

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

(FOREST DISTRICTS: PARRY SOUND, BRACEBRIDGE,  
ALGONQUIN PARK, PEMBROKE, MINDEN AND BANCROFT)

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FORESTRY CANADA  
ONTARIO REGION  
GREAT LAKES FORESTRY CENTRE  
1989

MISCELLANEOUS REPORT NO. 84

## SURVEY HIGHLIGHTS

This report describes the most important and prevalent biotic and abiotic conditions that were detected and evaluated during extensive aerial and ground surveys conducted in the Algonquin Region of Ontario in 1988.

The area of moderate-to-severe defoliation caused by the forest tent caterpillar continued to increase. It amounted to 1,257,909 ha in 1988 and was forecasted to expand in 1989. Defoliation of hardwoods by the gypsy moth in Bancroft and Pembroke districts increased from 111 ha in 1987 to 494 ha in 1988. Egg-mass surveys to forecast next year's population levels of this pest were conducted for the first time in Minden District, and severe defoliation was forecasted for an area in Cavendish Township in 1989. Damage caused by the redheaded pine sawfly and the pine false webworm continued to increase in pine plantations across the region, as did damage caused by the cedar leafminer complex in cedar. There was a near-complete collapse of the Bruce spanworm infestation and no evidence of damage by either the spruce or the jack pine budworm could be found.

In all, 76 plantations were surveyed for Scleroderris canker; the European race of this disease was found infecting four new plantations, but all were within the immediate area of previous infection centers. The long drought experienced across the region resulted in severe foliar browning of hardwoods, primarily, over 141,632 ha in mid-August, mainly in Bracebridge and Parry Sound districts. Blowdown was commonly encountered at numerous locations in the region.

The 20 semipermanent sugar maple plots, the three red oak decline plots and the six Acid Rain National Early Warning System (ARNEWS) plots were all retallied. Twelve red pine plantations were randomly selected and evaluated as part of the continuing surveys of high-value plantations, and a collection of 100 red pine cones was completed at two locations to determine which pests are affecting seed production. In a joint project with the United States Forest Service, four North American Sugar Maple Decline Project (NASMDP) plots were established in the region to monitor crown conditions and decline in sugar maple stands.

In this report, the following categories are used to determine the importance of insects and 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

Frontispiece



Severe defoliation of sugar maple (*Acer saccharum* Marsh.)  
by the forest tent caterpillar (*Malacosoma disstria* Hbn.)



Drought-damaged red oak (*Quercus rubra* L.) grown on  
shallow-soil sites

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## INSECTS

### Major Insects

#### Pine False Webworm, *Acantholyda erythrocephala* (L.)

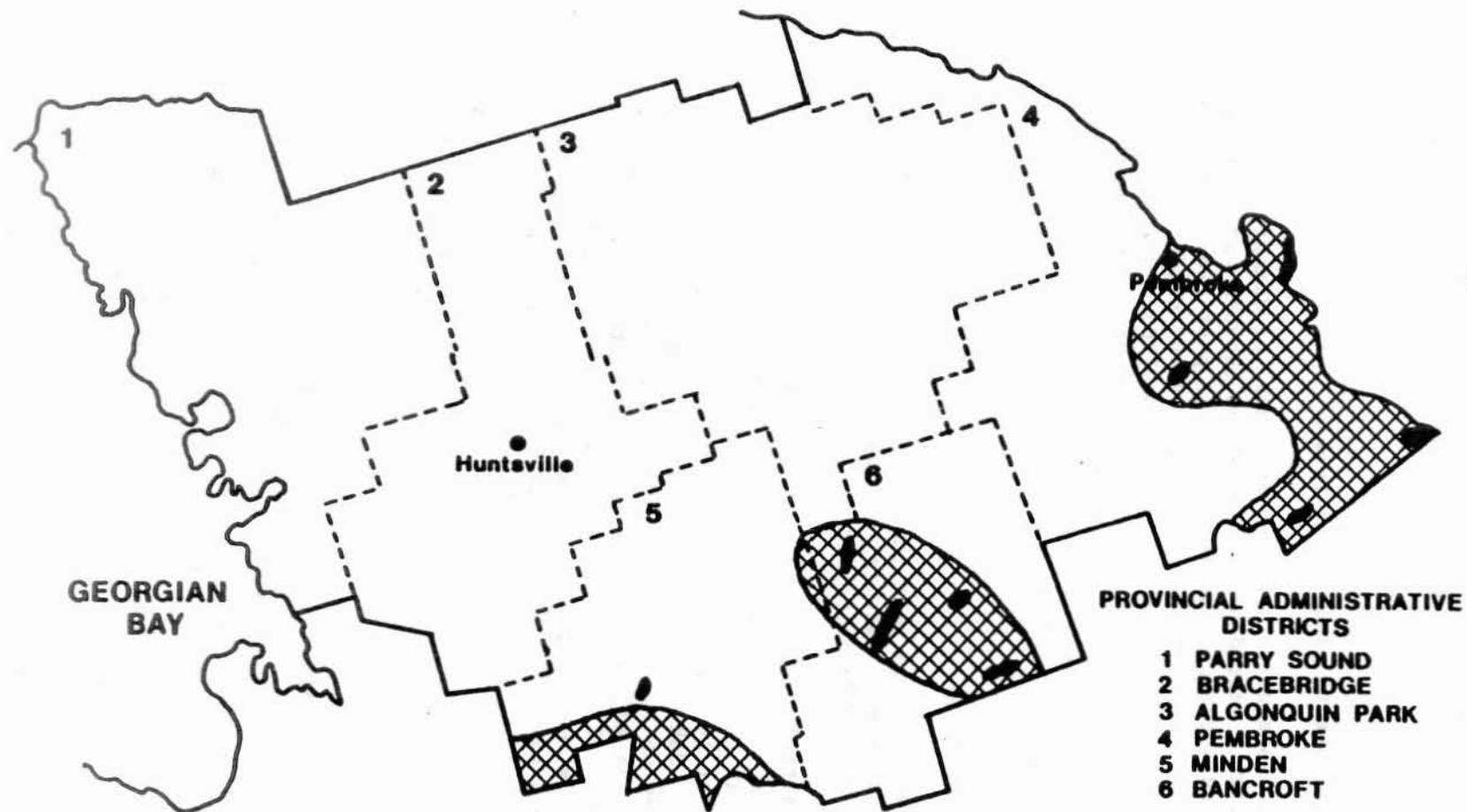
This introduced pest continues to spread and cause defoliation in pine (*Pinus* sp.) plantations across the region. The heaviest damage occurred in red pine (*Pinus resinosa* Ait.) plantations in McMurrich Township in Parry Sound District. Severe defoliation was observed in several locations and evaluated in two that seemed to represent the defoliation that was occurring in the township. In a 1.1-m-tall, 10-ha red plantation east of Sprucedale, 85% of the trees were infested with an average of 19 webmasses per tree, which caused 25% defoliation. In the southwest corner of the township, a 1.7-m-tall, 8-ha red pine plantation was found to have 92% of its trees infested and an average of 15 webmasses per tree, which caused 20% defoliation.

In Minden District, a 6-ha red pine plantation in Stanhope Township that has been heavily infested for the last three seasons and was hand-sprayed last season by the Ontario Ministry of Natural Resources (OMNR) was found to have only 40% of its trees infested in comparison with 100% last season. The numbers of webmasses per infested tree declined from 10 to only two, and defoliation declined from 90% to only 10%.

In Bancroft District, populations remained very high, causing defoliation levels from 10 to 80% in Carlow and Mayo townships. In a 0.5-ha red pine plantation south of Apsley in Cardiff Township, 30% of the 2.5-m-tall trees sustained 80% defoliation. In Bracebridge District, foliar damage levels ranging from 10 to 40% were observed in Macaulay, Draper and Stisted townships.

In Bancroft District, OMNR ground-sprayed a 2.5-ha red pine plantation to control high populations of this pest. Surveys indicated that 95% of the 2.5-m-tall trees were infested; therefore, in early July, the chemical insecticide Sevin was applied at a rate of 5 ml of active ingredient per L of water. Surveys five days later revealed that the treatment had been very successful.

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## PROVINCIAL ADMINISTRATIVE DISTRICTS

- 1 PARRY SOUND
- 2 BRACEBRIDGE
- 3 ALGONQUIN PARK
- 4 PEMBROKE
- 5 MINDEN
- 6 BANCROFT

Figure 1. Cedar leafminer complex

Areas within which affected foliage was observed

Moderate..... 

Light..... 

A spruce budworm egg-mass survey was conducted at the same six locations in which the Multi-pher pheromone traps were deployed. The egg-mass survey was conducted to assist in predicting infestation levels expected in 1989. Examination of the foliage on the six branches collected in each area did not reveal any egg masses; consequently, no damage is forecasted for 1989.

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

For the second consecutive year no evidence of damage to jack pine (*Pinus banksiana* Lamb.) caused by the jack pine budworm was detected in the region. Egg-mass surveys conducted over the past two years have indicated that this would be the case, and the survey conducted at 10 locations in 1988 indicates a similar situation for 1989. One egg-mass sample each was collected from Mowat, Wallbridge and Harrison townships and two from Carling Township in Parry Sound District, and one each from White, Edgar and Stratton townships in Algonquin Park District and from Buchanan and Petawawa townships in Pembroke District.

**Gypsy Moth, *Lymantria dispar* (L.)**

Population levels of this pest continued to fluctuate throughout the region. Moderate-to-severe defoliation was aerially sketch-mapped across some 494 ha, all within Bancroft and Pembroke districts.

In Bancroft District, 370 ha of moderate-to-severe defoliation were detected, primarily in Methuen Township. Sixteen areas of heavy defoliation were found in the township, the largest covering 78 ha, and two additional pockets of 14 and 13 ha of heavy defoliation were found along the north side of Oak Lake. A 32-ha area of moderate-to-severe defoliation was detected on the north side of MacDonald Bay on Kasshabog Lake, in addition to 32-ha and 18-ha areas of moderate-to-severe defoliation along the north side of Long Lake. At Methuen Lake 28-ha and 16-ha pockets were mapped. (The remaining eight pockets, < 15 ha in size, were scattered throughout the township.) In Carlow Township, a 12-ha area of moderate-to-severe defoliation was found in the north central portion of the township. The 124 ha of moderate-to-severe defoliation in Pembroke District consisted of seven pockets, each approximately 15 ha in size, along the north side of Golden Lake in North Algona Township, with two pockets of similar size in Fraser Township (Fig. 3).

Elsewhere in the region, trace-to-low numbers of insects were frequently encountered in hardwood stands. At Beaver Dam campground in Killbear Provincial Park, Parry Sound District, small numbers feeding on red oak (*Quercus rubra* L.) were collected. However, the defoliation that occurred throughout the campground was caused by the more abundant forest tent caterpillar (*Malacosoma disstria* Hbn.), which is present in the area. In the Gravenhurst area of Bracebridge District, similarly small numbers of gypsy moth were found at Muldrew Lake and Muskoka Bay in Muskoka Township, together with forest tent caterpillar, which caused the defoliation in these two places. Trace numbers were reported by OMNR on

the south shore of Rousseau Lake in the Port Carling area of Watt Township. In Minden District, small numbers were found on open-growing scrub oak (*Quercus* spp.) at Gull Lake in Lutterworth Township, Crystal Lake in Galway Township and Mississauga Lake in Harvey Township. In Bancroft District, small numbers were encountered on oak along Stony Lake in Burleigh Township and throughout most of Methuen Township. Defoliation levels of approximately 5% were found on sugar maple (*Acer saccharum* Marsh.) near Calabogie in Blithfield Township, and in oak stands east of Muskrat Lake in Westmeath Township and at Mountain Hill in Griffith Township.

In cooperation with OMNR Parks staff, the burlap trapping program was conducted again in 1988 at 22 provincial campgrounds in the region. At each campground, 10 burlap traps were set out in late May and routinely examined by Parks staff for the presence of larvae until mid-July. For the first time, larvae were recovered from Lake St. Peter and Silent Lake provincial parks in Bancroft District and from Killbear Provincial Park in Parry Sound District. The complete results of this trapping survey are presented in Table 1.

In conjunction with the burlap trapping program, pheromone traps were set out at each of the 22 campgrounds. Two traps were set out at each campground, one at the main entrance to the park, and one in the campgrounds in which the burlap traps were located. The numbers of male moths trapped at all the campgrounds in Algonquin Park decreased significantly, whereas the numbers trapped at the remaining parks were very similar to those of 1987. The complete results of this survey are presented in Table 1.

Burlap traps were also set out at one location at the Petawawa National Forestry Institute (PNFI). The 10 traps were placed on Lombardy poplar (*Populus nigra* var. *italica* Muenchh.) at a public beach and for a second year, three larvae were recovered. Four pheromone traps were set out at PNFI and 57 male moths were captured, a number similar to that of 1987. At the Canadian Armed Forces Base at Petawawa, 14 pheromone traps were deployed, 10 of the regular sticky traps and four of the newer Multi-pher traps. Nine of the 10 sticky traps were recovered, and 152 moths were trapped. Again, the catch was very similar to that of 1987. The four Multi-pher traps were recovered and 597 moths were captured. This type of trap uses a pail to collect the moths. Unlike the smaller, sticky trap, it does not become saturated after capturing 15-20 moths.

An egg-mass survey was conducted in late September at four locations in Minden District that were known to harbor populations of gypsy moth. Because of the severe defoliation caused by the forest tent caterpillar, however, the exact level of damage attributable to gypsy moth could not be determined. Therefore, egg-mass counts were conducted according to the line-search method. Three lines, each 160 m long, were examined at each location. Only trace population levels were found at all but one of these locations. In a rocky, open-growing red oak stand at the dam on Mississauga Lake in Harvey Township, 32 egg masses (on average) were detected along each line. The locations of the line searches are given and the results are summarized in Table 2.

Table 1. Results of larval burlap trapping and adult pheromone trapping of gypsy moth at 22 camp-grounds in the Algonquin Region (counts based on 10 burlap traps and two pheromone traps set out at each location) (concl.)

Location (Park)	Burlap trapping					Pheromone trapping				
	Positive (+) or negative (-)					Total number of male				
	trapping of larvae					moths trapped				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
<u>Parry Sound District</u>										
Grundy Lake	-	-	-	-	-	1	0	24	9	6
Killbear	-	-	-	-	-	1	2	37	29 <sup>b</sup>	27
Oastler Lake	-	-	-	-	-	0	1	14	23 <sup>b</sup>	32
Sturgeon Bay	a	-	-	-	-	a	0	19	18	30
<u>Pembroke District</u>										
Bonnechere	-	+	+	+	+	2 <sup>b</sup>	39 <sup>b</sup>	22 <sup>b</sup>	22 <sup>b</sup>	33
Carson Lake	-	-	-	+	+	4 <sup>b</sup>	21 <sup>b</sup>	40	43	30

<sup>a</sup> no trapping at campground in 1984

<sup>b</sup> one pheromone trap missing at each location

<sup>c</sup> two pheromone traps missing at each location

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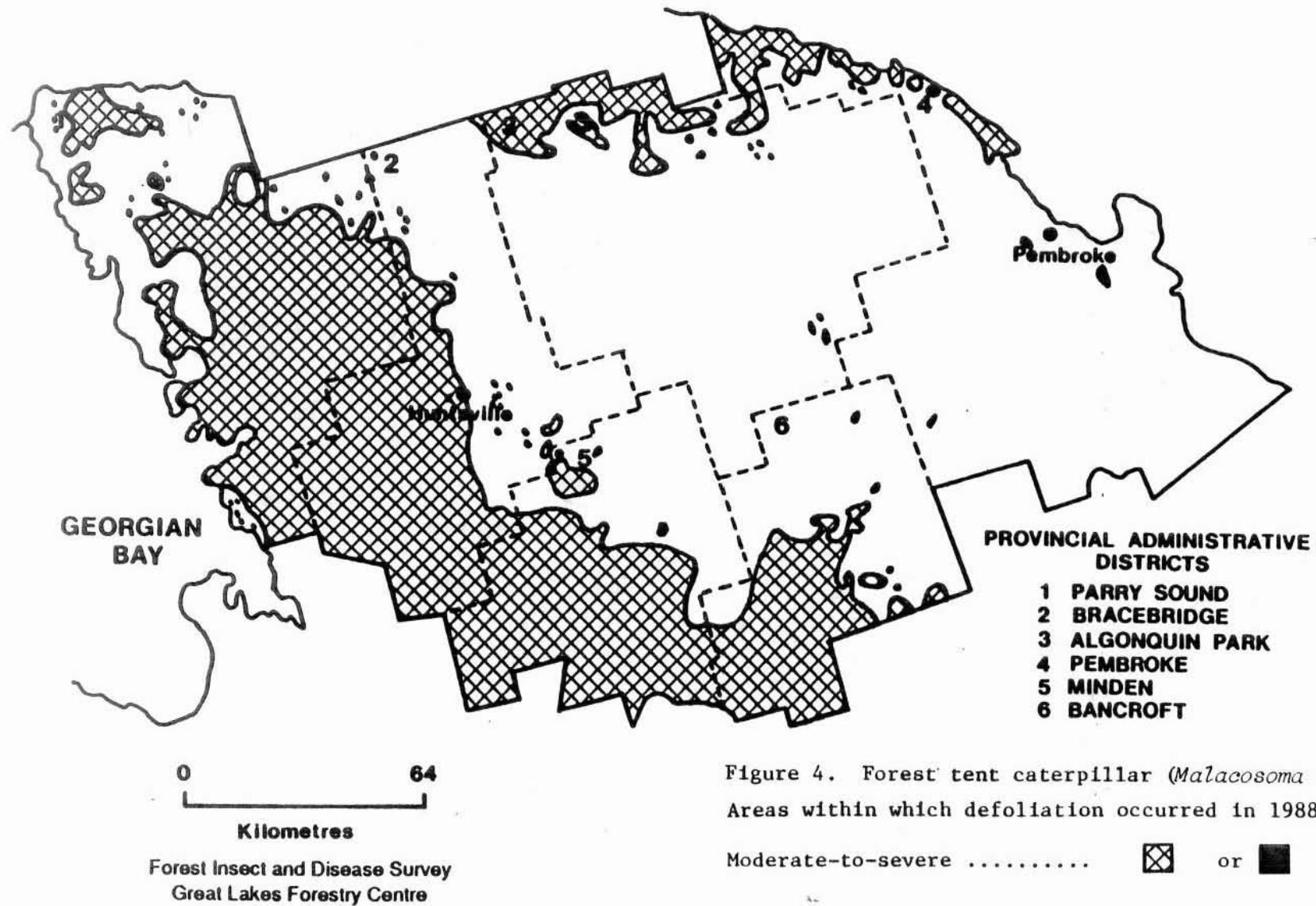
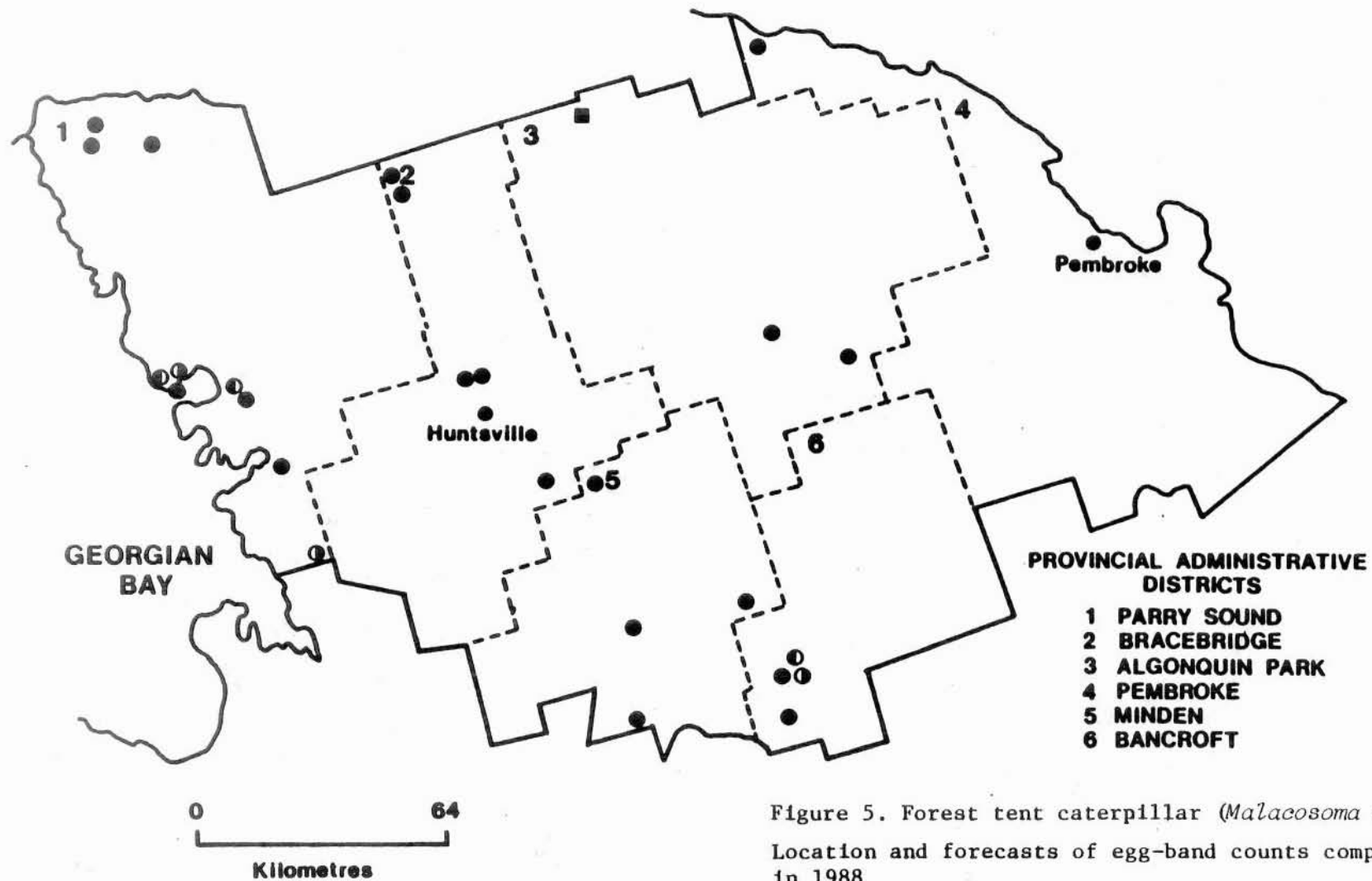


Figure 4. Forest tent caterpillar (*Malacosoma disstria* Hbn.)  
Areas within which defoliation occurred in 1988

# ALGONQUIN REGION



Forest Insect and Disease Survey  
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Figure 5. Forest tent caterpillar (*Malacosoma disstria* Hbn.)

Location and forecasts of egg-band counts completed  
in 1988

Nil ..... ■  
Light ..... ○  
Moderate ..... ◐  
Severe ..... ●

Table 3. Forest tent caterpillar egg band counts at 19 locations in the Algonquin Region (concl.)

Location (Twp)	Host <sup>a</sup>	Avg DBH (cm)	No. of trees examined	Avg no. of egg bands per tree	Infestation forecasts for 1989 <sup>b</sup>
<u>Parry Sound District</u>					
Blair	tA	14.0	1	24	S
Conger	rO	16.5	1	13	S
Gibson	sM	12.5	3	5	M
Carling					
Killbear Prov. Pk	sM	18.5	3	6	M
	rO	28.5	10 <sup>c</sup>	1	S
	sM	18.0	3	3	L
Foley					
Oastler Lake Prov. Pk	sM	15.0	15 <sup>c</sup>	1	L
	cPo	21.0	1	29	S
Movat					
Grundy Lake Prov. Pk	tA	17.0	1	48	S
	tA	15.0	1	92	S
<u>Pembroke District</u>					
Clara	tA	15.0	1	55	S

<sup>a</sup> tA = trembling aspen, sM = sugar maple, rO = red oak, cPo = Carolina poplar

<sup>b</sup> N = nil, L = light, M = moderate, S = severe

<sup>c</sup> two branches sampled from upper crown of each tree at these locations

OMNR in Parry Sound District attempted to control this pest by applying the Lecontvirus but, because of the extreme heat in July, the larvae developed very quickly and were beyond the optimum stage at which they could be effectively controlled by the virus spray.

Additional information on this pest is presented later in this report under Special Surveys, in the Red Pine Plantation Survey.

#### Bruce Spanworm, *Operophtera bruceata* (Hlst.)

There was an almost total collapse in the population levels of this insect in 1988. Only two small pockets of defoliation could be detected from the air. One area of approximately 300 ha was located in the southwestern corner of Finlayson Township in Algonquin Park District, and the other of approximately 20 ha was in the southeastern corner of Radcliffe Township in Pembroke District (Fig. 6). The outbreak started in 1985 and continued for four consecutive years, one year longer than a normal outbreak period. The last outbreak occurred in 1973 and lasted until 1976. Infestations occur approximately every 10 to 12 years.

In the areas defoliated in 1987, large numbers of male moths were observed in the late fall of that year, an indication that defoliation would be heavy in 1988. However, early spring surveys showed that although a large number of larvae hatched and fed for approximately two weeks, they died from exposure to a naturally occurring polyhedrosis virus, as is usual when Bruce spanworm infestations collapse.

#### Minor Insects

##### Eastern Tent Caterpillar, *Malacosoma americanum* (F.)

Population levels of epidemic proportions caused up to 100% defoliation of open-growing pin cherry (*Prunus pensylvanica* L.f.), choke cherry (*P. virginiana* L.), red oak, bur oak (*Quercus macrocarpa* Michx.), and hawthorn (*Crataegus* spp.) across the entire central and southern portions of the Algonquin Region.

Especially hard-hit were areas along Hwy 169 from the village of Bala to the town of Gravenhurst, along Muskoka County Road 13 in Wood Township in Bracebridge District, and along hwy 36 and 507 in Harvey and Cavendish townships in Minden District. Similar damage occurred along Hwy 28 from the village of Burleigh Falls to the town of Bancroft in Bancroft District.

In many totally stripped areas accurate defoliation levels could not be estimated because of the severe defoliation caused by the present outbreak of forest tent caterpillar.

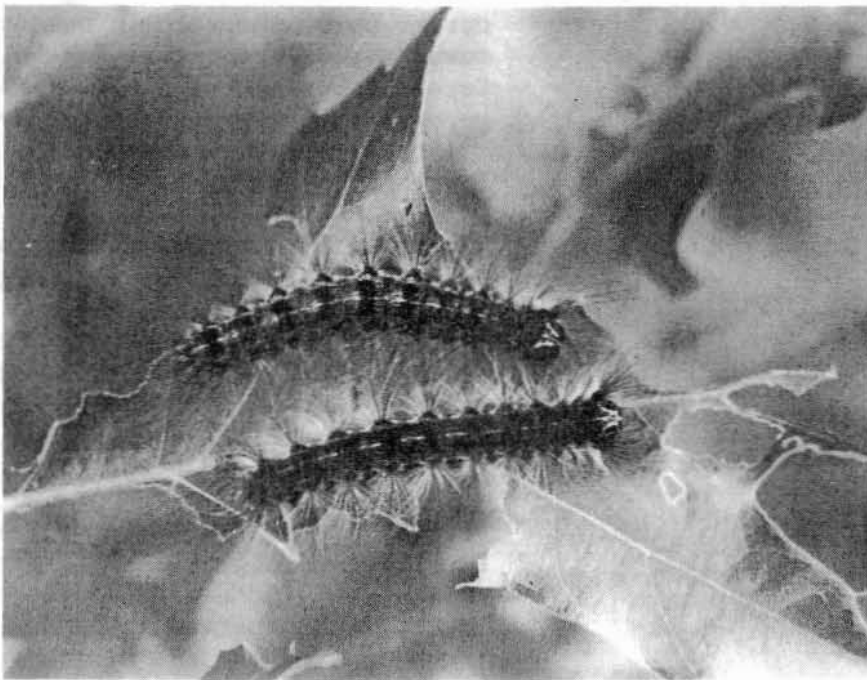
Table 5. Other forest insects

Insect	Host(s)	Remarks
<i>Adelges abietis</i> (L.) Eastern spruce gall adelgid	wS	Roadside trees 7 m tall south of Maple Island in Craft Twp, Parry Sound District were found to have 10% of their branches infested.
<i>Aphrophora saratogensis</i> (Fitch) Saratoga spittlebug	rP	20% branch mortality recorded in 0.5-ha areas of plantations in Hagarty, Fraser and Ross twps, Pembroke District
<i>Diprion similis</i> (Htg.) Introduced pine sawfly	wP	trace numbers detected in a 5-ha seed orchard in Snowdon Twp, Minden District
<i>Eucosma gloriola</i> Heinr. Eastern pine shoot borer	rP	3% of the 8-m-tall trees in a 6.5-ha plantation infested in Wicklow Twp, Bancroft District
<i>Exotelia pinifoliella</i> (Cham.) Pine needleminer	jP	Along a 0.5-km section of Hwy 69 at the Pickerel River in Mowat Twp, Parry Sound District, 30% of the 5-m-tall trees had 25% of the old foliage damaged.
<i>Penusa pusilla</i> (Lep.) Birch leafminer	wB	Moderate-to-severe browning was recorded on ornamentals in numerous towns across the entire region. Severe browning was also recorded on several roadside trees along Hwy 11 at Burk's Falls in Armour Twp, Bracebridge District.
<i>Macrohaltica populi</i> (Brown) Poplar flea beetle	bPo	Along Hwy 60 from the village of Madawaska in Murchison Twp, Algonquin Park District to the town of Barry's Bay in Sherwood Twp, Pembroke District 25% foliar damage was common. A 5% foliar damage level was observed along hwy 62 and 28 at the south end of Bancroft District.
<i>Neodiprion abietis</i> complex Balsam fir sawfly	bF	Populations continued to decrease in Pembroke and Algonquin Park districts. Foliar damage levels of 5 to 15% were observed on roadside trees in Stafford and Horton twps, Pembroke District, and in Murchison, Sproule and Dickens twps, Algonquin Park District.

(cont'd)



Webmasses of the pine false webworm (*Acantholyda erythrocephala* [L.])



Mature gypsy moth larva (*Lymantria dispar* L.)

## TREE DISEASES

### Major Diseases

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

This root rot, which affects both hardwoods and softwoods, is frequently encountered throughout the region. Mortality rates of 2 to 3% are common in young pine plantations, as was the case this season in an 8-ha red pine plantation in Dungannon Township, Bancroft District. A standard 150-tree evaluation revealed a mortality rate of 2% in six-year-old, 1.5-m-tall trees. A similar mortality rate was recorded in a seven-year-old, 20-ha red pine plantation in McMurrich Township, Parry Sound District.

Additional information on this root rot is presented later in this report under Special Surveys, in the Red Pine Plantation Survey.

#### Scleroderris Canker, *Ascochyta abietina* (Lagerb.) Schlöpfer-Bernhard

A special survey is conducted annually across the entire region for any evidence of either the native or the European race of this disease. The European race is more virulent than the native and is capable of killing mature or semimature trees in a single growing season, whereas the native race usually kills only a single internode on a branch of a sapling-sized tree. In 1988, 76 pine plantations were evaluated, and a minimum of 500 trees examined at each site (Fig. 7). Serological testing confirmed the existence of six infection centers of the European race and one of the native race. Two of the six sites on which the European race was found were plantations that had been confirmed in previous years, while the remaining four were first-time records. However, all areas were very close to previously confirmed sites. The data collected from the plantation survey are presented in Table 6.

In Mayo Township, Bancroft District, the sample in which the European race was confirmed was collected in a seven-year-old, 2-ha red pine plantation that had been sanitized in 1986. In Parry Sound District, a positive sample was again collected from a red pine plantation in McMurrich Township. This 13-year-old, 4-ha plantation was first found to be infected in 1986; however, it was confirmed in 1988 that no control or sanitation program had been conducted at the site. At present, 27% of the trees are severely affected, and the current mortality rate is 1%.

The four new sites were found in two plantations in each of McMurrich and Ryerson townships, Parry Sound District. In McMurrich Township, a 13-year-old, 2-ha red pine plantation bordering the above-mentioned unsanitized plantation was found to have 25% of its trees severely affected, but no mortality was recorded. The second red pine plantation is five lots northwest of an infection center detected in 1987. It was estimated that 2% of the six-year-old red pine in the 4-ha plantation were severely affected, but once again no mortality was recorded. In Ryerson Township, the first site was detected one lot south

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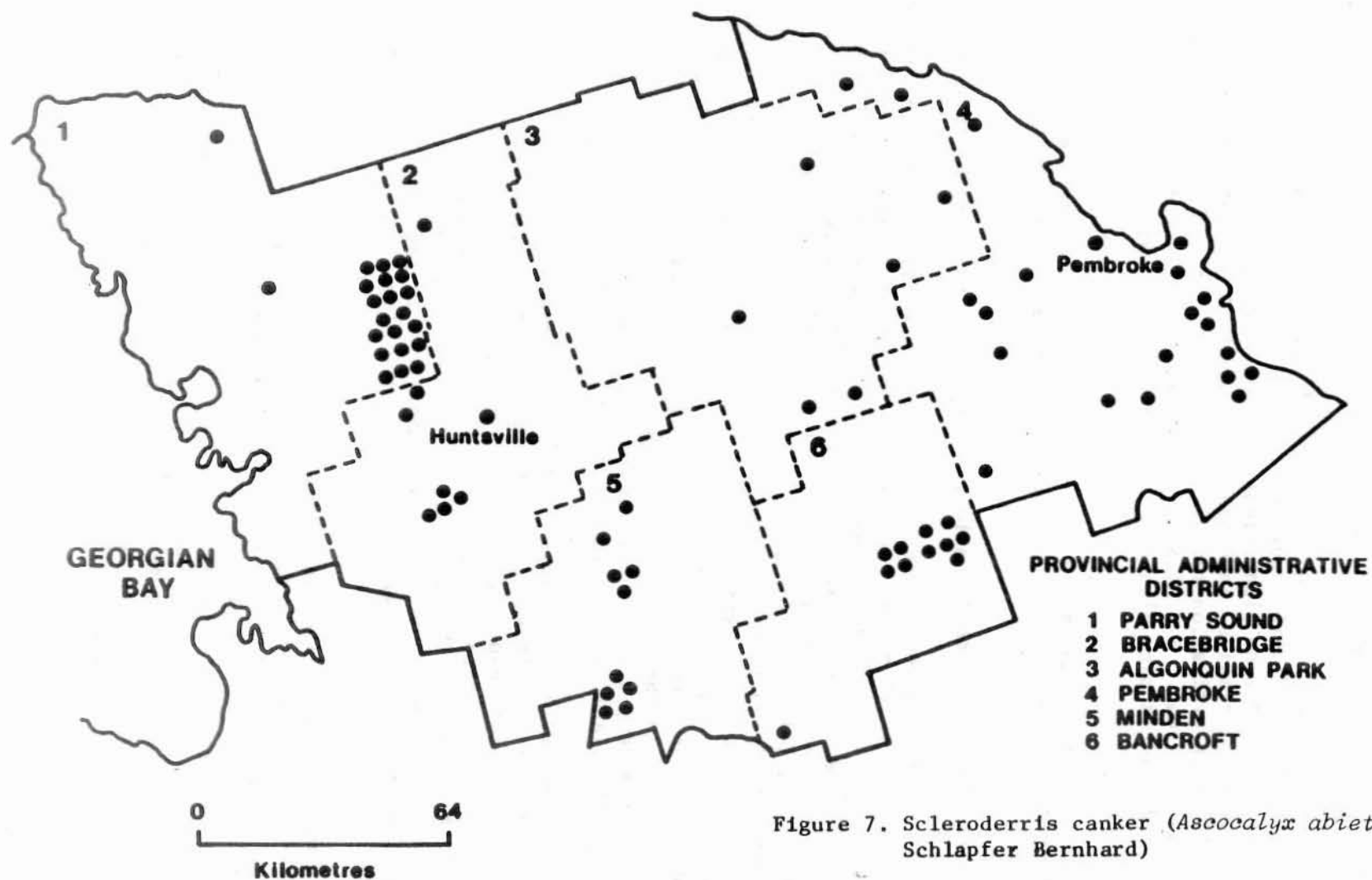


Figure 7. Scleroderris canker (*Ascochyta blight* [Lagerb.]  
Schlapfer Bernhard)

Locations in which pine plantations were  
examined in 1988 .....

Table 6. Results of a special survey for Scleroderris canker at 76 locations in Algonquin Region in 1988 (counts based on the examination of 500+ red pine trees at each location).

Location (Twp)	Tree ht (m)	Total trees per ha	Total area examined (ha)	Trees affected (%)	Trees dead (%)
<u>Algonquin Park District</u>					
Lyell	6.5	2,200	8	0	0
Sproule	21.0	1,600	1	0	0
Sabine	7.0	2,500	4	0	0
Guthrie	8.8	1,200	10	0	0
White	4.5	2,500	4	0	0
Stratton	4.5	2,400	1	0	0
<u>Bancroft District</u>					
Burleigh	7.5	1,300	2	0	0
Mayo	0.5	2,500	2	2 <sup>a</sup>	2
	1.0	2,500	4	0	0
	9.0	2,200	6	0	0
	17.0	1,800	8	0	0
	6.0	2,300	40	0	0
	7.0	1,600	6	0	0
Dungannon	7.0	2,500	3	0	0
	1.5	2,500	6	0	0
	2.5	2,500	2	0	0
	1.5	2,200	8	0	0
<u>Bracebridge District</u>					
Macaulay	0.8	2,000	1	0	0
	0.4	2,000	1	0	0
	4.0	2,100	2	0	0
	4.0	2,300	5	0	0
Strong	20.0	1,000	3	0	0
Stisted	11.0	1,700	3	0	0
	5.0	2,000	4	0	0
<u>Minden District</u>					
Stanhope	1.6	2,200	8	0	0
	1.7	2,200	3	0	0

(cont'd)

Table 6. Results of a special survey for Scleroderris canker at 76 locations in Algonquin Region in 1988 (counts based on the examination of 500+ red pine trees at each location) (cont'd).

Location (Twp)	Tree ht (m)	Total trees per ha	Total area examined (ha)	Trees affected (%)	Trees dead (%)
<u>Minden District (concl.)</u>					
Somerville	16.0	1,500	10	0	0
	16.0	1,400	16	0	0
	9.0	1,600	10	0	0
	18.0	1,200	3	0	0
	17.0	1,300	10	0	0
Minden	9.0	2,300	2	0	0
	9.0	2,300	3	0	0
	11.0	2,000	4	0	0
<u>Parry Sound District</u>					
Hagerman	12.0	2,100	4	0	0
McConkey	2.0	2,300	2	0	0
McMurrich	9.0	2,200	1	0	0
	1.2	2,100	4	0	0
	0.9	2,100	3	0	0
	0.9	2,200	4	0	0
	3.6	2,000	3	1 <sup>a</sup>	0
	10.0	1,500	2	0	0
	12.0	2,100	1	0	0
	3.0	2,000	4	27 <sup>b</sup>	1
	3.0	2,000	2	25 <sup>b</sup>	0
	2.0	2,200	10	0	0
	1.0	2,100	4	1 <sup>c</sup>	1
Ryerson	5.0	2,000	2	39 <sup>b</sup>	0
	2.0	2,000	10	0	0
	8.0	2,200	1	0	0
	8.0 <sup>d</sup>	2,300	3	0	0
	9.0 <sup>d</sup>	1,700	4	0	0
	1.0 <sup>d</sup>	1,900	4	0	0
	1.0 <sup>d</sup>	2,200	1	0	0
	2.0 <sup>d</sup>	2,100	8	0	0
	0.7	2,300	1	2 <sup>c</sup>	0

(cont'd)

Table 6. Results of a special survey for Scleroderris canker at 76 locations in Algonquin Region in 1988 (counts based on the examination of 500+ red pine trees at each location) (concl.)

Location (Twp)	Tree ht (m)	Total trees per ha	Total area examined (ha)	Trees affected (%)	Trees dead (%)
<u>Pembroke District</u>					
Head	1.8	2,200	20	0	0
Richards	2.5	2,500	3	0	0
	5.3	2,000	8	0	0
Bromley	11.0	1,800	2	0	0
Ross	1.0	2,500	20	0	0
	3.0	2,500	2	0	0
	4.7	2,500	2	0	0
Horton	12.0	2,200	4	0	0
	9.0	2,500	4	0	0
	10.6	2,200	2	0	0
	14.6	1,600	2	0	0
Grattan	12.0	2,000	5	0	0
Westmeath	6.3	2,500	6	0	0
	5.0	1,800	1	0	0
Sebastopol	5.7	2,500	10	0	0
Hagarty	4.5	1,700	8	0	0
Fraser	7.0	2,200	3	0	0
Raglan	6.2	2,200	4	0	0
Maria	5.0	2,500	4	0	0
Rolph	10.0	2,500	2	0	0

- a positive identification of the North American race of Scleroderris canker  
b samples being tested for race identification  
c positive identification of the European race of Scleroderris canker  
d Scots pine examined at these locations

of the first red pine plantation in which the disease was confirmed in 1987. Evaluation revealed that 2% of the six-year-old red pine in the 2-ha plantation were affected, but there was no mortality. At the fourth and final site, three lots north of the initial site, 39% of the 16-year-old, 2-ha red pine plantation was severely affected, but no mortality was detected. As there was no mortality in evidence at any of these sites, it is possible that each is a very recent infection center (Fig. 8).

Control operations have already been conducted at the location in Mayo Township and at one of the new sites in McMurrich Township. In both areas the red pine were young (sapling size, <1 m tall), and OMNR staff simply pulled out the infected trees and burned them on site. The site confirmed in Ryerson Township in 1987, the Neilson property, was completely sanitized early in the spring of 1988. Heavily infected or dead trees were cut and burned and the lower uninfected branches of the remaining trees were pruned and also burned.

## ALGONQUIN REGION

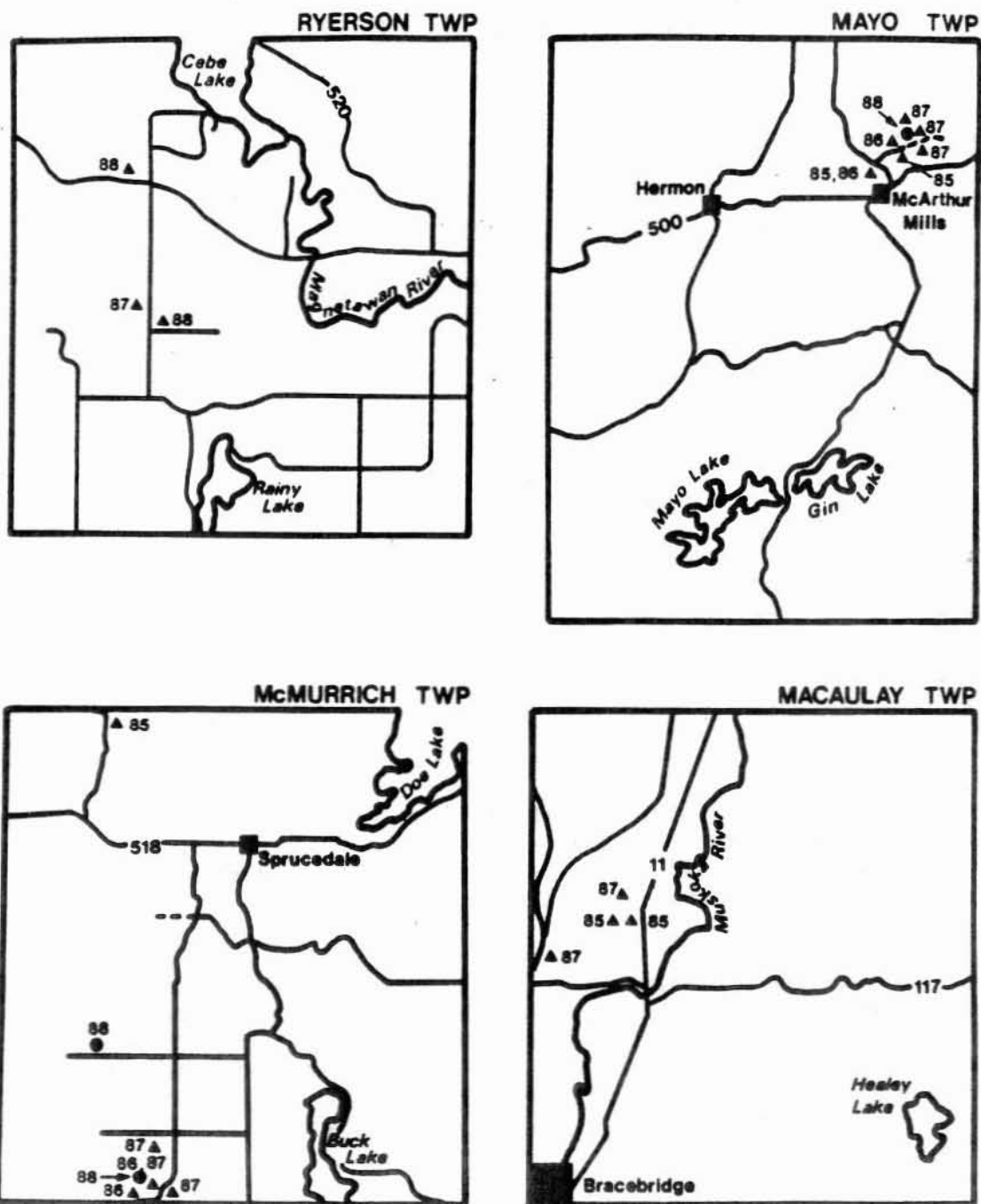


Figure 8. Scleroderris canker (*Ascochyta abietina* [Lagerb.] Schlapfer Bernhard)

Locations of confirmed sites of the European race of Scleroderris canker in Ryerson and McMurrich townships, Parry Sound District, Mayo Township, Bancroft District, and Macaulay Township, Bracebridge District

Table 7. Other forest diseases

Disease	Host(s)	Remarks
<i>Coleosporium asterum</i> (Dietel) Sydow Pine needle rust	rP	10% defoliation of 2-m trees in a 10-ha plantation in Hagarty Twp, and 2% defoliation of 0.5-m trees in a 4-ha plantation in Griffith Twp, Pembroke District
<i>Eutypella parasitica</i> Davidson & Lorenz Eutypella canker	sM	Two of the 25 semimature trees on the maple plot were cankered at Killbear Prov. Pk in Carling Twp, Parry Sound District.
<i>Lophodermium</i> sp. A needle cast	rP	30% of the 2-m trees infected in a 9.7-ha plantation in Wicklow Twp, Bancroft District, and in a 3.6-ha plantation of similar height in Airy Twp, Algonquin Park District
<i>Phellinus igniarius</i> (L.:Fr.) Quélet White trunk rot	rO	found on one of the 100 tagged trees in the oak decline plot at the Resource Centre, Macaulay Twp, Bracebridge District
<i>Phyllosticta minima</i> (Berk. & Curt.) Underw. & Earle Leaf spot	rM	30% infection rate detected on host trees on the ARNEWS plot in Mowat Twp, and a similar rate in a 10-ha area along Hwy 520 south of Maple Island in Croft Twp, Parry Sound District
<i>Sphaeropsis sapinea</i> (Fr.) Dyko & B. Sutton Tip blight	ScP AusP	20% infection rate on 4-m roadside trees in Somerville and Lutterworth twps and on 3-m trees along Hwy 121 in Dysart Twp, Minden District

## DIEBACKS AND DECLINES

## Maple Decline

The 20 sugar maple impact plots established in 1987 to rate and monitor crown conditions in maple stands were retallied in 1988. A standard crown dieback classification system was used to evaluate the 25 dominant or codominant trees on each plot. In 1987, 352 trees (70.4%) were considered very healthy (< 5% current dieback), and only 18 trees (3.6%) were determined to have a high level (>25%) of current dieback. In 1988, 374 trees (74.8%) were considered healthy and only 25 trees (5.0%) had a high level of current dieback. In 1987, 122 trees (24.4%) were considered healthy on the basis of total dieback, and 201 trees (40.2%) were considered to have >25% of the crown dead. In 1988, 99 trees (19.8%) were healthy, and 218 trees (43.6%) had >25% total dieback; of the latter, only two trees had >40% total dieback. Therefore, it can be concluded that very little change in crown conditions has occurred on the 20 plots during the first two years of monitoring (Table 8).

Defoliation was recorded on 70% of the plots. The forest tent caterpillar was found causing from 5 to 90% defoliation on 50% of the plots and the Bruce spanworm was recorded causing from 10 to 40% defoliation on 25% of the plots. Wood-boring insects were recorded infesting the stems of 2.8% of the trees on 40% of the plots and stem decay or stem cankers were recorded on 19.4% of the trees on 45% of the plots. Abiotic damage, such as frost, was found on 1.4% of the trees on 10% of the plots.

Table 8. Summary of data collected from 20 semipermanent sugar maple plots established in the Algonquin Region to monitor crown conditions (counts based on the examination of 25 host trees at each location).

Location (Twp)	Avg DBH (cm)	Year	Dieback Classes <sup>a</sup>											
			Current					Total						
			0	1	2	3	4	5	0	1	2	3	4	5
<u>Algonquin Park District</u>														
Deacon	32.5	1987	14	11	0	0	0	0	0	3	18	4	0	0
		1988	23	1	0	1	0	0	0	3	16	6	0	0
Murchison	41.0	1987	17	8	0	0	0	0	0	9	16	6	0	0
		1988	18	7	0	0	0	0	0	9	16	0	0	0
Peck	36.3	1987	15	10	0	0	0	0	0	4	17	4	0	0
		1988	21	4	0	0	0	0	0	5	16	4	0	0
<u>Bancroft District</u>														
Bangor	44.9	1987	13	12	0	0	0	0	0	6	13	6	0	0
		1988	23	2	0	0	0	0	0	6	13	6	0	0
Cardiff	32.3	1987	11	12	2	0	0	0	0	3	13	9	0	0
		1988	22	3	0	0	0	0	0	3	15	7	0	0

(cont'd)

Table 8. Summary of data collected from 20 semipermanent sugar maple plots established in the Algonquin Region to monitor crown conditions (counts based on the examination of 25 host trees at each location) (concl.).

Location (Twp)	Avg DBH (cm)	Year	Dieback Classes <sup>a</sup>											
			Current							Total				
			0	1	2	3	4	5	0	1	2	3	4	5
<u>Bancroft District (concl.)</u>														
Limerick	31.8	1987	21	4	0	0	0	0	0	6	16	3	0	0
		1988	24	1	0	0	0	0	0	6	16	3	0	0
<u>Bracebridge District</u>														
Chaffey	31.6	1987	24	0	0	1	0	0	14	10	0	0	1	0
		1988	21	3	1	0	0	0	11	12	1	0	1	0
Machar	34.4	1987	24	1	0	0	0	0	12	11	2	0	0	0
		1988	19	5	1	0	0	0	9	13	3	0	0	0
Stisted	29.9	1987	16	9	0	0	0	0	10	15	0	0	0	0
		1988	4	10	9	2	0	0	2	12	9	2	0	0
Wood	31.3	1987	24	1	0	0	0	0	17	7	1	0	0	0
		1988	17	5	3	0	0	0	14	8	3	0	0	0
<u>Minden District</u>														
Hindon	35.9	1987	24	4	0	0	0	0	9	16	0	0	0	0
		1988	13	11	1	0	0	0	7	17	1	0	0	0
Minden	41.0	1987	6	11	5	3	0	0	5	12	5	3	0	0
		1988	20	4	1	0	0	0	5	15	4	1	0	0
Monmouth	30.4	1987	21	4	0	0	0	0	12	11	2	0	0	0
		1988	14	8	3	0	0	0	9	12	4	0	0	0
<u>Pembroke District</u>														
Richard	40.5	1987	16	9	0	0	0	0	0	10	15	0	0	0
		1988	22	3	0	0	0	0	0	7	17	1	0	0
Ross	43.5	1987	13	12	0	0	0	0	0	12	13	0	0	0
		1988	18	7	0	0	0	0	0	11	14	0	0	0
Sebastopol	40.2	1987	18	7	0	0	0	0	0	15	9	1	0	0
		1988	22	3	0	0	0	0	0	15	9	1	0	0
Wylie	37.0	1987	23	2	0	0	0	0	0	5	17	3	0	0
		1988	15	9	1	0	0	0	0	4	14	7	0	0
<u>Parry Sound District</u>														
Carling	30.6	1987	25	0	0	0	0	0	25	0	0	0	0	0
		1988	24	1	0	0	0	0	24	1	0	0	0	0
Christie	31.7	1987	8	10	7	0	0	0	3	14	7	1	0	0
		1988	12	11	2	0	0	0	2	16	6	1	0	0
Gibson	27.1	1987	22	3	0	0	0	0	15	8	2	0	0	0
		1988	22	3	0	0	0	0	16	8	1	0	0	0

<sup>a</sup> Dieback classes: 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61%+, 5 = dead tree

## North American Sugar Maple Decline Project (NASMDP)

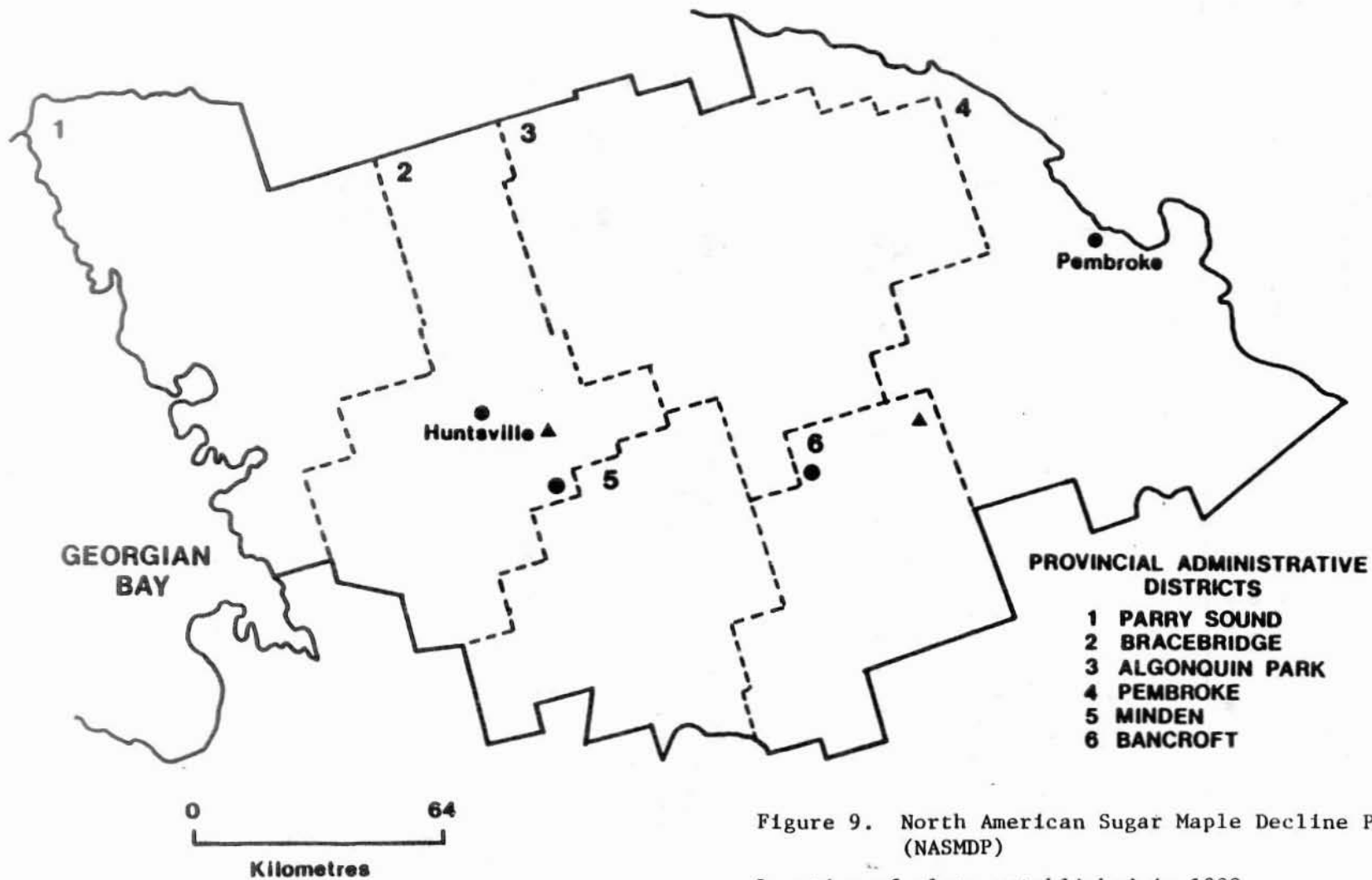
As part of a continuing effort to determine if maple decline is a problem in Ontario's forests, Forestry Canada has entered into a cooperative agreement with the United States Forest Service to study the extent and causes of decline in northeastern North America. The objectives of the agreement are: 1) to determine the rate of change in sugar maple tree-condition ratings from 1988 through 1990; 2) to determine if the rate of change in sugar maple tree-condition ratings is different between: a) various levels of pollution measured as wet deposition, b) sugarbush and undisturbed forest, and c) various levels of initial stand decline conditions; 3) to determine the possible causes of sugar maple decline and the geographical relationship between causes and extent of decline. In an attempt to meet these objectives, the two partners in the agreement have established 103 plots in the northeastern United States and 62 in northeastern Canada.

In Ontario, the responsibility for establishing and monitoring these plots was given to the Forest Insect and Disease Survey Unit (FIDS) at the Great Lakes Forestry Centre. In 1988, 24 plots were established, four in the Northeastern Region, four in the Algonquin Region, three in the Eastern Region, six in the Central Region and seven in the South-western Region. The plots are paired in each deposition zone, one in a sugar maple bush that is being tapped for maple syrup production, and the other in an undisturbed stand.

In the Algonquin Region, one plot was established in each of Ridout and Franklin townships in Bracebridge District and Cardiff and Wicklow townships in Bancroft District (Fig. 9). At each sample point, a cluster of five plots, each 20 m<sup>2</sup>, at least 20 m apart and 20 m from any stand opening or edge, was set in place. A complete site and stand description was provided for each of the five plots in the cluster. The following data were recorded for all sugar maple trees on the plots: DBH, crown position and vigor, number of current and old tapping holes, stem defects, percentage of crown dieback, foliage density, leaf discoloration, leaf dwarfing and epicormic shoots. Increment cores were also collected to determine stand age and to evaluate sugar maple growth patterns before the plots were established.

The crown evaluations revealed that most of the trees were very healthy. In the undisturbed stand in Cardiff Township only 16.0% of the trees had more than 15% dieback in the crown, and in the sugar bush in Wicklow Township that was being tapped, 24.5% of the trees had >15% dieback. In Ridout Township, in the undisturbed stand, 16.4% of the trees had >15% dieback and the figure dropped to only 9.1% in the stand that was being tapped in Franklin Township. Results of the crown evaluations are presented in Table 9. At each location, conditions such as stem wounds caused by various agents, dead branch stubs, and sweep or crook were also recorded. Table 10 presents data on three agents that may cause large, open wounds: the sugar maple borer (*Glycobius speciosus* [Say]), *Eutypella* canker (*Eutypella parasitica* Davidson & Lorenz) and frost cracks longer than 1 m. These open wounds often serve as an entrance court for other diseases that may add to a decline problem.

# ALGONQUIN REGION



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Figure 9. North American Sugar Maple Decline Project (NASMDP)

Location of plots established in 1988

Tapped sugar maple stand ..... ▲

Undisturbed sugar maple stand .... ●

Table 9. Summary of sugar maple crown conditions recorded in four North American Sugar Maple Decline Project (NASMDP) plots established in the Algonquin Region in 1988.

Location (Twp)	Avg DBH (cm)	Total no. of trees	Total no. of trees per dieback class <sup>a</sup>											
			00	05	10	20	30	40	50	60	70	80	90	99
<u>Bancroft District</u>														
Cardiff	20.2	94	1	54	24	11	2	1	0	0	0	0	1	0
Wicklow	37.1	53	0	13	27	11	2	1	0	0	0	0	0	0
<u>Bracebridge District</u>														
Ridout	25.4	61	0	36	15	5	2	1	0	0	0	0	0	2
Franklin	32.3	44	0	32	8	3	1	0	0	0	0	0	0	0

<sup>a</sup> Dieback classes: 00 = 0%, 05 = 1-5%, 10 = 6-15%, 20 = 16-25%, 30 = 26-35%, 40 = 36-45%, 50 = 46-55%, 60 = 56-65%, 70 = 66-75%, 80 = 76-85%, 90 = 86-95%, 99 = 95-100%

Table 10. Summary of data on stem wounds recorded in four North American Sugar Maple Decline Project (NASMDP) plots established in the Algonquin Region in 1988.

Location (Twp)	Avg DBH (cm)	Total no. of trees	Stem wounds		
			Sugar maple borer (%)	Eutypella canker (%)	Frost crack >1 m long (%)
<u>Bancroft District</u>					
Cardiff	20.2	94	6.4	5.3	20.2
Wicklow	37.1	53	24.5	0.0	35.8
<u>Bracebridge District</u>					
Ridout	25.4	61	34.4	3.3	32.8
Franklin	32.3	44	22.7	2.3	45.5

## Red Oak Decline

Three red oak decline plots in the region are monitored annually to record crown conditions of 100 tagged trees at each site. A standard classification system is employed to record the current dieback and cumulative dieback levels in each crown. In 1987, significant crown deterioration occurred throughout the plot in Macaulay Township in Bracebridge District. This was the result of late frosts in the spring of 1987 followed by severe defoliation by the forest tent caterpillar. The evaluation in 1988 showed a marked decrease in the number of trees with current dieback: only 13% of the trees had more than 20% current dieback in comparison with 33% in 1987. The 1988 level of dieback was the same as that recorded in the three years previous to 1987, although severe defoliation by the forest tent caterpillar has occurred now for two consecutive years. However, no damaging late spring frosts were recorded in 1988.

Two plots are located in Pembroke District, one each in Alice and Wylie townships. The only significant change occurred in Alice Township, where three additional oak trees on the plot died. Death was attributed to Armillaria root rot. The data from this survey are summarized and presented in Table 11.

Table 11. Results of the evaluation of data collected from three semipermanent plots established in the Algonquin Region in 1977 to monitor red oak decline (data based on the examination of 100 host trees at each location).

Location (Twp)	Avg DBH of sample trees (m)	Stand size (ha)	Year	Dieback class <sup>a</sup>											
				Current						Cumulative					
				0	1	2	3	4	5	0	1	2	3	4	5
<u>Bracebridge District</u>															
Macaulay <sup>b</sup>	35	5	1984	69	21	4	0	0	6	2	44	34	11	3	6
			1985	71	17	3	2	1	6	2	39	36	12	5	6
			1986	79	11	0	2	0	8	5	48	32	8	2	8
			1987	22	45	22	3	0	8	2	41	37	10	2	8
			1988	38	49	4	0	1	8	2	58	25	4	3	8
<u>Pembroke District</u>															
Alice <sup>c</sup>	18	4	1984	51	46	0	0	0	3	0	0	41	54	2	3
			1985	95	1	1	0	0	3	0	0	41	54	2	3
			1986	96	1	0	0	0	3	0	0	42	51	4	3
			1987	81	12	0	0	0	3	0	2	43	45	3	3
			1988	85	4	1	0	2	6	0	2	40	44	4	6
Wylie	25	3	1984	72	25	0	0	0	3	0	0	27	66	4	3
			1985	93	2	0	0	0	5	0	0	23	69	2	5
			1986	89	6	0	0	0	5	0	0	24	70	1	5
			1987	89	6	0	0	0	5	0	0	27	66	2	5
			1988	93	1	0	0	0	6	0	0	27	64	3	6

<sup>a</sup> Dieback classification: 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61%+, 5 = dead tree

<sup>b</sup> Forest tent caterpillar feeding resulted in 100% defoliation of the oak on this plot in 1987 and 1988.

<sup>c</sup> Only 96 host trees were tallied; four trees were cut down and removed in 1987.

## ABIOTIC DAMAGE

### Blowdown

On several occasions during the summer of 1988 severe thunderstorms, accompanied by high winds, caused numerous areas of blowdown in the region. Damage in some cases covered large areas while in others it was limited to scattered individual trees, often ornamentals.

On 5 August tornado-force winds struck a forested area southwest of the village of Maynooth in Monteagle Township, Bancroft District. Approximately 1,449 ha of mixed forest in one continuous strip were flattened by this storm. The same storm caused 252 ha of blowdown in the northeastern corner of Carlow Township in Bancroft District, and 2 ha of blowdown in a pocket in Radcliffe Township in Pembroke District. As this storm moved northeastward across the region, numerous single trees fell in its path. At PNFI in Wylie and Buchanan townships, some 630 ha were severely damaged.

Two areas of continuous damage, both approximately 10 ha in size, were detected from the air in late August: one in the southwestern corner of Oakley Township, Bracebridge District, and the other in the northwestern corner of Longford Township, Minden District. In the immediate vicinity of these two areas, numerous single trees were blown down in a much larger (approx. 20-30 ha) area.

At the junction of hwy 118 and 169 in Medora Township, Bracebridge District, more than 75% of the trees were blown over in a 5-ha area. This area consisted of mixed hardwoods and softwoods, with more softwoods being blown over than hardwoods. Numerous single trees that had been blown down were seen in the Kinmount area of Somerville Township and along the Hindon access road in Hindon Township in Minden District. This type of damage was also commonly encountered across the entire northern end of Bancroft District (Fig. 10).

### Drought

For the second consecutive year drought has been a major problem in many areas in the region. The summer of 1988 was reported as the hottest in recent years. In addition to extremely high temperatures, a below-normal precipitation level was recorded throughout the region. This prolonged condition of high temperatures and low moisture has a significant effect on numerous tree species. Drought injury is generally difficult to diagnose, with weakened trees often being affected by secondary factors such as insects and diseases. Such injury may appear very quickly or may take two to three years to become evident. Younger trees are more seriously affected than older trees that have deeper, well established root systems. In hardwoods, leaf discoloration and premature leaf fall are commonly seen in drought years. Crown dieback, in varying amounts, is also a direct result of drought, occurring either in the same year or during the following two or three years. Depending on the extent of the dieback, whole-tree mortality is often experienced as well.

# ALGONQUIN REGION

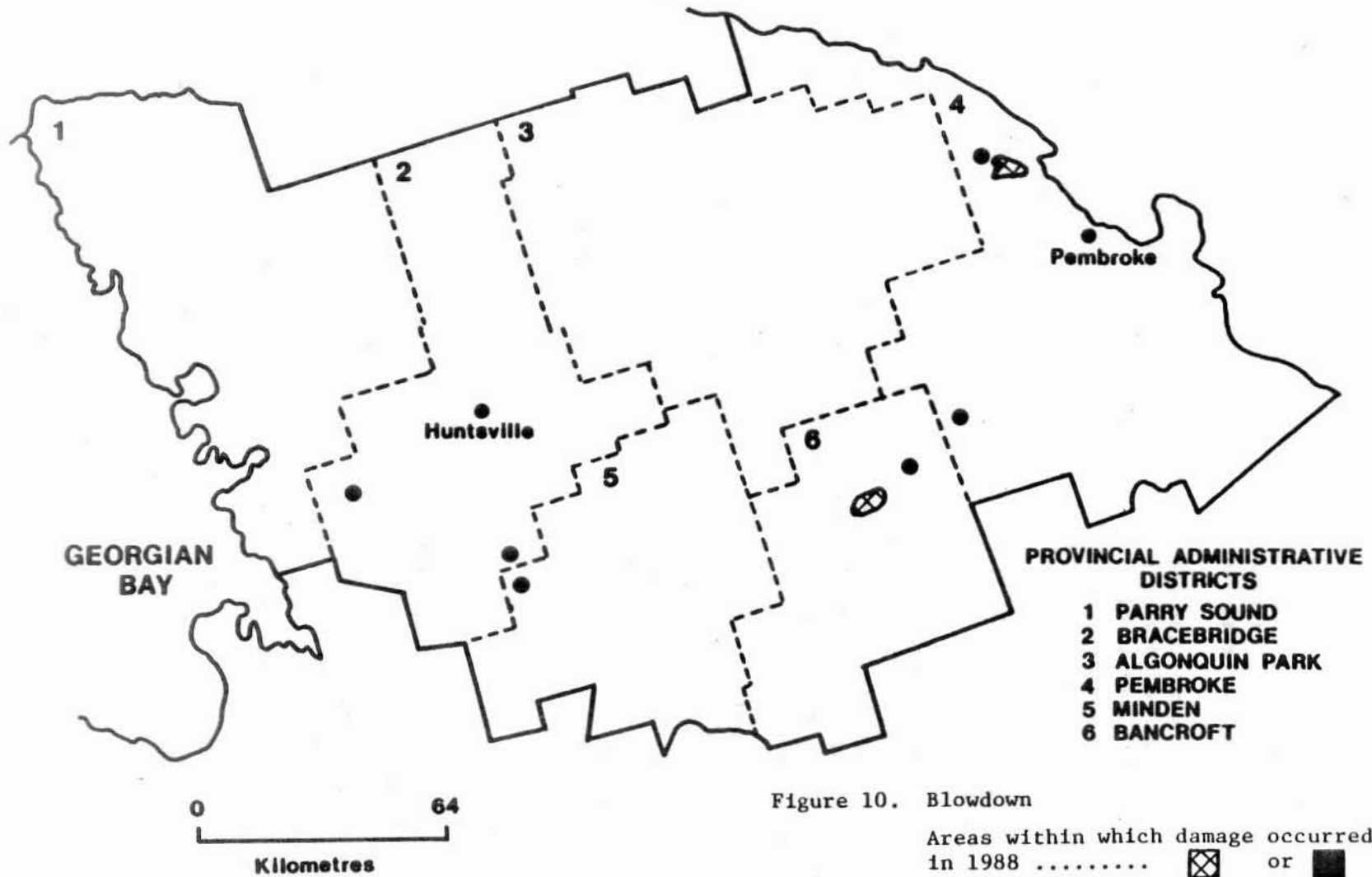


Figure 10. Blowdown

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In 1988 some 141,632 ha of forested land were aerially sketch-mapped in the region, and showed discoloration typical of drought damage. Primarily hardwoods were affected, often only on hilltops or southwest-facing slopes. The shallow-soil areas throughout the Muskoka Lakes portion of Bracebridge District were severely affected. The majority of the damage occurred throughout Bracebridge District, where some 60,792 ha were mapped. Parry Sound sustained 36,088 ha, Minden District 24,649 ha, Bancroft District 20,126 ha, Algonquin Park District 708 ha and Pembroke District 162 ha of damage (Fig. 11).

Much of the area affected by drought was also severely defoliated by the forest tent caterpillar. The stress effect of either of these conditions is severe enough to cause diebacks and whole-tree mortality. In years when both factors occur simultaneously the result is often devastating, with whole-tree mortality occurring over large areas. This condition was recorded in 1977 and 1978 in Parry Sound and Owen Sound districts in the Southwestern Region. The extent of damage to hardwood stands may not be known for the next year or two, but the condition will be monitored.

#### Hail

On 5 August, hailstones and damaging winds severely defoliated 5,292 ha. The damage occurred in many scattered pockets on western exposures and hilltops across Herschel, Monteagle, Wicklow and Carlow townships in the northwestern corner of Bancroft District (Fig. 12). The area damaged consisted of mostly hardwoods, sugar maple and beech (*Fagus grandifolia* Ehrh.), but other species were also affected.

A hailstorm that occurred on 8 June 1987 caused 3,440 ha of severe defoliation, starting in the southeastern corner of Algonquin Park District and proceeding in an almost continuous line to the city of Pembroke in Pembroke District (Fig. 12). An aerial survey of this area revealed mortality ranging from whole-tree mortality to severe branch mortality over 2,583 ha. The area affected contained primarily trembling aspen (*Populus tremuloides* Michx.) and largetooth aspen (*Populus grandidentata* Michx.) trees in eastern Pembroke District and white pine (*Pinus strobus* L.) trees in western Algonquin Park District. A salvage cut was started in 1988 to utilize the killed white pine.

# ALGONQUIN REGION

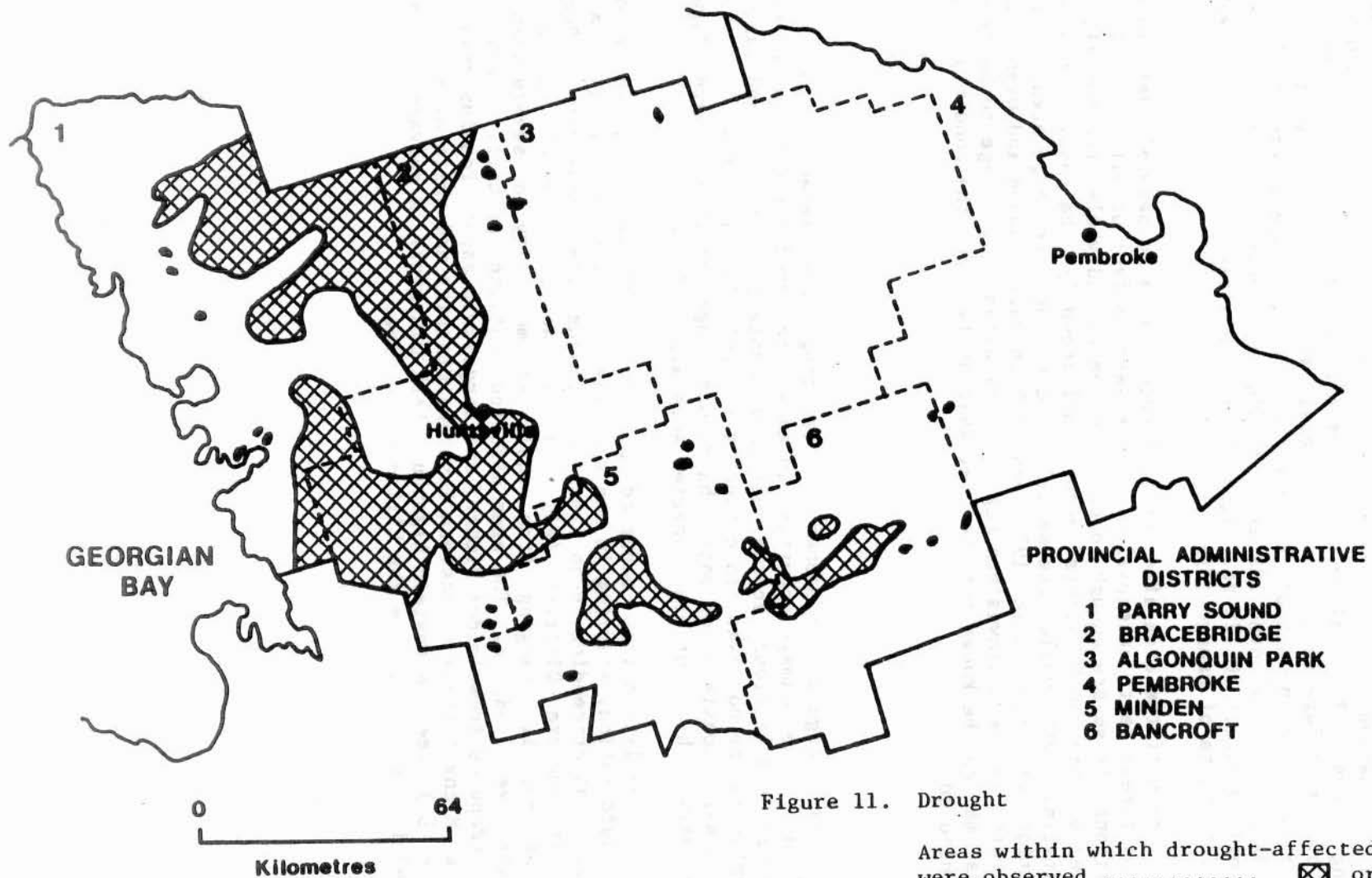


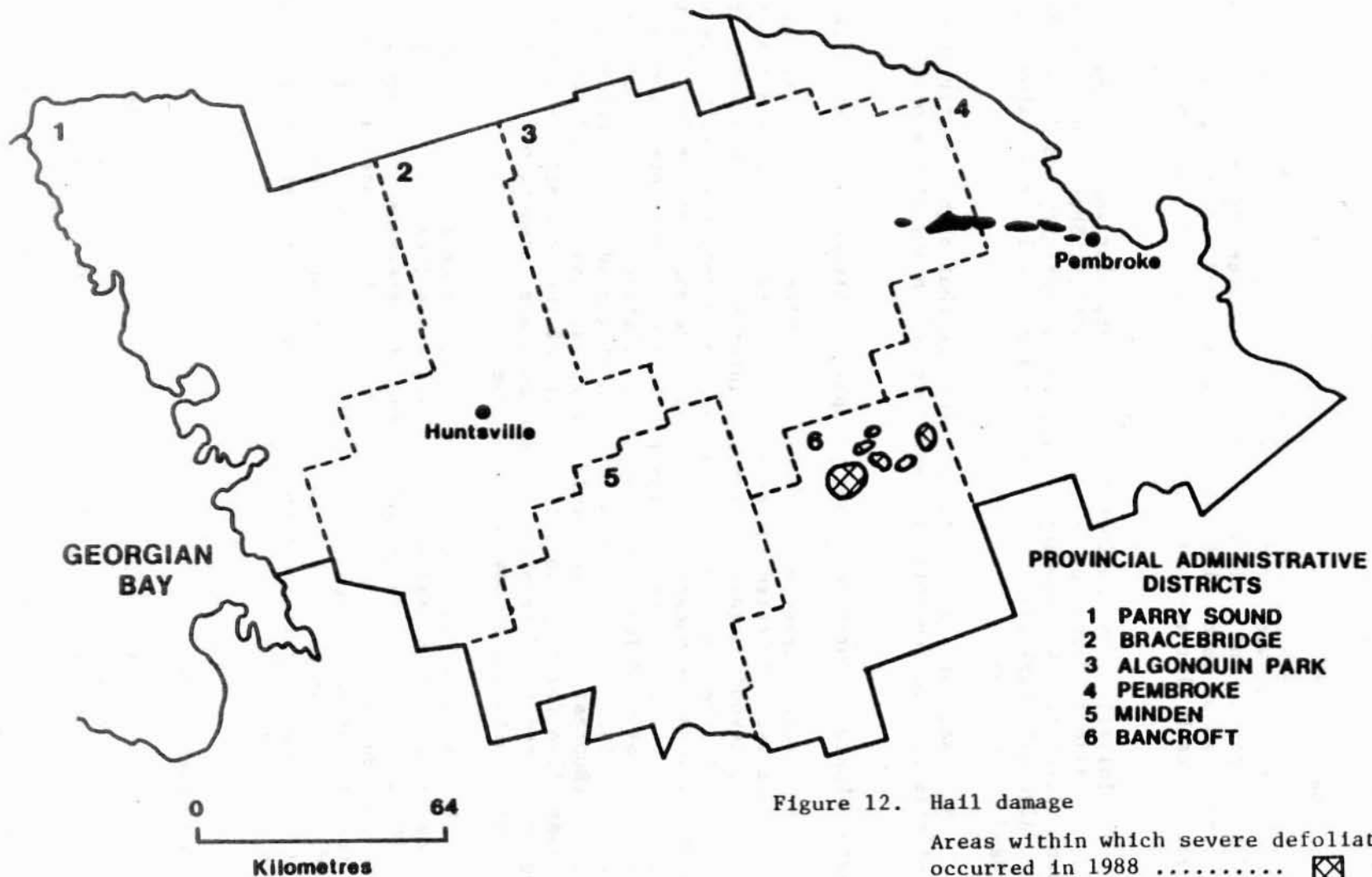


Figure 11. Drought

Areas within which drought-affected hardwoods were observed .....  or 

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# ALGONQUIN REGION



Forest Insect and Disease Survey  
Great Lakes Forestry Centre

Figure 12. Hail damage

Areas within which severe defoliation occurred in 1988 .....



Areas within which branch or total tree mortality occurred (caused by 1987 hail damage) .....



## SPECIAL SURVEYS

### Acid Rain National Early Warning System (ARNEWS)

The six ARNEWS plots in the region were evaluated for a specific list of prescribed conditions as set out in the national plot procedure manual. Each tree was rated for overall vigor, crown condition, insect or disease pests and acid rain symptoms. Three regeneration subplots were retallied on each plot and the established list of ground plants present on each plot was reviewed for any changes in the type or number of plants.

Defoliation by the forest tent caterpillar was detected in the plots in Ridout Township, Bracebridge District, Sherbourne Township, Minden District, Mowat Township, Parry Sound District and Sproule Township, Algonquin Park District. Defoliation on all of the above plots averaged 10% or less.

No damage or discoloration of foliage that might be attributed to the effects of acid precipitation was observed on any of the plots.

### Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer) Nickle

A special survey was conducted in which adult bark beetles and wood borers were collected to determine if these insects were transmitting the pinewood nematode from an infested to an uninfested tree. Often, trees that are under stress from nematode activity are also attacked by these secondary pests. Adult pine engraver beetles (*Ips pini* [Say]) were collected from red pine plantation thinning operations at one location in Stisted Township, Bracebridge District, and two locations in Somerville Township, Minden District. A single adult, ventrally spotted buprestid (*Buprestis maculativentris* Say) was also collected from one of the Somerville Township locations. All of the collections are still being processed to determine if nematodes are present on the adult's body; the results are unknown at this time.

To date, it has been confirmed that some form of the pinewood nematode is present in dead or dying trees at 16 locations in the region. In 1988, all areas were ground checked to determine if there was any whole-tree mortality or additional symptoms of nematode activity. No evidence of current damage could be found. At the majority of the confirmed sites, samples were taken from trees under severe stress as a result of some other factor such as flooding, severe defoliation or bark beetle activity.

### Red Pine Cone Survey

Every year a special collection of cones of a specific conifer species is made to determine the percentage of cones damaged, subsequent seed loss, and the pests responsible. In 1988, 100 randomly selected red pine cones were collected from the total length of the conebearing section of the crowns of eight trees at two separate locations in the region.

The first collection was made in a semimature red pine plantation in Head Township, Pembroke District. In all, 18 of the 100 cones were damaged by insects, and the seed loss was estimated at 64% in the damaged cones. The insect pests responsible for the damage, in order of the percentage of seed loss attributed to each, are: the red pine cone borer (*Eucosma monitorana* Heinr.), unknown insects, unknown Lepidopterous insects, and unknown *Dioryctria* spp.

The second collection was taken in a semimature red pine plantation in Somerville Township, Minden District. At this location, 59 of the 100 cones were damaged, and the seed loss was estimated at 79% in the damaged cones. The insect pests responsible, in order of the percentage of seed loss attributed to each, are: the red pine cone borer, unknown Lepidopterous insects, unknown insects, the red pine cone beetle (*Conophthorus resinosae* Hopk.), the fir coneworm (*Dioryctria abietivorella* [Grt.]) and an unidentified midge (*Resseliella* sp.)

#### Red Pine Plantation Survey

The 1988 high-value plantation survey was conducted in 12 randomly selected red pine plantations. At each plantation, a standard 150-tree evaluation was conducted for a specific list of insects and diseases in mid-June and again in mid-August. Tables 12(a) and (b) summarize the data collected on the pests that were found to be affecting the trees during this survey (see also Fig. 13).

During the first visit, the only insect pest encountered was the pine root collar weevil (*Hyllobius radialis* Buch.), which was affecting 1% of the trees at one location. Pine needle rust (*Coleosporium asterum* [Dietel] Sydow) was detected at three locations, affecting from 2 to 33% of the trees. Scleroderris canker (the European race) was found affecting 1% of the trees at a single location. Pests not found during this visit included the European pine sawfly (*Neodiprion sertifer* [Geoff.]) and the black root stain disease (*Verticicladiella procera* Kendrick).

During the second visit, the redheaded pine sawfly was found in five of the plantations, infesting 1 to 9% of the trees. The pine false webworm was encountered at five plantations, infesting 4 to 68% of the trees. The European pine shoot moth (*Rhyacionia buoliana* [D. & S.]) was found at six locations, infesting 1 to 21% of the trees. Armillaria root rot was detected in only one plantation, affecting 3% of the trees. Stand openings were recorded in five plantations, and current mortality ranging from 1 to 3% was recorded at three locations. In Sabine Township, Algonquin Park District, suppression by other trees caused 1% mortality and in Wicklow Township, 2% mortality resulted from snow damage. In McMurrich Township, Parry Sound District, 3% mortality was caused by Armillaria root rot. A needle cast disease (*Lophodermium pinastri* [Schrader:Fr.] Chev.) was searched for, but not found in the survey.

Table 12(a) Summary of the results of a red pine plantation survey conducted at 12 randomly selected locations in the Algonquin Region in 1988 (counts based on the examination of 150 trees at each location).

Location (Twp)	Estimated area of stand (ha)	Estimated no. of trees per ha	Avg ht of trees (m)	Redheaded pine sawfly		Pine false webworm		European pine shoot moth		Root collar weevil
				Infested trees (%)	Avg no. of colonies per tree	Infested trees (%)	Avg defoliation per tree (%)	Leaders attacked (%)	Laterals only attacked (%)	Infested trees (%)
<u>Algonquin Park District</u>										
Sabine	61.0	2,000	13.6	0	0	0	0	0	0	0
Airy	4.0	2,000	1.7	1	1	0	0	0	3	0
<u>Bancroft District</u>										
Wicklow	7.0	2,300	8.0	0	0	0	0	0	0	0
Wicklow	10.0	2,300	2.4	0	0	34	7	1	21	0
<u>Bracebridge District</u>										
Macaulay	6.0	2,300	4.4	5	1	0	0	0	0	0
<u>Minden District</u>										
Harburn	8.0	2,200	2.6	9	2	68	6	0	1	0
Stanhope	3.0	2,200	1.9	0	0	4	1	0	5	0
Somerville	4.0	1,200	10.0	0	0	0	0	0	0	0
<u>Parry Sound District</u>										
McMurrich	4.0	2,100	1.0	1	1	8	5	1	13	1
Hagerman	3.0	2,000	11.0	0	0	0	0	0	0	0
<u>Pembroke District</u>										
Ross	9.0	2,400	3.0	0	0	0	0	0	0	0
Horton	10.0	2,500	1.5	1	2	31	5	0	2	0

(cont'd)

Table 12(b). Summary of the results of a red pine plantation survey conducted at 12 randomly selected locations in the Algonquin Region in 1988 (counts based on the examination of 150 trees at each location).

Location (Twp)	Estimated area of stand (ha)	estimated no. of trees per ha	Avg ht of trees (m)	No. of stand openings	Needle rust		Scleroderris Canker		Armillaria root rot	Current mortality (%)
					Trees affected (%)	Avg defoliation (%)	Trees affected (%)	Stem cankered (%)	Trees affected	
<u>Algonquin Park District</u>										
Sabine	61.0	2,000	13.6	0	0	0	0	0	0	1
Airy	4.0	2,000	1.7	0	0	0	0	0	0	0
<u>Bancroft District</u>										
Wicklow	7.0	2,300	8.0	0	0	0	0	0	0	2
Wicklow	10.0	2,300	2.4	0	0	0	0	0	0	0
<u>Bracebridge District</u>										
Macaulay	6.0	2,300	4.4	3	7	1	0	0	0	0
<u>Minden District</u>										
Harburn	8.0	2,200	2.6	8	33	1	0	0	0	0
Stanhope	3.0	2,200	1.9	11	0	0	0	0	0	0
Somerville	4.0	1,200	10.0	3	0	0	0	0	0	0
<u>Parry Sound District</u>										
McMurrich	4.0	2,100	1.0	17	2	10	1	0	3	3
Hagerman	3.0	2,000	11.0	0	0	0	0	0	0	0
<u>Pembroke District</u>										
Ross	9.0	2,400	3.0	0	0	0	0	0	0	0
Horton	10.0	2,500	1.5	0	0	0	0	0	0	0

# ALGONQUIN REGION

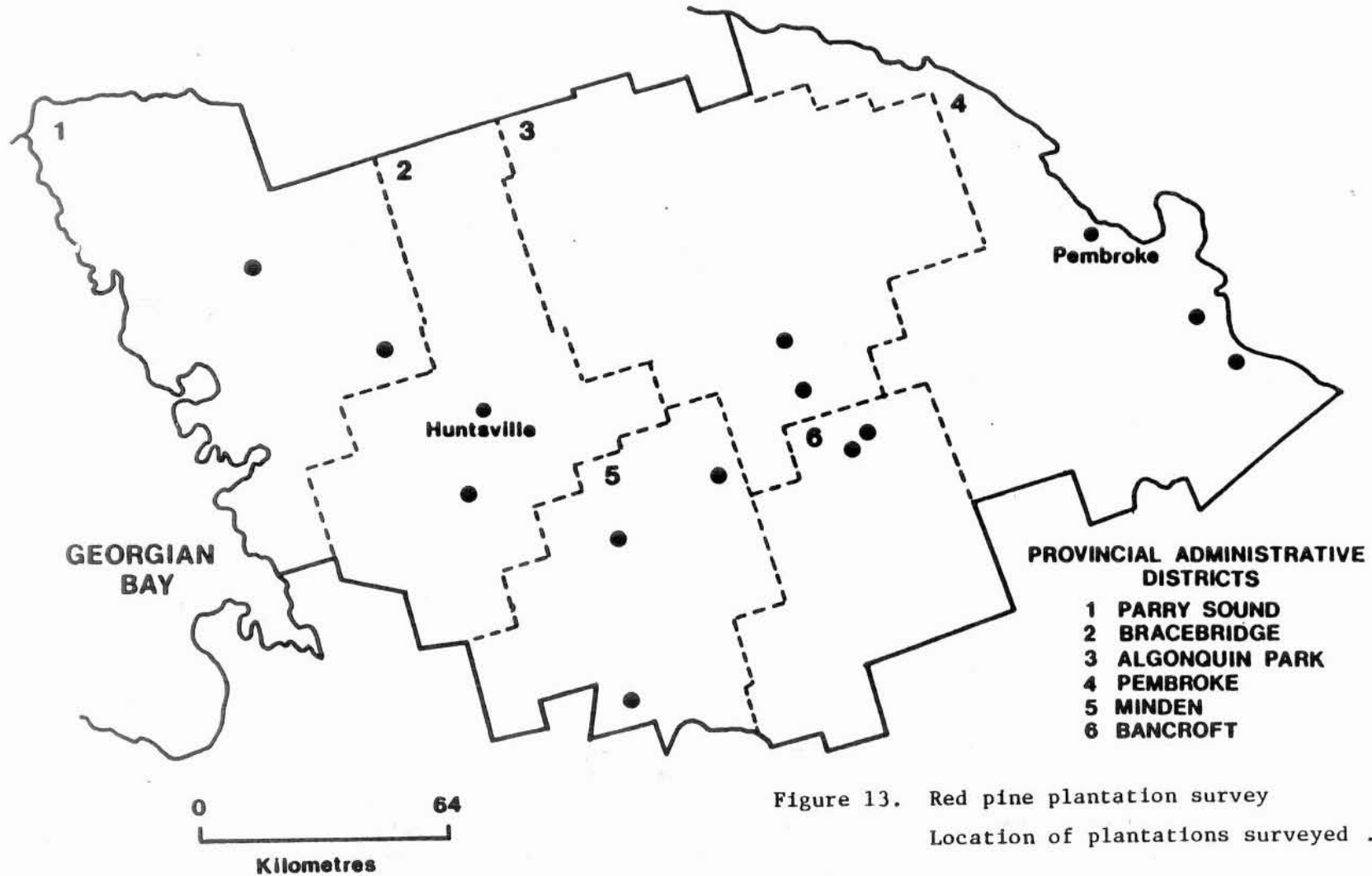


Figure 13. Red pine plantation survey

Location of plantations surveyed .....●

The red pine sawfly (*Neodiprion nanulus nanulus* Schedl.) was not on the specific list of pests to evaluate; however, it was encountered at three locations, causing 1 to 2% defoliation on 2 to 7% of the trees. The European pine needle midge (*Contarinia baeri* [Prell]) was also detected at six locations, infesting 3 to 92% of the trees and causing 1 to 2% defoliation.

Special surveys were conducted in red pine plantations in the region in 1979, 1982, and 1985. The results in 1988 were very similar to those of the previous three surveys. The redheaded pine sawfly, the pine false webworm and the European pine shoot moth were detected in previous surveys but slightly higher numbers were recorded in 1988. The European pine sawfly was not recovered during any of these surveys. Armillaria root rot is usually recovered at a low level from a couple of the plantations, as are needle rust and needle cast diseases. The black root stain disease was not recovered in any of the surveys.

#### Light Trap

Every year a light trap is operated at PNFI near Chalk River in Pembroke District.

In 1988 it was operated every night from 13 June to 1 August, primarily to monitor the annual flight of the spruce budworm moth. In all, 428 spruce budworm moths were captured in comparison with 0 in 1987. The first spruce budworm moths were captured on 30 June and the flight period peaked from 7 July to 11 July, when 364 moths were captured.

In addition to spruce budworm moths, the light traps captured forest tent caterpillar moths--26,903 in 1988, in comparison with 3,211 in 1987. This explosion in numbers indicates that trees in the Chalk River area may experience severe defoliation in 1989.

#### Climatic Data

Seasonal variations in the normal weather patterns have a direct effect on both biotic and abiotic conditions. Sudden and extreme changes in weather have a significant effect on forest pest problems, and the droughts experienced in 1988 will affect the growth and vigor of numerous tree species. Monitoring daily weather conditions permits the accurate prediction of the emergence of overwintering larvae. For these reasons, the FIDS Unit maintains daily and monthly averages of weather conditions on file for numerous locations across the province. Table 13 summarizes the weather data for 1988 (January to December) provided by two Atmospheric Environment Service weather offices in the Algonquin Region. The normals quoted were taken directly from the Canadian Climate Normals for Ontario, 1951-1980.

Table 13. Summary of climatic data for the 12-month period, January to December 1987, for two locations in the Algonquin Region.

Location	Month	Mean temperature		Total precipitation	
		Actual (°C)	Normal (°C)	Actual (mm)	Normal (mm)
<u>Bracebridge District</u>					
Muskoka Airport	Jan.	-9.5	-10.4	113.1	85.9
	Feb.	-11.1	-9.4	107.9	62.4
	Mar.	-4.8	-3.8	46.5	66.3
	Apr.	+4.8	+4.5	92.4	73.3
	May	+12.2	+10.9	62.6	77.8
	June	+15.2	+15.9	65.0	81.9
	July	+20.4	+18.3	121.4	77.5
	Aug.	+18.6	+17.4	97.0	89.0
	Sept.	+12.9	+13.2	94.9	102.4
	Oct.	+5.1	+7.5	142.2	93.9
	Nov.	+2.8	-1.1	106.2	101.0
	Dec.	-7.2	-7.1	97.3	97.8
<u>Pembroke District</u>					
Petawawa Weather Station	Jan.	-10.5	-12.8	48.4	46.7
	Feb.	-12.0	-11.2	52.6	51.0
	Mar.	-5.5	-4.6	42.2	50.5
	Apr.	+4.8	+4.2	88.0	59.6
	May	+13.7	+11.5	40.0	60.0
	June	+15.7	+16.3	63.6	87.5
	July	+21.3	+18.7	78.0	84.5
	Aug.	+18.9	+17.6	101.9	79.8
	Sept.	+12.3	+12.6	54.5	83.1
	Oct.	+4.9	+7.1	109.0	66.7
	Nov.	+2.2	-0.1	72.1	65.8
	Dec.	-10.1	-9.7	31.8	64.8