

RESULTS OF FOREST INSECT AND
DISEASE SURVEYS IN THE
NORTHEASTERN REGION OF ONTARIO
1988

(FOREST DISTRICTS: WAWA, SAULT STE. MARIE, BLIND RIVER,
ESPANOLA, SUDBURY, TEMAGAMI AND NORTH BAY)

D.C. Constable, W.A. Ingram, L.S. MacLeod and S. Melbourne

FORESTRY CANADA
ONTARIO REGION
GREAT LAKES FORESTRY CENTRE
1989

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SURVEY HIGHLIGHTS

This report describes the status of the more important insect and disease conditions that affected the forests in the Northeastern Region of Ontario in 1988 as determined by ground and aerial surveys.

Infestations of the forest tent caterpillar doubled in area since 1987, with the most noticeable increases occurring in Espanola and Sudbury districts. After four consecutive years of infestations across three districts of the region, Bruce spanworm populations collapsed, and only 1,840 ha of damage occurred in Blind River District. New distribution records were established for the occurrence of the gypsy moth; in the Sudbury District, one egg-mass was collected at Killarney Provincial Park and two larvae were collected by burlap trapping at the same site. In Prince Township, Sault Ste. Marie District, two egg masses were also found. Populations of jack pine and spruce budworms remained at endemic levels; however, egg-mass sampling revealed light-to-moderate defoliation of balsam fir and white spruce could occur in three districts of the region in 1989.

As a result of extremely warm weather conditions a total of 36,318 ha of drought damage occurred throughout the region. Surveys for the European race of Scleroderris canker proved negative.

An additional 10 plots were established in the region to assess the health of sugar maple. Special surveys were conducted in 12 jack pine plantations and 4 jack pine plots established in 1984 were revisited. Four plots were established as part of the North American Sugar Maple Project in cooperation with the United States Department of Agriculture Forest Service. The four Acid Rain National Early Warning System (ARNEWS) plots were revisited to detect early evidence of damage.

In this report, the following categories are used to describe the importance of insects or diseases.

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;

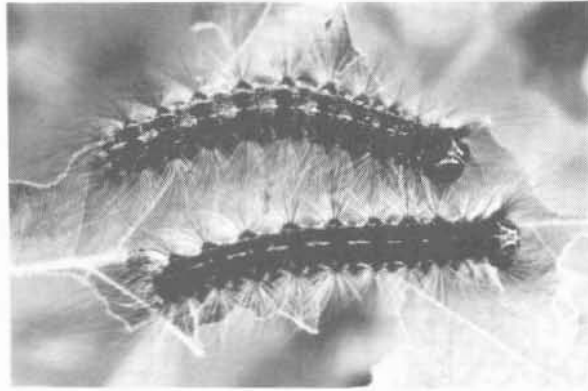
(2) those that are capable of causing serious damage but, because of low incidence or for other reasons, did not cause serious damage in 1988.

Districts affected by specific insects or diseases are listed beneath the names of those insects or diseases in the table of contents.

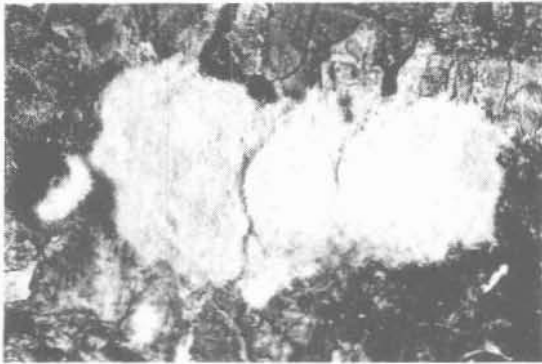
The authors would like to express their appreciation to personnel of the Ontario Ministry of Natural Resources (OMNR) and wood-using industries for their cooperation during the 1988 field season.

D.C. Constable
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Frontispiece



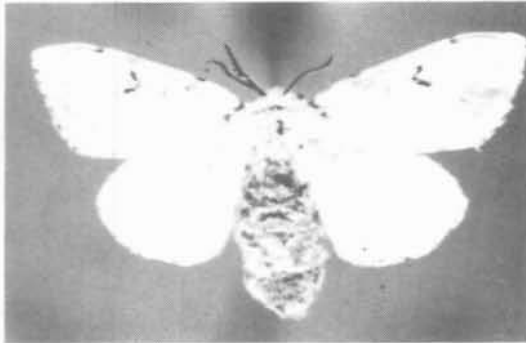
Larva



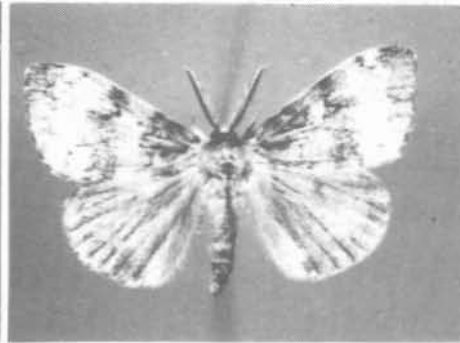
Egg



Pupa



Female Moth



Male Moth

Life cycle of the gypsy moth (*Lymantria dispar* [L.]

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INSECTS

Major Insects

Cedar Leafminer, *Argyresthia aureoargentella* Brower, *Coleotechnites thujaella* (Kft.)

Severe browning of eastern white cedar (*Thuja occidentalis* L.) occurred in the southern portion of Espanola District on Manitoulin, Cockburn and Fitzwilliam islands.

On Manitoulin Island, an average of 60% defoliation was recorded throughout 2,899 ha of cedar forest across the southern portion of the island. The largest single area of damage was in the southwestern portion of the Wikwemikong Indian Reserve in the area of Thomas Bay; at this location, 1,870 ha of cedar received damage in the 50 to 80% range. Continuing heavy damage in the above area has resulted in partial and whole-tree mortality to between 10 and 20% of the stands. Numerous additional pockets of moderate-to-severe defoliation (30 to 80%) ranging in size from 50 to 610 ha were recorded in the southern portion of the island from South Bay Mouth to Quany Bay, just south of Meldrum Bay, on the extreme western portion of the island.

The northern and southwestern portion of Fitzwilliam Island sustained 30 to 70% defoliation over a total of 1,338 ha of shoreline cedar stands. Similarly, 50 to 70% defoliation was recorded on Cockburn Island over a total of 198 ha of cedar adjacent to Wagosh Bay in the extreme southwestern portion of the island.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

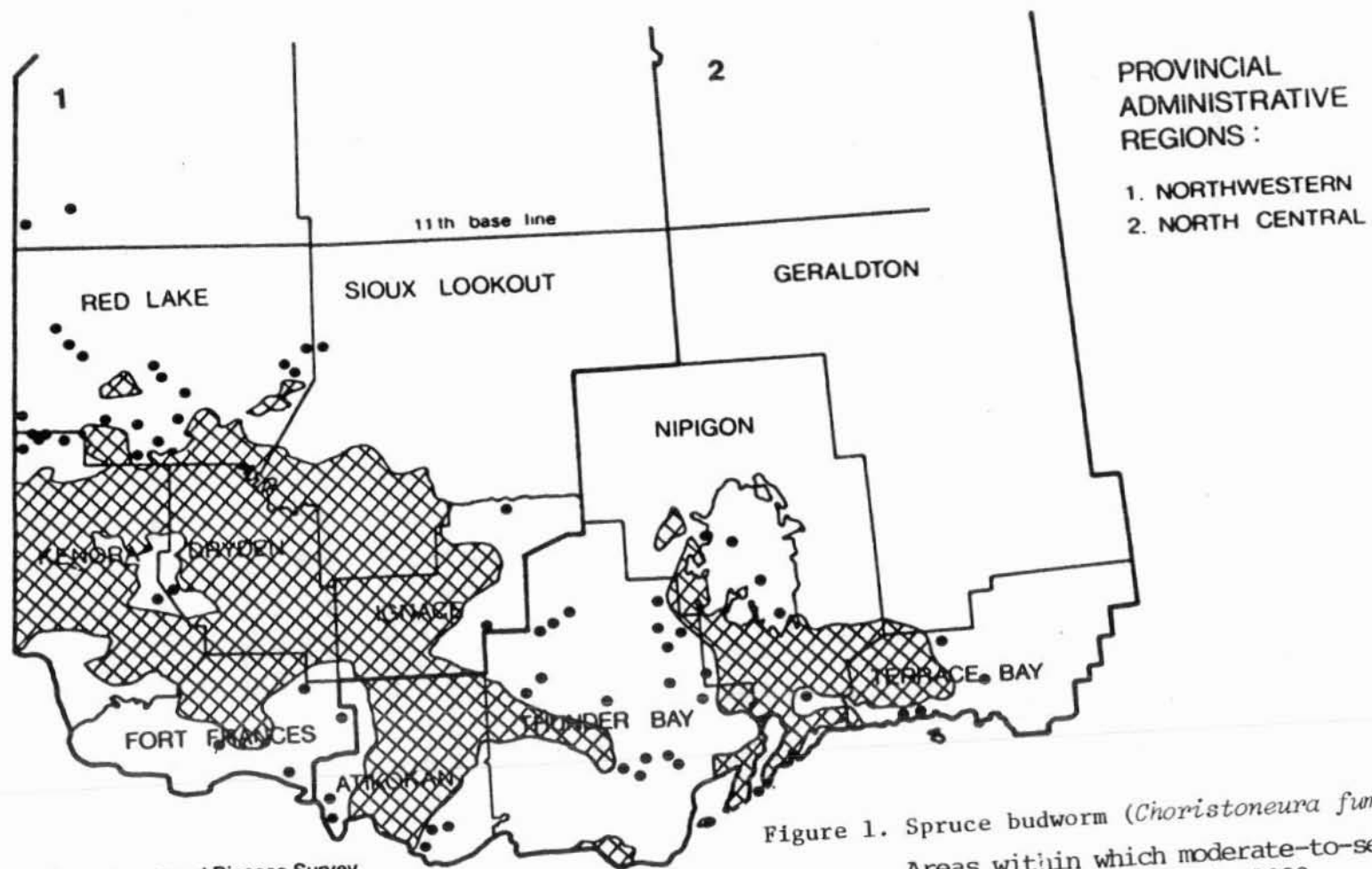
For the second year, no infestations of this major pest of spruce (*Picea* spp.) and balsam fir (*Abies balsamea* [L.] Mill.) occurred in the region. The only areas of moderate-to-severe defoliation that occurred in the province were in the North Central and Northwestern regions, where a total of 5,224,734 ha of damage was mapped from the air (Fig. 1); this represents a decrease from the 7,189,763 ha of damage reported in 1987.

On the basis of egg-mass sampling carried out in the region (Table 1), light-to-moderate defoliation could occur in 1989 in Kirkwood Township, Blind River District, Tarbutt Additional Township, Sault Ste. Marie District, and in Lalibert and Recollet townships, Wawa District.

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Since 1986, population levels of this insect have continued to decline across the region. In 1987, only small numbers of larvae were observed on jack pine (*Pinus banksiana* Lamb.) regeneration in Lane Town-

NORTHWESTERN ONTARIO



- 2 -

Figure 1. Spruce budworm (*Choristoneura fumiferana* [Clem.])
Areas within which moderate-to-severe
defoliation occurred in 1988 • or ☒

Forest Insect and Disease Survey
Great Lakes Forestry Centre

0 80
Kilometres

Table 1. Northeastern Region - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1988, and infestation forecasts for 1989.

Location	Host	Estimated defoliation in 1988 (%)	No. of egg masses per 9.29 m ² of foliage	Infestation forecasts for 1989 ^a	Accumulated damage ^b
<u>Blind River District</u>					
Kirkwood Twp					
- OMNR Tree Nursery	wS	0	23	L-M	0
Villeneuve Twp	wS	0	0	0	9
<u>Espanola District</u>					
Boon Twp	bF	0	0	0	0
Robinson Twp - Deer Yard	wS	3	0	0	-
<u>North Bay District</u>					
Jocko Twp	bF	0	0	0	9
Macbeth Twp	bF	0	0	0	2
Sisk Twp					
- Martin River Prov. Pk	bF	0	0	0	6
<u>Sault Ste. Marie District</u>					
Jollineau Twp	bF	0	0	0	+
Tarbutt Additional Twp	bF	0	20	L-M	9
<u>Sudbury District</u>					
Antrim Twp					
- Halfway Lake Prov. Pk	wS	0	0	0	6
Cascaden Twp	bF	0	0	0	5
<u>Temagami District</u>					
Gillies Limit Twp	wS	0	0	0	+
Strathcona Twp	bF	0	0	0	+
<u>Wawa District</u>					
Asselin Twp	bF	0	0	0	+
Dahl Twp - Obatanga Prov. Pk	bF	2	7	L	0
Dambrossio Twp - Impact Plot	bF	0	8	L	+
	bS	0	0	0	9
Lalibert Twp - Impact Plot	bF	0	21	L-M	9
	bS	0	0	0	9
McCron Twp - Access Rd	bF	5	0	0	0
Recollet Twp	bF	0	37	L-M	1
White Lake Prov. Pk	bF	0	8	L	0

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

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

ship, Blind River District. During the 1988 field season, no larval activity or infestations were observed during routine ground and aerial surveys. Egg-mass sampling was carried out at 10 widely scattered locations across the region to forecast population levels for 1989; however, negative results were obtained in all areas sampled.

In 1985, semipermanent plots were established at 13 locations across the region to monitor whole-tree mortality and the occurrence of bare tops in areas of moderate-to-severe defoliation (Table 2). Although no increases in the incidence of bare tops or whole-tree mortality were recorded in Blind River District, increases in tree mortality and bare tops were observed in Sudbury and Espanola districts. This increase could possibly be solely a result of drought conditions that prevailed in 1988 or the result of a combination of both drought and defoliation.

Table 2. Summary of whole-tree mortality and incidence of bare tops associated with damage caused by the jack pine budworm in the Northeastern Region of Ontario in 1987 and 1988 (counts based on the examination of 100 jack pine trees at each location).

Location (Twp)	Avg DBH (cm)	Whole-tree mortality (%)		Bare tops (%)	
		1987	1988	1987	1988
<u>Blind River District</u>					
Gaunt ^a	10	18	18	0	0
Lane ^a	13	11	11	0	0
Sagard	10	7	7	9	9
Winkler	15	10	10	2	2
<u>Espanola District</u>					
Gervais	22	13	17	6	19
Monestime Area 1	22	21	22	13	20
Monestime Area 2	13	10	14	27	39
Olinyk	24	13	14	5	2
<u>Sudbury District</u>					
Cartier	19	2	4	1	4
Cascaden	15	0	6	2	8
Cox	17	17	37	17	34
Hart	17	0	3	1	1
Ulster	17	4	20	2	1

^a mortality only on suppressed trees

Oak Leaf Shredder, *Croesia semipurpurana* (Kft.)

High population levels of this pest were evident at one location in the region. Approximately 495 ha of red oak (*Quercus rubra* L.) in the vicinity of Maple Ridge in Thessalon Township, Blind River District, experienced 75% defoliation. Light feeding also occurred in Long Township, Blind River District, with foliar damage not exceeding 15%.

In Sault Ste. Marie District, light feeding was observed at sample plots in Hilton Township, on St. Joseph Island, and at Hiawatha Park in Tarentorus Township. In both areas foliar damage did not exceed 1%. Elsewhere in the region, this insect was not observed. Egg-mass sampling carried out at four sample points (Table 3) indicates that moderate defoliation will occur in 1989 at one location in Long Township and light defoliation is probable in the Maple Ridge and Hiawatha Park areas.

Table 3. Summary of oak leaf shredder egg counts for 1987 and 1988, with 1989 infestation forecasts (egg counts based on the examination of eight 30-cm branch tips selected randomly from four trees at each location).

Location (Twp)	Avg no. of eggs per branch tip		Infestation forecast		Pheromone trap- ping (no. of adults captured)	
	1987	1988	1988	1989	1987	1988
<u>Sault Ste. Marie District</u>						
Tarentorus	0.8	0.2	light	light	228	65
Hilton	0.1	0.0	light	nil	47	84
<u>Blind River District</u>						
Long	19.4	19.0	medium-	medium-	18	1706
Thessalon	35.4	4.6	severe	light	467	341

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Since 1985, leader damage has not exceeded 5% in the pine (*Pinus* spp.) plantations surveyed. However, slight increases were observed in 1988 in two districts of the region, with damage mostly confined to trees shorter than 4.0 m (Table 4). The majority of damage caused by this insect has occurred on lateral shoots and the proportion of affected trees has ranged from 1 to 58%.

Table 4. Damage by the Eastern Pine Shoot Borer in the Northeastern Region of Ontario in 1988 (counts based on the examination of 150 randomly selected pine trees at each location).

Location (Twp)	Host	Estimated area of stand (ha)	Estimated density (trees/ha)	Avg ht of trees (m)	Trees affected in 1988 (%)	Leaders attacked in 1988 (%)
<u>Wawa District</u>						
Maness	jP	50	1600	2.4	4.0	0.0
Nebonaionquet	jP	100	1111	1.8	2.0	0.0
Bullock	jP	2	1877	1.7	2.0	0.8
<u>Blind River District</u>						
Kirkwood	jP	4	2500	1.5	1.3	0.0
Viel	jP	100	2500	1.8	1.3	0.0
Villeneuve	jP	50	3908	1.8	2.6	0.0
<u>Espanola District</u>						
Nairn	jP	50	5000	1.3	26.7	8.0
Tennyson	scP	5	4444	4.0	58.0	0.0
Tennyson	scP	10	4444	2.0	14.7	0.0
Tennyson	wP	20	4444	1.0	8.0	0.0
Tennyson	wP	10	4444	1.1	8.0	0.0
<u>Sudbury District</u>						
Hendrie	jP	50	5000	6.3	15.0	1.7
<u>Temagami District</u>						
Milne	jP	50	4000	3.0	-	4.6
Barr	jP	50	4000	1.3	-	8.0

Birch Leafminer, *Fenusa pusilla* (Lep.)

Extremely high population levels of this leafminer were observed throughout most of the region. In Sault Ste. Marie District, this insect was most prevalent in the Point des Chênes area in Park Township and near Goulais Bay in Fenwick Township; small pockets of semimature white birch (*Betula papyrifera* Marsh.) were 50 to 100% mined at numerous sites in both townships. In Ryan Township, Sault Ste. Marie District, a 3-km stretch of roadside trees was severely mined, with foliar damage exceeding 90%. Approximately 200 ha of white birch trees in the Cobalt-Gillies-Latchford areas of Temagami District suffered 75% defoliation on

trees averaging 15 cm in DBH. In Hudson Township, Temagami District, white birch trees sustained 90-100% defoliation over an area of approximately 10 ha.

The situation was similar in the Blind River, Sudbury, Espanola and North Bay districts. In these areas, damage was most noticeable on open-grown ornamental plantings, with various amounts of damage occurring. In Wawa District, damage was less conspicuous than in other areas of the Region; however, for the second year, 2 ha of roadside trees were 50 to 100% mined along Highway 17 in Goodwillie Township.

Gypsy Moth, *Lymantria dispar* (L.)

Surveys continued in the region for the purpose of detecting and monitoring the spread of this insect. In 1988, egg masses were found for the first time in the Sault Ste. Marie and Sudbury districts. In Sault Ste. Marie District, two egg masses were found in Prince Township; one egg-mass was obtained at Killarney Provincial Park, Sudbury District, along with two larvae collected by burlap trapping. Both these areas will be monitored frequently for the detection of larval activity in 1989.

Pheromone trapping continued in 1988. A total of 98 traps were deployed at 27 widely scattered locations across the region (Fig. 2, Table 5). In 1988, 438 adult males were trapped, which represents an increase from the 414 moths trapped in 1987, in 42 fewer traps.

The largest number of male moths trapped occurred once again at Killarney Provincial Park, where a total of 241 moths were captured compared with a total of 210 in 1987. A decrease in the number of adults trapped occurred at South Bay Mouth, Espanola District; in 1987, 142 adults were obtained whereas a total of 53 adults were recorded in 1988.

Surveys to detect and monitor this major pest will continue in 1989, especially in areas in which pheromone traps caught many moths and areas in which egg masses were found.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The area infested by this insect has doubled since 1987 (Fig. 3, Table 6). A total of 2,107,749 ha of forests was moderately-to-severely defoliated across the region compared with 1,041,743 ha in 1987.

NORTHEASTERN REGION

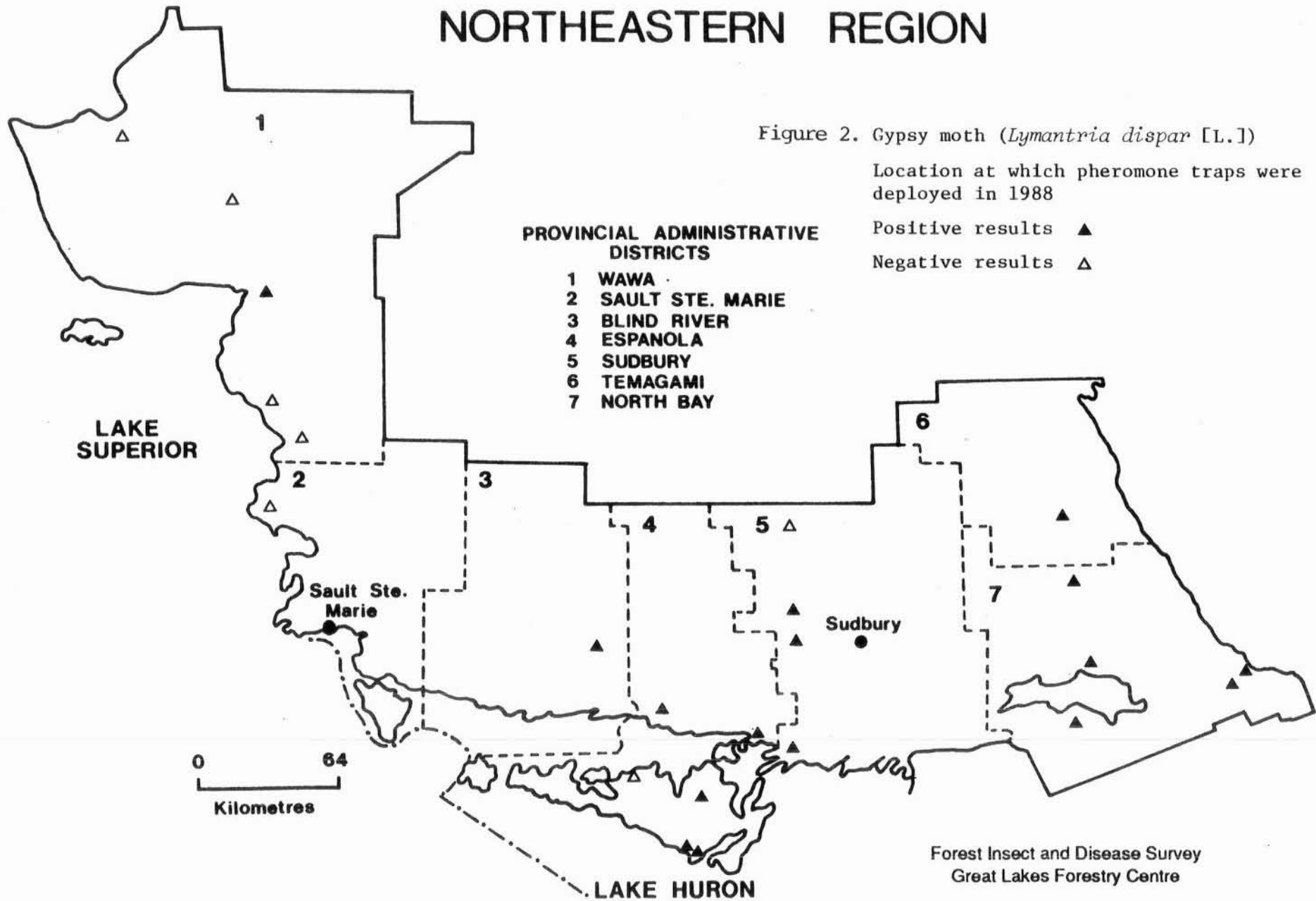


Table 5. Results of gypsy moth pheromone trapping in the Northeastern Region of Ontario from 1980 to 1988. (Two traps were deployed at each location except where otherwise indicated).

Location	No. of male moths captured								
	1980	1981	1982	1983	1984	1985	1986	1987	1988
<u>Wawa District</u>									
White Lk Prov. Pk	0	0	1	0	0	0	0	0	0
Obatanga Prov. Pk	0	1	0	0	0	0	0	0	1
Rabbit Blanket Lk Campground	1	0	0	0	0	0	0	0	1
Agawa Bay Campground	0	0	0	0	0	1	0*	0	0
Crescent Lk Campground	0	0	0	0	0	0	0	0	0
<u>Sault Ste. Marie District</u>									
Pancake Bay Prov. Pk	0	0	0	0	0	0	0	0	0
<u>Blind River District</u>									
Mississagi Prov. Pk	0	0	0	0	0	2	1*	1*	11*
<u>Espanola District</u>									
Chutes Prov. Pk	0	0	0	0	0	0	3	2*	28*
Gore Bay, Gordon's Lodge			0	0	0	0	0	0	0
Bidwell, Red Lodge			0	0	1	3*	2*	4*	12*
South Bay Mouth, Trailer Pk					0	1	25*	28*	24*
Dock							0	60	2
Memorial Pk								54	27
Birch Island								2	-
Willisville								0	12
Whitefish Falls								1	14
<u>Sudbury District</u>									
Halfway Lk Prov. Pk	0	0	0	0	0	0	0	0	0
Windy Lk Prov. Pk	0	1	0	0	0	0	1	0*	2
Fairbanks Prov. Pk	0	0	0	0	1	0*	7	0*	6
Killarney Prov. Pk	0	0	0	0	0	0	16	210*	241*
<u>North Bay District</u>									
Antoine Prov. Pk	0	0	0	0	0	1	54*	20*	10*
Marten River Prov. Pk	0	0	0	0	0	0	1	0*	5
Restoule Prov. Pk	0	0	0	0	0	0	27	12*	11*
Samuel de Champlain Prov. Pk	0	0	0	0	0	1	22	17*	29*
Beaucage Pk								1	1
Beaucage Lookout								2	-
<u>Temagami District</u>									
Finlayson Point Prov. Pk	0	0	0	0	0	0	0	0	1

* 10 traps deployed at these locations

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Figure 3. Forest tent caterpillar (*Malacosoma disstria* Hbn.)

Areas within which defoliation occurred in 1988.

Moderate-to-severe defoliation ■

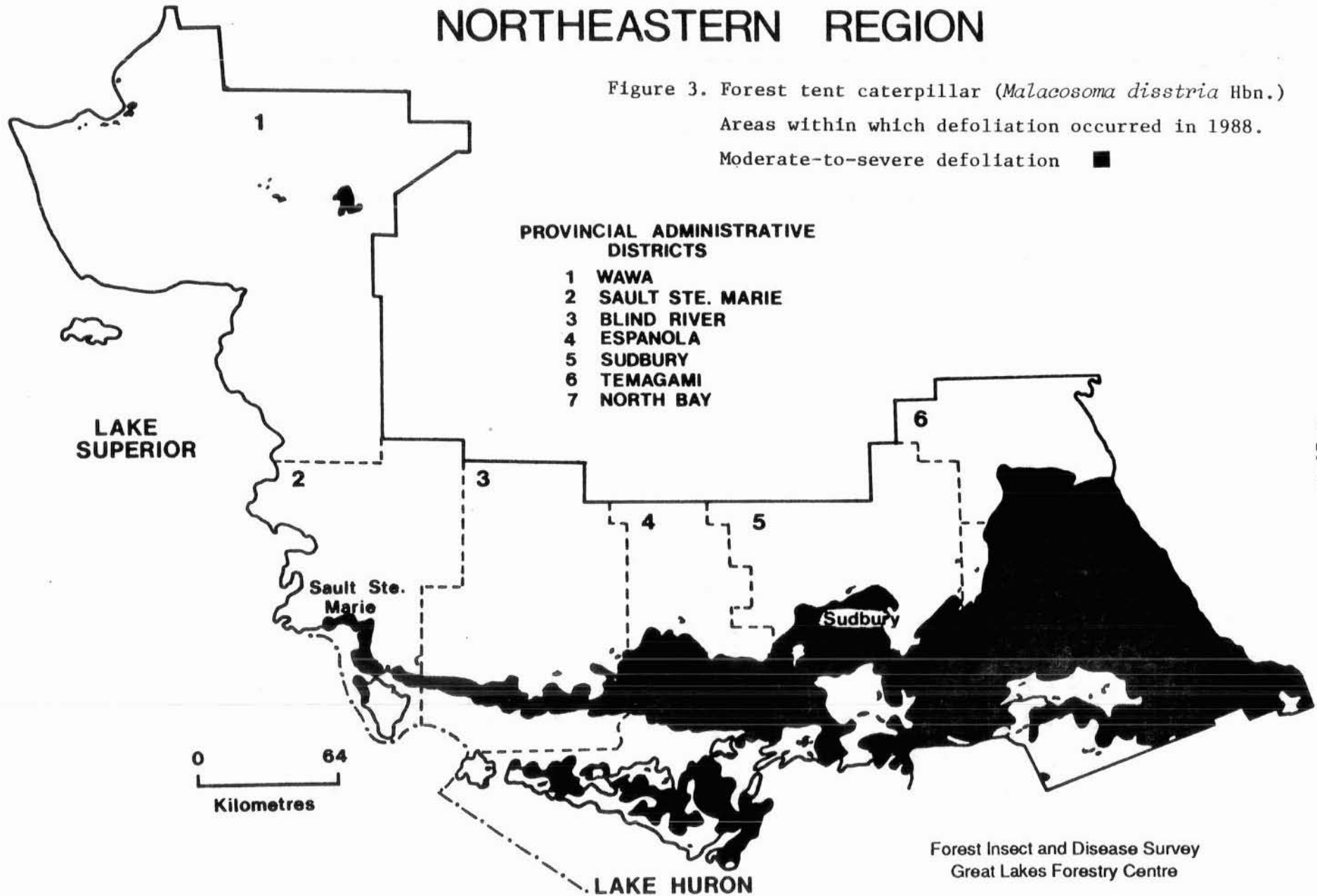


Table 6. Comparison of the areas of forest defoliated by the forest tent caterpillar in 1987 and 1988 in the Northeastern Region of Ontario.

District	Defoliation (ha)		Change (ha) 1988
	1987	1988	
Blind River	35,867	102,852	+66,985
Espanola	67,010	415,273	+348,263
North Bay	584,501	856,053	+271,552
Sault Ste. Marie	11,340	26,560	+15,220
Sudbury	39,394	442,274	+402,880
Temagami	292,913	252,650	-40,263
Wawa	10,720	12,087	+1,367
Total	1,041,745	2,107,749	+1,066,000

The most noticeable increases occurred in the Sudbury and Espanola districts, where a total of 751,143 ha of defoliation was aerially mapped, compared with 106,404 ha in 1987. Substantial increases also occurred in the Blind River, North Bay and Sault Ste. Marie districts, and a slight increase was recorded in Wawa District. A decrease in the area defoliation of 40,263 ha was noted in Temagami District.

The present infestation now encompasses most of the North Bay and Temagami districts and extends westward throughout the southern parts of the Sudbury, Espanola and Blind River districts and along the north channel to the Bruce Mines area of Sault Ste. Marie District. Another 15,995 ha of trembling aspen (*Populus tremuloides* Michx.) was moderately-to-severely defoliated from the Echo Bay area west to the Highway 17 bypass within the eastern portion of the city of Sault Ste. Marie. On St. Joseph Island, a total of 3,925 ha of trembling aspen was defoliated on the western side of the island from the Kentvale area north to Stribling Point.

In Wawa District, moderate-to-severe defoliation persisted in the Missanabie-Lochalsh area, where 8,067 ha of trembling aspen were 80% defoliated. Six pockets of defoliation ranging from 50 to 925 ha occurred in the Dubreuilville area and affected parts of the surrounding townships of Dumas, Carmody and Dunphy. Farther north approximately 1,550 ha was defoliated on the eastern side of White Lake. Several smaller pockets ranging from 20 to 80 ha were mapped in parts of McCron, Laberge and Brothers townships.

Egg-band surveys (Fig. 4, Table 7) were conducted at 121 locations across the region in infested and uninfested areas. The forecasts for 1989 indicate moderate-to-severe defoliation will recur and intensify, especially in parts of the Sudbury, Espanola, Blind River and Sault Ste. Marie districts.

NORTHEASTERN REGION

Figure 4. Forest tent caterpillar (*Malacosoma disstria* Hbn.)

Areas in which egg-band counts were carried out in 1988, and forecast for 1989

Forecast: Nil ○ Moderate ●
Light ⊕ Heavy ●

PROVINCIAL ADMINISTRATIVE DISTRICTS

- 1 WAWA
- 2 SAULT STE. MARIE
- 3 BLIND RIVER
- 4 ESPANOLA
- 5 SUDBURY
- 6 TEMAGAMI
- 7 NORTH BAY

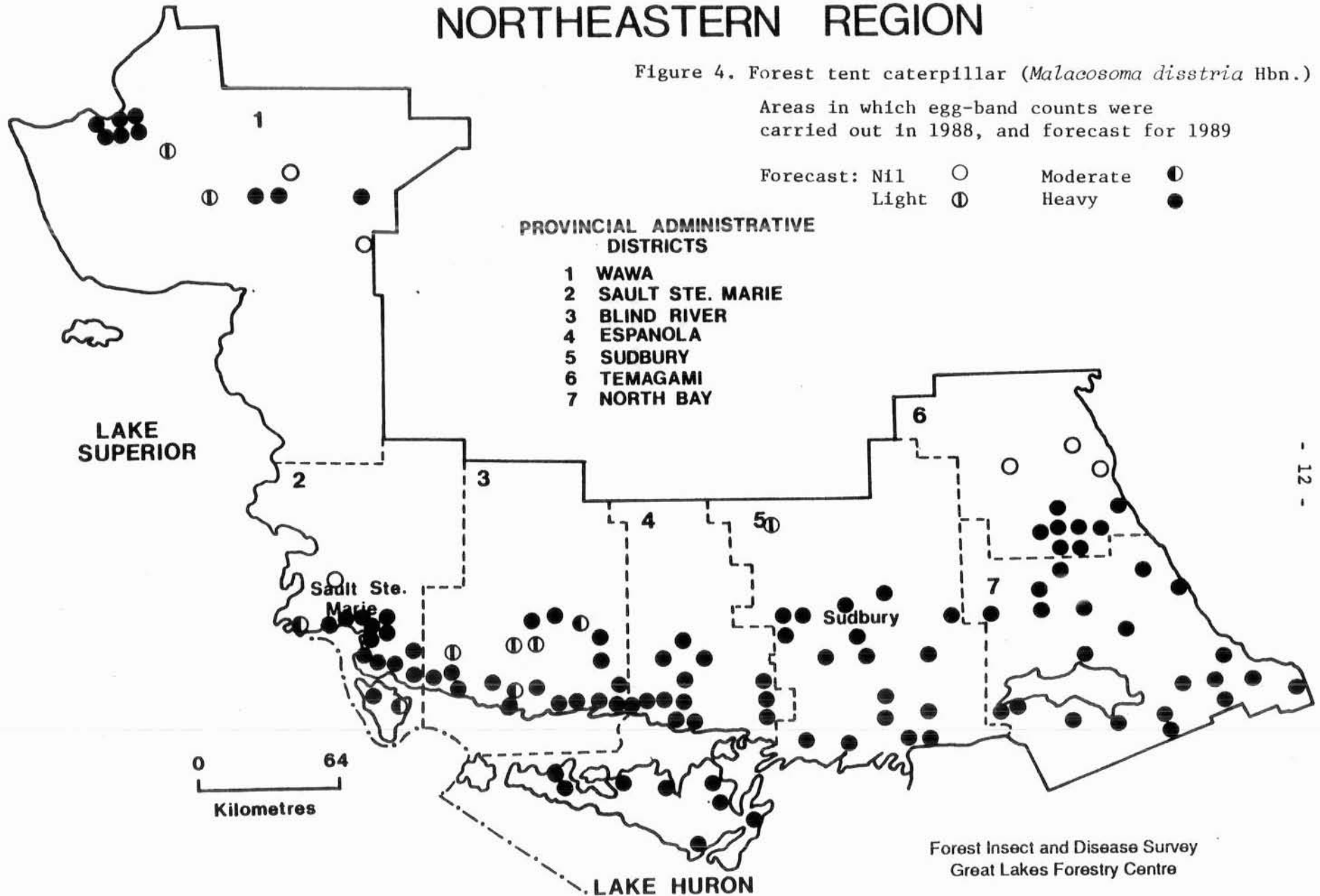


Table 7. Results of forest tent caterpillar egg-band counts in 1988 and infestation forecasts for 1989 (counts based on the examination of one, two or three trees at each location).

Location	Avg DBH of sample trees (cm)	No. of trees examined	Avg no. of egg bands per tree	Infestation forecast for 1989
<u>Blind River District</u>				
Albanel Twp	11.0	3	9	H
Bouck Twp	11.0	3	7	H
Bridgland Twp	8.0	3	1	L
Gladstone Twp	10.0	3	7	H
Gunterman Twp	11.0	1	26	H
Kamachisitit Twp	6.0	3	3	L
Kirkwood Twp	10.0	3	15	H
Lefroy Twp	8.0	1	56	H
Lewis Twp	12.0	3	30	H
Long Twp	8.0	3	20	H
Nicholas Twp	12.0	3	6	H
Nouvel Twp	9.0	3	1	L
Patton Twp	9.0	3	3	M
Proctor Twp	10.0	3	18	H
Raimbault Twp	7.0	3	2	M
Scarfe Twp	13.0	3	9	H
Serpent River Indian Reserve	12.0	3	16	H
Spragge Twp	10.0	1	33	H
Striker Twp	9.0	1	11	H
Thessalon Twp	11.0	1	21	H
Thompson Twp	9.0	3	13	H
<u>Espanola District</u>				
Billings Twp	9.4	1	20	H
Chutes Prov. Pk	8.7	1	82	H
Curtin Twp	8.4	1	35	H
Fort La Cloche	10.9	1	14	H
Foster Twp	11.3	1	82	H
Gerow Twp	8.4	1	52	H
Gordon Twp	10.5	1	49	H
Indian Reserve #5	12.3	1	47	H
Indian Reserve #26	7.9	1	77	H
Mandamin Twp	25.0	1	91	H
Nairn Twp	12.3	1	35	H
Robinson Twp	9.8	1	18	H
Robinson Twp	8.7	1	20	H
Shedden Twp	13.0	1	68	H

(cont'd)

Table 7. Results of forest tent caterpillar egg-band counts in 1988 and infestation forecasts for 1989 (counts based on the examination of one, two or three trees at each location) (cont'd).

Location	Avg DBH of sample trees (cm)	No. of trees examined	Avg no. of egg bands per tree	Infestation forecast for 1989
<u>Espanola District (concl.)</u>				
Sheguiandah Twp	8.5	1	44	H
Sheguiandah Twp	6.6	1	34	H
Shibananing Twp	14.0	1	11	H
Tehkummah Twp	10.7	1	16	H
Tennyson Twp	13.0	1	129	H
Victoria Twp	10.3	1	55	H
<u>North Bay District</u>				
Bastedo Twp	12.2	1	32	H
Beaucage Twp	12.3	1	52	H
Bonfield Twp	6.9	1	10	H
Calvin Twp	10.1	1	21	H
Cameron Twp	10.2	1	40	H
Chisholm Twp	5.9	1	8	H
Chisholm Twp	6.2	1	15	H
Crerar Twp	7.8	1	111	H
Dana Twp	7.8	1	18	H
Falconer Twp	8.3	1	36	H
Latchford Twp	7.0	1	15	H
Lauder Twp	6.2	1	32	H
Lyman Twp	7.5	1	80	H
Marten River Prov. Pk	10.0	1	33	H
McAuslan Twp	11.2	1	17	H
Merrick Twp	7.0	1	29	H
Nipissing Twp	9.3	1	29	H
Papineau Twp	9.2	1	15	H
Poitras Twp	8.0	1	11	H
Restoule Prov. Pk	9.4	1	17	H
Samuel de Champlain Prov. Pk	11.9	1	9	H
Thistle Twp	12.8	1	37	H
<u>Sault Ste. Marie District</u>				
Aweres Twp	8.0	3	0	nil
Garden River	10.0	1	15	H
Indian Reserve				
Johnson Twp	8.0	3	17	H

(cont'd)

Table 7. Results of forest tent caterpillar egg-band counts in 1988 and infestation forecasts for 1989 (counts based on the examination of one, two or three trees at each location) (cont'd).

Location	Avg DBH of sample trees (cm)	No. of trees examined	Avg no. of egg bands per tree	Infestation forecast for 1989
<u>Sault Ste. Marie District (concl.)</u>				
Kehoe Twp	6.0	3	6	H
Laird Twp	8.0	1	49	H
MacDonald Twp	11.0	1	63	H
Parke Twp	10.0	3	2	M
Plummer Twp	10.0	3	13	H
Plummer Additional Twp	10.0	1	55	H
Prince Twp	10.0	3	2	M
Rankin Reserve	9.0	3	16	H
St. Joseph Island (Hwy 548 and D Line)	10.0	1	42	H
St. Joseph Island (Jocelyn Twp)	8.0	3	4	M
Sault Ste. Marie (east end)	17.0	1	115	H
Sault Ste. Marie (Hwy 17B)	9.0	1	24	H
Tarbutt Additional Twp	9.0	1	56	H
<u>Sudbury District</u>				
Allen Twp	6.8	1	14	H
Bigwood Twp	6.8	1	20	H
Bleazard Twp	5.8	1	67	H
Broder Twp	6.0	1	27	H
Capreol Twp	7.3	1	11	H
Delamere Twp	8.0	1	85	H
Dowling Twp	7.3	1	51	H
Fairbanks Prov. Pk	9.0	1	16	H
Graham Twp	10.2	1	39	H
Halfway Lk Prov. Pk	6.8	3	1	L
Hawley Twp	4.3	1	43	H
Humboldt Twp	6.8	1	38	H
Killarney Prov. Pk	5.7	1	25	H
Laura Twp	4.3	1	11	H
Loughrin Twp	6.3	1	23	H

(cont'd)

Table 7. Results of forest tent caterpillar egg-band counts in 1988 and infestation forecasts for 1989 (counts based on the examination of one, two or three trees at each location) (concl.).

Location	Avg DBH of sample trees (cm)	No. of trees examined	Avg no. of egg bands per tree	Infestation forecast for 1989
<u>Sudbury District (concl.)</u>				
Rayside Twp	8.4	1	52	H
Waldie Twp	6.7	1	16	H
Windy Lk Prov. Pk	6.3	1	44	H
<u>Temagami District</u>				
Askin Twp	7.0	1	21	H
Aston Twp	15.0	3	0	nil
Gillies Limit	15.0	3	0	nil
Hartle Twp	10.0	1	223	H
Hebert Twp	10.0	1	27	H
Law Twp	7.0	1	16	H
Milne Twp	7.0	1	25	H
Olive Twp	12.0	1	95	H
Strathcona Twp	8.0	1	27	H
South Lorrain Twp	12.0	3	0	nil
Yates Twp	8.0	1	23	H
<u>Wawa District</u>				
Cecile Twp	13.8	3	1	L
Dumas Twp	8.0	3	6	H
Dunphy Twp	8.0	1	8	H
Euchum Twp	9.0	3	0	nil
Huotari Twp	8.0	3	0	nil
Laberge Twp	9.0	3	7	H
Laberge Twp (White Lk)	14.0	1	23	H
McCron Twp (Bertrand Creek)	10.5	3	9	H
McCron Twp (Moberg Road)	8.5	2	9	H
Obatanga Prov. Pk	10.0	3	1	L
West Twp	10.0	3	25	H
White Lk (bridge)	13.0	1	46	H
White Lk Prov. Pk	11.0	1	21	H

Redheaded Pine Sawfly, *Neodiprion lecontei* (Fitch)

This insect, which was very abundant in 1987, was less frequently observed throughout the Region in 1988. Larvae were detected more commonly in Blind River District than in other districts of the region. Scattered, small, single clumps of roadside red pine trees (*Pinus resinosa* Ait.) approximately 2 to 3 m in height sustained foliar damage ranging from 50 to 80% at several locations in Lefroy, Day and Spragge townships. In the Kirkwood Management Unit, it was not uncommon to observe single trees that sustained 100% foliar damage. Very little damage was observed in plantations and an evaluation performed in Parkinson Township on red pine trees shorter than 2 m revealed the incidence of attack was 6% and foliar damage was less than 1% over a 50-ha area.

In Sault Ste. Marie District, roadside red pine trees just east of the town of Bruce Mines, in Plummer Additional Township, were entirely stripped of both old and new foliage. In Hodgins Township, an evaluation conducted in a 5-ha plantation of red pine trees in the 2.5-m height class revealed that the incidence of trees affected was 15% with foliar damage ranging from 10 to 60% on scattered trees.

In the Sudbury, North Bay and Espanola districts, populations were once again observed causing various amounts of defoliation on single and open-grown red and jack pine; however, damage was less than 25%.

Swaine Jack Pine Sawfly, *Neodiprion swainei* Midd.

The last infestation of Swaine sawfly in the Elk Lake Management Unit in the Kirkland Lake and Temagami districts peaked in 1981, when an area of 5,699 ha of jack pine was moderately-to-severely defoliated. From 1982 to 1984 a steady downward trend in population levels was recorded and the infestation subsided completely by 1985.

On 22 August 1988, a helicopter survey was made over the former infestation in the Lady Evelyn-Banks-Makobe-Alexander lakes area. Light defoliation was mapped on jack pine in two pockets totaling 200 ha between Tretheway and Wolfskin lakes in the northwestern part of Tretheway Township. Subsequent ground checks revealed scattered colonies of the sawfly in jack pine plantations in Brewster, Gamble and McGiffin townships, Temagami District.

Moderate-to-severe defoliation (approximately 50%) recurred on island 127 in the northeast arm of Lake Temagami, where a small pocket (0.2 ha) of infestation has persisted for several years. Scattered colonies of the sawfly were also found on islands and in shoreline stands at many other points on Lake Temagami.

Bruce Spanworm, *Operophtera bruceata* (Hlst.)

The area infested by this defoliator of trembling aspen and sugar maple (*Acer saccharum* [Marsh.]) decreased in 1988. A total of 1,840 ha of moderate-to-severe defoliation occurred in the region, compared with 202,206 ha of defoliation in 1987.

Only four pockets of defoliation were aerially mapped and all occurred in Blind River district (Fig. 5). The largest pocket occurred on sugar maple in the Cummings Lake area, Gould Township, where 50% foliar damage was observed. Approximately 280 ha of aspen and sugar maple were also defoliated in the Constance Lake area, Parkinson Township, and again defoliation did not exceed 50%. Just south of Wharncliff in Wells Township two small pockets totaling 160 ha were moderately defoliated, with sugar maple being the main host affected.

Throughout other previously infested areas of the region larvae could be found but in extremely low numbers and with trace amounts of defoliation occurring. No major infestations are expected to occur within the region in 1989.

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

As in the past, population levels of this defoliator continued to fluctuate. In the Sault Ste. Marie and Wawa districts, damage was most apparent on single, small clumps of trees and usually on trees less than 2 m tall. At one location in the town of White River, Wawa District, a clump of roadside black spruce (*Picea mariana* [Mill.] B.S.P.) had defoliation levels between 25 and 75%. Many roadside black spruce along Hwy 108 in Lewis Township, Blind River District, had an average foliar damage level of 80%. In the towns of Blind River and Wawa and within the city of Sault Ste. Marie the insect was present on ornamental Colorado blue spruce (*Picea pungens* Engelm.); however, damage did not exceed 25%, whereas complete defoliation was observed in several areas in 1987.

In the Espanola, North Bay and Temagami districts, this insect could be readily found. At one location in East Mills Township, North Bay District, a 2-ha white spruce (*Picea glauca* [Moench] Voss) plantation, with trees averaging 1.5 m tall had 30% of trees attacked, with current defoliation averaging 50%. Mortality in this plantation is now about 4% as a result of repeated defoliation.

White Pine Weevil, *Pissodes strobi* (Peck)

Population levels of this insect varied throughout the region, as indicated by quantitative sampling (Table 8). The highest percentage of trees attacked occurred in Milne Township, Temagami District, on trees 3 m in height in a 50-ha jack pine stand in which 24% current leader damage was recorded. In 1987, only 9% of leaders were destroyed in this same plantation.

NORTHEASTERN REGION

Figure 5. Bruce spanworm (*Operophtera bruceata* [Hbst.])

Areas within which moderate-to-severe
defoliation occurred in 1988

■ or ●

PROVINCIAL ADMINISTRATIVE DISTRICTS

- 1 WAWA
- 2 SAULT STE. MARIE
- 3 BLIND RIVER
- 4 ESPANOLA
- 5 SUDBURY
- 6 TEMAGAMI
- 7 NORTH BAY

LAKE SUPERIOR

0 64
Kilometres

Sault Ste.
Marie

Sudbury

LAKE HURON

Forest Insect and Disease Survey
Great Lakes Forestry Centre

Table 8. Damage by the white pine weevil in plantations in the North-eastern Region of Ontario from 1987 to 1988 (counts based on the examination of 150 randomly selected trees at each location).

Location (Twp)	Host	Esti- mated area of stand (ha)	Esti- mated no. of trees per ha	Avg ht of trees (m)	Leaders attacked (%)	
					1987	1988
<u>Blind River District</u>						
Haughton	jP	50	2500	2.0	7.0	10.0
Kirkwood	jP	4	2500	1.5	-	6.0
Lane	jP	4	2700	1.3	-	1.3
Timbrell	jP	50	2500	3.2	8.0	11.0
Viel	jP	100	2500	1.8	-	15.3
Villeneuve	jP	50	3900	1.8	2.0	1.8
<u>Espanola District</u>						
Nairn	jP	20	4222	1.3	-	0.7
Tennyson	scP	10	4444	2.0	-	4.7
Tennyson	scP	5	4444	4.0	7.0	6.0
Tennyson	wP	20	4444	1.0	-	6.0
<u>North Bay District</u>						
Burwash	wS	3	3334	2.9	6.0	9.0
Burwash	wP	10	3777	2.5	13.0	12.0
Pardo	wP	30	2125	1.8	1.0	9.3
<u>Sault Ste. Marie District</u>						
Hurlburt	jP	50	3000	2.8	8.0	13.3
Smilsky	jP	4	2500	1.6	-	1.3
<u>Sudbury District</u>						
Hendrie	jP	50	5000	6.3	-	2.0
<u>Temagami District</u>						
Barr	jP	50	4000	1.3	-	6.6
Firstbrook	jP	10	4500	1.2	-	5.3
Milne	jP	50	4000	3.0	9.0	24.0
<u>Wawa District</u>						
Bullock	jP	2	1877	1.7	-	7.2
Cecile	jP	20	3500	3.3	-	0.7
Cecile	jP	10	2500	2.0	-	6.0
Maness	jP	50	1600	2.4	2.0	2.4
Nebonaionquet	jP	100	1111	1.8	-	1.8

In Pardo Township, North Bay District, control measures in the form of hand thinning were carried out in a 30-ha white pine (*Pinus strobus* L.) plantation. A follow up of results, summarized in Table 9, showed a 4.6% reduction in the percentage of trees attacked in the area that had been hand clipped in 1987; however, in the unclipped area the percentage of trees attacked increased by 4%.

Table 9. A comparison of white pine weevil damage in two adjacent plantings of white pine in Pardo Twp, North Bay District. (Area A was left as a control and area B had the infested leaders clipped and burned in the summer of 1987).

Area	Estimated stand area (ha)	Density (trees/ha)	Average ht of trees (m)	Leaders weeviled (%)	
				1987	1988
A	25	4444	2.1	5.3	9.3
B	30	4444	1.8	7.3	2.7

Minor Insects

Jack Pine Tip Beetle, *Conophthorus banksianae* McP.

High population levels of this insect persisted in Lane Township in 1988 (Table 10). As in the past, damage was mainly confined to lateral shoots and less than 3% of leaders were attacked.

Table 10. Damage caused by the jack pine tip beetle in the Northeastern Region of Ontario in 1987 and 1988 (counts based on the examination of 150 randomly selected trees at each location).

Location (Twp)	Estimated stand area (ha)	Density (trees/ha)	Avg ht of trees (m)	Trees affected (%)		Leaders attacked	
				1987	1988	1987	1988
				Blind River District			
Lane	53	3000	2.6	58.0	68.0	8.0	3.0
Timbrell	100	2700	2.7	25.3	21.0	2.7	2.0

Although the jack pine tip beetle has occurred in relatively large numbers in localized areas from time to time it has not caused serious injury. However, such injury can result in excessive branching in the upper half of the tree's crown. All species of pine can be attacked although jack pine seems to be the preferred host.

Table 11. Other forest insects.

Insect	Host(s)	Remarks
Archips cerasivorana (Fitch) Uglynest caterpillar	Cherry	Small pockets of defoliation (up to 0.2 ha in size) were recorded across the southern portion of the Espanola, Sudbury and North Bay districts, and north into Temagami District, in the rural areas of New Liskeard.
Arge pectoralis (Leach) Birch sawfly	wB	Population levels were greatly reduced throughout the previously heavily infested 55 ha in Dryden, McKim and Neelon twps.
Cecidomyia resinicola (O.S.) Jack pine resin midge	jP	Damage on 3% of the trees was recorded over a 5-ha area of 1-m-tall trees in Lumsden Twp, Sudbury District.
Cephalcia fulviceps (Roh.) Pine web-spinning sawfly	jP	Low population levels were recorded on 1-m-tall trees in plantations in Lumsden and Street twps, Sudbury District.
Coleophora laricella (Hbn.) Larch casebearer	tL	Trees in a swampy 10-ha area of larch in Lauder Twp, North Bay District sustained from 60 to 80% defoliation of their lower crowns.
Conophthorus resinosae Hopk. Red pine cone beetle	rP	Uneven-aged stands on islands in and along the shoreline of Lake Temagami sustained heavy damage to cone crops as a result of feeding by this cone beetle.

(cont'd)

Table 11. Other forest insects (cont'd).

Insect	Host(s)	Remarks
<i>Dioryctria abietivorella</i> (Grt.) Fir coneworm	wS	Mature trees received damage to 14% of their cones at Rabbit Blanket Lake in Peterson Twp, Wawa District.
<i>Dryocampa rubicunda</i> (F.) Greenstriped mapleworm	rM	Light defoliation was recorded sporadically in Temagami, Espanola and Sudbury districts.
<i>Exoteleia pinifoliella</i> (Cham.) Pine needleminer	jP	Defoliation in a 5-ha area of 10-m-tall trees ranged between 40 and 70% in the Dry Pine Bay area of Bigwood Twp, Sudbury District.
<i>Malacosoma americanum</i> (F.) Eastern tent caterpillar	Cherry	An unusually high number of tents were observed throughout the region.
<i>Malacosoma californicum pluviale</i> (Dyar) Northern tent caterpillar	Cherry	Defoliation ranged between 10 and 30% on small roadside clumps of cherry in Street and Neelon twps, Sudbury District.
<i>Messa nana</i> (Klug.) Early birch leaf edgeminer	wB	Heavy defoliation persisted in McKim and Neelon twps.
<i>Neodiprion abietis</i> complex Balsam fir sawfly	bF	Understory trees sustained an average of 25% defoliation at one location in Plummer Additional Twp, Sault Ste. Marie District.
<i>Neodiprion nanulus nanulus</i> Schedl. Red pine sawfly	rP	Light defoliation of up to 5% was recorded sporadically across Blind River, Sudbury, North Bay and Temagami districts.
<i>Neodiprion pratti banksianae</i> Roh. Jack pine sawfly	rP	Light defoliation (3-4%) was recorded over areas up to 20 ha in size in Dryden and Lorne twps, Sudbury District, and Stover Twp, Wawa District.

(cont'd)

Table 11. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Neodiprion sertifer (Geoff.) European pine sawfly	scP rP jP	Moderate-to-severe defoliation was recorded in a young Scots pine plantation near Gore Bay, Espanola District, and in a mixed red pine-jack pine plantation in Tarentorus Twp, Sault Ste. Marie District.
Petrova albicapitana (Bsk.) Northern pitch twig moth	jP	Light damage (1-3%) to trees averaging 1.5 m in height were recorded in plantations up to 15 ha in size in Lumsden Twp, Sudbury District and Merritt and Tennyson twps, Espanola District.
Pleroneura brunneicornis Roh. Balsam shootboring sawfly	bF	Shoot damage of 80% was recorded over a 0.2-ha stand of semimature trees in Proctor Twp, Sault Ste. Marie District. Damage of 10% was observed in Gladstone Twp, Blind River District.
Pristiphora geniculata (Htg.) Mountain-ash sawfly	aMO	Ornamental plantings commonly sustained an average of 25% defoliation in the towns of Wawa, Blind River, and Massey and in the City of Sault Ste. Marie.
Rhyacionia buoliana (D. & S.) European pine shoot moth	jP	Evaluations conducted in Espanola District revealed leader damage of 9% in a 2-ha plantation of 1-m-tall trees in Nairn Twp and 2% in an 8-ha plantation of 1.5-m-tall trees in Merritt Twp.
Toumeyella parvicornis (Ckll.) Pine tortoise scale	jP	An evaluation conducted in a 20-ha area of 2-m-high natural regeneration in Antrim Twp, Sudbury District, revealed that 4% of the trees sustained an average of 20% damage.

(cont'd)

Table 11. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Zeiraphera sp. (prob. <i>canadensis</i> Mut. & Free.) Spruce bud moth	wS	Damage to 100% of the current shoots was recorded on a hedgegrow of 6-m-tall trees in Plummer Additional Twp, Sault Ste. Marie District. Less conspicuous damage was also noted at other locations in the Blind River and Sault Ste. Marie districts.

TREE DISEASES

Major Diseases

Armillaria Root Rot, *Armillaria mellea* (Vahl:Fr.) Kummer

Evaluations carried out on three 4-ha jack pine progeny test sites revealed mortality levels of 6% at one test site and less than 1% at the other two sites. In Kirkwood Township, Blind River District, 6% current mortality occurred on trees averaging 1.5 m tall whereas 0.7% mortality was recorded on 1.3-m-tall trees at the Hinckler Progeny Test Site, Lane Township, Blind River District. In Smilsky Township, Sault Ste. Marie District, 0.7% mortality was recorded on trees averaging 1.6 m tall. In the special surveys conducted at 12 jack pine plantations across the region (see Table 18) mortality levels did not exceed 1%.

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schöpfer-Bernhard

Surveys were continued across the region for the detection of the European race of this fungus; however, negative results were recorded.

Damage caused by the North American race was evaluated in four plantations (Table 12) and the incidence of trees attacked ranged from 27% to a high of 90%, which occurred in Smilsky Township, Sault Ste. Marie District. At this site, damage was mainly confined to the lower 1.5 m of the 4-m trees. Although infection was extremely severe, very few basal cankers were observed, and as a result, trees should out-grow the infection with little mortality, although some lower-branch mortality can be expected. No whole-tree mortality was observed at this site as a result of the infection. Little damage apart from loss of branches below breast height is experienced after the trees surpass 2 m in height (Dorworth 1976).

Table 12. Summary of damage caused by Scleroderris canker in the Northeastern Region of Ontario in 1988 (counts based on examination of 150 randomly selected trees at each location).

Location (Twp)	Host(s)	Estimated stand area (ha)	Density (trees/ ha)	Avg ht of trees (m)	Trees affected (%)	Mortality (%)
<u>Blind River District</u>						
Galbraith	rP	5	3000	3.5	75	0
Haughton	rP	10	2500	2.3	67	2
<u>North Bay District</u>						
Oirig	rP	5	4444	1.3	27	1
<u>Sault Ste. Marie District</u>						
Smilsky	JP	117	2500	4	90	0

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

An evaluation carried out in approximately 16 ha of jack pine trees 1.7 m in height in Lane Township, Blind River District, revealed that 54% of trees were infected with this organism. Of this total, 19% of the trees were severely galled (galls on main stem). Although no mortality was encountered in the 150-tree plot, single-tree mortality was present in the area as a result of basal galls. In the special jack pine survey (see Table 18) one other plantation in Lane Township had 16.7% incidence of the disease, with 4% of the trees severely galled.

This disease can kill small trees and losses may be severe in nurseries, young forest stands and Christmas tree plantations. In older stands, trees with trunk infections may develop decay and can be broken easily by the wind.

Table 13. Other forest diseases.

Disease	Host(s)	Remarks
<i>Coleosporium asterum</i> (Dietel) Sydow Pine needle rust	jP	An average of 15% defoliation was recorded on 95% of the 2-m trees over an 8-ha area in Merritt Twp, Espanola District.
<i>Chrysomyxa arctostaphyli</i> Dietel Spruce broom rust	wS	Single-tree infections were recorded in the Walkhouse Point area in Robinson Twp, Espanola District.
<i>Chrysomyxa pirolata</i> (Körn.) Winter Spruce cone rust	wS	Damage to between 2 and 12% of the current cone crop was recorded over a 1-ha area of 15-m-tall trees in Robinson Twp, Espanola District.
<i>Cronartium ribicola</i> J.C. Fischer White pine blister rust	wP	Stem infections were recorded on 2% of the 1-m-tall trees in a 20-ha plantation in Street Twp, Sudbury District.

(cont'd)

Table 13. Other forest diseases (cont'd).

Disease	Host(s)	Remarks
Davisomycella ampla (J. Davis) Darker Tar spot needle cast	jP	A 16-ha plantation of 1.7-m-tall trees in Lane Twp, Blind River District, sustained an average of 24% defoliation to 63% of the trees. Similarly, a 4-ha plantation of 4-m-tall trees in Dryden Twp, Sudbury District, sustained an average of 8% defoliation to 12% of the sample trees.
Discula umbrinella (Berk. & R.Br.) Morelet Anthracnose	Be	The beech component in a 5-ha stand of mixed hardwoods in Restoule Prov. Pk, North Bay District, sustained 5 to 10% foliar damage.
Mycosphaerella populicola G.E. Thompson Septoria leaf spot	bPo	Widespread, heavy foliar damage (80 to 100%) was recorded south and west of the city of Sudbury. Similar damage was recorded in Espanola District from the town of Webwood to Spanish, and on Manitoulin Island from Elizabeth Bay to the Meldrum Bay area.

ABIOTIC DAMAGE

Drought

In 1988, a total of 37,318 ha of drought damage was aeri-ally mapped in the region (Fig. 6, Table 14). This condition was created as a result of higher-than-normal temperatures and lower-than normal precipitation (see Table 20). Damage was mapped as far north as the Harmony Bay area of Sault Ste. Marie District and eastwards throughout the Blind River, Espanola, Sudbury and North Bay districts.

The largest area of damage occurred in Blind River District, where approximately 20,194 ha of damage was mapped. Damage was usually confined to hills, ridge tops and rocky sites, with sugar maple the most commonly affected species, followed by red oak, white birch and trembling aspen. Eastern white pine was the coniferous species most commonly damaged.

NORTHEASTERN REGION

Figure 6. Drought damage

Areas within which damage occurred in 1988



Severely damaged pockets • or ■

PROVINCIAL ADMINISTRATIVE DISTRICTS

- 1 WAWA
- 2 SAULT STE. MARIE
- 3 BLIND RIVER
- 4 ESPANOLA
- 5 SUDBURY
- 6 TEMAGAMI
- 7 NORTH BAY

LAKE SUPERIOR

0 64
Kilometres

LAKE HURON

Forest Insect and Disease Survey
Great Lakes Forestry Centre

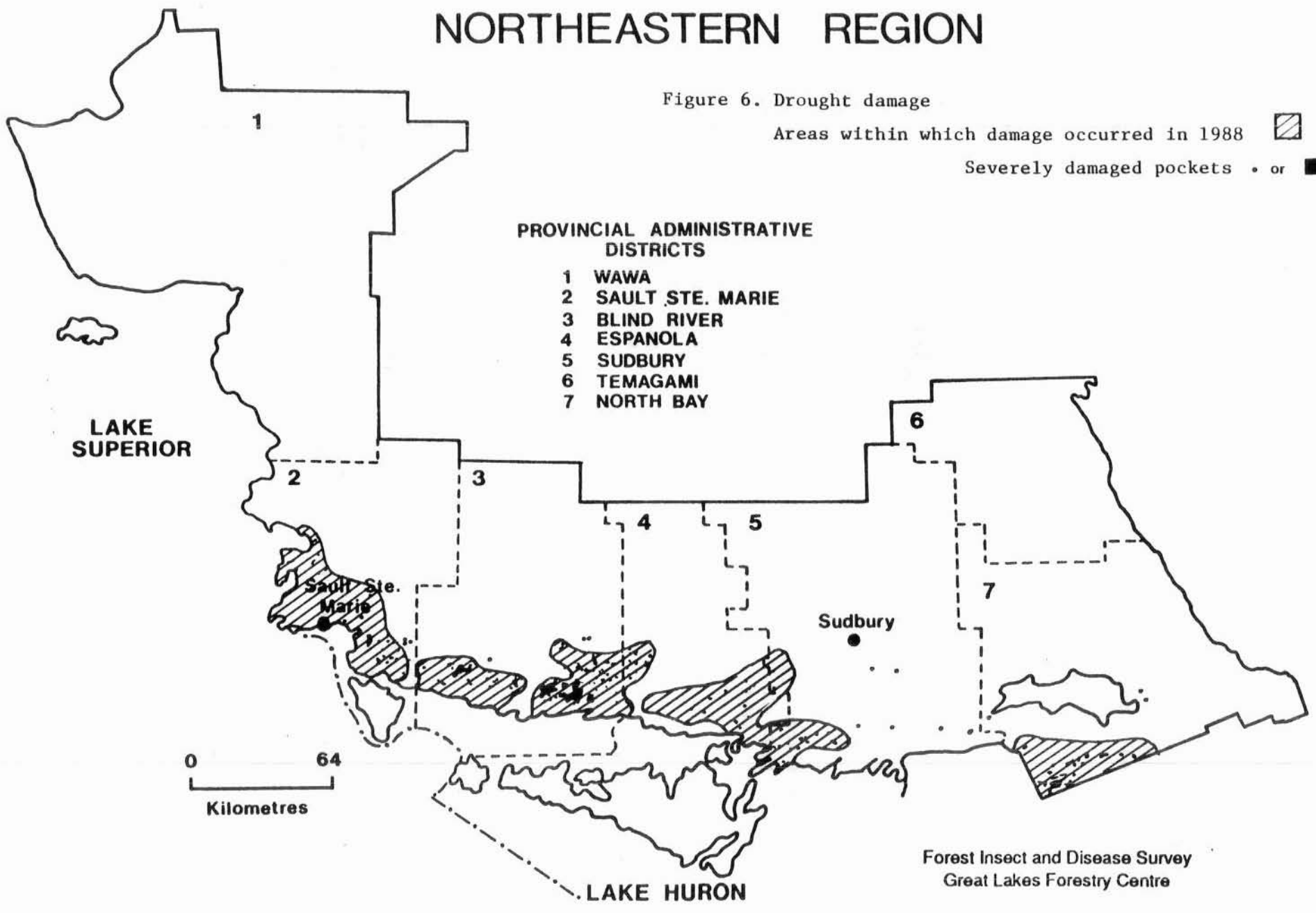


Table 14. Drought damage in the Northeastern Region of Ontario in 1988.

District	Area affected (ha)
Blind River	20,394
Espanola	1,384
North Bay	8,846
Sault Ste. Marie	5,790
Sudbury	904
Total	37,318

In several of the above districts, areas of newly planted trees were examined. Mortality was observed in two young jack pine plantations in Robinson Township, Espanola District. The greatest damage occurred in a 4-ha plantation of 1.2-m-tall trees. At this site, 72% of the trees were totally brown and of the 150 evaluated, 68% mortality occurred. In the second plantation, 2 ha in size, 15% of 0.4-m-tall trees were affected and 9% mortality was recorded. However, not all new plantations were examined and the overall extent of damage is unknown. In many areas examined no obvious damage was observed; however, long term effects could possibly show up at a later date.

In 1989, areas affected by this year's drought will be re-examined to determine if further dieback or mortality has occurred.

Winter Drying

This condition was observed at scattered points in the region. The most noticeable area of damage was along Highway 17 from the town of Warren to Sturgeon Falls, in North Bay District, where white spruce windbreaks sustained 20 to 30% foliar damage. Similar damage occurred along Highway 11 from the town of North Bay to Marten River Provincial Park.

Damage was also observed in two plantations in Blind River District. In Timbrell Township, 34% incidence and 5% foliar damage occurred over 2 ha of red pine trees averaging 1 m in height. In Parkinson Township, 80% incidence and 10% foliar damage was recorded in a 1-ha pitch pine (*Pinus rigida* Mill.) plantation on trees averaging 1.8 m in height.

SPECIAL SURVEYS

Thessalon Nursery Survey

Routine visits to the Thessalon Tree Nursery revealed no major damage by insects or diseases.

Low population levels of thrips were observed in the greenhouses and although light damage was present on seedlings, no losses occurred. To prevent further damage by these pests, greenhouses were routinely sprayed with Dursban 2E and Diazinon. Needle and stem mortality caused by diploia tip blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton, was also reported on red pine; damage was rated at less than 1%. Trace levels of gray mold, *Botryotinia fuckeliana* (de Bary) Whetzel, were found in greenhouse 13; however, only one jack pine seedling was affected. In greenhouse 8, 25-75% of white spruce seedlings were affected with *Fusarium* sp.; however, this pest is considered a secondary pathogen and caused no concern. *Cylindrocladium* root rot, *Cylindrocladium floridanum* Sob. & C.P. Seym., was also present in samples taken from soil beneath bare-root seedlings by OMNR staff, but again no losses were reported as a result of this pathogen. This fungus was also recovered by FIDS staff.

Other minor problems that occurred were caused by excessive moisture and/or high salt levels, but losses were small. Approximately 10-20% of 6-week-old jack pine suffered light foliar damage as a result of the deposition of either a fertilizer or the chemical Diazinon, which was used to control thrips in greenhouse 10.

Jack Pine Cone Survey

A survey was carried out to determine the influence of insects and diseases on cones and seeds of jack pine. Collections were made of 100 second-year cones that were still in the succulent green stage but close to full size. A total of 300 cones (100 from each of three locations) was collected during the first week of July, before the hardening process had begun, from a minimum of three trees; in each case, the total length of the cone-bearing crown was represented. Cones were assessed in Sault Ste. Marie for the proportion of damaged cones, the proportion of damaged seeds and the identity of any insects and diseases causing the damage. Results are summarized in Table 15.

Jack Pine Plantation Survey

In 1979, 1982, 1985 and 1988, special surveys were conducted to determine insect and disease problems in jack pine plantations. A comparison of the results for three of these surveys is presented in Table 16. Twelve plantations were visited each year, with two stands of trees in each of the <2.0 m, 2.1-6.0 m and >6.0 m height categories (Fig. 7).

Table 15. Summary of the incidence of insect damage and seed loss in jack pine cones in the Northeastern Region of Ontario in 1988 (counts based on the examination of 100 randomly selected cones at each location).

Location (Twp)	Damaged cones (%)	Avg seed loss in damaged cones (%)	Principal cause of seed loss	
			Lepidoptera (%)	Unknown (%)
<u>Sudbury District</u>				
Hendrie	8	1.0	1.0	8.0
<u>Temagami District</u>				
Firstbrook	48	16.7	47.0	1.0
<u>Wawa District</u>				
Huotari	2	N/A	2.0	0

Table 16. A comparison of insect and disease activity recorded in jack pine plantation surveys in the Northeastern Region of Ontario since 1979 (12 plantations examined each year).

Insect (Year)	Plots affected (%)	Trees affected (%)	Defoliation (%)
<u>Jack pine budworm</u>			
1979	-	-	-
1982	8.3	9.3	trace
1988	-	-	-
<u>White pine weevil</u>			
1979	33.3	2.6	N.A.
1982	50.0	1.4	N.A.
1988	85.7	6.2	N.A.
<u>Eastern pine shoot borer</u>			
1979	25.0	2.2	N.A.
1982	8.3	4.0	N.A.
1988	71.4	21.7	N.A.

(cont'd)

Table 16. A comparison of insect and disease activity recorded in jack pine plantation surveys in the Northeastern Region of Ontario since 1979 (12 plantations examined each year) (cont'd).

Insect (Year)	Plots affected (%)	Trees affected (%)	Defoliation (%)
<u>Jack pine tip beetle</u>			
1979	-	-	N.A.
1982	16.7	1.0	N.A.
1988	50.0	11.6 ^a	N.A.
<u>Swaine jack pine sawfly</u>			
1979	8.3	0.1	trace
1982	8.3	5.0	trace
1988	0.0	0.0	Nil
<u>Pitch nodule maker</u>			
1979	0.0	-	N.A.
1982	0.0	-	N.A.
1988	42.8	1.3	N.A.
<u>Needle cast</u>			
1979	16.7	45.5	10
1982	33.3	21.7	6
1988	35.7	12.9	11
<u>Gall rust</u>			
1979	-	-	-
1982	25.0	3.1	N.A.
1988	64.3	3.9	N.A.
<u>Stem rust</u>			
1979	25.0	2.4	N.A.
1982	8.3	9.3	N.A.
1988	-	-	N.A.
<u>Armillaria root rot</u>			
1979	8.3	1.3	N.A.
1982	16.7	0.7	N.A.
1988	35.7	0.7	N.A.

(cont'd)

Table 16. A comparison of insect and disease activity recorded in jack pine plantation surveys in the Northeastern Region of Ontario since 1979 (12 plantations examined each year) (concl.).

Insect (Year)	Plots affected (%)	Trees affected (%)	Defoliation (%)
<u>Scleroderris canker</u>			
1979	-	-	N.A.
1982	25.0	26.2	N.A.
1988	-	-	N.A.
<u>Needle rust</u>			
1979	-	-	-
1982	16.7	1.2	trace
1988	57.1	45.6	8.4

^a only lateral shoots were affected

The most commonly encountered insects found during the surveys were the white pine weevil, the eastern pine shoot borer and the jack pine tip beetle. Of the diseases encountered, Armillaria root rot, tar spot needle cast, and western gall rust were the most prevalent. Results for the 12 areas evaluated in 1988 are shown in Tables 17 and 18.

Maple Health

In 1987, twenty maple plots were established in the region to determine the amount of dieback, mortality and pest problems encountered. In 1988, an additional 10 plots were established in the Blind River and Sault Ste. Marie districts (Fig. 8). Of the 750 trees examined in 1988, only one tree was tallied as dead and 91% of the trees were in the 0-5% dieback class (Table 19). To date, no major problems of maple are apparent from data retrieved from the 30 established plots.

The major pest problems were the forest tent caterpillar and the Bruce spanworm. In French Township, North Bay District, 40% defoliation by the forest tent caterpillar was reported in one stand of sugar maple and 25% defoliation by the Bruce spanworm was reported in Meredith, Hodgins and Deroche townships, Sault Ste. Marie District. In Gladstone and Gould townships, Blind River District, 25% defoliation by the Bruce spanworm was also recorded.

In 1989, these 30 plots will be re-tallied and a total of 10 more plots will be established throughout the Espanola, Sudbury and North Bay districts.

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Figure 7. Jack pine (*Pinus banksiana* Lamb.) plantations surveyed in 1988

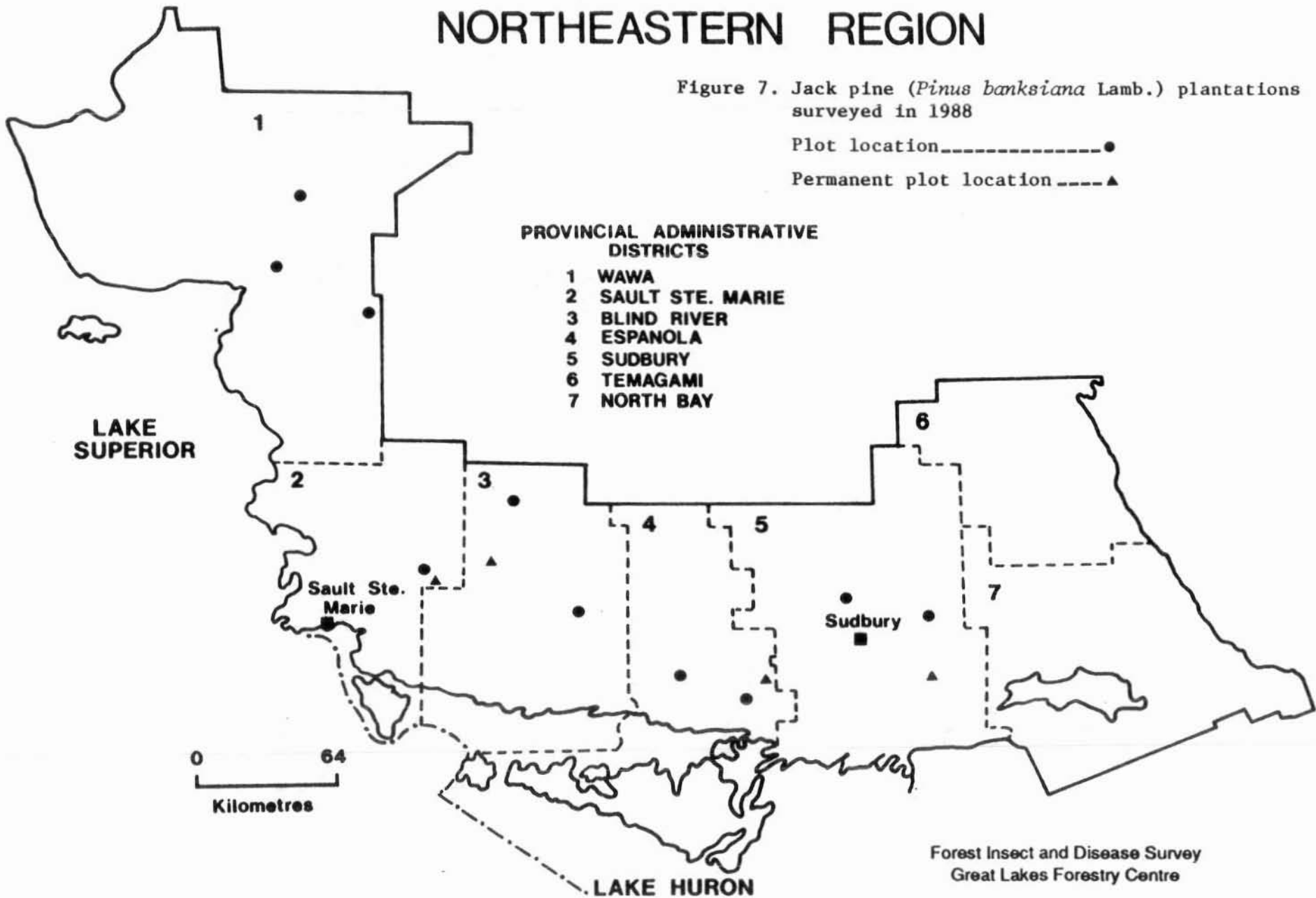


Table 17. Summary of the incidence of insect-caused damage noted in a survey conducted in jack pine plantations in the North-eastern Region of Ontario in 1988 (counts based on the examination of 150 or 300 randomly selected trees at each location).

Location (Twp)	Estimated area of stand (ha)	Density (trees/ha)	Avg ht of trees (m)	White pine weevil	Eastern pine shoot borer		Jack pine tip beetle	Pitch nodule maker
				Leaders attacked (%)	Leaders attacked (%)	Lateral shoots attacked (%)	Trees infested (%)	Trees infested (%)
<u>Blind River District</u>								
Lane	53	2500	2.6	5.3	1.3	66.0	0.0	0.0
Segard	100	4444	11.0	0.0	0.0	0.0	0.0	2.7
Villeneuve*	20	2900	3.4	0.4	0.0	0.0	44.8	0.0
<u>Espanola District</u>								
Merritt	8	4222	2.1	4.0	4.0	14.0	2.0	0.7
Nairn*	4	5000	5.8	3.3	1.7	16.0	0.0	0.0
Tennyson	15	4444	2.3	13.3	2.7	69.0	0.7	2.0
<u>Sault Ste. Marie District</u>								
Hurlburt	200	2500	0.8	7.3	2.0	5.3	0.0	0.0
Hurlburt*	50	2500	3.2	15.1	0.0	3.4	23.1	0.8
<u>Sudbury District</u>								
Hendrie*	50	5000	6.3	2.0	1.7	16.7	0.3	0.0
Lumsden	8	4222	1.1	9.3	5.3	10.7	0.7	0.7
Street	10	4444	1.1	9.3	7.3	14.0	0.0	0.7
<u>Wawa District</u>								
Esquega	457	2500	0.9	3.3	0.0	0.0	0.0	0.0
Huotari	24	1800	11.0	0.0	0.0	0.0	0.0	0.0
Recollet	500	2500	6.0	1.3	0.0	2.0	9.3	0.0

* semipermanent plots

Table 18. Summary of the incidence of disease-caused damage noted in a survey conducted in jack pine plantations in the Northeastern Region of Ontario in 1988 (counts based on the examination of 150 or 300 randomly selected trees at each location).

Location (Twp)	Estimated no. of stand (ha)	Density (trees/ ha)	Avg ht of trees (m)	Armillaria	Pine needle	Tar spot	Western	Foliar
				root rot	rust	needle cast	gall rust	chlorosis
				Trees affected (%)	Trees affected (%)	Trees affected (%)	Trees affected (%)	Trees affected (%)
<u>Blind River District</u>								
Lane	53	2500	2.8	0.0	74.0	42.6	16.7	0.0
Sagard	100	4444	11.0	0.0	0.0	0.0	6.7	0.0
Villeneuve*	20	2900	3.4	0.0	0.0	12.1	0.0	0.0
<u>Espanola District</u>								
Merritt	8	4222	2.1	0.7	95.3	0.0	0.7	0.0
Nairn*	4	5000	5.8	0.0	0.7	0.0	2.0	0.0
Tennyson	15	4444	1.3	0.0	0.7	0.0	0.0	0.7
<u>Sault Ste. Marie District</u>								
Hurlburt	200	2500	0.8	0.0	100.0	0.0	0.0	0.0
Hurlburt*	50	2500	3.2	0.7	0.0	0.0	1.3	0.0
<u>Sudbury District</u>								
Hendrie*	50	5000	6.3	0.0	0.0	0.0	1.3	0.0
Lumsden	8	4222	1.1	0.7	1.3	1.0	0.7	6.7
Street	10	4444	1.1	0.7	18.0	0.0	0.0	19.3
<u>Wawa District</u>								
Esquega	457	2500	0.9	0.7	66.0	0.0	2.0	0.0
Huotari	24	1600	11.0	0.0	0.0	0.0	0.0	0.0
Recollet	500	2500	6.0	0.0	0.0	8.0	4.0	0.0

* semipermanent plots

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Figure 8. Sugar maple (*Acer saccharum* Marsh.) health plots established in 1987 and 1988

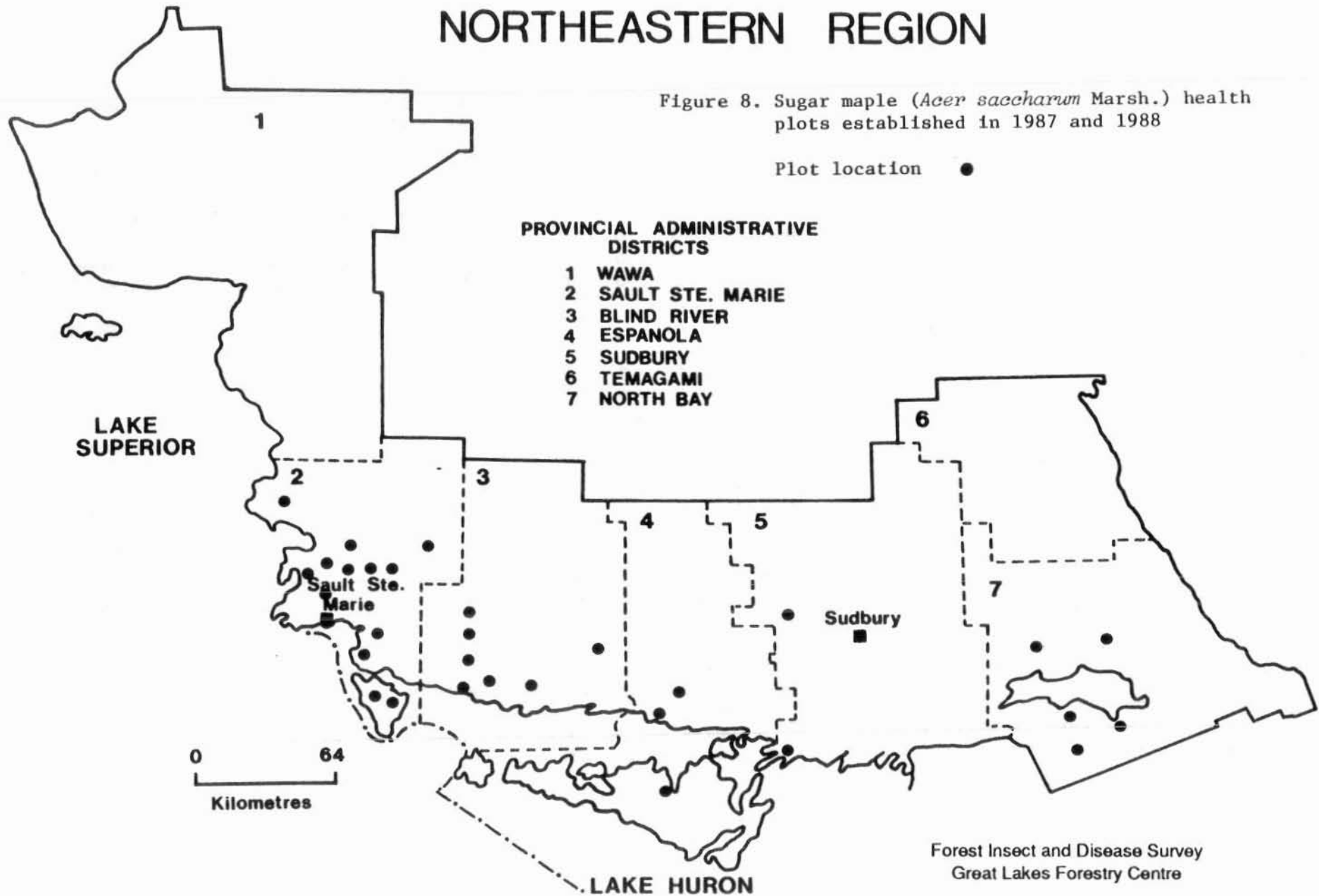


Table 19. Results of the examination of sugar maple plots in five districts in the Northeastern Region of Ontario in 1987 and 1988 (data based on the examination of 25 host trees at each site).

District (Twp)	Current crown dieback class ^a												Average defoliation (%)	Trees with cankers and stem decay (%)	
	0		1		2		3		4		5			87	88
	87	88	87	88	87	88	87	88	87	88	87	88			
<u>Blind River</u>															
Casson	-	100	-	0	-	0	-	0	-	0	-	0	0	-	24
Gladstone	100	100	0	0	0	0	0	0	0	0	0	0	25 ^b	24	28
Gould	-	100	-	0	-	0	-	0	-	0	-	0	25 ^b	-	20
Gunterman	-	96	-	4	-	0	-	0	-	0	-	0	0	20	20
Scarfe	-	100	-	0	-	0	-	0	-	0	-	0	0	-	24
Thessalon	100	100	0	0	0	0	0	0	0	0	0	0	0	12	20
Wells	96	96	0	4	0	0	4	0	0	0	0	0	0	31	32
<u>Espanola</u>															
Billings	100	72	0	28	0	0	0	0	0	0	0	0	5 ^c	12	12
Gough	96	76	4	24	0	0	0	0	0	0	0	0	5 ^c	36	36
Pringle	84	80	16	20	0	0	0	0	0	0	0	0	5 ^c	16	16
Spanish River	100	96	0	4	0	0	0	0	0	0	0	0	>1 ^c	12	12
<u>North Bay</u>															
Blyth	86	64	16	36	0	0	0	0	0	0	0	0	5 ^c	24	24
French	88	92	12	8	0	0	0	0	0	0	0	0	40 ^c	24	24
Nipissing	100	96	0	4	0	0	0	0	0	0	0	0	5 ^c	24	24
Patterson	100	88	0	12	0	0	0	0	0	0	0	0	5 ^c	16	16

(cont'd)

Table 19. Results of the examination of sugar maple plots in five districts in the Northeastern Region of Ontario in 1987 and 1988 (data based on the examination of 25 host trees at each site) (concl.).

District (Twp)	Current crown dieback class ^a												Average defoliation (%)	Trees with cankers and stem decay (%)		
	0		1		2		3		4		5			87	88	
	87	88	87	88	87	88	87	88	87	88	87	88				
<u>Sault Ste. Marie</u>																
Aweres	72	88	28	12	0	0	0	0	0	0	0	0	0	5 ^b	72	60
Deroche	80	84	20	12	0	0	0	4	0	0	0	0	0	25 ^b	100	68
Fenwick	84	100	16	0	0	0	0	0	0	0	0	0	0	4 ^b	0	4
Hilton	72	84	28	16	0	0	0	0	0	0	0	0	0	5 ^b	44	48
Hodgins	72	80	0	16	12	4	16	0	0	0	0	0	0	25 ^b	96	84
Jocelyn	-	9	-	4	-	-	-	-	-	-	-	-	-	0 ^b	-	20
Jollineau	-	92	-	8	-	-	-	-	-	-	-	-	-	2 ^b	-	56
Laird	96	100	4	0	0	0	0	0	0	0	0	0	0	0 ^b	4	20
Meredith	52	96	0	0	20	0	16	0	0	0	12	4	25 ^b	12	16	
Palmer	-	92	-	8	-	-	-	-	-	-	-	-	-	0	-	32
Shield	-	88	-	8	-	4	-	0	-	0	-	0	0	0	-	28
Van Koughnet	-	100	-	0	-	0	-	0	-	0	-	0	0	0	-	56
Whitman	-	92	-	4	-	4	-	0	-	0	-	0	0	0	-	40
<u>Sudbury</u>																
Cascaden	100	92	0	8	0	0	0	0	0	0	0	0	0	>1 ^c	4	4
Rutherford	96	96	4	4	0	0	0	0	0	0	0	0	0	5 ^c	32	32

^a Dieback classification 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = >61%, 5 = dead tree

^b *Malacosoma disstria*

^c *Operophtera bruceata*

North American Sugar Maple Project

Concern about the health of sugar maple in the United States and Canada has prompted a cooperative agreement between the United States Forest Service, Forestry Canada, and forestry staff from several north-eastern states and provinces to monitor the health of this species. A total of 24 plots was established throughout the province of Ontario. The objectives of this study are:

1. To determine the rate of change in sugar maple tree-condition ratings from 1988 to 1990.
2. To determine if the rates of change in sugar maple tree conditions differ among: (a) various levels of pollution, measured as wet deposition; (b) sugar bush and undisturbed forest; and (c) various levels of initial stand condition.
3. To determine the possible causes of sugar maple decline and the geographical relationship between causes and the extent of decline.

Four plots were established in the Northeastern Region, two in Sault Ste. Marie District and two in North Bay District. Of the four plots, two were established in undisturbed forest and two in a sugar bush. Results of the surveys are summarized in Table 20.

Table 20. North American Sugar Maple Project plots.

District (Twp)	No. trees	Dieback class (%)					
		0-5	6-25	26-45	46-65	66-85	86-100
<u>North Bay</u>							
Nipissing	118	99	17	2	-	-	-
Patterson	71	56	14	-	1	-	-
<u>Sault Ste. Marie</u>							
Tarentorus	89	70	18	1	-	-	-
Wishart	78	53	21	3	1	-	-

Pinewood Nematode Vector Survey

As requested by Forestry Canada headquarters in Ottawa, a priority survey was carried out for the possible vectors of the pinewood nematode. Collections of bark beetles, weevils, horntails and other woodboring adult insects were made from dying or recently dead trees.

These were then submitted to the laboratory in Sault Ste. Marie, where they were prepared for shipment to an expert at the Memorial University in Newfoundland for examination. A total of 33 samples was taken across the Sault Ste. Marie, Wawa and Blind River districts.

Identification is still in progress and results are incomplete.

Acid Rain National Early Warning System (ARNEWS)

As an ongoing survey, the four ARNEWS study plots that were established in 1984 and 1985 in Wawa, Sault Ste. Marie, Sudbury and North Bay districts were re-tallied. The assessments involved monitoring various insect and disease problems and other abnormalities related to acid precipitation, if apparent. Regeneration and ground vegetation data were also recorded at each location.

Plots visited in Sault Ste. Marie and Wawa districts revealed no signs of damage caused by insect or disease problems. However, some foliage discoloration was observed at the plot in Wishart Township, Sault Ste. Marie District. This occurred as a result of the drought conditions that prevailed throughout the region and samples submitted for identification confirmed these observations. In Samuel de Champlain Provincial Park, North Bay District, 100% defoliation by the forest tent caterpillar occurred on birch and aspen, whereas defoliation on sugar maple by the caterpillar averaged 60% in Hyman Township, Sudbury District. No disease problems were evident in the plots.

Climatic Data

Environmental factors such as temperature and precipitation play an important role in the development of insects and diseases and in tree growth in the forest. Certain weather conditions can predispose the forest to damage, and can be the cause of marked fluctuations in insect populations or in the incidence of disease. Adverse weather conditions cause abiotic damage such as frost, winter drying or scorch, breakage as a result of wind, snow or hail damage, and drought. Weather data for three locations across the region are recorded in Table 21. This table includes the monthly mean temperature, total precipitation for 1988, and deviation of both parameters in 1987 and 1988 from the normals for previous years.

More detailed weather information can be obtained from local Atmospheric Environment Service weather offices.

Table 21. Mean temperatures and total precipitation in 1988 and deviation from the norms for 1987 and 1988 at three locations across the Northeastern Region of Ontario.

Location	Month	Mean temperature (°C)		Deviation from norm (°C)		Total precipitation (mm)		Deviation from norm (%)	
		Normal	Actual	1987	1988	Normal	Actual	1987	1988
<u>Sault Ste. Marie Airport</u>									
	January	-10.1	-10.3	+3.1	-0.2	74.0	77.4	-23.5	+4.6
	February	-10.0	-11.7	+3.6	-1.7	68.0	37.2	-77.1	-45.3
	March	-5.1	-5.6	+3.2	-0.5	60.4	85.9	-41.6	+42.2
	April	3.1	3.4	+3.8	+0.3	64.4	63.1	-42.9	-2.0
	May	9.1	11.3	+2.0	+2.2	84.2	36.9	-3.6	-56.2
	June	14.6	15.2	+1.3	+0.6	74.2	10.2	-15.6	-86.3
	July	17.3	19.5	+2.1	+2.2	55.6	66.4	+70.5	+19.4
	August	16.9	18.2	+0.6	+1.3	82.7	137.8	+42.0	+66.6
	September	12.8	13.1	+1.3	+0.3	95.3	76.8	-19.4	+19.4
	October	7.6	5.2	-2.0	-2.4	74.2	139.4	+72.0	+87.9
	November	0.7	2.7	+0.5	+2.0	85.7	169.7	+13.2	+98.0
	December	-6.7	-7.1	+3.5	-0.4	79.6	82.7	-6.3	+3.9
<u>Sudbury Airport</u>									
	January	-13.7	-12.2	+3.8	+1.5	57.5	70.2	-46.3	+22.1
	February	-12.5	-13.5	+2.9	-1.0	47.0	75.7	-5.1	+61.1
	March	-6.0	-6.6	+3.3	-0.6	55.2	95.6	-16.3	+73.2
	April	2.7	3.3	+4.8	+0.6	61.1	77.1	-23.4	+16.4
	May	10.5	12.9	+1.0	+2.4	67.1	90.6	-4.3	+35.0
	June	16.0	15.7	+1.4	-0.3	82.8	37.1	-29.7	-55.2
	July	18.7	21.9	+1.6	+3.2	83.1	29.8	-45.4	-64.1
	August	17.3	19.0	+0.4	+1.7	82.9	188.1	-47.3	+126.9
	September	12.2	12.5	+1.6	+0.3	106.5	91.5	-11.9	-14.1
	October	6.3	4.1	-1.9	-2.2	74.6	122.2	-5.2	+63.8
	November	-1.2	0.5	0.0	+1.7	77.8	120.0	+3.2	+54.2
	December	-10.2	-10.3	+4.4	-0.1	65.8	66.2	+11.7	+0.6
<u>North Bay Airport</u>									
	January	-13.0	-10.8	+3.0	+2.2	63.5	78.8	-54.2	+24.1
	February	-11.3	-12.8	+0.9	-1.5	56.2	74.8	-26.0	+33.1
	March	-5.3	-6.3	+3.1	-1.0	61.1	64.1	+16.7	+4.9
	April	3.2	3.9	+4.3	+0.7	62.3	77.0	-22.0	+23.6
	May	10.6	12.7	+0.5	+2.1	69.3	76.0	+13.8	+9.7
	June	15.7	14.9	+1.1	-0.8	85.1	63.6	+38.2	-25.3
	July	18.3	20.8	+1.5	+2.5	102.4	70.0	-28.7	-31.6
	August	17.0	18.1	-0.3	+1.1	98.7	205.6	+28.3	+108.3
	September	12.2	12.2	+1.3	0.0	115.9	118.2	-49.3	+2.0
	October	6.4	4.4	-2.3	-2.0	87.7	128.7	+13.8	+46.8
	November	-1.0	0.5	-0.1	+1.5	86.6	99.0	-31.6	+14.3
	December	-9.7	-10.1	+3.7	-0.4	75.4	65.2	+14.9	-13.5

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