

RESULTS OF FOREST INSECT AND
DISEASE SURVEYS IN THE
NORTHERN REGION OF ONTARIO
1989

(FOREST DISTRICTS: MOOSONEE, HEARST, KAPUSKASING, COCHRANE,
CHAPLEAU, TIMMINS, KIRKLAND LAKE and GOGAMA)

L.S. MacLeod, S. Payne and B.E. Smith

FORESTRY CANADA
ONTARIO REGION
GREAT LAKES FORESTRY CENTRE
1990

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SURVEY HIGHLIGHTS

Forest Insect and Disease Survey (FIDS) activities in 1989 in the Northern Forest Region of Ontario are summarized in this report.

The 1989 field season was highlighted by a new outbreak of the forest tent caterpillar in the northern districts of the region. Other major defoliators of deciduous stands included the early aspen leafcurler and the birch leafminer. Egg-mass sampling for spruce budworm and jack pine budworm indicate that these pests will not create major problems in the region in 1990.

Western gall rust continued to cause substantial mortality in jack pine plantations in several districts, and damage was caused by drought at several locations.

Pheromone trapping to detect the presence of gypsy moth was continued in provincial parks, and captures were made in Chapleau and Kirkland Lake districts. Other special projects included experimental pheromone trapping for spruce budworm and black army cutworm, detailed surveys of black spruce plantations and monitoring plots established to determine the effects of acid precipitation.

After 44 years of service with FIDS, Lyall MacLeod retired late in 1989. His valuable work and experience with the Unit will be missed by all.

The same format was followed in categorizing forest pests as in the 1988 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 threat to living trees or shrubs

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pest:

- (1) those that are of minor importance and have not been known to cause serious damage to forest trees
- (2) those that are capable of causing damage but, because of low populations or for other reasons, did not cause serious damage in 1989.

The assistance and cooperation of Ontario Ministry of Natural Resources (OMNR) and wood-industry personnel in all districts are gratefully acknowledged.

L.S. MacLeod
S. Payne
B.E. Smith

Frontispiece



Damaged white birch (*Betula papyrifera* Marsh.). This was a problem through much of the region, and was the focus of special surveys in 1989.

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INSECTS

Major Insects

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Spruce budworm populations increased substantially in Ontario in 1989. There was a total area of 6,239,636 ha of moderate-to-severe defoliation in comparison with 5,224,734 ha in 1988. Infestations were confined to the North Central and Northwestern forest regions (Fig. 1).

Although aerial surveys failed to reveal any foliar damage caused by the spruce budworm in the Northern Region, small numbers of larvae were found as a result of ground surveys at several points in the Chapleau and Gogama districts. The largest number was recorded in Shoals Provincial Park in the Chapleau District but defoliation there and at other locations was negligible.

Pheromone trapping with two types of lures (Bio-lure and P.V.C.) was continued on impact plots and at selected locations. Significantly larger numbers of male moths were captured in the Hearst and Kapuskasing districts than in 1988 (Table 1).

Light trapping was continued in the Chapleau and Kapuskasing districts. To compare the effectiveness of pheromone traps and light traps in detecting the flight period of spruce budworm moths, a Bio-lure trap was located near each light trap. Results are summarized in Table 2.

Egg-mass sampling was carried out at 40 locations across the region, and results indicate that some light-to-medium infestations may be expected in 1990, particularly in the Chapleau and Hearst districts (Table 3).

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Examination of jack pine (*Pinus banksiana* Lamb.) stands and plantations at numerous locations in all districts failed to reveal any damage or evidence of jack pine budworm in 1989. The only budworm found were 96 adult moths captured in the light trap operated at Chapleau. Egg-mass surveys were completed at 11 locations in the Chapleau, Cochrane, Hearst, Kapuskasing, Kirkland Lake and Timmins districts but not a single egg mass was found. This insect is not expected to cause any damage in the region in 1990.

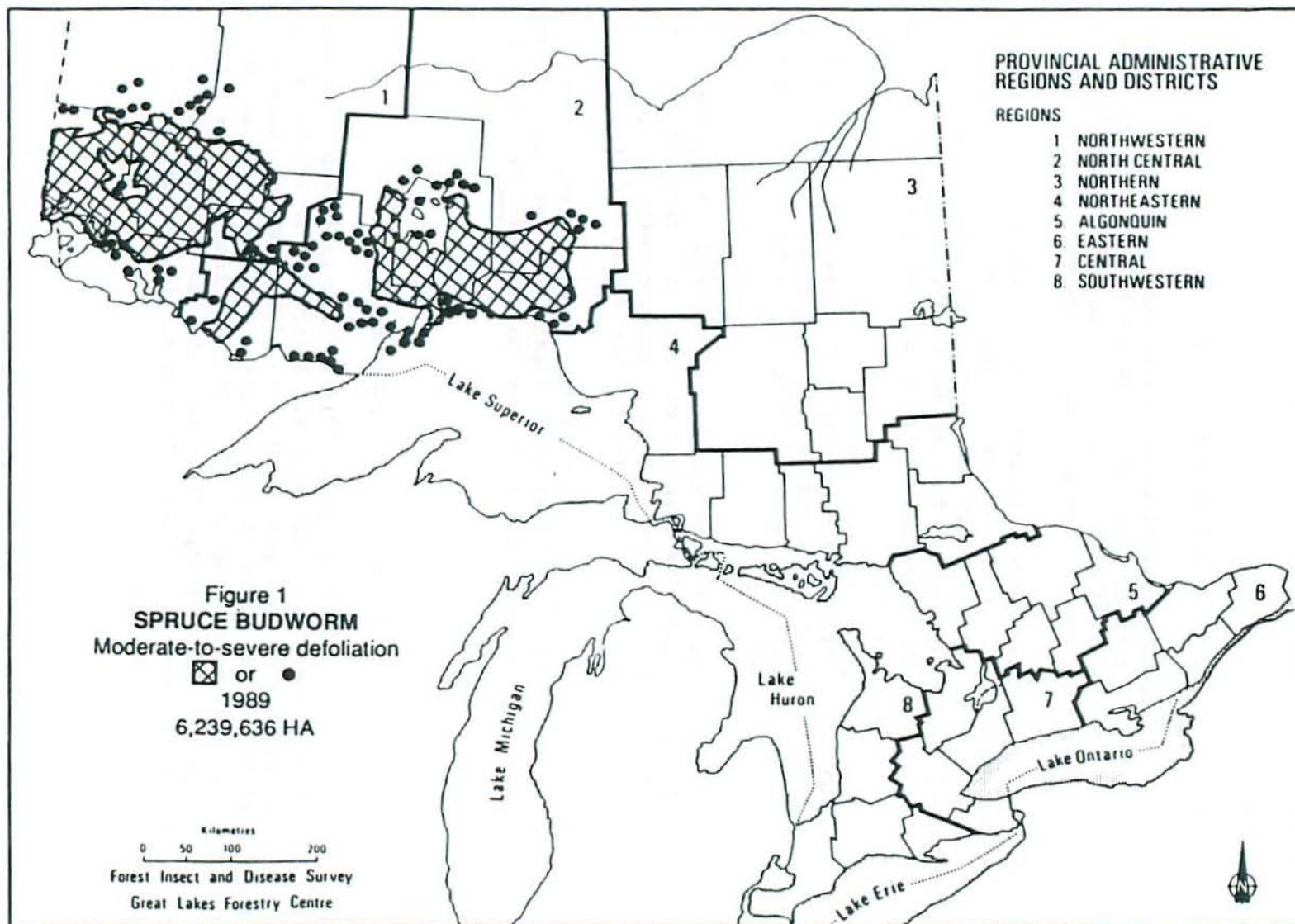


Table 1. Summary of captures of male spruce budworm moths in pheromone traps in six districts of the region, 1988-1989.

Location (Twp)	1988 P.V.C.	Total moths captured	
		1989 P.V.C.	1989 Bio-lure
<u>Chapleau District</u>			
Peters	0	12	19
Neelands	0	3	6
<u>Cochrane District</u>			
St. John	2	3	26
<u>Gogama District</u>			
Dublin	1	22	16
<u>Hearst District</u>			
Larkin			1
	325	156	
Frost	7	496	188
<u>Kapuskasing District</u>			
Fauquier	1	28	20
Guilfoyle	4	19	23
<u>Kirkland Lake District</u>			
Pacaud	0	4	4
Maisonville	0	5	7

Table 2. Summary of captures of spruce budworm moths in light traps and pheromone traps at two locations in the region in 1989.

Location	Total number of moths captured	
	Light trap	Pheromone trap
<u>Chapleau District</u>		
Chapleau	182	8
<u>Kapuskasing District</u>		
Remi Lake	75	24

Table 3. Northern Region - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1989, and infestation forecasts for 1990.

Location	Host	Estimated defoliation in 1989 (%)	No. of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1990 ^a	Accumulated damage
<u>Chapleau District</u>					
(6 locations)					
Borden Twp	bF	0	0	0	0
Ivanhoe Twp	WS	0	0	0	0
Neelands Twp - Impact Plot	bF	0	0	0	0
	WS	2	0	0	0
Peters Twp					
- Shoals Prov. Pk	bF	3	23	L-M	1
Reaney Twp					
- Five Mile Prov. Pk	bF	0	20	L-M	0
<u>Cochrane District</u>					
(5 locations)					
Clute Twp - OMNR Seed Production Area	WS	0	0	0	0
Fournier Twp - OMNR Seed Production Area	WS	0	0	0	0
Laughton Twp	bF	0	0	0	9
Marathon Twp	bF	0	0	0	9
St. John Twp - Stand 177	bF	0	10	L	9
<u>Gogama District</u>					
(3 locations)					
Dublin Twp	bF	0	0	0	0
Garvey Twp	bF	0	0	0	0
St. Louis Twp	WS	1	0	0	0
<u>Hearst District</u>					
(17 locations)					
Elgie Twp	bF	0	30	L-M	9
Franz Twp	bF	0	0	0	9
Frost Twp					
- Nagagamisis Prov. Pk Campground	bF	0	25	L-M	9
- Impact Plot	bF	0	9	L	9
	WS	0	21	L-M	9
	BS	0	0	0	9
Fushimi Twp					
- Fushimi Prov. Pk	bF	0	27	L-M	9

(cont'd)

Table 3. Northern Region - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1989, and infestation forecasts for 1990 (concl.).

Location	Host	Estimated defoliation in 1989 (%)	No. of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1990 ^a	Accumulated damage
<u>Hearst District</u> (cont'd)					
(17 locations)					
Gourlay Twp	bF	1	10	L	9
Kohler Twp	bF	1	11	L	9
Larkin Twp					
- Impact Plot	bF	0	0	0	9
	WS	0	0	0	9
	BS	0	8	L	9
Lessard Twp - Stand 341	bF	0	12	L	9
McEwing Twp	bF	0	22	L-M	9
Rogers Twp					
- Plantation 26A	bF	0	11	L	9
	WS	0	11	L	9
Studholme Twp					
- (Plantation 37)	WS	0	0	0	0
<u>Kapuskasing District</u>					
(3 locations)					
Cumming Twp	WS	0	0	0	9
Fauquier Twp					
- René Brunelle Prov. Pk	bF	0	0	0	9
Guilfoyle Twp	bF	0	0	0	9
<u>Kirkland Lake District</u>					
(4 locations)					
Lamplugh Twp	bF	0	0	0	+
Maisonville Twp	bF	0	0	0	+
	BS	0	0	0	+
Pacaud Twp	bF	0	0	0	+
<u>Timmins District</u>					
(2 locations)					
Hassard Twp	bF	0	0	0	+
Thomas Twp	WS	0	0	0	0

^a S = severe, M = moderate, L = light, 0 = nil

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Various degrees of leader mortality caused by the eastern pine shoot borer were found in most jack pine plantations examined in the southern districts of the region. Leader damage ranged from a low of 0.7% in the Chapleau District to a high of 16.6% in the Kirkland Lake District (Table 4).

Table 4. Summary of leader damage by the eastern pine shoot borer in three districts of the region in 1988 and 1989 (counts based on the examination of 150 randomly selected jack pine trees at each location).

Location (Twp)	Avg. ht of trees (m)	Estimated no. of of trees per ha	Estimated area affected (ha)	Leaders killed (%)	
				1988	1989
<u>Chapleau District</u>					
Alcona	1.5	2,500	200	-	4.7
Island Lake	1.5	1,500	30	15.3	0.7
Delaney	3.8	2,500	20	-	2.7
Strom	2.0	2,500	10	-	1.3
McNaught	1.8	1,500	50	2.0	4.7
Chewett	2.8	2,500	100	-	3.3
Copperfield	2.4	1,500	68	10.0	12.0
D'Arcy	2.2	1,500	75	-	2.0
<u>Kirkland Lake District</u>					
Holmes	1.8	2,500	10	9.3	4.6
Charters	1.0	2,500	10	5.3	16.6
Lawson	1.5	2,500	10	-	9.3
Arnold	1.0	2,500	10	-	4.0
<u>Timmins District</u>					
Carscallen	3.0	2,500	50	12.0	13.0
Macklem	2.0	2,500	25	8.6	14.0
Robb	3.5	2,500	50	3.3	3.6

Birch Leafminer, *Fenusa pusilla* (Lep.)

In most districts of the region high populations of the birch leafminer continued to cause moderate-to-severe discoloration of white birch (*Betula papyrifera* Marsh.) trees in urban areas, in rural situations (open-growing trees) and in lightly stocked forest stands.

Foliar damage of 50-90% was common in urban areas through the districts of Hearst, Kapuskasing and Cochrane and in forest stands along Highway 631 from Highway 11 to Hornepayne in the Hearst District. Similar damage was recorded at many points along Highway 11 from Hearst to Iroquois Falls and along the Detour Lake Road north of Wade Lake in the Cochrane District.

In the Kirkland Lake and Timmins districts defoliation of 50% was general in small pockets ranging in size from an area containing several trees to 2 ha, and severe discoloration of ornamentals was common in towns through the area.

Damage levels were not as high in the Chapleau and Gogama districts where populations were much lower than in 1988.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

A pronounced increase in the number of forest tent caterpillars was observed in several districts of the region in 1989.

The small infestation recorded in 1988 in the Hearst District developed into a major outbreak. Moderate-to-severe defoliation of trembling aspen (*Populus tremuloides* Michx.) was general through the northern and central sections of the district, and extended into the western part of Kapuskasing District (Fig. 2). The total area of defoliation mapped was 157,920 ha: 150,439 ha in Hearst District and 7,482 ha in Kapuskasing District. The largest area of defoliation was centered around the town of Hearst, extending from Calstock in the west to Hallenbourg in the east and from Lac Ste. Therese in the north to Joques in the south. Trees of all susceptible species were defoliated along the Kenogami river and its tributaries as far north as the Little Current River. A small pocket of defoliation was mapped at Tocheri Lake in Cholette Township in the southwest corner of Hearst District.

In Chapleau District, four small areas of moderate-to-severe defoliation were mapped in Panet Township north of Chapleau and in Moggy Township in the southwest corner of the district. Light defoliation was recorded in the town of Chapleau and in Missinaibi Provincial Park. No damage was reported from other districts in the region.

Egg-band counts taken in the autumn of 1989 indicate that infestations will increase substantially in 1990 (Fig. 3), particularly in the Hearst and Kapuskasing districts (Table 5).

NORTHERN REGION

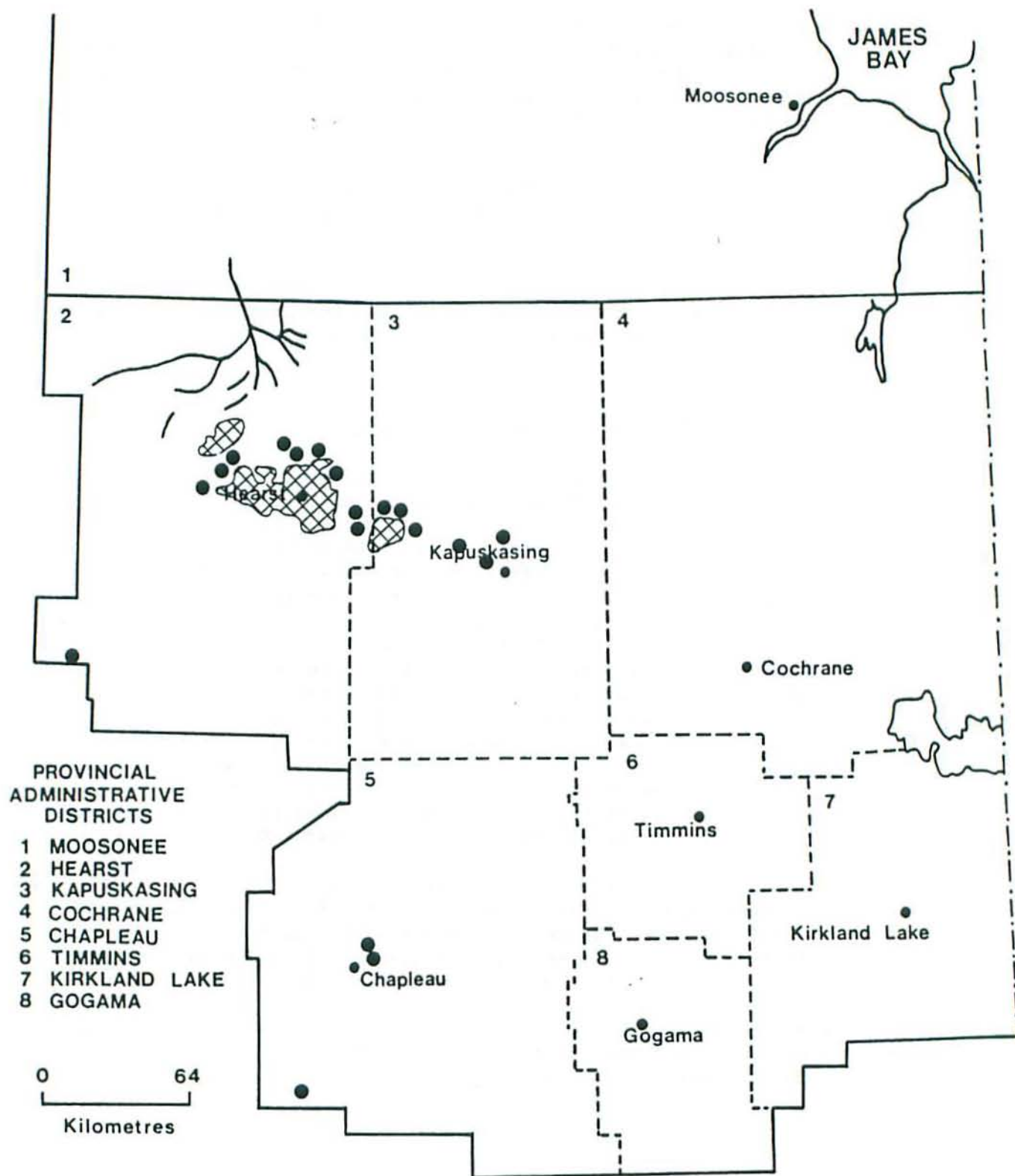
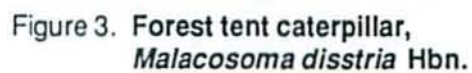


Figure 2. Forest tent caterpillar, *Malacosoma disstria* Hbn.

Forest Insect and Disease Survey
Forestry Canada, Ontario Region

Areas within which moderate-to-severe
defoliation occurred in 1989

or ●



Moderate-to-heavy ☒
 Light ☐

Table 5. Summary of the results of forest tent caterpillar egg-band counts on trembling aspen in three districts of the region in 1989 and infestation forecasts for 1990.

Location (Twp)	Avg DBH of trees (cm)	Avg no. of egg bands per tree	Infestation forecasts for 1990
<u>Hearst District</u>			
McCoig	15	5	severe
Arnott	15	2	light
Gill	15	10	severe
North of Rogers Twp	15	10	severe
Studholme	15	10	severe
Fushimi	15	10	severe
Kendall	15	10	severe
Lowther	15	5	severe
Shannon	15	10	severe
Devitt	15	5	severe
Shetland	15	4	light
Caithness	15	3	light
<u>Kapuskasing District</u>			
Eilber	15	5	severe
Idington	15	3	light
Williamson	15	4	light
<u>Chapleau District</u>			
Brackin			
- Brac Lake	11	20	severe
- Crooked Lake	12	2	light
Barclay	11	1	light

Whitespotted Sawyer, *Monochamus scutellatus* (Say)

Concern expressed by woods personnel of Newaygo Timber Company and the Ontario Ministry of Natural Resources prompted a detailed survey of dead and dying jack pine trees in Marjorie Township, Hearst District. The damaged stands were composed of numerous pockets ranging in size from 0.5 to 1 ha; further examination showed that heavy feeding by sawyer beetles in 1987 and 1988 caused significant damage that undoubtedly contributed greatly to tree mortality. Since cutting operations in the area were just beginning and no slash had accumulated, it was suspected that the vast numbers of beetles required to cause the damage originated in timber windthrown by a large tornado that passed through the area just west of the damaged stands in 1986.

Pine Sawflies, *Neodiprion maurus* Roh., *N. pratti banksianae* Roh. and *N. virginiana* complex

As in 1988, colonies of several species of *Neodiprion* sawflies were found frequently in jack pine stands and plantations, particularly in the southern districts of the region. *N. virginiana* was the most common of these sawflies; single trees and small groups of trees along the fringes of stands sustained moderate-to-severe defoliation at several locations. In Alcona Township, Chapleau District, a 200-ha jack pine plantation was infested and 54% of the 6-year-old trees suffered an average defoliation of 35%. Light damage was recorded in Margaret Township near Biscotasing, where 100% of the semimature trees in a 0.5-ha stand were infested and sustained an average defoliation of 15%. In Farquhar Township, Hearst District, similar defoliation was recorded on 15-m trees. Defoliation ranging from 10 to 70% was common on small groups of trees in Eby, Grenfell, Lamplugh, Catherine, Skead and Michaud townships in the Kirkland Lake District. Scattered colonies of *N. pratti banksianae* were found in jack pine stands in most districts of the region and several colonies of the relatively rare *N. maurus* were recovered from Carnegie and Murphy townships, Timmins District.

Swaine Jack Pine Sawfly, *Neodiprion swainei* Midd.

Moderate-to-severe defoliation of jack pine trees recurred on Island 127 in Lake Temagami where a small pocket (0.2 ha) of infestation has been present for several years. Scattered colonies were again found on other islands and in shoreline stands on Lake Temagami and in the Gamble-McGiffin plantations in the Temagami District.

In September, a helicopter survey was made of the former infestation, which encompassed parts of the Temagami and Kirkland Lake districts. Light defoliation was recorded in the two pockets (200 ha) mapped in 1988 in Trethewey Township. Light top mortality was observed in these areas. No defoliation was observed in other sections of the former infestation.

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

High numbers of this spruce sawfly were reported from several districts in the region. Damage to windbreaks, snowhedges, plantations and open-growing black spruce (*Picea mariana* [Mill.] B.S.P.) and white spruce (*Picea glauca* [Moench] Voss) trees in old fields, in cutovers and along roadsides was conspicuous at many locations.

In the town of Chapleau, defoliation of ornamental trees averaged 30% and the mortality level among 2-m trees was 10%. Similar mortality was recorded at Wakami Provincial Park (see photo page). Ornamental trees in Foleyet were attacked for the first time and defoliation averaged 65%.

Medium-to-heavy infestations recurred through the Kirkland Lake and Timmins districts. Defoliation ranged from 10 to 100% and mortality of trees up to 2 m in height was common. Spray projects were carried out by the Ontario Ministry of Natural Resources at the Swastika Tree Nursery and at the seed orchard in Chamberlain Township and by the Ontario Ministry of Transportation at several points.

No extensive damage was recorded in Hearst and Kapuskasing districts except in René Brunelle Provincial Park at Remi Lake, where small trees sustained about 30% defoliation. In Glackmeyer Township, Cochrane District, 93% of 1.4-m white spruce trees in a 4-ha plantation were attacked and defoliation averaged 37%. Defoliation of 60% was recorded in a 2-m snowhedge east of the town of Cochrane.

White Pine Weevil, *Pissodes strobi* (Peck)

Little change in population levels of the white pine weevil was observed in the region. Various degrees of leader mortality were recorded in jack pine plantations in the Chapleau, Kirkland Lake and Timmins districts (Table 6).

The 40 semipermanent plots established to record damage in jack pine plantations in Invergarry and Vrooman townships, Gogama District were retallied (Table 7).

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Tamarack (*Larix laricina* [Du Roi] K. Koch) stands in the region have been monitored closely for damage by this sawfly since 1987. In 1988, a few colonies were found in Kapuskasing and Timmins districts. In 1989, 5% defoliation was observed on 15-m trees at several points along roadsides in Farquhar Township, Hearst District. Scattered colonies were found in Eilber Township, Kapuskasing District; in Carnegie Township, Timmins District; and in Morrisette, Arnold and Powell townships, Kirkland Lake District.

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

Populations of this sawfly remained relatively low throughout the region. In the town of Chapleau, 40% of the trees examined sustained 20% defoliation. Defoliation of open-growing mountain-ash (*Sorbus americana* Marsh.) trees in Ivanhoe Provincial Park was approximately 60%. In Dublin Township, Gogama District, roadside surveys showed an average of 25% defoliation on 65% of the trees examined. In the remainder of the region lightly defoliated trees were observed in most districts but no extensive damage occurred.

Table 6. Summary of damage caused by the white pine weevil in jack pine plantations in three districts of the region in 1989 (counts based on the examination of 150 randomly selected trees at each location).

Location (Twp)	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Leaders killed (%)
<u>Chapleau District</u>				
Alcona	1.5	2,500	200	4.7
Lynch	3.7	1,500	200	3.3
Island Lake TIA	1.5	1,500	30	6.7
Topham	3.7	1,500	100	2.0
Neelands	2.0	2,500	10	2.7
Delaney	3.8	2,500	20	3.3
Chappise	3.7	1,500	50	2.7
Strom	2.0	2,500	10	4.7
McNaught	1.8	1,500	50	8.7
Chewett	2.8	2,500	100	2.7
Lipsett	1.8	1,500	200	2.0
Copperfield	2.4	1,500	200	3.3
D'Arcy	2.2	1,500	75	6.0
<u>Kirkland Lake District</u>				
Charters	1.0	2,500	10	26.0
Lawson	1.5	2,500	5	14.3
Holmes	1.8	2,500	5	20.0
Arnold	1.0	2,500	5	6.0
<u>Timmins District</u>				
Carscallen	3.0	2,500	10	8.0
Macklem	2.0	3,500	5	3.0

Table 7. Summary of leader damage in jack pine plantations in two townships of Gogama District, 1987-1989 (counts based on the examination of 150 randomly selected trees at each location).

Year	White pine weevil	Eastern pine shoot borer	Jack pine tip beetle	Unknown
1987	6.2	2.3	0.8	3.7
1988	2.4	3.2	0.6	6.4
1989	2.5	6.8	0.4	2.8

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

The infestation of this insect expanded considerably in 1989 (Fig. 4). A total of 15,703 ha of moderate-to-severe defoliation was mapped, mainly in the northern part of the Hearst District. The largest pocket, extending from the northern part of Rogers Township north to Limestone Rapids on the Kabinakagami River, encompassed 12,610 ha. A second pocket of 775 ha stretched from south of Limestone Rapids into the northern part of Fushimi Township. An infestation of approximately 1,940 ha was mapped in the west-central part of Auden Township and two small pockets of 130 and 250 ha occurred in the central part of Rogers Township. The leafcurler also caused defoliation ranging from 5 to 20% through many areas in Kapuskasing and Cochrane districts; in Whitney and Mountjoy townships, Timmins District; and in Taylor, Carr, Beatty and Hislop townships, Kirkland Lake District.

Grey Willow Leaf Beetle, *Tricholochmaea decora* (Say)

In 1988, severe defoliation of hundreds of hectares of willow (*Salix* spp.) through Chapleau, Gogama, Kirkland Lake and Timmins districts prompted numerous inquiries from concerned property owners. The infestation recurred throughout all four districts in 1989 and extensive mortality of willow shrubs was observed at many locations. Adults of this insect feed in late May and early June, and are followed by larvae skeletonizing in late July and early August. Therefore, damage occurs over an extended period.

Table 8. Other forest insects

Insect	Host(s)	Remarks
<i>Aceria</i> sp. nr. <i>dispar</i> (Nal.) Aspen leaf mite	tA	common throughout Timmins and Kirkland Lake districts; particularly conspicuous in stands defoliated by leaf rollers
<i>Acrobasis betulella</i> Hlst. Birch tubemaker	wB	3 to 5% defoliation in Rogers and McEwing twps, Hearst District; low populations found in a majority of stands examined throughout the region
<i>Adelges lariciatus</i> (Patch) Spruce gall adelgid	wS	commonly found at trace levels on scattered, individual trees in the northern portion of the work area

(cont'd)

Table 8. Other forest insects

Insect	Host(s)	Remarks
<i>Anacampis niveopulvella</i> (Chamb.) Paleheaded aspen leafroller	tA	less than 10% defoliation in scattered stands throughout Chapleau, Kirkland Lake and Timmins districts
<i>Aphrophora cribrata</i> (Wlk.) Pine spittlebug	jP	high numbers of spittle masses in many plantations and natural stands in the southern part of the region
<i>Archips cerasivorana</i> (Fitch) Uglynest caterpillar	Ch	numerous nests on shrubs in rural areas in the vicinity of New Liskeard, Englehart, and Charlton, Kirkland Lake District
<i>Cecidomyia resinicola</i> (O.S.) Jack pine resin midge	jP	1-2% branch top mortality in many plantations in Chapleau, Kirkland Lake and Timmins districts
<i>Chionodes obscurusella</i> Cham. Boxelder leafworm	Manitoba maple	90% foliar damage to the majority of mature ornamentals growing in the town of Chapleau, Chapleau District
<i>Choristoneura conflictana</i> (Wlk.) Large aspen tortrix	tA	Trace-to-low populations were found throughout central Chapleau District.
<i>Coleophora laricella</i> (Hbn.) Larch casebearer	tL	low populations found in central Chapleau District; heaviest damage in Blamey Twp, where 10% of the examined shoots were affected
<i>Conophthorus banksianae</i> McP. Jack pine tip beetle	jP	High populations continued at Missinaibi Prov. Pk, Chapleau District; populations declined elsewhere in the district.
<i>Dasineura balsamicola</i> (Lint.) Introduced false balsam gall midge	bF	commonly found at low levels in balsam fir stands in Kirkland Lake and Timmins districts

(cont'd)

Table 8. Other forest insects

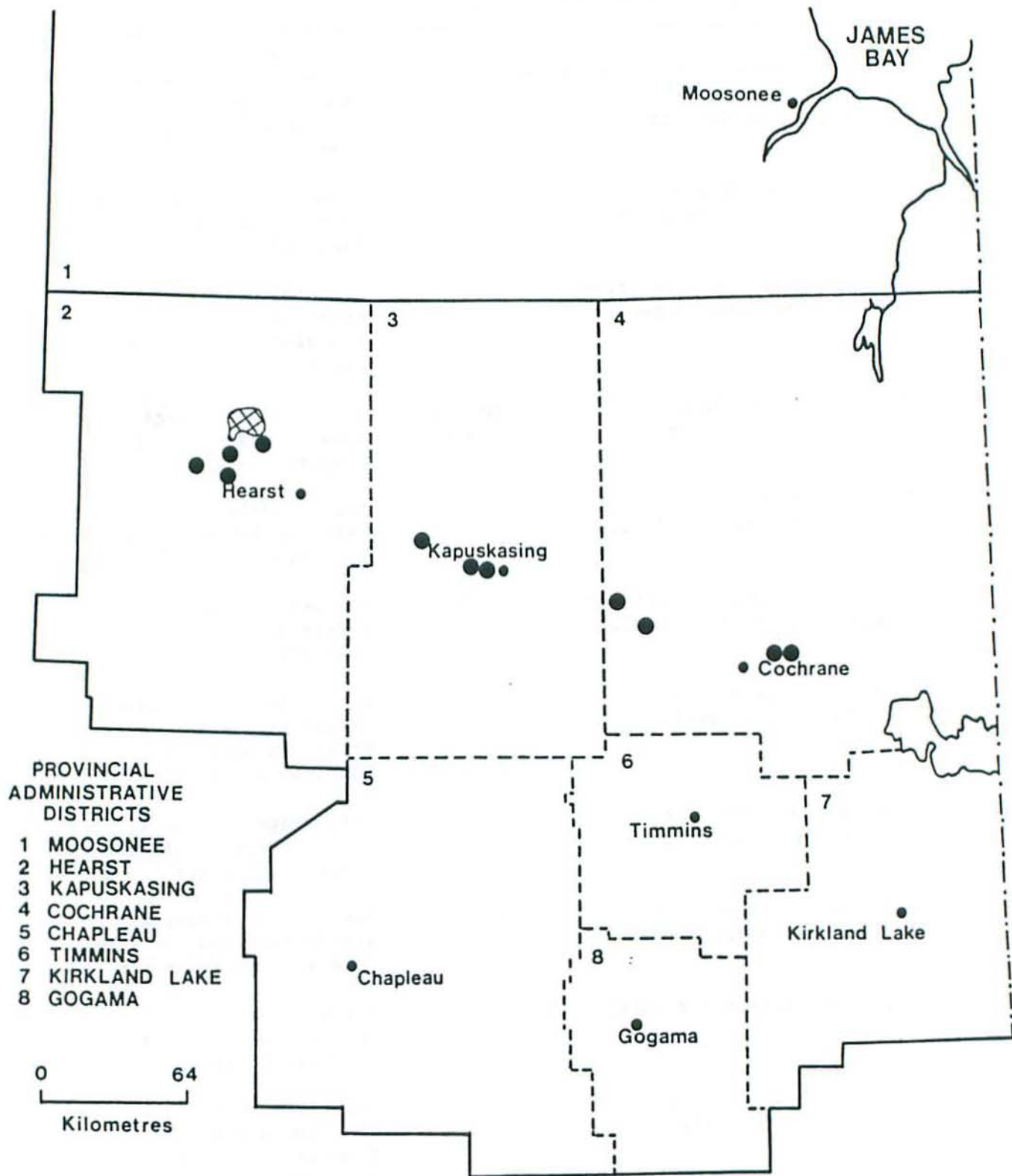
Insect	Host(s)	Remarks
<i>Enargia decolor</i> (Wlk.) Aspen twoleaf tier	tA	low populations in aspen stands in Kirkland Lake and Timmins districts
<i>Epinotia solandriana</i> (L.) Birch-aspen leafroller	wB, tA	5-10% defoliation at many scattered points in Chapleau, Kirkland Lake and Timmins districts
<i>Eupareophora parca</i> (Cress.) Spiny ash sawfly	bAs	The upper crowns of the majority of trees examined in Chapleau and Gogama districts were 10-15% defoliated.
<i>Ips pini</i> (Say) Pine engraver	jP	Scattered single-tree mortality along bush roads in Franz Twp, Hearst District was attributed to this beetle.
<i>Macrohaltica ambiens</i> (LeC.) Alder flea beetle	Al	100% foliar damage to roadside bushes, Delaney and Caouette twps, Chapleau District; high numbers at many locations in Kirkland Lake and Timmins districts
<i>Macrohaltica populi</i> (Brown) Poplar flea beetle	Al	25% defoliation of hybrid alder (<i>Alnus</i> spp.) seedlings planted around spruce (<i>Picea</i> spp.) seedlings at Walley Creek, Cochrane District
<i>Malacosoma americanum</i> (F.) Eastern tent caterpillar	Ch	A few colonies caused 25% defoliation along Island Lake Rd in Chappise Twp, Chapleau District.
<i>Malacosoma californicum pluviale</i> (Dyar) Northern tent caterpillar	Ch, w wB	High populations caused heavy damage to roadside bushes in Pattinson, Floranna and Lipsett twps, Chapleau District; low levels were common across the southern portion of the region.

(cont'd)

Table 8. Other forest insects (concl.)

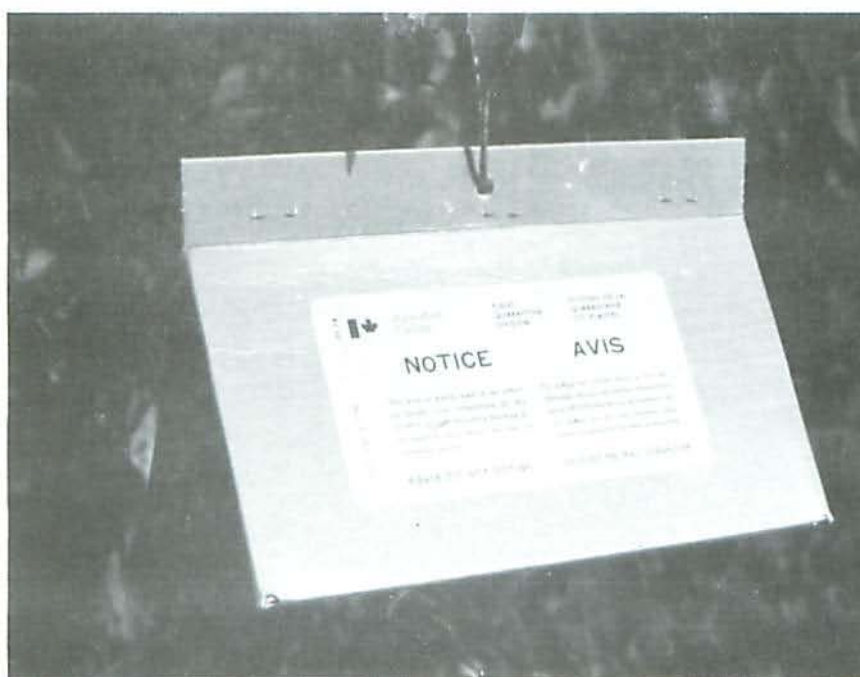
Insect	Host(s)	Remarks
<i>Meroptera praveilla</i> (Grt.) Lesser aspen webworm	tA	common in mature aspen stands in Kirkland Lake and Timmins districts
<i>Petrova albicapitana</i> (Bsk.) Northern pitch twig moth	jP	found at low levels in most stands examined in Kirkland Lake and Timmins districts
<i>Phyllonorycter ontario</i> (Free.) Aspen leafblotch miner	tA	95% foliar damage to 2-m trees at Bonner Centre in Fauquier Twp, Kapuskasing District
<i>Phytoptus pyri</i> (Pgst) Pear leaf blister mite	Mountain-ash	100% foliar damage to road-side trees in Topham Twp, Chapleau District
<i>Pineus similis</i> (Gill.) Ragged sprucegall adelgid	wS	trace levels found on 15-m-tall ornamentals in Fauquier Twp, Kapuskasing District
<i>Pleroneura brunneicornis</i> Roh. Balsam shootboring sawfly	bF	low levels found throughout Kirkland Lake and Timmins districts
<i>Pristiphora lena</i> Kinc. Little spruce sawfly	wS	Low populations caused 10% defoliation of open-growing trees in Shoals Prov. Park, Chapleau District.
<i>Pyrrhia exprimens</i> (Wlk.) Variable caterpillar	bPo	30% damage to 2-m-tall road-side trees in Racine Twp, Chapleau District
<i>Rhabdophaga swainei</i> Felt. Spruce bud midge	wS, bS	low levels of damage in most stands examined in Kirkland Lake and Timmins districts
<i>Tetralopha aplastella</i> (Hlst.) Aspen webworm	tA	5-10% foliar damage widespread in Chapleau Twp, Chapleau District
<i>Toumeyella parvicornis</i> (Ckll.) Pine tortoise scale	jP	heavy damage to small groups of semimature trees in Timmins and Kirkland Lake districts
<i>Vasates quadripedes</i> Shimer Maple bladdergall mite	siM	100% foliar damage common on ornamentals growing in the town of Chapleau, Chapleau District

NORTHERN REGION





Gypsy moth, *Lymantria dispar* L., pheromone trap being hung at Shoals Provincial Park, Chapleau District



Closeup of gypsy moth pheromone trap used to monitor populations of male moths in provincial parks



Fruiting bodies of white pine blister rust, *Cronartium ribicola* J.C. Fischer, on stem of young white pine (*Pinus strobus* L.)
(Blister rust is a common disease in Chapleau District.)



Severely defoliated white spruce (*Picea glauca* [Moench] Voss), which has suffered three consecutive years of damage caused by the yellowheaded spruce sawfly, *Pikonema alaskensis* (Roh.).
(Wakami Provincial Park, Chapleau District)

TREE DISEASES

Major Diseases

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

This root rot continued to cause low levels of mortality in jack pine plantations and in natural jack pine regeneration throughout the region. The highest incidence of mortality was in Gauthier Township, Kirkland Lake District, where 20% of the trees evaluated were killed (Table 9). Tree mortality ranged from 0.7% to 1.3% in other areas examined in the region.

Table 9. Summary of jack pine mortality caused by *Armillaria* root rot in the region in 1989 (counts based on the examination of 150 randomly selected trees at each location).

Location (Twp)	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Current mortality (%)
<u>Chapleau District</u>				
Oates	1.0	3,500	10	1.3
Reaney	0.5	3,500	15	1.3
<u>Gogama District</u>				
Vrooman	1.0	2,500	10	1.3
Macmurchy	2.0	2,500	10	1.3
<u>Kirkland Lake District</u>				
Gross	2.8	3,500	15	0.7
Chamberlain	2.3	3,500	5	1.3
Gauthier	5.0	2,500	2	2.0
Morrisette	2.0	4,000	10	1.3
Holmes	2.0	4,000	5	1.3
McCann	1.8	4,000	3	2.0
<u>Timmins District</u>				
Robb	3.5	3,500	10	0.6
Carscallen	2.5	4,000	5	1.3

Ink Spot of Aspen, *Ciborinia whetzellii* (Seaver) Seaver

Severe damage was caused by this foliar disease in the northern portion of the region in 1989. An unusually wet and cool spring provided ideal conditions for development of the fungus. Damage was confined to roadside stands of trembling aspen, 1-2 ha in area, west of the town of Hearst in Hanlan Township. One hundred percent of the mature trees in these stands were affected with 50% foliar damage. Similar high levels of damage were found in Kendry Township, Kapuskasing District, and in Lamarche Township, Cochrane District. In Mageau Township, Chapleau District, 20% foliar damage was recorded on 100% of the regeneration in the area. This foliar disease was common in Timmins and Kirkland Lake districts, but it did not cause extensive damage in either district.

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

Generally, these rusts were of minor importance in white spruce and black spruce stands in 1989. Light levels of damage were common across the region (Table 10), but there were several exceptions in the northern portion of the region. These occurred in Hopkins Township, Kakuskasing District and in Bragg and Thorning townships, Cochrane District. In areas in which the incidence of this disease was high, a fungus suspected of being parasitic on the rust was found (Fig. 5).

Table 10. Summary of damage caused by spruce needle rusts in the region in 1989 (counts based on the examination of 150 trees).

Location (Twp)	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)	Trees with suspect- ed rust parasite (%)
<u>Hearst District</u>						
Larkin	0.5	1,400	10	8.7	2.0	0
Eilber	7.1	2,500	5	99.0	2.0	0
<u>Kapuskasing District</u>						
Hopkins	1.4	2,000	120	100.0	16.5	66.7
Shearer	3.8	2,500	100	16.7	2.0	0
<u>Cochrane District</u>						
Bragg	1.5	2,200	5	100.0	25.0	8
Thorning	1.5	2,500	110	100.0	22.0	95
Sheldon	1.6	1,600	10	90.7	2.2	0
Calder	4.5	2,500	10	88.0	2.0	0

NORTHERN REGION

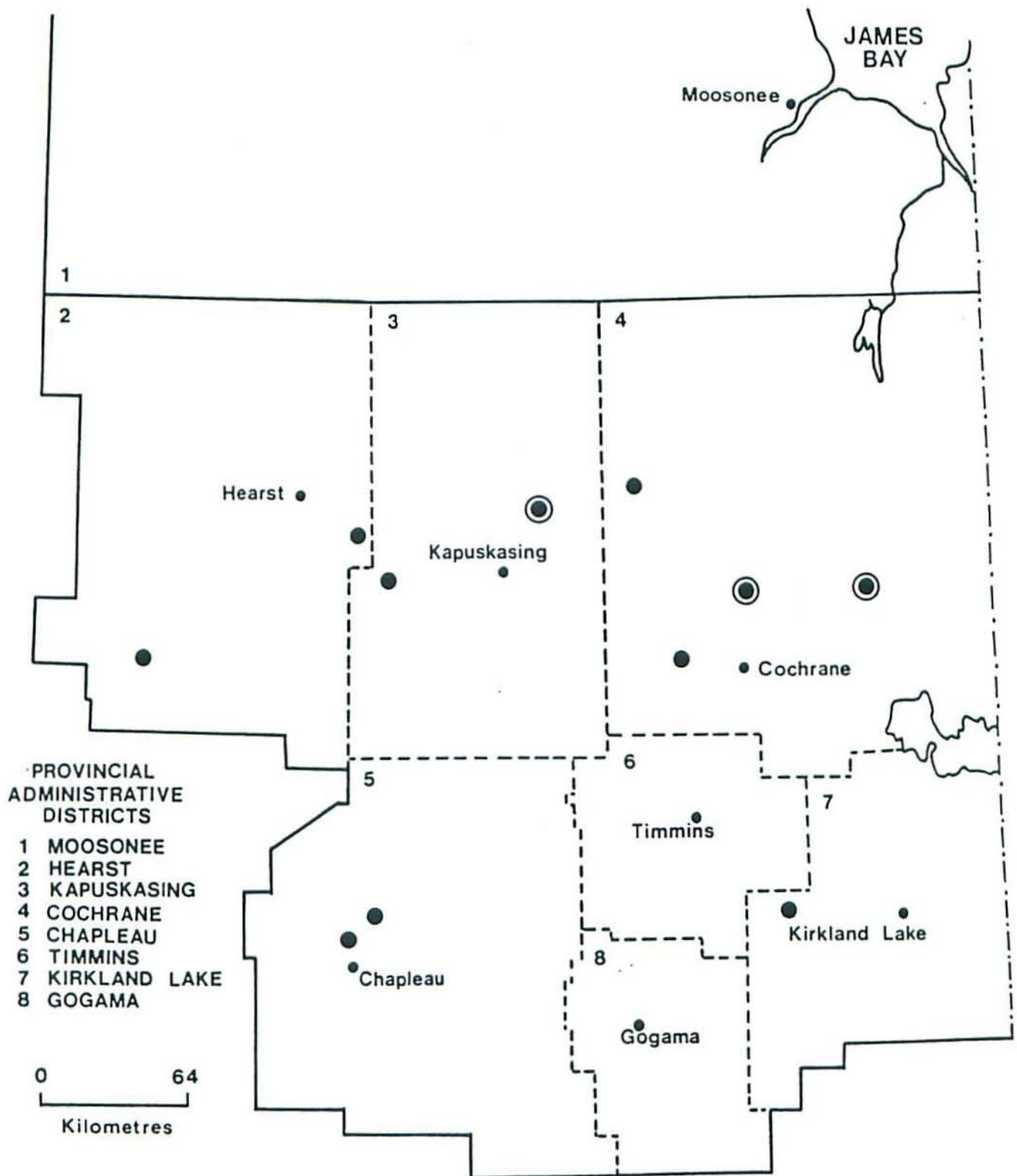


Figure 5. Spruce needle cast, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary and *Chrysomyxa ledicola* (Peck) Lagerh.

Forest Insect and Disease Survey
Forestry Canada, Ontario Region

Areas within which damage occurred in 1989

Affected areas
Affected areas with parasitic fungus present ...

Pine Needle Rust, *Coleosporium asterum* (Dietel) Sydow

The incidence of this foliar disease of jack pine, and damage caused by it, were similar in 1988 and 1989. Light damage was common in the majority of plantations examined (Table 11). For the second consecutive year the heaviest damage occurred in Reaney Twp, Chapleau District, where 99% of the trees were affected and an average of 45% of the foliage was infected. 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.

Sweetfern Blister Rust, *Cronartium comptoniae* Arthur

This stem disease of jack pine has a complex life cycle, as it requires two hosts to complete the cycle. Jack pine is the primary host and sweetfern and sweetgale are the alternate hosts. The presence of these alternate hosts helps in the diagnosis of the fungus, which damages these hosts by girdling action. Trees less than 10 cm in diameter can be girdled and killed.

Sweetfern blister rust was commonly found in plantations in Chapleau and Gogama districts. Although only trace levels of the disease were found in the majority of plantations examined, moderate damage did occur in a couple of areas. Results of the surveys are found in Table 12.

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

In Chapleau District, young eastern white pine (*Pinus strobus* L.) in several townships in the southern portion of the district were affected with this disease (Table 13). In all cases, infection was severe, i.e., it had reached the stem (see photo page). This infection will eventually girdle the stem and kill the tree. In the areas evaluated, it was not possible to do a 150-tree survey; therefore, a 100% evaluation was completed.

This disease is common on mature eastern white pine in the southern part of the region. Trees with tops killed by blister rust are a common sight when one is traveling through the southern districts. It is difficult to assess damage to mature trees because they are so widely scattered, but a reasonable estimate is that 15% of the trees are affected.

Table 11. Summary of damage caused by pine needle rust in the region in 1989 (counts based on the examination of 150 randomly selected trees at each location).

Location	Avg ht of trees (m)	Estimated no. of trees/ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
<u>Chapleau District</u>					
Keith	0.5	2,500	10	50	10
Copperfield	2.0	1,500	25	99	7
Nimitz	2.0	2,500	80	10	5
Muskego	1.0	2,500	10	80	5
Silk	2.0	1,500	20	40	20
Alcona	0.7	2,500	25	99	25
Darcy	1.0	2,500	50	95	10
Marshall	2.0	2,500	20	99	15
Reaney	0.5	4,444	25	99	45
Warren	1.0	2,500	20	90	25
Cortez	1.0	2,500	20	99	20
<u>Gogama District</u>					
Invergarry	1.0	2,500	50	50	10
Macmurchy	0.5	2,500	30	99	30
Garibaldi	2.0	2,500	100	99	17
<u>Cochrane District</u>					
Sheldon	3.5	1,500	93	87	5
<u>Hearst District</u>					
Cross	4.0	1,500	220	97	4
<u>Kirkland Lake District</u>					
Morrisette	2.0	3,000	10	4.0	10
Holmes	2.0	3,000	10	4.6	15
Arnold	2.0	3,000	5	5.3	5
<u>Timmins District</u>					
Robb	3.5	3,500	10	1.6	5

Table 12. Summary of damage caused by sweetfern blister rust in the region in 1989 (counts based on the examination of 150 randomly selected trees).

Location (Twp)	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Trees severely affected (%)
<u>Chapleau District</u>				
Cortez	1.0	4,000	10	3.0
Reaney	0.5	2,500	20	2.7
Hutcheon	1.5	2,500	20	1.3
Keith	1.0	4,444	10	2.0
deGaulle	2.0	2,500	10	5.0
<u>Gogama District</u>				
Invergarry	1.5	2,500	20	3.3
Vrooman	1.0	2,500	25	3.0

Table 13. Summary of damage caused by white pine blister rust in Chapleau District in 1989.

Location (Twp)	Avg ht (m)	No. of trees examined	No. of trees affected	Trees affected (%)
Cortez	0.6	100	11	11
Genier	0.8	83	5	6
Kosney	0.7	27	7	26
Gilliland	0.9	56	3	5
Green	1.1	27	2	7
Neill	0.9	24	5	21

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

This early-season needle disease, which causes discoloration and premature casting of the 1-year-old foliage of jack pine, was observed at low levels through the entire region. However, light-to-moderate damage was recorded in a few scattered plantations (Table 14). The highest level of damage was found in a plantation in Nimitz Township, Chapleau District, where 90% of the trees sustained 25% foliar damage. In addition, small pockets of mature trees with moderate damage were encountered at widely scattered points in the region.

Table 14. Summary of damage caused by tar spot needle cast in the region in 1989 (counts based on the examination of 150 or 300 randomly selected trees at each location).

Location (Twp)	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
<u>Chapleau District</u>					
Caverly	0.6	1,600	10	7	15
Nimitz	1.2	2,500	80	90	25
Marshall	1.5	2,500	20	99	5
Neelands	1.0	2,500	5	41	17
deGaulle	1.7	2,500	10	65	20
Chappise	2.0	2,500	23	25	17
Copperfield	1.5	2,500	25	35	30
<u>Gogama District</u>					
Vrooman	0.7	4,444	15	25	25
Invergarry	0.9	2,500	5	75	20
Garibaldi	1.3	2,500	50	30	35
<u>Kirkland Lake District</u>					
Gross	2.8	3,500	15	4	12
McEvay	3.8	3,500	5	5	10
Arnold	2.0	4,000	5	4	15
<u>Timmins District</u>					
Robb	3.5	3,500	10	9	34

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

This rust was found at various levels in many jack pine stands throughout the region. In most instances, branch galls were more common, but occasionally the stems of small trees in plantations had been girdled and killed. High damage levels, together with mortality caused by gall rust, have rendered several plantations in Chapleau District commercially useless. In one 10-ha plantation in deGaulle Township, 30% of the trees were dead, and 45% of the remaining trees had gall rust. Results of surveys conducted are given in Table 15.

Table 15. Summary of damage by western gall rust in the region in 1989
(counts based on the examination of 150 trees at each location).

Location (Twp)	Avg ht of trees (m)	Estimated no. of trees per ha	Estimated area affected (ha)	Trees affected (%)	Trees severely affected (%)
<u>Chapleau District</u>					
Neelands	1.0	2,500	5	50	42
Cortez	1.0	4,000	10	2	2
Caverly	0.6	1,600	5	33	33
Hutcheon	1.8	1,600	10	9	3
Carty	1.5	2,500	25	3	3
McNaught	1.7	2,500	25	2	2
deGaulle	1.7	2,500	10	45	25
Nimitz	1.2	2,500	80	11	7
<u>Gogama District</u>					
Invergarry	1.2	2,500	50	3	3
Macmurchy	1.4	2,500	10	9	9
<u>Kirkland Lake District</u>					
Gross	2.0	3,500	15	0	0
Morrisette	1.5	4,000	10	2	1.3
Ben Nevis	1.5	3,500	5	27	27
<u>Timmins District</u>					
Robb	3.5	3,500	10	3	0.6

Table 16. Other forest diseases

Organism	Host(s)	Remarks
<i>Ascocalyx abietina</i> (Lagerb.) Schläpfer-Bernhard Scleroderris canker	jP	low levels of damage throughout the region
<i>Erwinia amylovora</i> (Burr.) Winsl. et al. Fire blight	Mountain- ash	20% foliar damage to individual semimature trees in Casselman Twp, Kapuskasing District

(cont'd)

Table 16. Other forest diseases

Organism	Host(s)	Remarks
<i>Gymnosporangium cornutum</i> Arthur ex Kern Gall rust	Mountain- ash	several trees heavily infested at one location in Grenfell Twp, Kirkland Lake District
<i>Hypoxyylon mammatum</i> (Wahlenb.) J. Miller Hypoxyylon canker	tA	5% of the trees affected and 3% mortality recorded in a 5-ha natural stand in Glackmeyer Twp, Cochrane District; similar levels found commonly throughout the region
<i>Isthmiella crepidiformis</i> (Darker) Darker Needle cast	bS	widely distributed at trace levels through Timmins and Kirkland Lake districts
<i>Isthmiella faullii</i> (Darker) Darker Needle cast	bF	35% of the old foliage on regeneration balsam fir (<i>Abies balsamea</i> [L.] Mill.) damaged in Reaney Twp, Chapleau District; low levels of damage to regeneration in Macmurchy Twp, Gogama District
<i>Lophodermium pinastri</i> (Schrader:Fr.) Chev. Needle cast	jP	one semimature tree with 30% foliar damage in Reaney Twp, Chapleau District
<i>Linospora tetraspora</i> G.E. Thompson Leaf blight	bPo	foliar damage levels varying from 50 to 80% in scattered areas throughout the region
<i>Melampsora abietis-capraerum</i> Tubeuf Fir-willow rust	bF	100% of regeneration bF suffering 15% foliar damage in Floranna Twp, Chapleau District

(cont'd)

Table 16. Other forest diseases (concl.)

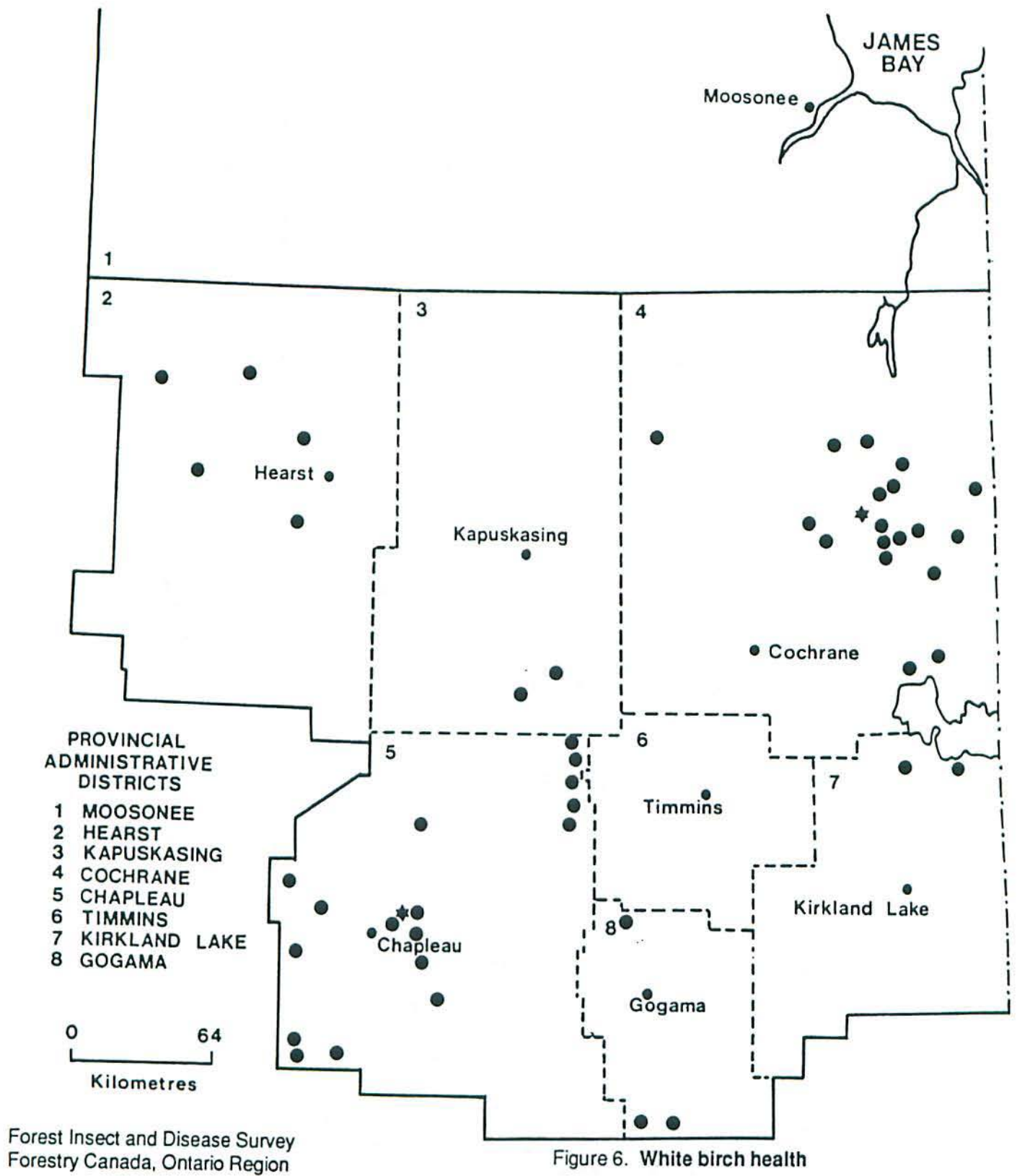
Organism	Host(s)	Remarks
<i>Melampsora medusae</i> Thüm Larch-poplar rust	hybrid Po	25% foliar damage common on individual trees in a 2-ha plantation at Bonner Centre in Fauquier Twp, Kapuskasing District
<i>Mycosphaerella populorum</i> G.E. Thompson Leaf spot	bPo	widespread damage throughout the eastern portion of the region
<i>Pucciniastrum epilobii</i> Otth Fireweed rust	bF	There was 10% foliar damage in young understory trees in Thorning Twp, Cochrane District; 100% of the trees examined had an average of 15% foliar damage in Panet Twp, Chapleau District.
<i>Venturia macularis</i> (Fr.) Müller & v. Arx Shoot blight	tA	widely distributed in aspen regeneration throughout the region, but damage generally insignificant

FOREST HEALTH

White Birch Health

Reports of extensive birch dieback throughout northern Ontario in recent years prompted FIDS staff to conduct special surveys in 1989 (see Frontispiece). Both aerial and ground surveys were undertaken. Birch stands that had obviously been disturbed, mainly by selective logging, were ignored during aerial surveys. There was no evident cause of damage in other areas in which dieback was aeri ally mapped and ground checked (Fig. 6). Two semipermanent plots have been established to monitor dieback in the future. One plot is in Borden Township, Chapleau District and the other is in Cochrane District on the Detour Lake Road, 120 km northeast of the town of Cochrane. From initial surveys it appears that most damage was found in stands that have suffered some manner of human disturbance, while undisturbed stands have proved to be relatively healthy.

NORTHERN REGION



Sample locations 1989

Areas within which white birch showed evidence of decline ●

Locations of semipermanent dieback plots ★

ABIOTIC DAMAGE

Drought

Drought was the cause of damage in two instances in central Chapleau District in 1989. Significant mortality was recorded at the Island Lake Tree Improvement Area, where 3- to 4-year-old black spruce in three fields covering 36 ha were affected. Trees growing in competition with heavy weed cover were heavily damaged; 42% were dead and another 10% showed stress from drought. Jack pine trees 5 to 6 years old growing in fields adjacent to the black spruce were not affected.

Damage also occurred in a 3-ha plantation in Strom Township containing alternate rows of jack pine and larch (*Larix* spp.). Of the trees examined, 56% were dead. Since the site was relatively unsuitable for larch, it is probable that this factor contributed to the high level of mortality.

SPECIAL SURVEYS

Black Spruce Plantations

In 1989 a special survey was conducted to assess the impact of insect and disease problems in 16 black spruce plantations in the region (Table 17). Stand selection was based on three height classes: <2 m, 2-6 m, and >6 m. A random sampling procedure was used and 150 trees were examined during two visits, one in mid-June and the other late in July. The plantations were surveyed for the following insects, diseases and abiotic damage.

Insects: spruce budworm, spruce coneworm, yellowheaded spruce sawfly, white pine weevil and sawyer beetles

Diseases: Armillaria root rot, spruce needle rust, spruce broom rust

Abiotic damage: frost

Insects and disease not found in 1989:

Insects: spruce coneworm, sawyer beetles

Diseases: Armillaria root rot, spruce broom rust

Severe damage caused by the white pine weevil was encountered in two plantations, one in Shearer Township, Kapuskasing District, where 8.0% of the trees were damaged, and the other in the Island Lake Tree Improvement Area, Chapleau District, where 9.3% of the trees had been attacked. There were no other instances of significant damage caused by insects.

Table 17. Summary of the results of a special survey of black spruce plantations and high-value stands in the Northern Region in 1989
(counts based on the examination of 150 trees at each location).

Location (Twp)	Esti- mated stand area (ha)	Esti- mated no. of trees per ha	Ht (m)	Spruce budworm		Yellowheaded spruce sawfly		White pine weevil	Frost		Needle rust	
				Trees attacked (%)	Defolia- tion (%)	Trees attacked (%)	Defolia- tion (%)	Trees attacked (%)	Trees affected (%)	Foliar damage (%)	Trees affected (%)	Foliar damage (%)
<u>Chapleau District</u>												
Delaney	30	1,500	2.1-6.0	0	0	0	0	2	0	0	11.7	1.0
Island Lake TIA	25	1,500	0.5-2.0	0	0	0	0	9.3	0	0	0	0
Panet	50	2,500	0.5-2.0	0.7	0	0	0	1.7	0	0	0	0
Panet	25	1,500	2.1-6.0	0	0	0	0	0	0	0	72.0	4.5
Floranna	76	100	>6.0	0	0	0	0	0	0	0	100	5
<u>Gogama District</u>												
Jack	12	3,000	>6.0	0	0	0	0	0	0	0	0	0
<u>Cochrane District</u>												
Sheldon	10	1,600	0.5-2.0	0	0	0	0	2.0	0	0	90.7	2.2
Calder	10	2,500	2.0-6.0	0	0	0	0	4.7	0	0	88	1
<u>Hearst District</u>												
Eilber	5	2,500	>6.0	0	0	0	0	0	0	0	99	1
Larkin	10	1,400	0.5-2.0	0.7	0	0	0	0	0	0	8.7	1

(cont'd)

Table 17. Summary of the results of a special survey of black spruce plantations and high-value stands in the Northern Region in 1989
(counts based on the examination of 150 trees at each location) (concl.).

Location (Twp)	Esti- mated stand area (ha)	Esti- mated no. of trees per ha	Ht (m)	Spruce budworm		Yellowheaded spruce sawfly		White pine weevil	Frost		Needle rust	
				Trees attacked (%)	Defolia- tion (%)	Trees attacked (%)	Defolia- tion (%)	Trees attacked (%)	Trees affected (%)	Foliar damage (%)	Trees affected (%)	Foliar damage (%)
<u>Kapuskasing District</u>												
Shearer	100	2,500	2.0-6.0	0	0	0	0	8.0	0	0	16.7	1
Fauquier	1	1,400	>6.0	0	0	0	0	0	0	0	0	0
<u>Kirkland Lake District</u>												
Chamberlain	10	1,600	0.5-2.0	0	0	2.0	1	0	0	0	35	1
McEvay	5	2,500	>6.0	0	0	0	0	0	0	0	0	0
Mulligan	5	2,500	2.0-6.0	0	0	0	0	2.7	100	2.6	4	1
<u>Timmins District</u>												
Stock	520	4,440	2.0-6.0	0	0	0	0	2.7	0	0	0	0

Spruce needle rust was encountered at 10 of the locations but in no instance was the damage serious.

Forest Tree Nursery Report

At Swastika Nursery in 1989 most damage occurred in windbreaks and plantations. The yellowheaded spruce sawfly was found in several windbreaks of white spruce and black spruce, but was controlled by spraying. White pine weevil was also a problem in plantations, and necessitated spray operations. Jack pine resin midge caused some twig mortality, and low levels of the basal stem canker, *Cronartium comptoniae*, were found in plantations. Damaged seedlings were sampled several times but no pest was identified as the causal agent.

At the Chapleau Nursery damage to spruce seedlings was limited to physical injury that occurred during weeding operations. Less than 1% of the trees were affected. High levels of western gall rust were found on semimature jack pine surrounding the nursery.

Western gall rust continued to be a problem on the mature trees surrounding the Gogama Nursery. Also at Gogama Nursery, 1-2% of young white spruce in a seed orchard were killed by *Armillaria* root rot, which is a continual problem in this area.

Gypsy Moth Pheromone Traps

Pheromone traps were deployed in the 12 provincial parks in the region in an effort to detect the presence of male gypsy moth *Lymantria dispar* (L.) adults (see photo page). As in previous years, 10 traps were hung in parks in which positive catches had been made in 1988, viz., Esker Lakes and Kap-Kig-I-Wan provincial parks, Kirkland Lake District. In all remaining parks two traps were hung. In Kirkland Lake District positive catches were again made at both Esker Lake and Kap-Kig-I-Wan provincial parks. Positive catches were also made at Missinaibi Provincial Park and Mississauga Wild River Park, both in Chapleau District.

All the parks in which positive catches were recorded are heavily used by campers from eastern Ontario and Michigan, where there are currently gypsy moth infestations. Therefore, it is likely that the gypsy moth were transported to the area by the campers and were not the result of a population buildup in the parks.

Acid Rain National Early Warning System

In 1984 and 1985 three study plots were established in the Northern Region in an effort to determine the possible effects of acid rain on forests. These plots are intensively surveyed annually for damage. In previous years no damage attributable to acid rain was recorded, and 1989 proved no exception. However, minor damage caused by insects such as jack pine tip beetle and by diseases such as western gall rust was encountered. Every year, aerial photos are taken of each plot and are compared with photos from previous years to determine if any changes have occurred. As was the case with the ground surveys, however, no effects of acid rain were observed.

Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhner) Nickle

Surveys have been conducted over the past few years in an attempt to detect the presence of the pinewood nematode in the region. Samples taken from trees exhibiting symptoms of nematode damage have confirmed that the nematode is present in jack pine throughout the region. It has also been found on black spruce and white spruce, but to a much lesser degree. In 1989, of five jack pine trees sampled, four proved positive for nematode. One black spruce was sampled, and it, too, was positive.

In 1987, six plots were established in the region in known infection centers to determine if the nematode spreads from tree to tree and, if so, what the rate of spread is. Dead and live trees are marked. The plots are visited annually and are checked for recent mortality. Mortality has occurred and the nematode has been found in the recently dead trees, but it has not been established if the nematode is the primary or secondary cause of death.

Jack Pine Plots

A continuing survey is being conducted to assess the impact of insect and disease problems in six semipermanent jack pine plantations in the region (Table 18). Two visits were made to each plot during the periods 6-24 June and 1-31 August. The stands were checked for the presence of the following insects and diseases:

Insects: Jack pine budworm, white pine weevil, eastern pine shoot borer, jack pine tip beetle, jack pine sawflies and Swaine jack pine sawfly

Diseases: Armillaria root rot, stem rusts, western gall rust, pine needle rust, tar spot needle cast

Insects not found in the current survey included jack pine budworm and Swaine jack pine sawfly.

Table 18(a). Summary of the results of surveys of permanent jack pine plots established in 1982 (counts based on the examination of 300 trees at each location)

Location (Twp)	Esti- mated stand area (ha)	Esti- mated no. of trees per ha	Year of evalu- ation	Jack pine budworm		White pine weevil	Eastern pine shoot borer		Jack pine tip beetle	Jack pine sawflies		
				Trees affected (I)	Defoli- ation (I)	Leaders attacked (I)	Leaders attacked (I)	Laterals attacked (I)	Leaders attacked (I)	Trees affected (I)	Defoli- ation (I)	
<u>Chapleau District</u>												
Bliss	75	2,775	1982	0	0	0.3	0	0.3	0.3	0	0	
			1983	0	0	0.3	1.0	0	0	0	0	
			1984	0	0	1.0	1.7	0	0.3	0	0	
			1985	1.0	1	2.7	3.8	4.5	4.5	0	0	
			1988	0	0	0.3	3.0	0	0	0	0	
			1989	0	0	0.7	3.3	0	0	0.3	5	
Gilliland	60	1982	0	0	0.7	0.3	0	0	0	0	0	
		1983	0	0	1.0	5.3	1.3	0	0	0	0	
		1984	0	0	2.7	8.2	4.1	1.3	0	0	0	
		1985	0	0	5.8	8.5	7.2	6.6	0	0	0	
		1988	0	0	1.3	4.3	0	0	0	0	0	
		1989	0	0	3.3	2.0	0	0	0	0	0	
<u>Cochrane District</u>												
Sheldon	93	2,770	1982	0	0	0	0	0	0	0	0	
			1983	0	0	0	0	0	0	0	0	0
			1984	0	0	0.3	1.0	0	0	0	0	0
			1985	0	0	0	0	0.3	0	0	0	0
			1988	0	0	0	0	0	0	0	0	0
			1989	0	0	0.3	0	0	0	0	0	0

(cont'd)

Table 18(a). Summary of the results of surveys of permanent jack pine plots established in 1982 (counts based on the examination of 300 trees at each location) (concl.).

Location (Twp)	Esti- mated stand area (ha)	Esti- mated no. of trees per ha	Year of evalu- ation	Jack pine budworm		White pine weevil	Eastern pine shoot borer		Jack pine tip beetle	Jack pine sawflies	
				Trees affected (%)	Defoli- ation (%)	Leaders attacked (%)	Leaders attacked (%)	Laterals attacked (%)	Leaders attacked (%)	Trees affected (%)	Defoli- ation (%)
<u>Hearst District</u>											
Cross	220	2,541	1982	0	0	0	0	0	0	0	0
			1983	1.3	1	0	0.7	1.0	0	0	0
			1984	0	0	0	0	0	0	0	0
			1985	9.6	1	0	0	0	0	0	0
			1988	0	0	0	0	0	0	0	0
			1989	0	0	0	0	0	0	0	0
<u>Kirkland Lake District</u>											
Corkill	322	2,900	1982	0	0	1.0	1.6	0	0	0	0
			1983	0	0	3.3	4.3	0	0	0	0
			1984	0	0	7.5	4.4	0	1.0	0	0
			1985	100	5	14.1	1.7	1.7	0.3	0	0
			1988	0	0	14.0	3.3	4.0	4.0	0	0
			1989	0	0	4.3	3.6	0	0	0	0
<u>Timmins District</u>											
Robb	50	2,900	1982	0	0	0	1.3	0	0	0.3	10
			1983	0	0	0	1.0	0	0	0.3	1
			1984	0.3	1	0.3	1.0	0	0	0	0
			1985	0	0	0	2.4	0	0.3	0.3	1
			1988	0	0	0.7	3.3	0	0	0	0
			1989	0	0	0	3.6	0	0.3	0	0

Table 18(a). Summary of the results of surveys of permanent jack pine plots established in 1982 (counts based on the examination of 300 trees at each location)

Location (Twp)	Esti- mated stand area (ha)	Esti- mated no. of trees per ha	Year of evalu- ation	Jack pine budworm		White pine	Eastern pine		Jack pine	Jack pine	
				Trees affected (%)	Defoli- ation (%)	weevil Leaders attacked (%)	shoot borer Leaders attacked (%)	Laterals attacked (%)	tip beetle Leaders attacked (%)	sawflies Trees affected (%)	Defoli- ation (%)
<u>Chapleau District</u>											
Bliss	75	2,775	1982	0	0	0.3	0	0.3	0.3	0	0
			1983	0	0	0.3	1.0	0	0	0	0
			1984	0	0	1.0	1.7	0	0.3	0	0
			1985	1.0	1	2.7	3.8	4.5	4.5	0	0
			1988	0	0	0.3	3.0	0	0	0	0
			1989	0	0	0.7	3.3	0	0	0.3	5
Gilliland	60	1982	0	0	0.7	0.3	0	0	0	0	
		1983	0	0	1.0	5.3	1.3	0	0	0	
		1984	0	0	2.7	8.2	4.1	1.3	0	0	
		1985	0	0	5.8	8.5	7.2	6.6	0	0	
		1988	0	0	1.3	4.3	0	0	0	0	
		1989	0	0	3.3	2.0	0	0	0	0	
<u>Cochrane District</u>											
Sheldon	93	2,770	1982	0	0	0	0	0	0	0	0
			1983	0	0	0	0	0	0	0	0
			1984	0	0	0.3	1.0	0	0	0	0
			1985	0	0	0	0	0.3	0	0	0
			1988	0	0	0	0	0	0	0	0
			1989	0	0	0.3	0	0	0	0	0

(cont'd)

Table 18(a). Summary of the results of surveys of permanent jack pine plots established in 1982 (counts based on the examination of 300 trees at each location) (concl.).

Location (Twp)	Esti- mated stand area (ha)	Esti- mated no. of trees per ha	Year of evalu- ation	Jack pine budworm		White pine	Eastern pine		Jack pine	Jack pine	
				Trees affected (%)	Defoli- ation (%)	weevil Leaders attacked (%)	shoot borer Leaders attacked (%)	Laterals attacked (%)	tip beetle Leaders attacked (%)	Trees affected (%)	Defoli- ation (%)
<u>Hearst District</u>											
Cross	220	2,541	1982	0	0	0	0	0	0	0	0
			1983	1.3	1	0	0.7	1.0	0	0	0
			1984	0	0	0	0	0	0	0	0
			1985	9.6	1	0	0	0	0	0	0
			1988	0	0	0	0	0	0	0	0
			1989	0	0	0	0	0	0	0	0
<u>Kirkland Lake District</u>											
Corkill	322	2,900	1982	0	0	1.0	1.6	0	0	0	0
			1983	0	0	3.3	4.3	0	0	0	0
			1984	0	0	7.5	4.4	0	1.0	0	0
			1985	100	5	14.1	1.7	1.7	0.3	0	0
			1988	0	0	14.0	3.3	4.0	4.0	0	0
			1989	0	0	4.3	3.6	0	0	0	0
<u>Timmins District</u>											
Robb	50	2,900	1982	0	0	0	1.3	0	0	0.3	10
			1983	0	0	0	1.0	0	0	0.3	1
			1984	0.3	1	0.3	1.0	0	0	0	0
			1985	0	0	0	2.4	0	0.3	0.3	1
			1988	0	0	0.7	3.3	0	0	0	0
			1989	0	0	0	3.6	0	0.3	0	0

Table 18(b). Summary of the results of surveys of permanent jack pine plots established in 1982
(counts based on the examination of 300 trees at each location)

Location (Twp)	Esti- mated stand area (ha)	Esti- mated no. of trees per ha	Year of evalu- ation	Armillaria	Stem	Western	Pine	Tar spot
				root rot	rust	gall rust	needle rust	needle cast
				Trees affected (%)	Trees affected (%)	Trees affected (%)	Avg foliar damage (%)	Avg foliar damage (%)
<u>Chapleau District</u>								
Bliss	75	2,775	1982	0	0	0	1	0
			1983	0.3	1.7	0.3	0	0
			1984	0.3	0.7	0	0	0
			1985	0.3	0.3	0	1	1
			1988	0	0	0	8.7	9.3
			1989	0	0	0	6.0	4.0
Gilliland	60	2,424	1982	0.3	0	1.0	0	0
			1983	0.7	0	2.3	0	0
			1984	0.3	0	1.7	0	0
			1985	0	0	1.0	1	1
			1988	0	0	0	0	0
			1989	0	0	0	0	0
<u>Cochrane District</u>								
Sheldon	93	2,700	1982	0	0	0	0	0
			1983	0	0	0	0	0
			1984	0	0	0	0	0
			1985	0.3	0	0	1	0
			1988	0	0	0	0	0
			1989	0	0	0.3	4.0	1.0

(cont'd)

Table 18(b). Summary of the results of surveys of permanent jack pine plots established in 1982 (counts based on the examination of 300 trees at each location) (concl.).

Location (Twp)	Esti- mated stand area (ha)	Esti- mated no. of trees per ha	Year of evalu- ation	Armillaria	Stem	Western	Pine	Tar spot
				root rot	rust	gall rust	needle rust	needle cast
				Trees affected (%)	Trees affected (%)	Trees affected (%)	Avg foliar damage (%)	Avg foliar damage (%)
<u>Hearst District</u>								
Cross	220	2,541	1982	0	0	0	1	0
			1983	0.3	0	0	1	0
			1984	0.3	0	0.3	1	0
			1985	1.0	0	0.3	1	0
			1988	0	0	0	5.0	0.3
			1989	0	0	1.3	4.0	1.0
<u>Kirkland Lake District</u>								
Corkill	322	2,900	1982	0.3	0	0	0	0
			1983	0	0	0	0	0
			1984	0.3	0	0	0	0
			1985	0.3	0	0	0	0
			1988	0	0	0	0	5.0
			1989	0.3	0	0	0	12.0
<u>Timmins District</u>								
Robb	50	2,900	1982	0	0	0	0	0
			1983	0	0	0	0	0
			1984	0.3	32.1	0	0	0
			1985	0.3	2.1	0	0	0
			1988	0	0	0	0	0
			1989	0.3	1.6	2.3	1.0	15.0

Moderate damage caused by the eastern pine shoot borer was noted in four plantations, along with moderate damage caused by the white pine weevil in two of them. Low levels of jack pine tip beetle and pine sawfly were found in one plantation.

Light-to-moderate levels of the foliar diseases pine needle rust and tar spot needle cast were observed in five of the six plantations. Low levels of Armillaria root rot, western gall rust and stem rusts were observed at various locations.

Table 18 provides a summary of pest conditions in the plots since 1982. The plots were not examined in 1986 and 1987.

Black Spruce Seed and Cone Pests

A survey of insects causing damage to black spruce cones and seeds was conducted at five locations in the region in 1989. At each collection point 100 cones were taken from the total length of the cone-bearing crowns of a minimum of three trees. Samples were submitted to the laboratory in Sault Ste. Marie for dissection and analysis. Results of this survey are given in Table 19.

Climatic Data

Weather plays an important part in insect development and in the spread of infectious diseases, and is the cause of many noninfectious conditions such as frost and hail damage, winter drying and drought. Weather records for three stations at Earlton, Chapleau and Kapuskasing airports have been included in this report (Table 20).

Table 19. Summary of black spruce seed and cone damage in the Northern Region in 1989.

Location (Twp)	Damaged cones (%)	Seed loss within damaged cones (%)	Principal cause of seed loss (in order of importance
<u>Chapleau District</u>			
Caouette	14	40	Lepidoptera Unknown <i>Lasiomma anthracinum</i> (Czerny)
Hoey	53	5	<i>Lasiomma anthracinum</i> <i>Dioryctria</i> <i>abietivorella</i> (Grt.) <i>Endopiza piceana</i> (Free.)
<u>Kirkland Lake District</u>			
Teck	22	23	<i>Cydia strobilella</i> (L.) <i>Lasiomma anthracinum</i> <i>Cedidomyida</i>
<u>Kapuskasing District</u>			
Hopkins	28	21	<i>Dasineura rachiphaga</i> <i>Lasiomma anthracinum</i> <i>Cydia strobilella</i>
O'Brien	20	25	Unknown Lepidoptera <i>Lasiomma anthracinum</i>

Table 20. Summary of mean temperature and total precipitation at three locations in the region in 1989.

Location	Month	Mean temperature (°C)		Deviation from normal (°C)	Total precipitation (mm)		Deviation from normal (mm)
		Normal	Actual		Normal	Actual	
Earlton	January	-16.3	-13.7	+2.6	56.4	58.7	+2.3
	February	-14.1	-16.9	-2.8	47.2	11.6	-35.6
	March	-7.6	-10.6	-3.0	58.0	96.7	+38.7
	April	1.9	0.4	-1.5	50.0	29.8	-20.2
	May	9.8	11.2	+1.4	61.3	123.1	+61.8
	June	15.2	15.0	-0.2	89.2	112.2	+23.0
	July	17.7	18.9	+1.2	80.8	85.3	+4.5
	August	16.2	16.0	-0.2	83.4	110.7	+27.3
	September	11.1	12.3	+1.2	99.1	24.2	-74.9
	October	5.4	6.1	+0.7	70.0	60.9	-9.1
	November	-2.5	-7.2	-4.7	70.6	98.7	+28.1
	December	-12.6	-21.0	-8.4	65.3	42.2	-23.1
Chapleau	January	-16.9	-12.1	+4.8	46.9	55.8	+8.9
	February	-15.8	-16.7	-0.9	34.5	43.8	+9.3
	March	-8.6	-10.4	-1.8	56.2	59.4	+3.2
	April	0.6	-0.7	-1.1	59.3	50.8	+8.5
	May	8.6	10.6	+2.0	73.8	68.0	-5.8
	June	14.3	13.8	-0.5	110.4	81.0	-19.4
	July	16.8	18.1	+1.3	81.8	10.8	-71.0
	August	15.4	14.9	-0.5	86.2	113.4	+27.2
	September	10.4	11.5	+1.1	101.5	30.8	-70.7
	October	4.9	a	-	75.7	a	-
	November	-3.5	-1.3	+2.2	64.2	129.4	+65.2
	December	-12.8	-13.9	-1.1	53.5	68.0	+14.5
Kapusksing	January	-18.6	-16.6	+2.0	53.6	54.2	+0.6
	February	-16.2	-17.6	-1.4	43.0	17.8	-25.2
	March	-9.4	-12.3	-2.9	55.4	52.4	-3.0
	April	0.5	-0.7	-1.2	53.2	31.8	-21.4
	May	8.3	10.7	+2.4	74.3	69.2	-5.1
	June	14.1	13.8	-0.3	84.7	93.1	+8.4
	July	16.8	18.0	+1.2	96.3	39.6	-56.7
	August	15.3	15.1	-0.2	92.5	78.0	-14.5
	September	10.0	11.8	+1.8	94.4	34.4	-60.0
	October	4.4	4.7	+0.3	77.4	95.4	+18.0
	November	-4.4	-9.2	-4.8	80.1	99.8	+19.7
	December	-14.7	-21.7	-7.0	53.3	36.8	-16.5

^a Data not available