corkill	1.7	3 800	50+	0.7	0.7
Mickle	2.7	7 100	8	1.3	0.0
Ossian ^b	2.9	3 300	2	3.3	0.0
Tyrrell	2.4	2 500	50+	4.0	0.0
<i>Wawa District</i>					
Chenard	4.1	1 800	4	0.7	0.0
Finan	3.1	2 500	4	7.3	0.7
Magone	3.0	1 500	10	4.7	0.0

^a Seed orchard.

^b Family test.

Table 12. Other forest insects.

Insect	Host(s) ^a	Remarks
<i>Adelges lariciatus</i> (Patch) Spruce gall adelgid	wS	Surveys disclosed that 2 percent of the trees were infested with this pest in plantations in Idington Township, Hearst District and Sheldon Township, Cochrane District.
<i>Cecidomyia resinicola</i> (O.S.) (= <i>reeksi</i> Vock.) Jack pine resin midge	jP	A survey in the Tree Improvement Centre, Dalmas Township, Chapleau District, revealed that 3 percent of the trees were affected.
<i>Lambdina f. fiscellaria</i> (Gn.) Hemlock looper	bF	Low numbers of loopers were recovered from under-story trees in Dempsay Township, Cochrane District.
<i>Neodiprion virginiana</i> complex Redheaded jack pine sawfly	jP	Single tree defoliation of 75 percent was observed in Gertrude Township, Wawa District.
<i>Phyllocnistis populiella</i> Cham. Aspen serpentine leafminer	tA	Foliar damage caused by this leafminer averaged 40 percent to 14-m trees in a 0.5-ha area in Studholme Township, Hearst District.
<i>Pineus strobi</i> (Htg.) Pine bark adelgid	wP	Light damage was recorded in the Timmins District on 25 and 17 percent of the roadside regeneration in Turnbull and Paudash townships, respectively.
<i>Pristiphora geniculata</i> (Htg.) Mountain-ash sawfly	aMo	Complete defoliation of 0.5- to 3.0-m trees was noted in Maisonville Township, Kirkland Lake District and in Massey Township, Timmins District.
<i>Profenusa thomsoni</i> (Konow) Ambermarked birch leafminer	wB	Low leafminer numbers were encountered in Dempsay Township, Cochrane District.
<i>Resseliella pinifoliae</i> (Felt) White pine needle midge	wP	A survey found that 6 percent of the 1.2-m regeneration at one location in Noganosh Township, Wawa District, was lightly affected by this midge.

^a aMo = American mountain ash, bF = balsam fir, jP = jack pine, tA = trembling aspen, wB = white birch, wP = white pine, wS = white spruce.

TREE DISEASES

Major Diseases

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

Forty-four young plantations of jack pine, black spruce, white spruce, red pine (*Pinus resinosa* Ait.), and eastern white pine were surveyed to determine the incidence of recent tree mortality (trees dying in the past year). In the current survey, recent dead trees were encountered on the survey plots at 20 locations. The disease was present at a number of other locations, but only at low levels and it was not detected in the assessments (Table 13). The incidence of tree mortality was 1.3 percent or less, except for 2.7 and

3.3 percent recorded in Evelyn Township, Timmins District and Machin Township, Hearst District, respectively.

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

Light infections of the spruce needle rusts were the norm in the majority of spruce (*Picea* spp.) stands investigated in the region. The current situation of light infections was reflected in the collapse of a previous area of medium to heavy damage in a mixed spruce stand in Lendrum Township, Wawa District. As well, the disease was detected at only three of nine black spruce seed orchards and family test sites surveyed in the Kirkland Lake and Timmins

Table 13. Mortality caused by *Armillaria* root rot at 44 locations in the Northeast Region of Ontario in 1995. (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 ^b	jP	3.7	1 585	33	0.7
McNaught	jP	2.4	2 450	12	0.7
Reaney	jP	2.1	2 350	3	0.7
Triquet	jP	3.5	2 500	10	0.7
<i>Cochrane District</i>					
Dempsay	jP	0.9	2 350	75	1.3
Dundonald	jP	2.0	3 600	50	0.0
Sheldon	wS	0.8	1 800	100	0.0
Unsurveyed	jP	0.9	1 700	500+	0.0
<i>Hearst District</i>					
Arnott	jP	1.4	2 560	3	0.0
Elgie	jP	1.7	2 800	500+	0.7
Elgie	wS	1.5	2 400	80	0.0
Fauquier ^c	wS	2.2	2 900	2	0.0
Howells	jP	2.8	1 400	500+	0.0
Idington	wS	2.2	2 500	4	0.0
Machin	wS	1.2	2 200	25	3.3
McEwing	wS	1.1	2 900	120	0.0
McEwing ^d	jP	4.1	3 300	10	0.0
Nansen ^d	bS	1.8	2 900	150	0.7
Teetzel ^d	bS	1.8	2 500	50	0.7
<i>Kirkland Lake District</i>					
Arnold	jP	1.4	2 560	3	0.0
Burt ^d	bS	1.6	3 300	1	10.0
Burt ^d	bS	1.0	3 300	1	10.0
Chamberlain ^c	bS	1.9	2 950	13	0.0
Corkill	jP	1.7	3 800	50+	0.0
Flavelle ^d	jP	2.9	3 300	2	0.7
Kimberly ^d	bS	1.6	3 840	5	0.7
Mickle	jP	2.7	7 100	8	0.0
Ossian ^d	jP	2.9	3 300	5	0.7
Ossian	rP	0.9	2 300	1	0.7
Playfair ^c	bS	1.0	3 125	7	0.7
Playfair ^c	jP	2.6	4 100	10	0.0
Tyrrell	jP	2.4	2 500	50+	0.7
<i>Timmins District</i>					
Battersby	jP	3.3	2 475	24	0.0
Denton ^d	bs	1.5	3 125	7	1.3
Denton ^d	jP	2.6	3 300	2	0.7
Egan ^d	bS	1.7	3 100	7	0.0
Evelyn ^c	bS	1.1	3 125	12	0.0
Evelyn ^d	jP	1.9	3 300	5	2.7
Invergarry	jP	3.2	2 400	5	0.0
Macmurchy	jP	2.1	2 400	16	0.7
Paudash	jP	1.2	3 000	10	1.3
<i>Wawa District</i>					
Chenard ^c	jP	4.1	2 000	4	0.0
Finan ^d	jP	3.1	2 500	8	0.0
Noganosh	wP	1.2	2 000	12	0.0

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

^b Tree improvement area.

^c Seed orchard.

^d Family test.

districts. Trees affected averaged 17 percent damage at the seed orchard in Chamberlain Township, Kirkland Lake District and at the family test site in Egan Township, Timmins District. At the Evelyn Township seed orchard in the Timmins District, 3 percent of the trees were infected. However, foliar damage averaged <1 percent at all three sites.

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

Infections of the pine needle rust could be categorized as light across the region, but occasional areas experienced moderate to severe damage. The rust attacks the old foliage of jack pine and, if severe enough, may cause a growth loss in younger trees.

More than 20 areas of jack pine were examined, but the disease was found at only nine locations. Only one area, in Elgie Township, Hearst District, had any significant levels of the disease (Table 14). At a number of the locations the incidence of rust was high, but accompanying foliar damage was insignificant.

Sweet Fern Blister Rust, *Cronartium comptoniae* Arthur

Twenty-three areas of jack pine were surveyed, but sweetfern blister rust was identified at only seven locations (Table 15). The rust attacks the main stem of jack pine and

is capable of killing its host, or of weakening it and thereby making it more susceptible to insects, diseases, or wind breakage. It can also reduce the quality of lumber. In the current survey the highest levels of infection occurred in Calvert Township, Cochrane District, in a young plantation and a mature stand. Associated tree mortality was not encountered on any of the survey plots.

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

Foliar damage caused by the tar spot needle cast in 1995 was comparable to levels reported in previous years. A total of 23 jack pine plantations was assessed and affected older foliage was noted at 15 of these (Table 16). The incidence of trees affected ranged up to 34 percent; corresponding foliar damage was as high as 25 percent.

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

Surveys for the western gall rust were conducted in 28 areas of young jack pine in 1995 (Table 17). Trees affected (branch and stem infections) ranged as high as 16 percent in Suganaqueb Township, Wawa District. Severely affected trees (stem galls only) were noted at 16 sites; the highest incidence was 8 percent in a plantation in Calvert Township, Cochrane District. A comparison of the 1994 and 1995 results at 16 areas assessed in both

Table 14. Damage caused by the pine needle rust at nine locations in the Northeast Region of Ontario in 1995. (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
Battersby	3.3	2 475	24	5.4	<5
Reaney	2.6	2 350	3	45.3	<5
<i>Hearst District</i>					
Arnott	2.7	2 750	80	91.3	5
Elgie	1.7	2 800	500+	100.0	55
Howells	2.8	1 400	500+	0.7	20
McEwing	4.1	3 300	10	2.0	5
<i>Kirkland Lake District</i>					
Tyrrell	2.4	2 500	50+	100.0	10
<i>Timmins District</i>					
McMurchy	2.1	2 400	16	54.0	<5
<i>Wawa District</i>					
Hambleton	1.5	2 500	5	34.0	5

Table 15. Damage caused by the sweetfern blister rust at 7 locations in the Northeast Region of Ontario in 1995. (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 (%)	Mortality (%)
<i>Cochrane District</i>					
Calvert	21.0	600	1	14.7	0
Calvert	1.1	1 800	10	6.7	0
<i>Kirkland Lake District</i>					
Arnold	1.4	2 560	3	2.0	0
Flavelle ^a	2.9	3 300	2	1.3	0
Mickle	2.7	7 100	8	1.3	0
Playfair ^b	2.6	3 300	10	0.7	0
<i>Timmins District</i>					
Denton ^a	2.6	3 300	2	0.7	0

^a Family test.

^b Seed orchard.

Table 16. Damage caused by the tar spot needle cast at 15 locations in the Northeast Region of Ontario in 1995. (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>					
Battersby	3.3	2 475	24	6.6	<1
<i>Kirkland Lake District</i>					
Arnold	1.4	2 560	3	2.0	10
Chamberlain ^a	4.2	2 950	5	8.0	10
Corkill	1.7	3 800	50+	2.7	25
Flavelle ^b	2.9	3 300	2	3.3	25
Mickle	2.7	7 100	8	3.0	15
Ossian ^b	2.9	3 300	5	21.3	20
Playfair ^a	2.6	3 300	10	26.0	15
<i>Timmins District</i>					
Denton ^b	2.6	3 300	2	34.0	25
Evelyn ^b	1.9	3 300	5	2.7	10
Invergarry	3.2	2 400	5	11.3	5
Macklem ^b	4.3	3 300	4	2.0	25
<i>Wawa District</i>					
Chenard	3.9	1 800	4	20.0	17
Finan	2.9	2 500	8	26.0	19
Suganaqueb	3.4	1 800	15	8.0	20

^a Seed orchard.

^b Family test.

Table 17. Damage caused by the western gall rust at 28 locations in the Northeast Region of Ontario in 1995. (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 District</i>					
Dalmas ^a	3.7	1 585	33	2.7	0.0
McNaught	2.4	2 450	12	1.3	0.7
Reaney	2.6	2 350	3	2.7	0.7
Triquet	3.5	2 500	10	2.7	0.7
<i>Cochrane District</i>					
Calvert	1.1	1 800	10	12.0	8.0
Dempsay	7.5	8 000	20	2.7	0.7
Dundonald	2.0	3 600	50	4.7	2.0
Unsurveyed	0.9	1 700	500+	0.0	0.0
<i>Hearst District</i>					
Arnott	2.7	2 750	80	3.3	2.0
Elgie	1.7	2 800	500+	0.0	0.0
Howells	2.8	1 400	500+	0.0	0.0
McEwing	4.1	3 300	10	0.0	0.0
<i>Kirkland Lake District</i>					
Arnold	1.4	2 560	3	0.7	0.7
Chamberlain ^b	5.0	2 950	5	9.3	0.0
Corkill	1.7	3 800	50+	8.0	1.3
Flavelle ^c	2.9	3 300	2	1.3	0.0
Mickle	2.7	7 100	5	1.3	0.0
Ossian ^c	2.9	3 300	5	4.0	0.0
Playfair ^b	2.6	3 300	10	11.3	5.3
Tyrrell	2.4	2 500	25+	14.7	4.7
<i>Timmins District</i>					
Battersby	3.3	2 475	24	8.6	0.7
Denton ^c	2.6	3 300	2	8.0	1.3
Evelyn ^c	1.9	3 300	5	2.7	1.3
Macklem ^c	4.3	3 300	4	5.3	0.0
McMurphy	2.1	400	16	0.7	0.0
<i>Wawa District</i>					
Chenard	3.9	1 800	4	4.0	0.7
Finan ^c	2.9	2 800	4	3.3	0.0
Suganaqueb	3.4	1 800	15	16.0	2.0

^a Tree improvement area.

^b Seed orchard.

^c Family test.

years showed an increased incidence at all but three locations in 1995. Last year the incidence of affected trees averaged 2.1 percent. In the current survey affected trees averaged 4.9 percent at locations common to both years. Recent (within the past year) tree mortality of 0.7 percent was encountered at two locations: in Arnott Township, Hearst District and in Tyrrell Township, Kirkland Lake District.

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

Surveys for the presence of scleroderris canker were again carried out in a number of areas of young red pine and jack pine. The North American race of this fungus was recovered from seven locations.

Within the Kirkland Lake District, the disease damaged 2.0 percent and 1.3 percent of the 0.9-m red pine in Ossian Township and the 1.4-m jack pine in Arnold Township, respectively. It was also recovered from planted 3.0-m red pine in the Aide Creek seed orchard in Chamberlain Township. For the second consecutive year the disease was collected at the Swastika Nursery in a young 3.4-m jack pine outplant. The highest incidence of scleroderris canker was recorded in a 9-ha area of 3.3-m red pine in Skead Township, where it has been present for a number of years. Here, assessment disclosed that 28 percent of the trees were affected. Associated tree mortality was not observed at any of these locations.

A single collection of this canker-causing disease was made for the second consecutive year in a 1.9-m jack pine family test site in Evelyn Township, Timmins District. Infection was <1 percent and no tree mortality was observed.

An evaluation was also conducted in an area in Dempsay Township, Cochrane District, which has tradi-

tionally harbored the fungus for a number of years. The current survey found that 6.7 percent of the 0.9-m jack pine in a 75-ha plantation were diseased. Accompanying tree mortality was 1.3 percent.

Minor Diseases

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

White pine blister rust damage to natural regeneration was assessed at two locations in 1995. In Turnbull Township, Timmins District, blister rust cankers were found on 11.3 percent of the 1.2-m white pine; 8.0 percent of the cankers were on the main stem. Recent tree mortality (dying within the past year) of 0.7 percent was recorded at this location. The other site consisted of 3- to 5-m white pine in Cortez Township, Chapleau District. Here, 6.7 percent of the trees were affected; 1.3 percent had stem cankers.

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

Increased infections of 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 in 1995. Complete foliar damage was common.

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 18.

Table 18. Other forest diseases.

Disease	Host(s) ^a	Remarks
Jack pine mortality	jP	Dead and dying trees were noted in Pukaskwa National Park as well as in Spooner and Welsh townships, Wawa District.
<i>Fusarium</i> and <i>Cylindrocladium</i> spp. Root rots	bS	These fungi were found in association with light mortality (<1 percent) of black spruce growing stock at the Swastika Tree Nursery in Compartments BC12, BC13, and BC14.
<i>Cylindrocladium scoparium</i> Morgan Cylindrocladium root rot	bS	This fungus caused light mortality (<1 percent) of growing stock at the Swastika Tree Nursery in Compartments GH12 and GH13.

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

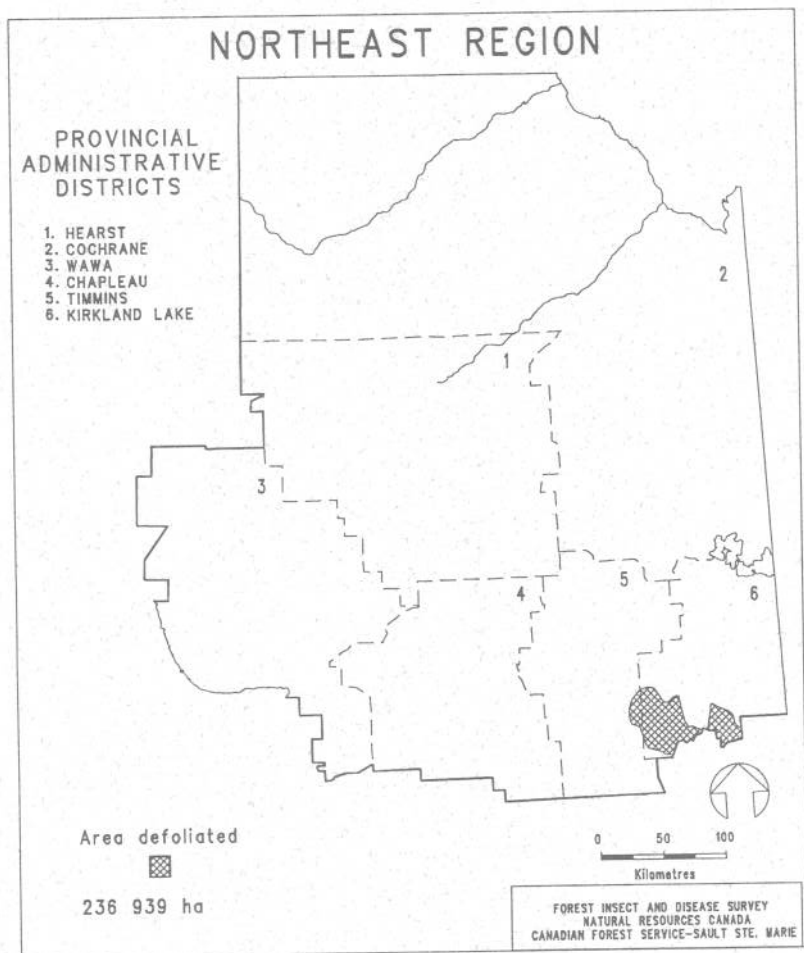


Figure 9. Areas within which drought damage occurred in 1995.

ABIOTIC CONDITIONS

Drought Damage

The hot dry summer of 1995 noticeably affected the health of white birch and jack pine in the southern part of the Kirkland Lake and Timmins districts.

Foliar discoloration of white birch in these same areas was apparent by the end of July and premature leaf fall was observed the first week in August. By the end of August stands of white birch were stripped of their entire foliar complement. The trees most adversely affected were those growing on hilltops and rock outcrops (the shallow soil sites). Aerial surveys delineated 214 565 ha and 22 374 ha of affected birch in the Kirkland Lake and Timmins districts, respectively (Fig. 9). A 50-tree impact plot was established in Haultain Township, Kirkland Lake District, to monitor the impact of the drought in terms of dieback and mortality in following years. At the time of plot establishment, it was determined that 6 percent of the plot trees were dead.

Jack pine also exhibited obvious signs of stress. Foliar discoloration of discrete pockets of trees growing on rocky ridges was detected. Ground checks revealed the entire complement of old foliage had turned reddish brown, and was readily discernible from the air against the backdrop of unaffected trees. The only green in these affected stands was the current year's growth. Approximately 15 pockets were mapped, each area of damage averaging 10 ha in size. Damage was confined to the Kirkland Lake District in the following townships: Knight, Leith, Leonard, Raymond, Tyrrell, and Van Hise.

Drought may also have been a factor in the mortality of black spruce and white spruce growing stock in the Swastika Nursery. Approximately 2 percent mortality of black spruce stock was recorded in Compartments D3, D4, D5, and D7. Mortality of 12 percent was noted in white spruce seedlings in Compartment F6 and similar levels were observed for black spruce stock in Compartments D5 and D6.

Frost Damage

A late spring frost in early June caused varying levels of foliar damage to black spruce, white spruce, and balsam fir in the region. The most significant damage was encountered south of Highway 11, north of Hornepayne, from Elgie and Frost townships in the Hearst District east to Machin Township in the Cochrane District. Within this area, shoot mortality up to 60 percent was recorded on various sizes of balsam fir. A survey in a stand of 12-m balsam fir in Templeton Township, Hearst District, revealed that 98 percent of the host was affected and that shoot mortality averaged 29 percent. Surveys in several white spruce plantations disclosed high levels of shoot mortality at a number of locations in the Hearst District (Table 19). In some cases the entire sample was damaged and there was up to 78 percent shoot mortality.

Similar surveys in the Chapleau, Kirkland Lake, and Timmins districts indicated that frost damage was widespread but relatively insignificant. The incidence of frost-damaged balsam fir ranged from 5 to 25 percent in all stands. Occasional trees experienced up to 10 percent shoot mortality, but for the most part damaged shoots averaged 5 percent or less. Damaged balsam fir were

Table 19. Damage caused by frost at 13 locations in the Northeast Region of Ontario in 1995. (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 (%)	Shoot mortality (%)
<i>Chapleau District</i>						
Dalmas ^b	bS	1.9	2 450	34	8.0	4.0
<i>Cochrane District</i>						
Sheldon	wS	0.8	1 800	100	50.0	60.0
<i>Hearst District</i>						
Elgie	wS	1.5	2 400	80	100.0	66.5
Fauquier ^c	ws	2.2	2 900	2	98.7	51.5
Idington	wS	2.2	2 500	4	88.6	36.5
McEwing	wS	1.1	2 900	120	100.0	71.0
Shackleton	wS	1.2	2 200	25	100.0	78.0
Teetzel	bS	1.8	2 500	250	0.0	0.0
<i>Kirkland Lake District</i>						
Chamberlain ^c	bS	1.6	3 850	5	66.0	2.0
Playfair ^c	bS	1.0	3 125	7	36.0	3.0
<i>Timmins District</i>						
Denton ^d	bS	1.5	3 125	7	33.0	4.0
Egan ^d	bS	1.7	3 100	7	49.0	1.0
<i>Wawa District</i>						
Davies	ws	1.2	1 000	5	50.0	60.0

^a bS = black spruce, wS = white spruce.

^b Tree improvement area.

^c Seed orchard.

^d Family test.

assessed in Doyle, Enid, Hazen, Massey, and Sewell townships, Timmins District and in Arnold, Eldorado, Elliott, Lamplugh, and Tyrrell townships, Kirkland Lake District.

Assessments were also carried out in the Chapleau, Kirkland Lake, and Timmins districts in a number of seed orchards, family test sites, or tree improvement areas. The incidence of affected trees was high in some cases, but accompanying shoot mortality was 4 percent or less.

Frost damage also occurred to growing stock at the Swastika Nursery. However, damage was light. Less than 1 percent of the black spruce in Compartments BC5, BC10, BC12, BC13, and BC14 was affected, and there was no bud or shoot mortality, just reddened foliage.

Frost-damaged trees were also noted in parts of the Wawa District. A survey in a plantation of 1.2-m white spruce in Davies Township showed that one-half of the trees were damaged; shoot mortality averaged 60 percent overall. Elsewhere in the district varying levels of foliar damage were observed on young roadside balsam fir.

FOREST HEALTH

Acid Rain National Early Warning System (ARNEWS)

The eight ARNEWS plots currently located throughout the Northeast Region are part of a nationwide network established to detect changes in forest trees, vegetation, and soil. The plots cover conditions in a variety of stands. The predominant forest cover at each plot is as follows: jack pine in Deans Township, Chapleau District, Huotari Township, Wawa District, and Cane Township, Kirkland Lake District; white birch in Green Township, Chapleau District and Dempsay Township, Cochrane District; black spruce in Hopkin Township, Hearst District and Sweatman Township, Cochrane District; and trembling aspen in Evelyn Township, Timmins District. Information on crown condition, foliar damage, woody tissue damage, and the occurrence of acid rain symptoms is collected annually. Ground vegetation is also examined, as certain plants are sensitive indicators of changes in soil acidity. In 1995 a

Table 20. Results of gypsy moth pheromone trapping in the Northeast Region of Ontario from 1991 to 1995.

Location	Number of moths trapped				
	1991	1992	1993	1994	1995
<i>Chapleau District</i>					
Ivanhoe Lake Provincial Park	3	6	0	0	2
Missinaibi Lake Provincial Park	0	1	0	0	1
Mississagi Wild River Provincial Park	0	0	1	1	2
Shoals Provincial Park	0	0	1	0	-
Wakami Lake Provincial Park	0	9	0	0	0
<i>Cochrane District</i>					
Greenwater Provincial Park	0	4	0	0	2
<i>Hearst District</i>					
Fushimi Lake Provincial Park	1	0	0	0	1
Nagagamisis Provincial Park	0	0	0	0	2
Rene Brunelle Provincial Park	2	1	0	0	0
<i>Kirkland Lake District</i>					
Esker Lakes Provincial Park	3	4	0	0	0
Kap-Kig-Iwan Provincial Park	1	27	0	0	1
<i>Timmins District</i>					
Dublin Township, Muldrew Lake	4	1	1	0	6
Kettle Lake Provincial Park	0	4	0	0	0
<i>Wawa District</i>					
Obatanga Provincial Park	0	2	0	0	0
White Lake Provincial Park	0	0	0	0	0

more intensive type of assessment, conducted every 5 years, was carried out at four of the ARNEWS plots. This sampling included the procurement of increment cores, foliage samples, soil samples, and shoot measurements.

To date, no symptoms attributable to acid rain deposits have been recorded in any of the monitored plots. During the course of the 1995 growing season no significant damage caused by insect, disease, or abiotic factors was identified at any of the eight locations.

SPECIAL SURVEYS

Gypsy Moth Pheromone Trapping

A pair of sticky, pheromone baited traps was set out at each of 14 locations. The number of adult captures of the gypsy moth (*Lymantria dispar* [L.]) increased significantly in 1995. In total, 17 adults were trapped compared to a single moth caught in 1994 (Table 20). No larvae or associated defoliation was encountered at any of the positive capture sites.

NORTHERN ONTARIO DEVELOPMENT AGREEMENT (NODA)

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 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.

Projects

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 eastern 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 a balsam fir/spruce composition of from 10 to 30 percent, 31 to 60 percent, and over 60 percent 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.

Assessments were carried out in the 66 study plots located in the Northeast Region. Variables such as defoliation, tree condition, and tree mortality were measured. Egg-mass samples were taken and pheromone traps were set out in a number of plots.

Management Guidelines for Jack Pine Budworm NFP Project No. 4033

Objectives for this program 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.

The 25 plots located in the Chapleau and Timmins districts were revisited in 1995 and assessed for such variables as defoliation, presence and density of flowers, and tree condition. Egg-mass samples and L2 (second instar larva) samples were also collected at each study plot. This year, two increment cores were taken from ten trees at each plot.

In 1995 four study plots, three in Westbrook Township and one in Vrooman Township, Timmins District, were within the area of moderate to severe defoliation caused by the jack pine budworm. A number of other plots experienced light damage.

Climatic Data

Temperature and precipitation can have a profound effect on the development of insect and disease organisms, and can facilitate or hinder their development from year to year. Adverse weather conditions such as 1995's below normal precipitation and above average temperatures can cause damage to trees and often 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 21. For ease of comparison, 30-year normals and the current deviation from normal figures are also listed.

Table 21. Mean temperatures and total precipitation at three locations in the Northeast Region of Ontario in 1995.

Location	Month	Mean temperature		Deviation from normal (°C)	Total precipitation		Deviation from normal (mm)
		Normal (°C)	Actual		Normal (mm)	Actual	
Chapleau Airport	January	-16.9	-13.2	+3.7	46.9	70.6	+23.7
	February	-15.8	-15.8	0.0	34.5	76.6	+42.1
	March	-8.3	-5.7	+2.6	56.2	59.4	+3.2
	April	0.6	-1.9	-2.5	59.3	68.0	+8.7
	May	8.6	9.0	+0.4	73.8	71.4	-2.4
	June	14.3	17.5	+3.2	100.4	29.2	-71.2
	July	16.8	17.3	+0.5	81.8	109.6	+27.8
	August	15.4	17.7	+2.3	86.2	67.4	-18.8
	September	10.4	9.2	-1.2	101.5	108.4	+6.9
	October	4.9	5.3	+0.4	75.7	137.4	+61.7
	November	-3.5	-9.4	-5.9	64.2	94.2	+30.0
	December	-12.8	-13.7	-0.9	53.5	56.0	+3.5
Earlton Airport	January	-16.3	-11.5	+4.8	56.4	53.7	-2.7
	February	-14.1	-15.8	-1.7	47.2	37.2	-10.0
	March	-7.6	-4.9	+2.7	58.0	46.0	-12.0
	April	1.9	-0.2	+2.1	50.0	82.9	+32.9
	May	9.8	10.4	+0.6	61.3	134.4	+73.1
	June	15.2	17.8	+2.6	89.2	66.0	-23.2
	July	17.7	19.1	+1.4	80.8	129.4	+48.6
	August	16.2	17.8	+1.6	83.4	35.3	-48.1
	September	11.1	10.0	-1.1	99.1	92.0	-7.1
	October	5.4	7.3	+1.9	70.0	71.0	+1.0
	November	-2.5	-8.0	-5.5	70.6	98.1	+27.5
	December	-12.6	-4.1	+8.5	65.3	44.2	-21.1
Kapuskaing Airport	January	-18.6	-15.2	+3.4	53.6	50.7	-2.9
	February	-16.2	-18.1	-1.9	43.0	51.3	+8.3
	March	-9.4	-6.7	+2.7	55.4	39.6	-15.8
	April	0.5	-2.1	+2.6	53.2	60.7	+7.5
	May	8.3	8.9	+0.6	74.3	47.6	-26.7
	June	14.1	16.8	+2.7	84.7	67.2	-17.5
	July	16.8	17.7	+0.9	96.3	110.8	+14.5
	August	15.3	18.4	+3.1	92.5	41.0	-51.5
	September	10.0	9.1	-0.9	94.4	100.5	+6.1
	October	4.4	4.5	+0.1	77.4	155.2	+77.8
	November	-2.4	-10.5	-8.1	80.1	86.2	+6.1
	December	-16.4	-16.0	+0.4	53.3	37.8	-15.5