1986

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RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE ALGONQUIN REGION OF ONTARIO, 1985

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

R.J. SAJAN and B.E. SMITH

GREAT LAKES FORESTRY CENTRE

CANADIAN FORESTRY SERVICE

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SURVEY HIGHLIGHTS

This report deals with the more important insect and disease conditions detected during aerial and ground surveys throughout the Algonquin Region of Ontario in 1985.

The gypsy moth was found causing 90 ha of moderate-to-severe defoliation along the southern portion of the Pembroke District, and 240 ha of light-to-severe defoliation, in scattered pockets across the southern portion of the Bancroft District. The area of moderate-to-severe defoliation caused by the jack pine budworm increased to some 54,034 ha in the northwestern portion of the Parry Sound District and the forest tent caterpillar defoliated approximately 1,006 ha in the north central area of the same district. The area within which defoliation was caused by the jack pine sawfly increased in the Pembroke District and the Bruce spanworm and redheaded pine sawfly increased in numbers at numerous scattered locations across the Region. The spruce budworm continues to decline, being only detected at low levels along scattered creek beds in the northern portions of the Bracebridge and Algonquin Park districts.

Three red pine plantations were found affected with the European race of Scleroderris canker, one in each of McMurrich Township, Parry Sound District, Macaulay Township, Bracebridge District, and Mayo Township, Bancroft District. At each location the affected trees were cut and burned in an attempt to control the spread of the disease. As part of a special survey, the pinewood nematode was detected in a pocket of dead red pine trees in Buchanan Township, Pembroke District. Three new acid rain national early warning system plots (ARNEWS) were located in the Region, bringing the total number to five.

Special surveys included two visits to 11 randomly selected red pine plantations, the oak decline plots were again tallied and a collection of 100 semimature red pine cones was taken to determine the various pests affecting the green cones. In all, 35 stands were sampled for the pinewood nematode.

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

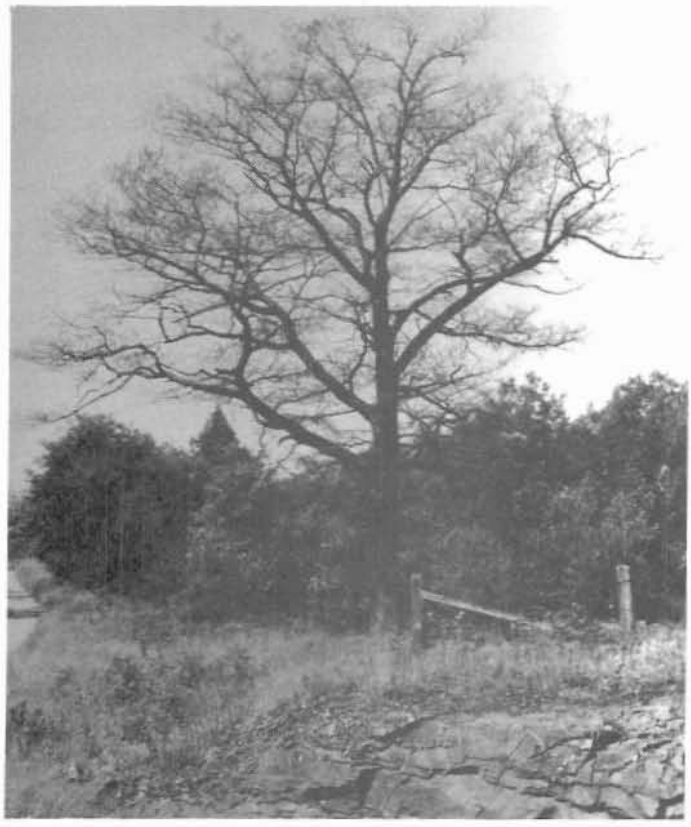
Major Insects or Diseases

capable of causing serious injury to or death of living trees or shrubs

Minor Insects or Diseases

capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs

Frontispiece



Defoliation of a red oak (*Quercus rubra* L.) by gypsy moth, *Lymantria dispar* (L.)

Cutting and burning of a red pine (*Pinus resinosa* Ait.) plantation in Bracebridge District to control the spread of the European race of Scleroderris canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pest:

1) those which are of minor importance and have not been known to cause serious damage to forest trees,

2) those which are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage in 1985.

The authors would like to express their appreciation to the personnel of the various Ontario Ministry of Natural Resources district and regional offices, wood-using industries and private individuals for their excellent cooperation during the 1985 field season.

R.J. Sajan

B.E. Smith

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INSECTS

Major Insects

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

The pine false webworm was detected at a damaging level in a red pine (*Pinus resinosa* Ait.) plantation in Stanhope Township, Minden District. A standard 150-tree evaluation conducted in the 7-ha plantation revealed that 60% of the trees 0.9 m high were infested. On average, six web-masses were found on each of the infested trees, and 40% defoliation resulted.

Very low population levels were found in two plantings in Burleigh Township, Bancroft District. Defoliation averaged less than 1% on the 4-m-high trees, and both areas were less than 1 ha in size.

A special survey was conducted in the white pine (*P. strobus* L.) seed orchard in Snowdon Township, Minden District, where a ground control program was completed in 1984 for this pest. In all, 300 trees were randomly selected and examined, and no evidence of the insect was found.

Additional information concerning the pine false webworm may be found later in this report under Special Surveys (Red Pine Plantation Survey).

Saratoga Spittlebug, *Aphrophora saratogensis* (Fitch)

For the third consecutive year tree mortality has continued in scattered pockets throughout a 15-ha, 2-m red pine plantation in Hagarty Township, Pembroke District. The pockets have increased by approximately 1 ha this year, and are now 3 ha in size. Little change has taken place in the number of dead trees reported in a ¼-ha pocket of a 4-ha plantation in Fraser Township, Pembroke District. A 0.5-ha pocket of stunted, 2-m red pine experiencing only branch mortality was discovered in a 12-ha plantation in Ross Township, Pembroke District. Tree and branch mortality is attributed to the feeding punctures caused by the sap-sucking behavior of the adults. In all of the above-mentioned areas there was an abundance of the alternate host, sweetfern, *Comptonia peregrina* (L.) Coult. Population numbers, which have varied for the past 11 years, have been increasing steadily for the last 3 years.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

A virtual collapse of this insect has taken place this year. A total of 63 ha of aerially detected defoliation occurred in three small

pockets in Bishop and Bower townships, in the Algonquin Park District. The areas in which this late-feeding insect were aerially mapped were in relatively pure stands of mature white birch (*Betula papyrifera* Marsh.) on lakeshores and adjacent ridge tops. The small pockets were found in the same area in which 1,827 ha were defoliated in 1984. A normal outbreak of this native skeletonizer lasts only a few years and usually occurs every 9 to 10 years. This particular outbreak in the Algonquin Region started in 1982 and caused damage to 40,884 ha. It peaked in 1983 with 481,000 ha of moderate-to-severe defoliation, and has been declining ever since.

Throughout the area of previous defoliation only trace numbers could be found.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Results of damage surveys, population sampling and egg-mass counts of the spruce budworm will be published with those of other regions at a later date in a report devoted specifically to this insect. The report will provide a complete description and analysis of developments in the spruce budworm situation in Ontario in 1985 and will give infestation forecasts for the province for 1986.

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

The total area of moderate-to-severe defoliation caused by the jack pine budworm (in the Parry Sound District) doubled in size in 1985 over that of 1984. In 1985, 54,034 ha were defoliated, over an area extending from Snug Harbour northward along the Georgian Bay shoreline to Henvey Inlet, and inland to Noganosh Lake in Brown Township (Fig. 1).

For the third consecutive year heavy defoliation of jack pine (*Pinus banksiana* Lamb.) occurred throughout the western portions of Wallbridge, Harrison, Shawanaga, and Carling townships. This continuing defoliation has resulted in some 9,070 ha of top killing or whole-tree mortality. Areas of mortality were aerially sketch-mapped across Franklin Island in Carling Township, in three small pockets along the shoreline in Shawanaga Township, and in a continuous band extending along the shoreline from Point au Baril Channel in Harrison Township to Byng Inlet in Wallbridge Township (Fig. 1).

In all, 14 mortality plots were established throughout the above-mentioned area. At each location 100 jack pine trees were randomly selected along a cruise line and visually examined to determine whether the tree was alive or dead, or just a portion of the crown was dead. Because of the extremely heavy defoliation, which virtually removed every needle from the trees in areas, the only accurate method

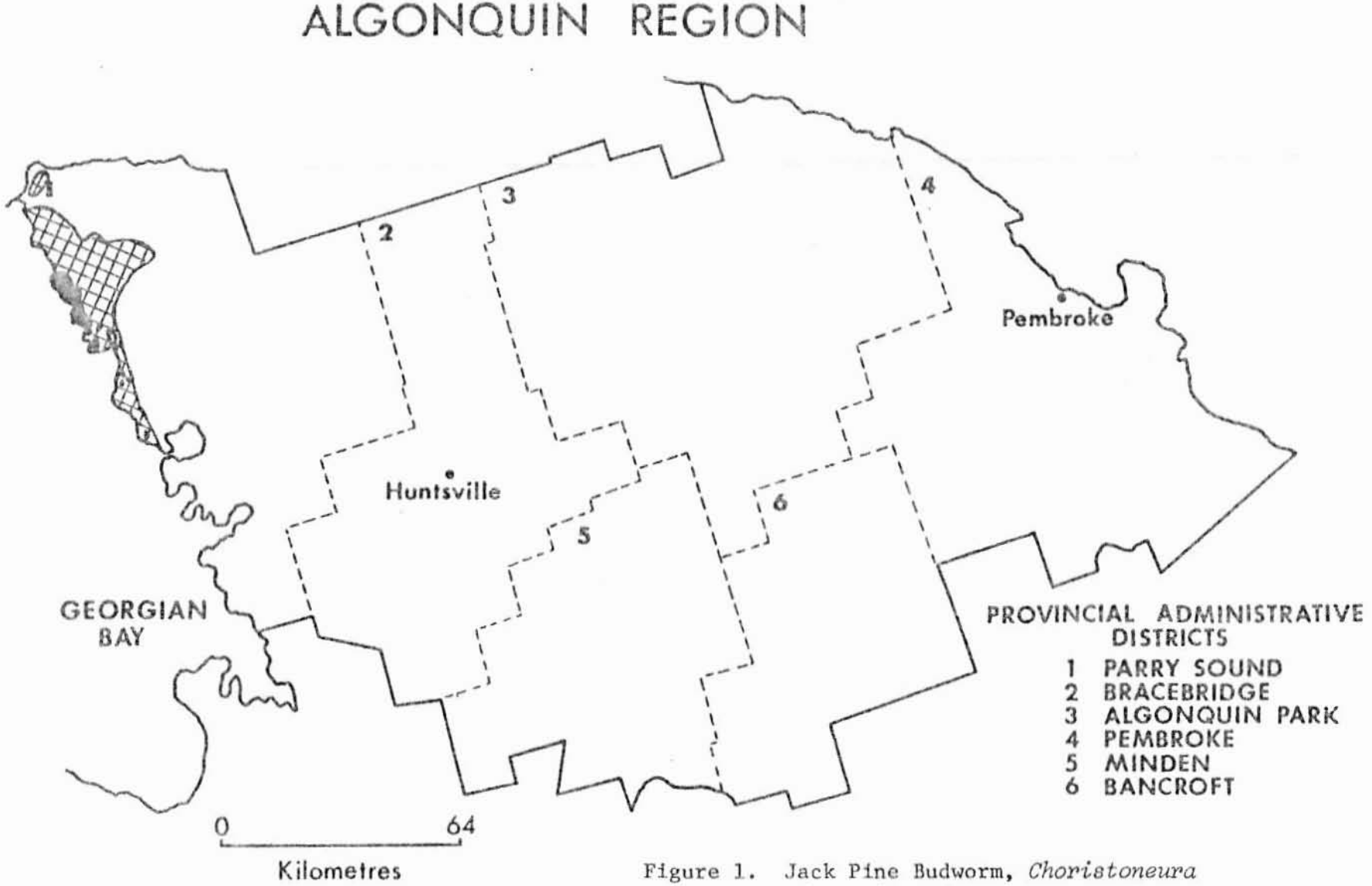

Figure 1. Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Area within which moderate-to-severe defoliation occurred in 1985 . . . .

Area within which mortality occurred in 1985 . . . . . .

of determining a live or dead tree was to examine physically the cambial layer under the bark. This often required felling of the trees, especially in cases in which the upper portions of the crowns were suspected of being dead. Table 1 summarizes the data collected from the mortality survey.

An egg-mass survey was completed at 15 locations for the purpose of forecasting population and defoliation levels expected in 1986. At each location, six 61-cm branch tips were removed from the mid- to upper crown and examined for jack pine budworm egg masses. The survey indicates that there should be a noticeable reduction in defoliation levels in 1986. Very low numbers of egg masses, or negative counts, were recorded at many of the locations. Three of the locations showing negative counts were resampled to check and verify the results, and once again no egg masses were found. The data are summarized in Table 2.

At numerous locations throughout the area of infestation, naturally occurring white pine was also defoliated by this pest. The heaviest damage detected was along the Georgian Bay shoreline in Wallbridge Township, where 2- to 3-m trees sustained 80% loss of both new and old foliage. The new foliage of the larger trees (15-20 m in height) sustained 30% loss.

Maple Trumpet Skeletonizer, *Epinotia aceriella* (Clem.)

There was a marked decrease in defoliation of sugar maples (*Acer saccharum* Marsh.) caused by this skeletonizer in the Region. Aerial surveys completed in early September across the north central portion of the Region where some 23,496 ha were severely defoliated in 1984 failed to detect any areas of similar levels of defoliation in 1985. However, light-to-moderate defoliation levels were detected at numerous scattered locations.

Moderate populations, causing 20 to 30% defoliation, were detected in maple stands along Highway 60 throughout Finlayson, Peck and Canisbay townships in the Algonquin Park District. Similar population levels were found south of Eagle Lake in Strong Township, along Muskoka County Road 8 from Highway 60 to Brooks Mill in Sinclair Township, south of the town of Huntsville along Muskoka County Road 2 to the Lake of Bays area, and south of the Muskoka River in Draper Township in the Bracebridge District. This level of defoliation was also detected along Haliburton County Road 118, from the town of Carnarvan to Maple Lake in the southern end of Stanhope Township, Minden District.

Elsewhere across the Region low numbers could be found easily in numerous hardwood stands with a high maple component. Defoliation was usually less than 10% and often confined to the exposed edges of the stands.

Table 1. Summary of data collected from 14 jack pine budworm mortality plots located in the Parry Sound District in the Algonquin Region (counts based on the examination of 100 codominant jack pine trees at each location).

Location	Avg tree height (m)	Avg DBH (cm)	Trees alive (%)	Whole-tree mortality (%)	Top Kill (%)
Wallbridge Township					
Hwy 69	11	19	98	2	28
Hwy 529	7	15	98	2	16
Jct. of hwys 69 and 529	6	7	98	2	0
Mud Channel	6	9	70	30	38
Prisque Bay	8	14	67	33	45
" "	9	17	85	15	63
Burritts Bay	8	17	60	40	47
Giroux River	9	16	71	29	50
Naiscott River	5	7	89	11	43
Harrison Township					
Point au Baril Channel	7	15	62	38	52
Big Burnt Island	6	16	75	25	51
Charles Inlet	6	11	34	66	33
" "	6	11	53	47	31
Carling Township					
Snug Harbour	7	11	95	5	25

Table 2. Summary of jack pine budworm egg-mass counts and defoliation estimates in 1985 and infestation forecasts for 1986 in the Algonquin Region (counts based on the examination of six 61-cm jack pine branch tips at each location).

Location	1985 defoliation (%)	Total no. of egg masses in 1985	Infestation forecasts for 1986[a]
Parry Sound District			
Blair Twp - Hwy 522	0	0	N
Carling Twp - Dinner Lake	0	0	N
- Sand Bay	8	1	L
- Snug Harbour	28	0	N
Harrison Twp - Hwy 529A	35	0	N
- Point au Baril	1	0	N
Henvey Twp - Still River	74	3	M
Mowat Twp - French River	0	0	N
- Grundy Lake Prov. Park	0	0	N
- Pickerel River	0	0	N
Wallbridge Twp - Magnetawan River	44	4	M
- Harris River	20	0	N
Algonquin Park District			
Edgar Twp	0	0	N
White Twp	0	0	N
Pembroke District			
Buchanan Twp	0	0	N

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

Fall Webworm, *Hyphantria cunea* (Dru.)

This annual pest of hardwoods was prevalent across the entire Region this year. Black ash (*Fraxinus nigra* Marsh.) growing on very low, wet sites, and choke cherry (*Prunus virginiana* L.) and pin cherry (*P. pensylvanica* L.f.) growing along roadsides, were the preferred hosts.

Heavy defoliation was recorded in numerous small pockets of black ash ranging in size from several trees to several hectares and on roadside choke cherry and pin cherry trees along Highway 69 from Mactier to the southern boundary of Gibson Township, Parry Sound District. Similar levels were recorded along Highway 11 from the town of Huntsville to the town of South River in the Bracebridge District and across the northern end of the Lindsay District and southern portion of the Minden District from Highway 35 east to the town of Lakefield.

Small, scattered pockets of various sizes, with up to 20% defoliation, were found along Highway 620 in Wollaston Township in the Bancroft District, along Highway 514 in Raglan Township, along Highway 41 in Wilberforce Township in Pembroke District, and along secondary roads on the eastern side of Algonquin Park District.

Elsewhere across the Region this pest was very common, but caused less defoliation.

Gypsy Moth, *Lymantria dispar* (L.)

Populations of this introduced forest pest have increased in the Region for the past two years. In 1985, various levels of defoliation were aerially sketch-mapped in the southern portion of the Pembroke and Bancroft districts (Fig. 2).

In the Pembroke District, 90 ha of moderate-to-severe defoliation were detected, scattered in pockets from the Icy Hills in Lyndoch Township east to White Lake in McNab Township. These pockets of defoliation ranged in size from 3 ha to 20 ha, similar to those which occurred across three hilltops north of the Madawaska River in Griffith Township.

In the Bancroft District various levels of defoliation were scattered throughout some 240 ha southwest of South Lake in Methuen Township. The topography in this area changes abruptly from swamp to rocky outcrops and the defoliation occurred mainly on the scrub red oak (*Quercus rubra* L.) growing on these very open rocky sites (see Frontispiece).

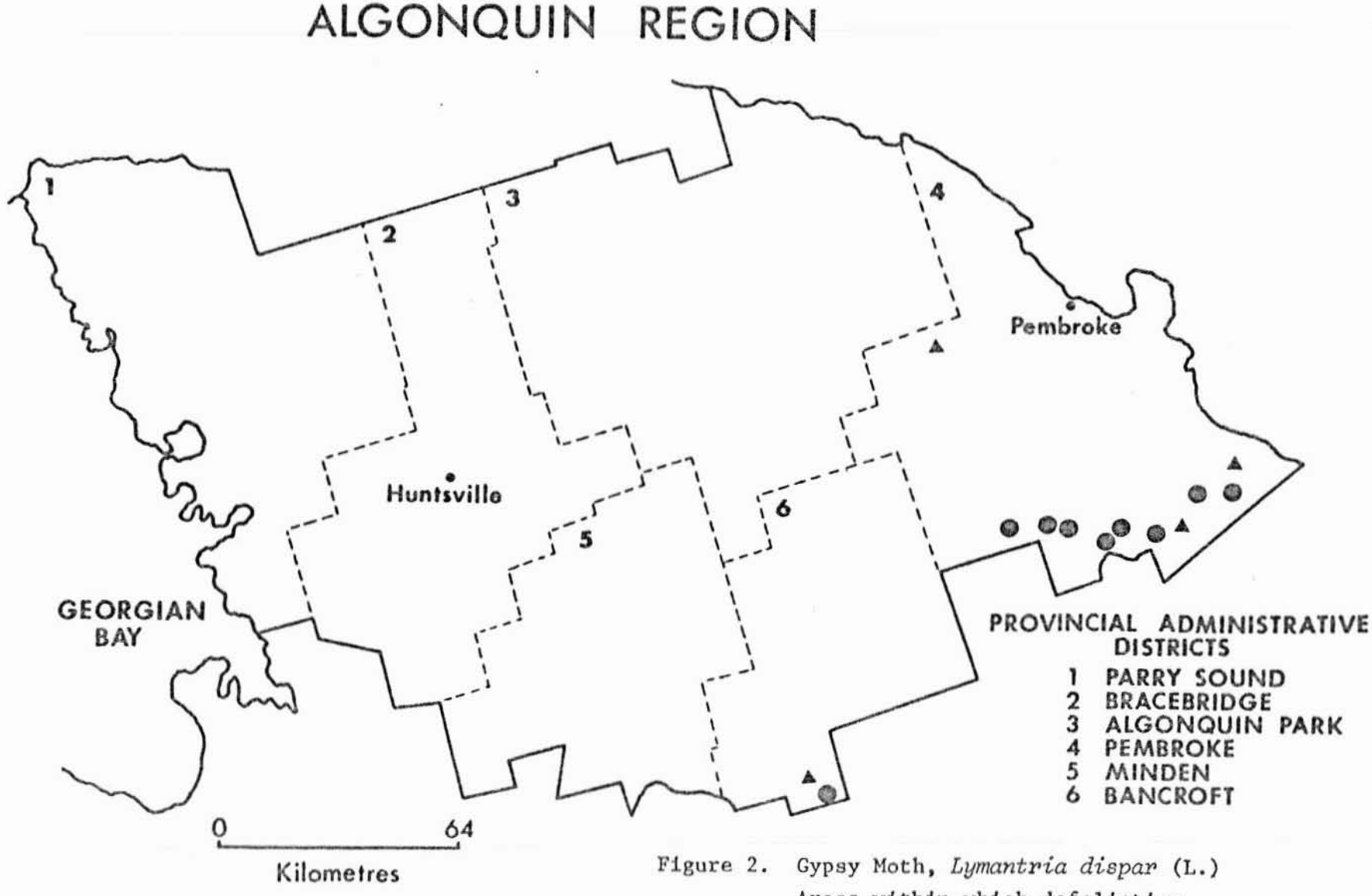

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Figure 2. Gypsy Moth, *Lymantria dispar* (L.)
Areas within which defoliation occurred in 1985

Light . . . . . ▲
Moderate-to-severe . . . ●

In cooperation with the Provincial Parks Branch of the Ontario Ministry of Natural Resources (OMNR), burlap and pheromone traps were set out at 22 provincial campgrounds across the Region (Fig. 3). Five burlap traps were set out at four of the smaller camping areas in Algonquin Park, and 10 at each of the 12 remaining parks. The traps were checked daily by park staff for the presence of larvae from late May until early July. Five larvae were collected from one of the 10 traps at Bonnechere Provincial Park in the Pembroke District. All other parks reported negative results.

In early July two pheromone traps were set out at each of the 22 campgrounds. One was located at the main entrance to the campground and the other was placed within the camping area. The traps remained in place until early September. Table 3 summarizes the data collected from the pheromone trapping program. Because of vandalism, only 39 of the 44 traps were recovered.

Elsewhere in the Region several larvae were collected on ornamentals (where they had caused less than 5% defoliation) at White Lake, McNab Township, at Haley Station, Ross Township, and in the towns of Renfrew and Pembroke in the Pembroke District.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

There was a marked increase in both the incidence and level of defoliation caused by this hardwood pest across the Region this season. The largest area of defoliation occurred in the north central portion of the Parry Sound District (Fig. 4).

In all, 1,006 ha of moderate-to-severe defoliation, comprising three pockets, were aerially sketch-mapped in early July. The largest pocket, some 692 ha, was detected south of Kashegaba Lake in Burton Township. A second pocket, totalling 126 ha, was found on the east end of Bolger Lake, in the same township. A third pocket totalling some 188 ha was detected to the northeast, on the east side of Wahwashkesh Lake, in McKenzie Township. Trembling aspen (*Populus tremuloides* Michx.), balsam poplar (*P. balsamifera* L.) and red oak were the main hosts defoliated throughout the three pockets (see photo page).

Low numbers causing 10% or less defoliation were detected in 11 additional areas across the Region. The defoliation was usually confined to the extreme fringes of stands, or as in the case of Medora Township, Bracebridge District, to open-grown scrub red oaks. In the eastern portion of the Region defoliation occurred mainly on sugar maple.

A single balsam poplar tree 14 cm DBH was felled south of Kashegaba Lake for the purpose of collecting egg bands to forecast populations expected in 1986. In all, 46 egg bands were found, an indication

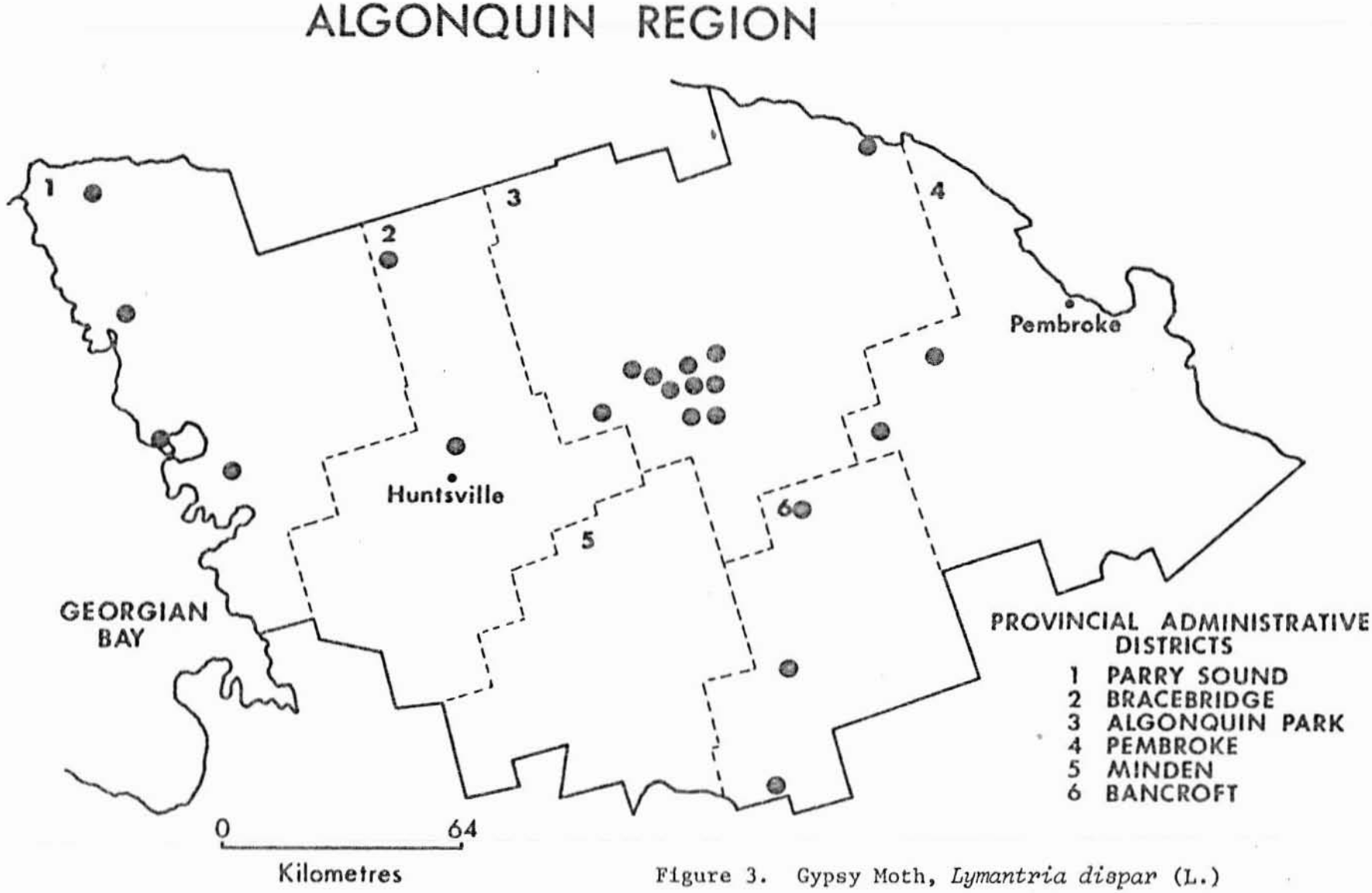

Figure 3. Gypsy Moth, *Lymantria dispar* (L.)
Locations of the burlap and pheromone trapping completed at 22 provincial campgrounds in 1985 . . . . . ●

Table 3. Summary of the results of adult pheromone trapping in the Algonquin Region in 1984 and 1985.

Location (Park)	No. of pheromone traps		No. of male moths trapped	
	1984	1985	1984	1985
Algonquin Park District				
Driftwood	1	2	0	24
Algonquin Park				
Kearny Lake	1	1[a]	0	0
Pog Lake	1	1[a]	0	0
Lake of Two Rivers	1	2	1	0
Mew Lake	2	2	1	0
Tea Lake	1	2	0	1
Coon Lake	1	2	2	0
Rock Lake	1	2	1	1
Whitefish Lake	1	2	0	0
Opeongo	1	1[a]	0	0
Canisby	1	2	0	0
Bancroft District				
Lake St. Peter	1	2	8	10
Petroglyphs	2	2	13	41
Silent Lake	2	2	7	13
Bracebridge District				
Arrowhead	2	1[a]	0	0
Mikisew	2	2	0	0
Parry Sound District				
Grundy Lake	2	2	1	0
Killbear	2	2	1	2
Oastler Lake	2	2	0	1
Sturgeon Bay	-	2	-	0
Pembroke District				
Bonnechere	2	2	2	39
Carson Lake	1	1[a]	4	21
Canadian Forces Base Petawawa				
Transport Compound	-	3	-	40
Residential area	-	6[a]	-	118

[a] One pheromone trap missing from each location.

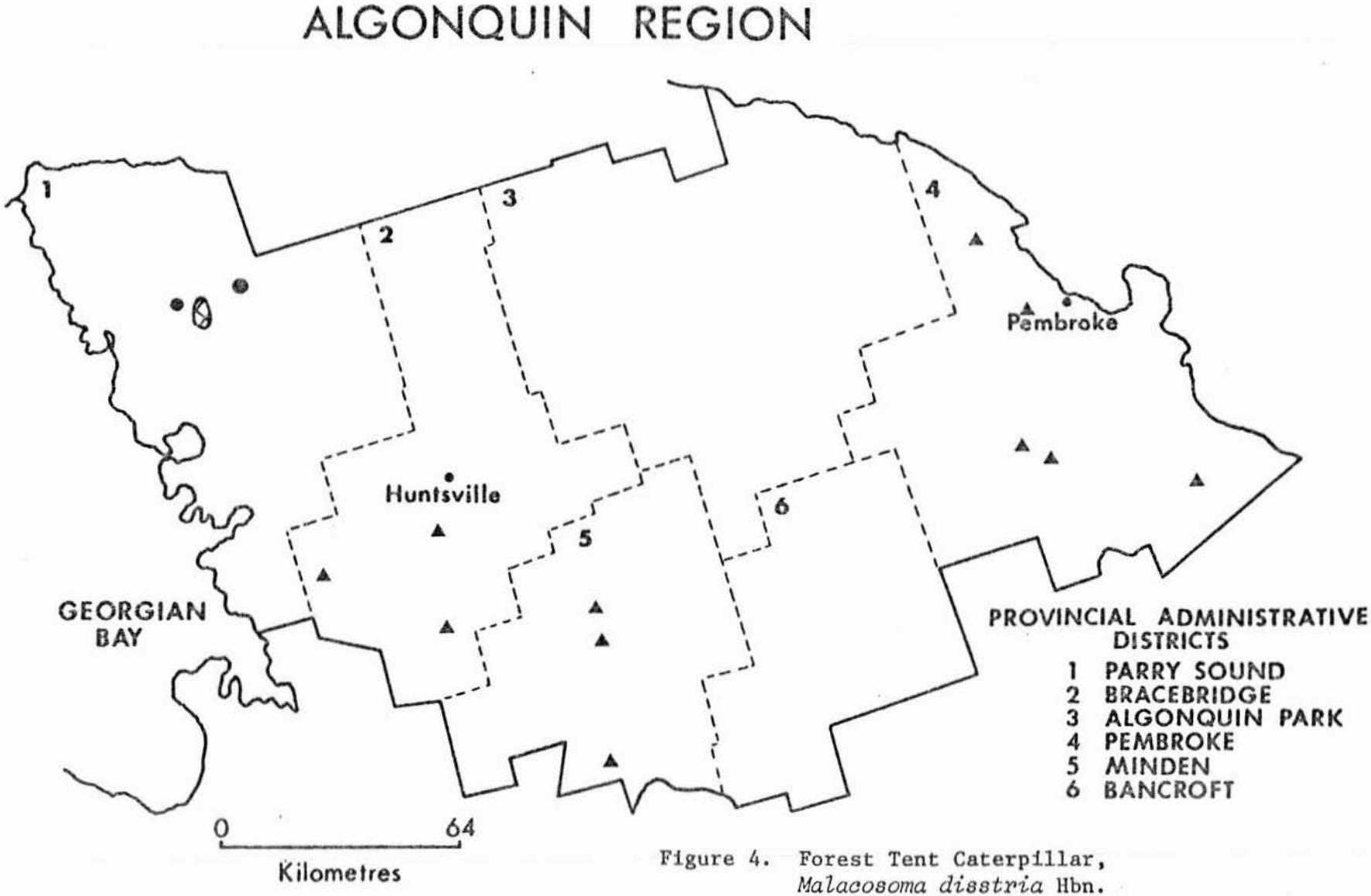

Figure 4. Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Areas within which defoliation occurred in 1985

Light . . . . . ▲

Moderate-to-severe . ▨ or ●

that severe defoliation should occur again next season, and an outward spread of defoliation into stands of suitable hosts is also expected.

Balsam Fir Sawfly, *Neodiprion abietis* complex

There was a slight increase in the total area affected by this sawfly in the Algonquin Region, but the actual severity of the damage has decreased. The total area affected increased from 1,000 ha to 1,300 ha in 1985. However, balsam fir, the primary host, usually constitutes a small component of the mixed softwood stands within which damage was detected.

The heaviest damage, 50% defoliation in the upper crowns, was detected in two pockets, each 0.5 ha in size, in Bracebridge District. The first was along Highway 35 in Franklin Township, and the second was in the northeast corner of McClintock Township. Defoliation levels of 30% were found in mixed softwood stands scattered across some 300 ha in Bromley and McNab Townships, Pembroke District, and 100 ha in Carlow Township, Bancroft District.

Low levels of sawfly damage totalling approximately 300 ha were observed at numerous locations on roadside trees in the northeastern and southern portions of the Algonquin Park District. Similar damage was found on some 400 ha of roadside trees throughout the Pembroke District, and 200 ha in the southwest portion of the Bancroft District.

Redheaded Pine Sawfly, *Neodiprion lecontei* (Fitch)

There was a marked increase in population levels of this pest across the entire southern portion of the Region. This is the first time since 1980 that high populations have been detected causing heavy defoliation of red pine in the Region (Fig. 5 and photo page).

High populations were detected in plantations south of the village of Apsley, in Burleigh Township, Bancroft District, and in Sebastopol Township, Pembroke District (Table 4). Similar levels were detected on roadside ornamental plantings along Highway 60, west of the village of Dwight in the Bracebridge District, where 55% of the 2.5-m trees were found to have lost 90% of both old and new foliage. A 60% defoliation level was estimated on 56% of 4-m ornamentals in a school yard along Highway 69, north of the town of Parry Sound, in the Parry Sound District.

All OMNR district offices reported that low numbers were frequently found at numerous locations throughout their specific areas of responsibility. Parry Sound and Bancroft districts reported the use of the lecontvirus at several locations to control this sawfly.

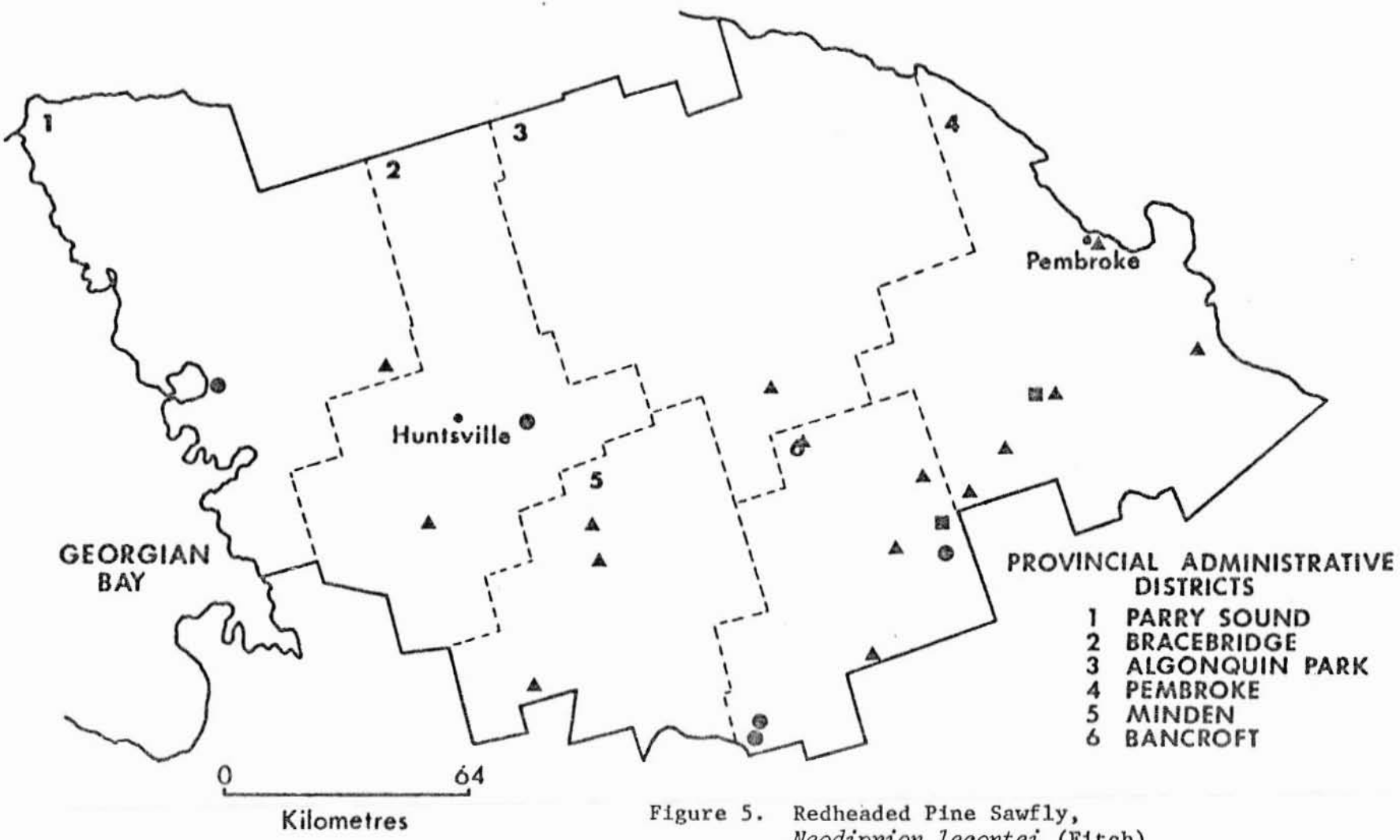

Figure 5. Redheaded Pine Sawfly, *Neodiprion lecontei* (Fitch)

Areas within which various population levels were detected in 1985

Low . . . . . ▲

Moderate . . . . . ■

High . . . . . ●

Table 4. Summary of damage caused by the redheaded pine sawfly at 11 locations in the Algonquin Region in 1985 (counts based on the examination of 150 trees at each location).

Location (Twp)	Avg ht of trees (m)	Total area affected (ha)	Estimated no. of trees per ha	Trees infested (%)	Avg no. of colonies per tree	Avg defoliation of infested trees (%)
Algonquin Park District						
Sabine	4.8	2	2,900	1	1	5
Bancroft District						
Burleigh	4.8	5	2,500	30	3	8
Mayo	4.9	5	2,500	1	1	10
Bracebridge District						
Macaulay	4.5	6	2,200	3	1	10
Macaulay	5.1	10	2,100	1	1	5
Minden District						
Minden	3.2	3	2,000	3	1	2
Laxton	1.4	2	2,000	4	1	5
Stanhope	0.9	2	1,000	1	1	3
Pembroke District						
Sebastopol	2.0	8	2,500	13	3	70
Ross	2.1	5	2,800	8	1	10
Ross	2.1	15	2,800	5	1	5

Additional information on this pest can be found elsewhere in this report under Special Surveys (Red Pine Plantation Survey).

Jack Pine Sawfly, *Neodiprion pratti paradoxicus* Ross

An increase has occurred in the area infested and the severity of damage to jack pine caused by this early feeding sawfly. Eighty percent defoliation occurred on a total of 250 ha of jack pine stands scattered throughout Richards, Hagarty, Fraser, North Algona, Wylie and Buchanan Townships in the Pembroke District.

Defoliation ranging from 5% to 24% could easily be found in the northern half of Pembroke District, in the northeastern portion of Algonquin Park District, and in a small pocket in Airy Township in the south-central portion of Algonquin Park District (Fig. 6).

Although jack pine makes up a high percentage of the forest on the northwestern side of the Region, the damage by this insect seems to be restricted to the central and eastern portions, where only scattered stands and individual trees grow.

Bruce Spanworm, *Operophtera bruceata* (Hlst.)

Routine surveys in sugar maple stands in May detected several pockets of varying levels of defoliation caused by the Bruce spanworm. These were the first reports of this pest in the Region since 1976 when the last outbreaks, which lasted four years, collapsed. The insect was found causing severe defoliation of the understory and regeneration in the stands, and light defoliation of the lower portions of the main crowns.

This type of damage, in which 80 to 90% of the understory leaves and 10% of the lower main crown were consumed, occurred in a 300-ha maple stand near the village of Cormac in Sebastopol Township, Pembroke District, and in 200-ha stands in the northwest corner of Herschel Township and the southwest corner of Faraday Township, Bancroft District. Similar damage conditions were detected in a 20-ha area within a 50-ha sugar maple stand on the northeastern side of Soyers Lake and in a 25-ha stand on the south shore of Kashagawigamog Lake, both in Minden Township, and in 10 ha of a 100-ha sugar maple stand north of the town of Haliburton in Dysart Township, Minden District.

Light-to-moderate defoliation, with less than 30% of the understory leaves consumed and no apparent feeding in the upper crowns, was found scattered across the Maple Lake area of Stanhope Township and the adjacent Green and Pine lakes area of Guilford Township, and south of Stormy Lake in Glamorgan Township, Minden District. This type of damage

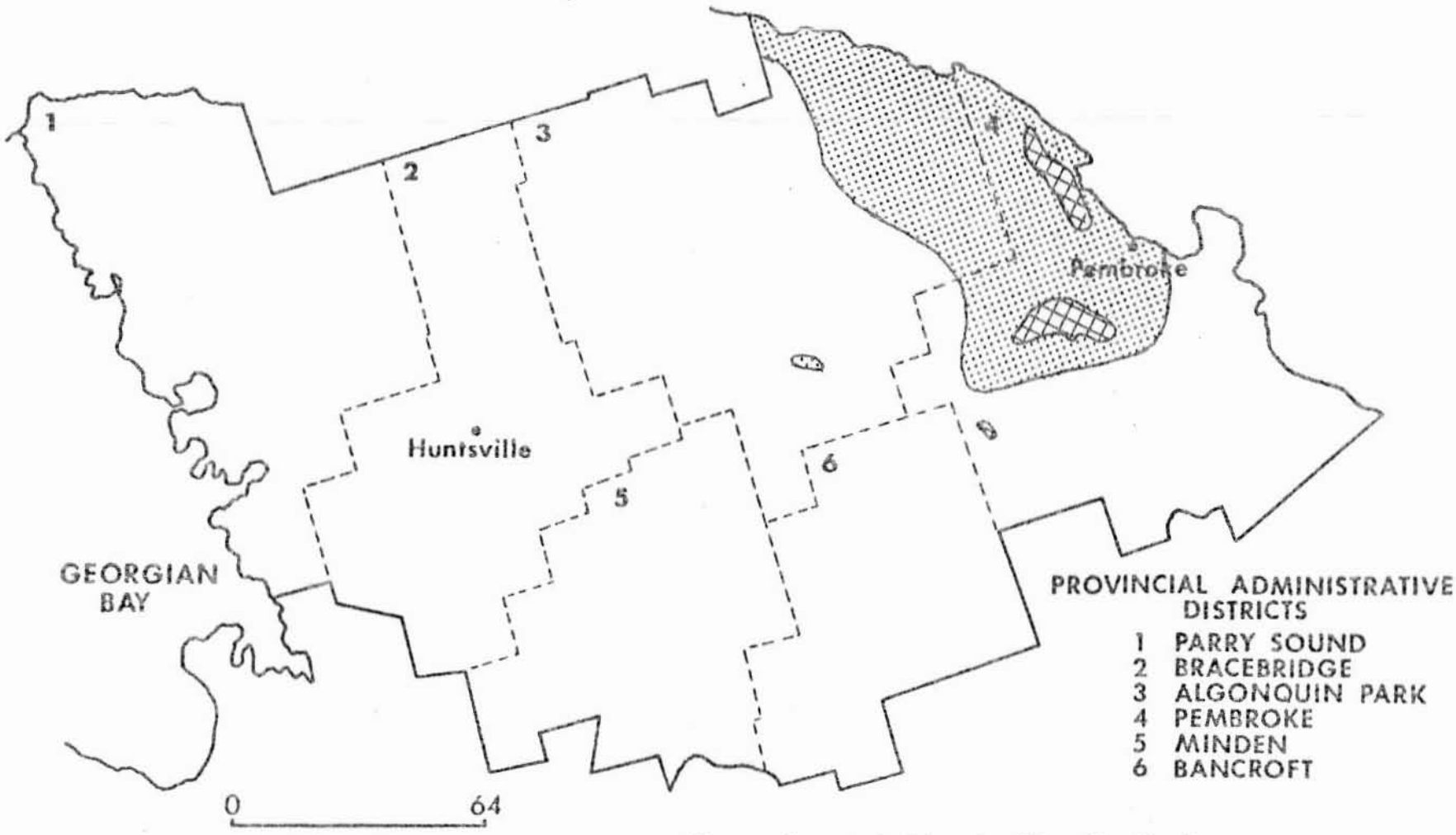

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Figure 6. Jack Pine Sawfly, *Neodiprion pratti paradoxicus* Ross

Area within which defoliation occurred in 1985

Light . . . . . .

Moderate-to-severe . . . .

was also found in scattered pockets, less than 0.5 ha in size, west of the village of Dwight along Highway 60 in Franklin Township, Bracebridge District.

Maple Leafcutter, *Paraclemensia acerifoliella* (Fitch)

There was a slight decrease in population and distribution levels of this pest in the Region in 1985. Populations remained high in a 126-ha hardwood bush near the town of Eganville in Wilberforce Township, Pembroke District. The sugar maples in the stand sustained 80% defoliation. This level of heavy defoliation was detected as well in a 35-ha area along the northeast corner of Head Lake in Laxton Township, Minden District.

A single pocket of moderate defoliation (40% to 50%) was encountered across the southwest corner of Laxton Township, Minden District. The majority of the damage was to understory and regeneration in this area; however, the main canopy was also occasionally attacked, and this caused a browning of the crowns.

Low numbers causing less than 10% defoliation of understory or fringe trees were commonly encountered in Peck Township, Algonquin Park District, in Sinclair and Medora Townships, Bracebridge District, in Minden, Laxton and Harvey Townships, Minden District, and in Westmeath and Sebastopol townships, Pembroke District. At these locations the pest was found scattered through areas 10 to 100 ha in size.

White Pine Weevil, *Pissodes strobi* (Peck)

Heavy leader damage occurred on 3-m natural regeneration eastern white pine growing under an overstory of trembling aspen in Dick Township, Algonquin Park District. The area had been weeviled for a number of years and a total of 50% of the trees were damaged over the entire 15-ha stand.

An early-season visit to a 3-m, 4-ha white pine plantation in Ross Township, Pembroke District, revealed high insect populations, with up to three adult weevils feeding per leader. A second visit in late August to the same plantation revealed that 30% of the leaders were damaged.

Elsewhere in the Region damaged leaders averaged 3%. This is considered a normal damage level in regeneration for this insect.

Other tree species affected by this very adaptable insect were genetically superior jack pine in a 3-ha experimental plantation of 2-m trees in Stratton Township, Algonquin Park District, where 2% of the

leaders were damaged and red pine in a 4-ha, 2-m plantation in Ross Township, Pembroke District, which had trace levels of damaged leaders.

Minor Insects

Pine Gall Weevil, *Podapion gallicola* Riley

Branch and whole-tree mortality caused by this gallforming weevil has been detected in mature red pine stands in the Region. This is only the second record in Ontario of this level of damage caused by this insect, which is widely distributed but has been considered of minor importance. The adult lays eggs in niches chewed into the bark of one-year-old twigs; the larvae feed in the cambium layer through three seasons. Pupation occurs in cells constructed in the bark during the spring of the fourth year. Galls are formed by hypertrophy of the xylem tissue surrounding the feeding larvae. Old galls continue to enlarge even after the insects have pupated and emerged from the gall. These galls, often three to five per branch tip, eventually kill the branch, and when numerous branches have died, the entire tree then succumbs to the damage.

Whole-tree mortality was detected in a 0.25-ha mature red pine plantation along Highway 17 in McNab Township, Pembroke District. Approximately 10 trees have died, and numerous other trees are heavily galled; branches are dead and foliage is very sparse. Ten trees were found killed along a fence line in Ross Township and heavy branch mortality was recorded on 20 trees in a 2-ha plantation in Buchanan Township and on 25 trees in a 1-ha plantation in Sherwood Township. Twelve trees were similarly affected at a picnic site at Lake Traverse in Edgar Township, Algonquin Park District, and scattered across 2-3 ha of open-grown semimature trees at Petroglyphs Provincial Park in Burleigh Township, Bancroft District.

Flat Leaftier, *Psilocorsis reflexella* Clem.

There was an apparent reduction in population levels of the flat leaftier across the Region this season. However, where the pest did occur, the foliar damage usually exceeded 75% on the infested trees. Severe browning was commonly detected on both oaks and aspens, but in the case of the oaks, usually only two or three trees were infested, whereas with aspen, often 0.5 ha was infested. The pest was also encountered more frequently across the western portion of the Region.

Heavy populations were detected in a 150-ha mixedwood stand in Hindon Township, in a 15-ha mixed hardwood stand in Laxton Township and in a 2-ha pocket of 10-m trees in Somerville Township, Minden District.

Moderate numbers were found on semimature aspen at a roadside picnic site in Brunel Township, Bracebridge District. Similar damage levels were found on aspen along Highway 69 at the Moon River and on red oak along Highway 38 in Gibson Township, Parry Sound District.

Trace-to-light numbers were found on aspen in Mount Township and on sugar maple in Burton Township, Parry Sound District. This population level was also found on red oak in Carlow Township, Bancroft District, and on white birch in Sabine Township, and on yellow birch (*Betula alleghaniensis* Britton) in Peck Township, Algonquin Park District.

Table 5. Other forest insects.

Insect	Host(s)	Remarks
Acrobasis betulella Hlst. Birch tubemaker	wB	low population levels collected on roadside, fringe 5-m trees in Mayo Twp, Bancroft District
Acleris logiana (Cl.) Blackheaded birch leaffolder	yB	2% defoliation of fringe semimature trees along Haliburton County Rd. 2 in Stisted Twp, Bracebridge District
Adelges abietis (L.) Eastern spruce gall adelgid	wS	Two 11-m roadside trees with 40% of branch tips infested were detected in Stanhope Twp, Minden District; moderate-to-high population levels were detected on all ages of white spruce (*Picea glauca* [Moench] Voss) in Wylie Twp, Pembroke District.
Altica populi Brown Poplar flea beetle	bPo	50% to 75% of leaves damaged wherever host occurred throughout Dungannon Twp, Bancroft District, and 40% in Brudenell Twp, Pembroke District

(cont'd)

Table 5. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Arge pectoralis (Leach) Birch sawfly	wB	15% defoliation of roadside trees at Moon River, Gibson Twp, Parry Sound District; 5% defoliation of semimature trees in four campgrounds in Algonquin Park, Algonquin Park District
Contarinia baeri (Prell) European pine needle midge	rP	a moderate population level detected in a 16-ha 5-m plantation in Westmeath Twp, Pembroke District
Croesia semipurpurana (Kft.) Oak leaf shredder	rO	trace numbers causing 1-2% defoliation in mature stands in Alice Twp, Pembroke District
Dioryctria zimmermani (Grt.) Zimmerman pine moth	wP	a single tree damaged in a seed orchard in Snowdon Twp, Minden District
Diprion similis (Htg.) Introduced pine sawfly	wP	2-3% defoliation of eight 2.5-m trees along Hwy 60 in Franklin Twp, and 1% defoliation of 5-m trees along Hwy 11 in Macaulay and Bracebridge twps, Bracebridge District
Epinotia solandriana L. Birch-aspen leafroller	wB	low numbers found in a 50-ha mixed hardwood stand in McDougall Twp, Parry Sound District; in a 10-ha stand in Machar Twp, Bracebridge District; and wherever the host occurred across Raglan Twp, Pembroke District
Erannis tiliaria (Harr.) Linden looper	sM, Ba, rO	trace numbers found in a 25-ha maple stand in Minden Twp, Minden District, and in a 20-ha oak-pine stand east of Bala in Wood Twp, Bracebridge District

(cont'd)

Table 5. Other forest insects (cont'd).

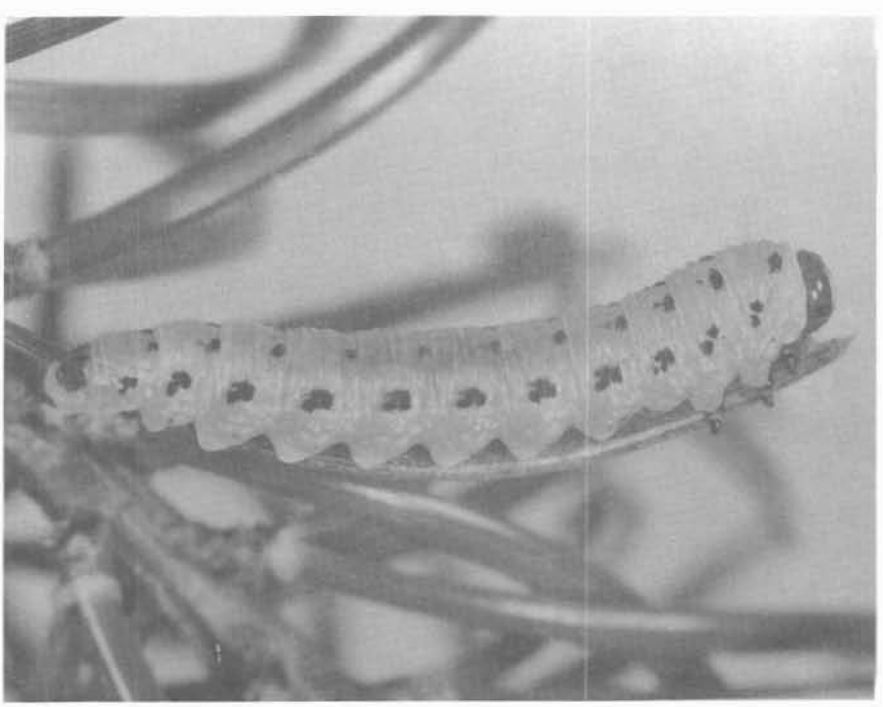
Insect	Host(s)	Remarks
Fenusa pusilla (Lep.) Birch leafminer	wB	This pest could be detected on ornamental trees throughout the entire Region, often causing severe browning of foliage.
Hylobius radicis Buch. Pine root collar weevil	scP	In an experimental planting at Petawawa National Forestry Institute (PNFI), 68 of 120 3-m trees were dead and an additional six were chlorotic in Buchanan Twp, Pembroke District.
Ichthyura albosigma Fitch Rustylined leaftier	tA	0.25 ha of open-grown 14-m trees sustained 2-3% defoliation in Harvey Twp, Minden District.
Messa nana (Klug) Early birch leaf edgeminer	wB	trace numbers causing 2-3% defoliation of immature roadside trees throughout Radcliffe Twp, Pembroke District
Neodiprion sertifer (Geoff.) European pine sawfly	rP	four colonies found in a 150-ha tree evaluation in a 5-ha 2-m plantation in Ross Twp, Pembroke District
Nymphalis antiopa (L.) Mourningcloak butterfly	wE, W, tA, Al	50-75% defoliation of single roadside trees in Mowat Twp, Parry Sound District and Canisbay and Fitzgerald twps, Algonquin Park District; 15% defoliation in Deacon Twp, Algonquin Park District
Pandemis limitata (Rob.) Threelined leafroller	rO	trace numbers detected on fringe trees in a 25-ha woodlot in Minden Twp, Minden District, and in a 50-ha mixed hardwood stand in Wood Twp, Bracebridge District

(cont'd)

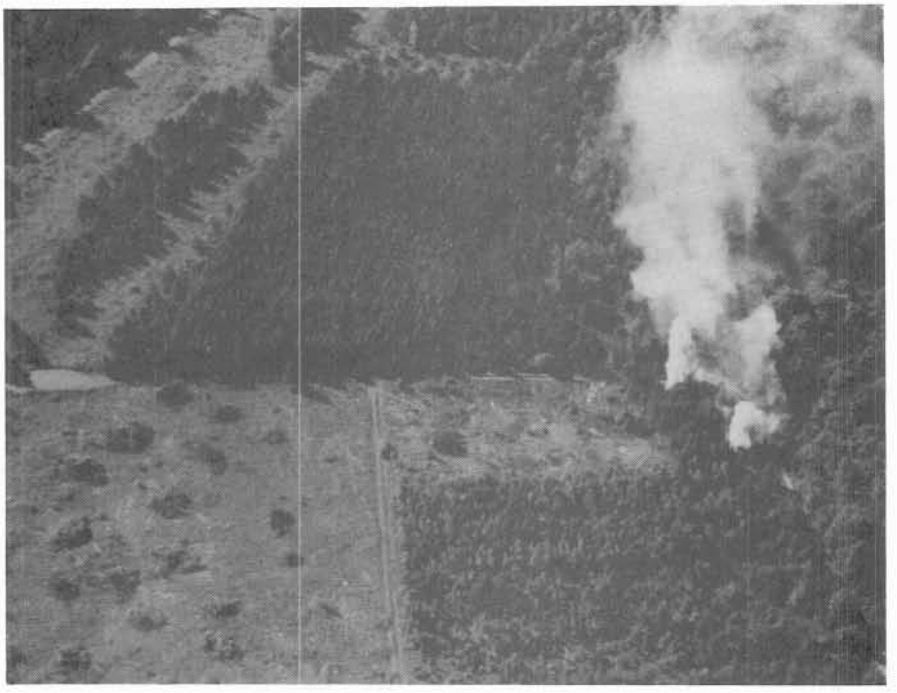
Table 5. Other forest insects (concl.).

Insect	Host(s)	Remarks
Phyllonorycter ontario (Free.) Aspen leafblotch miner	tA	75% of leaves mined on all ages of aspen scattered across Westmeath Twp, Pembroke District
Pikonema alaskensis (Roh.) Yellowheaded spruce sawfly	wS	30-50% defoliation of current growth found on ornamental and windbreak trees in the Bancroft area of Faraday Twp, Bancroft District
Pristiphora erichsonii (Htg.) Larch sawfly	eL	three colonies per 5-m tree detected on ornamentals at entrance to Mew Lake campground in Algonquin Provincial Park, Algonquin Park District
Pseudexentera cressoniana Clem. Oak olethreutid leafroller	rO	trace numbers found causing 2-3% defoliation of scattered host trees throughout Sebastopol and Wylie twps, Pembroke District
Zelleria haimbachi Busck Pine needle sheathminer	jP	An apparent reduction in numbers occurred across the northwestern portion of the Parry Sound District; only trace numbers were collected where a high incidence was recorded in 1984.

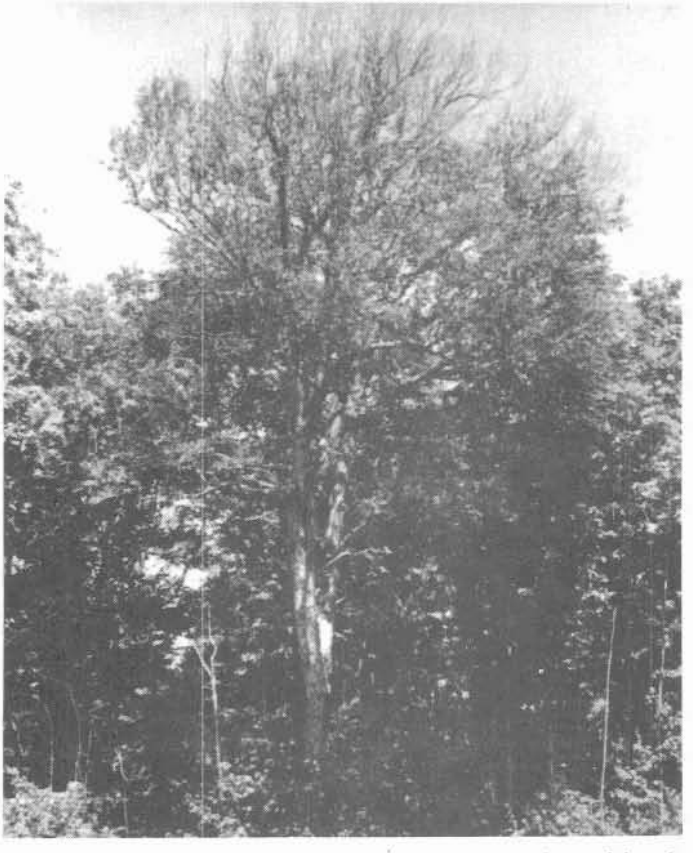
Defoliation of aspen (*Populus* spp.) caused by the forest tent caterpillar, *Malacosoma disstria* Hbn.



Mature larva of the redheaded pine sawfly, *Neodiprion lecontei* (Fitch), feeding on jack pine (*Pinus banksiana* Lamb.)



Control operation to prevent the spread of the European race of Scleroderris canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard



Typical top dieback of a yellow birch (*Betula alleghaniensis* Britton) possibly resulting from stress caused by drought and extremely heavy seed crop

TREE DISEASES

Major Diseases

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

In a mixed red pine and jack pine plantation, 10 ha in size and 2 m in height, in White Township, Algonquin Park District, a standard 150-tree disease evaluation revealed a current annual mortality rate of 2%. A similar survey conducted in 1984 in this plantation revealed a mortality rate of 3% attributed to this disease. In a clonal trial area in Stratton Township, Algonquin Park District, a 0.5-ha experimental planting of 1-m jack pine was found to have a current mortality rate of 20%.

Throughout the remainder of the Region, trace-to-low damage levels could be detected in plantations and natural stands.

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

An extensive aerial and ground survey was conducted across the Region for any evidence of the European race of Scleroderris canker. In all, 53 red pine plantations of various sizes and ages were ground checked, and at least 500 trees at each of these locations were examined visually (Fig. 7). As a direct result of this survey, the European race was confirmed at three locations in the Region.

The samples were collected from a 30-ha, 2-m red pine plantation in McMurrich Township, Parry Sound District, and a 10-ha red pine plantation, consisting of approximately 1 ha of 2-m trees and 9 ha of 6-m trees, in Macaulay Township, Bracebridge District. The third sample was collected from a 5-ha, 5-m red pine plantation in Mayo Township, Bancroft District (Fig. 8).

The native race of Scleroderris canker has been present and causing damage in McMurrich Township since 1970 and in Macaulay Township since 1978. A single collection was confirmed in Mayo Township in 1980, but the disease could not be detected in subsequent years. Because of the high incidence in McMurrich Township, sanitation programs to control the native race have been conducted in several plantations across the township since 1976. Similar programs have been conducted elsewhere in the Bracebridge District during the same time period; however, the problem was not serious enough to warrant a control program in Macaulay Township until 1984.

In that year, a standard 150-tree disease evaluation conducted at the Macaulay Township site revealed a 61% infection rate and a 13% current mortality rate in the 2-m trees. A sanitation program in which

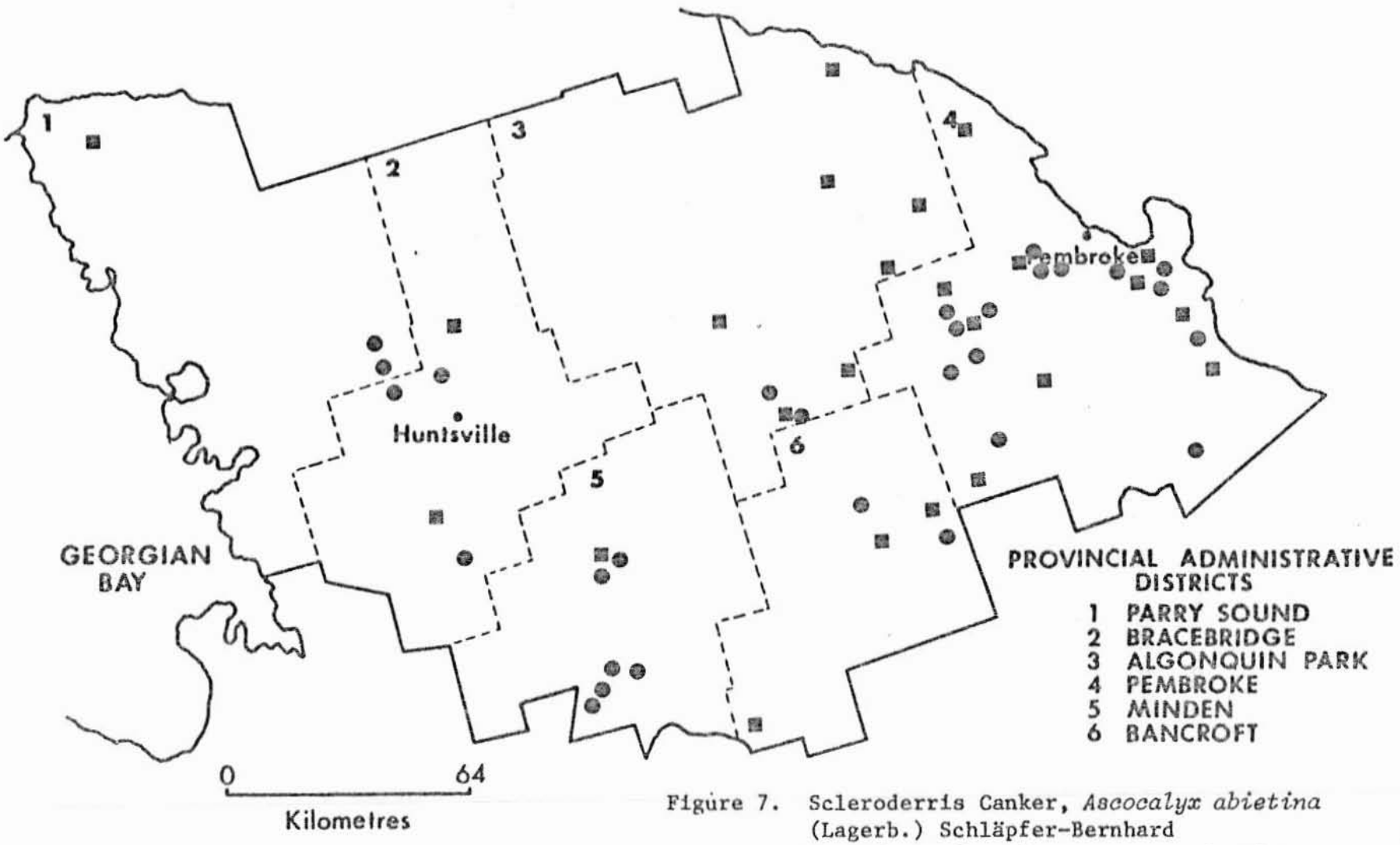


Figure 7. Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard
Locations of semipermanent monitoring plots and additional pine plantings examined in 1985
Semipermanent plots . . . . . ■
Additional areas checked . . . . . ●

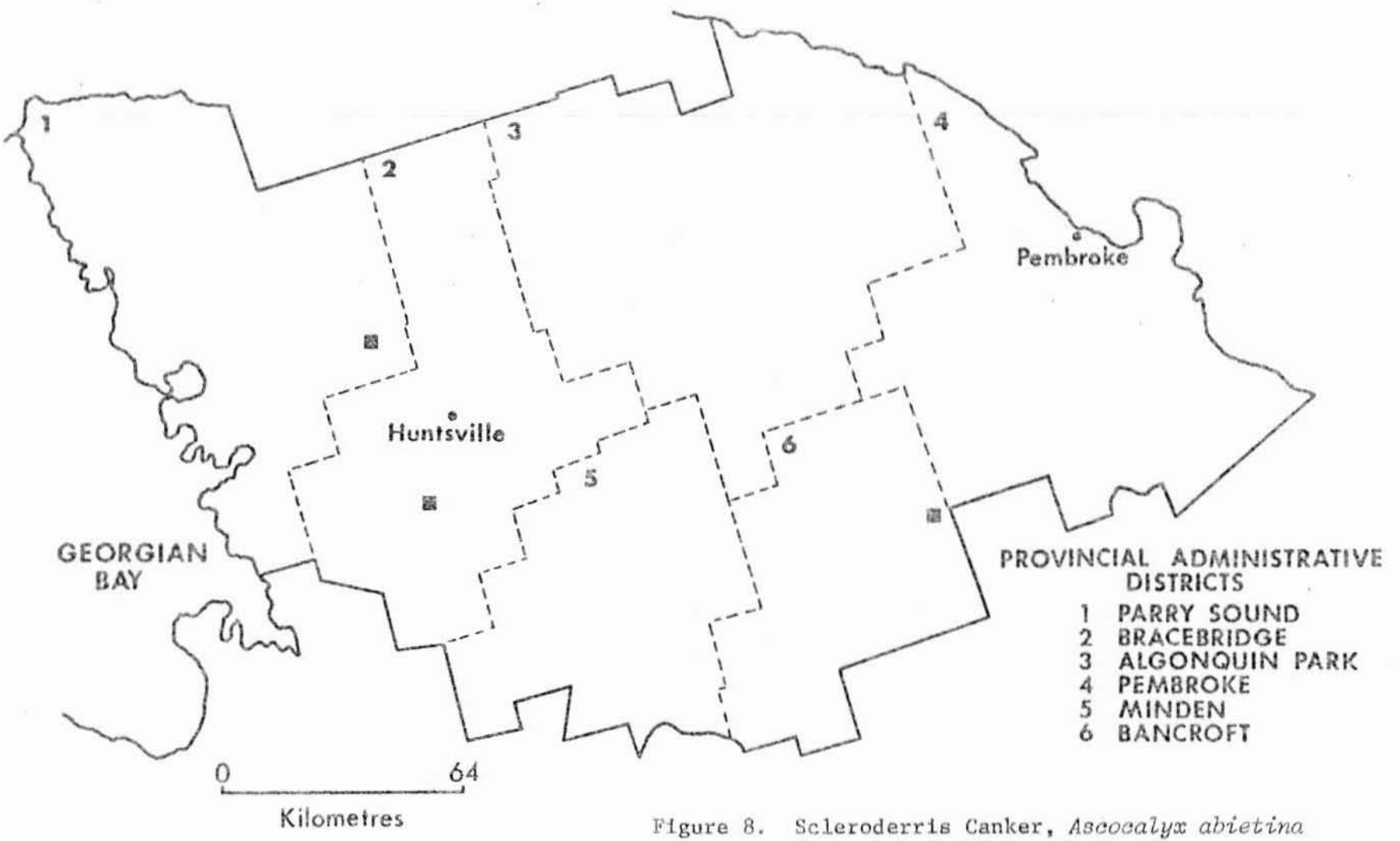


Figure 8. Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard

Locations where the European race of Scleroderris canker was detected in 1985 . . . . . ■

all dead or seriously infected trees were removed and affected branches on all remaining trees were cut off and destroyed was conducted by the Bracebridge District OMNR staff. An evaluation conducted in May of 1985 revealed that 37% of the remaining trees were showing signs of new infections and an additional 4% were considered severely diseased and likely to die during the current year. A similar evaluation conducted in McMurrich Township in 1984 revealed 33% of the trees affected and a 3% current mortality rate. The plantation was also heavily affected with Armillaria root rot and root collar weevils, *Hylobius* spp. Because of the high incidence of these three pests, and the mortality rate that had occurred across the plantation in the previous three or four years, the decision was made by the Parry Sound District OMNR staff to cut and burn the plantation. During the summer of 1985 the trees were cut and piled in windrows to be burned.

Following confirmation of the European race in McMurrich and Macaulay townships in early September and in Mayo Township in mid-October, a decision was made to attempt to eradicate the problem by cutting and burning the affected areas (see Frontispiece and photo page). This decision was made jointly following discussions and exchange of information by the Forest Insect and Disease Survey Unit (FIDS), Canadian Forestry Service, OMNR Pest Control Section, OMNR Huntsville Regional Office and the concerned district offices. Therefore, in mid-September the windrowed trees and any remaining standing trees in the 30-ha plantation in McMurrich Township were burned. In Macaulay Township, 10 ha were cut and burned following a ground survey conducted by FIDS and OMNR Pest Control staff which determined that the entire plantation was infected. At the Mayo Township location a similar ground survey indicated that only a small percentage of the trees in the 5-ha plantation were affected; therefore, only approximately 1 ha was cut and burned in early November. The remaining area was to have the lower branches pruned and burned. All locations are scheduled for a ground fire in the spring of 1986 to burn off any infected material that was not destroyed in the fall of 1985. Each site will not be planted for at least two years, and then only to a nonsusceptible species.

Bancroft District OMNR staff reported an additional pocket of damage in a red pine plantation approximately 1.0 km from the damaged area in Mayo Township. Symptomatic damage was found up to a height of 3.1 m on affected trees scattered throughout a 3.5-ha area in an 8.4-ha multiaged plantation. Symptomatic damage was also found on seedlings that had been planted in an adjacent field in 1984.

The decision was made to remove and burn all infected material, including entire trees if necessary. The lower branches of all remaining trees in the 3.5-ha area were removed and destroyed. The lower branches of trees in a surrounding buffer zone 30 m wide were also pruned to a height of 4 m, with these apparently unaffected branches being left on the ground.

Anthracnose, *Aureobasidium apocryptum* (Ell. & Ev.) Hermanides-Nijhof

Leaf deterioration by *A. apocryptum* occurred in scattered pockets varying in size from a few trees to 1 ha on mature red maple (*Acer rubrum* L.) and sugar maple across the Region.

Forty percent defoliation occurred for the second year in a 1-ha stand in Raglan Township, Pembroke District.

Smaller pockets and individual trees with heavy defoliation were sampled in White Township in the Algonquin Park District, in Cardiff Township in the Bancroft District, and along High Falls Road in Macaulay Township in the Bracebridge District.

Foliage severely affected by *Tubakia dryina* (Sacc.) B. Sutton was commonly observed on roadside bur oak (*Quercus macrocarpa* Michx.) across the southern portion of Pembroke and Bancroft districts.

Minor Diseases

Poplar Leaf Spot, *Marssonina populi* (Lib.) Magnus

Pockets of balsam poplar were heavily affected with this leaf spot across the entire work area. The pockets ranged in size from several trees to 2-ha patches and sustained damage levels of 50% to 90% defoliation. Virtually all host trees observed were infected.

Table 6. Other forest diseases.

Organism	Host(s)	Remarks
Ciborinia whetzelii (Seaver) Seaver Ink spot of aspen	tA	Mature and semimature roadside trees had up to 30% defoliation in Deacon, Fitzgerald, Maria and Dickens twps in Algonquin Park District.
Davisomycella ampla (J. Davis) Darker Tar spot needle cast	jP	5% of trees affected with less than 1% defoliation north of the Pickerel River, Mowat Twp, Parry Sound District.

(cont'd)

Table 6. Other forest diseases (cont'd).

Organism	Host(s)	Remarks
Endocronartium harknessii (J.P. Moore) Y. Hirats. Western gall rust	jP, scP	5-10% incidence detected throughout the Snug Harbour area of Carling Twp, Parry Sound District; 10 out of 15 trees dead in an experimental planting at PNFI in Buchanan Twp, Pembroke District.
Eutypella parasitica Davidson & Lorenz Eutypella canker	sM	100 trees examined in a 5-ha stand, eight severely stem-cankered, and 30% dieback of crowns on affected trees, in Strong Twp, Bracebridge District
Gymnosporangium globosum Farlow Globose gall rust	rCe	Low numbers of fruiting detected on open-grown trees scattered across the southern portion of Burleigh Twp, Bancroft District.
Hypoxylon mammatum (Wahlenb.) J. Miller Hypoxylon canker	tA	Of 150 trees evaluated in a 2-ha stand of 10-m trees in Somerville Twp, Minden District 6% were cankered; 40% were cankered in a 2-ha stand of immature trees in Lyell Twp, Algonquin Park District; the disease was commonly found elsewhere in stands across the Region at trace levels.

(cont'd)

Table 6. Other forest diseases (concl.)

Organism	Host(s)	Remarks
Lophodermium sp. A needle cast	rP	90% needle damage found on 4-m trees in a 1-ha plantation in Carlow Twp, Bancroft District, 30% affected on 70% of 3-m trees in a 3-ha plantation in Chaffey Twp, Bracebridge District; 25% affected on 25% of the trees in a mature 0.5-ha stand in Airy Twp, Algonquin Park District; and 20% of a 4-ha 3-year-old plantation sustained 30% damage in Brudenell Twp, Pembroke District.
Needle Droop	rP	A 13% mortality rate was detected in a 2.5-ha 1983 planting in Dalton Twp, Minden District; an additional 37% of the trees were affected with as much as 60% of the foliage damaged.

DIEBACKS AND DECLINES

Hardwood Decline

During routine travel throughout the Region, evidence was sought of hardwood decline caused by biotic or abiotic conditions. No hardwood decline that could not be explained was found.

The effects of the 1983 drought are still evident across the southern portion of the Region. Whole-tree and branch mortality are frequently encountered on the shallow, rocky sites along the edge of the Precambrian Shield. Red oak and white pine were the two species most commonly damaged across the southern portions of Bancroft, Minden and Bracebridge districts.

The extremely heavy seed crop in the Region in 1984 had a noticeable influence on the forest. Species such as yellow birch and red maple that produced little or no foliage because of the seed crop that year were found to have as much as 40% of the upper crown dead in some areas (see photo page). A pocket of approximately 100 ha of yellow birch with this type of damage was aerially detected near Round Lake in McCraney Township, Algonquin Park District and in a 20-ha area east of Elephant Lake in Harcourt Township, Bancroft District. Similar damage on single yellow birch and white birch was frequently encountered in Guilford Township, Minden District, and in Macaulay, McLean, McClintock, Bethune and Machar townships, Bracebridge District. Two areas of beech (*Fagus grandifolia* Ehrh.), each approximately 10 ha in size, one in Oakley Township in the Bracebridge District and the other in McDougall Township in the Parry Sound District, had as much as 60% of the crowns dead.

The eight sugar maple stands surveyed in the Region in 1984 for maple dieback were evaluated visually again this season. As was the case last year, no significant levels of current dieback were detected. There is a high incidence of mortality of hardwoods, especially sugar maple, along the right-of-way of Highway 11 between the towns of Bracebridge and Huntsville in the Bracebridge District. The trees are growing on very shallow, rocky sites along the highway corridor, and when the stress of the recent construction of the highway, the drought of 1983 and salt spray from winter road conditions are taken into consideration, the mortality is easily explained. Ground checks made at several locations along the highway revealed that the mortality was occurring in a very narrow band, usually less than 50 m wide.

Red Oak Decline

The annual evaluation of the three red oak monitoring plots that have been established in the Region since 1977 revealed very little change in the overall vigor of the trees this season. There was a

Table 7. Summary of the results of three semipermanent monitoring plots established in 1977 for red oak decline in the Algonquin Region (data based on the examination of a minimum of 100 host trees at each location).

Location (Twp)	Avg DBH of sample trees (cm)	Stand size (ha)	Year	Dieback classes[a] Current 0	1	2	3	4	5	Cumulative 0	1	2	3	4	5
Bracebridge District															
Macaulay	35	4	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
Pembroke District															
Alice	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
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

[a] Dieback classification: 0 = 0.5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61%+, 5 = dead tree.

ABIOTIC DAMAGE

Salt Damage

Natural regeneration eastern white pine growing along Highway 69 from Point au Baril to the French River in the Parry Sound District were heavily discolored as a result of the application of salt during the winter. Similar damage was observed on eastern white pine and red pine along Highway 11, from the town of Gravenhurst to the town of South River, in the Bracebridge District.

The damage usually resulted in only 5-10% of foliage; however, whole-tree mortality was scattered throughout the affected areas. Elsewhere throughout the Region, trace levels of salt damage could easily be found along major highways and secondary roads.

Scorch

This leaf condition was frequently encountered across the Region, with red maple being the tree species most affected. The damage occurs during periods of severe, warm, dry winds because of sudden and rapid loss of water from the leaves. Maples are particularly susceptible to leaf scorch, especially in the spring when the leaves are young and tender. Affected leaves show dead, brownish areas of their margins or between the veins, but remain alive and do not drop prematurely. The effects of this condition on the overall vigor of the tree are minimal.

A wide band of scorching extended from the north end of Muskoka Lake in the Bracebridge District, southeastward to Head Lake in Laxton Township, then easterly to the Haliburton area in the Minden District. Throughout this band, pockets of trees ranging in size from small clumps to 2 ha were affected, often with 100% of the leaves on the trees scorched. In a 0.75-ha red pine plantation in Somerville Township, Minden District, 4% of the 2-m trees were affected. The current year's foliage turned red by mid-August.

In the Bancroft District small scattered pockets were found along Highway 62 from the village of Maynooth Station to Combermere in Wicklow Township. Smaller pockets of only five or six severely affected trees were detected along the Achray Lake Road in White Township, Algonquin Park District.

Light-to-moderate damage levels were commonly observed throughout Gratton Township, Pembroke District.

Wind Damage

Following the tornadoes that occurred across south-central Ontario on 31 May, 1985, sporadic and localized wind damage was detected throughout the southern portion of the Minden District. Numerous single trees, mainly spruces and poplars, blew down during this storm, as did large branches and limbs.

A band of this type of damage extends from the southern end of the Muskoka Lakes in the Bracebridge District, southeasterly across the Minden District to the village of Buckhorn. The heaviest damage occurred in the Fenelon Falls-Bobcaygeon areas, along the north shores of Sturgeon and Pigeon lakes.

An area of some 25 ha of continuous blowdown of poplar was detected north of Club Lake in Pentland Township, Algonquin Park District. This pocket of damage was unrelated to the 31 May storm and appeared to have occurred earlier in the season.

SPECIAL SURVEYS

Red Pine Plantation Survey

As part of the annual special survey of high-value plantations to determine which forest pests are having a significant impact on man-made monocultural conifer stands, 11 red pine plantations were evaluated across the Region (Fig. 9). In all, 150 trees are examined visually at each plantation and certain insects and diseases are evaluated at two specific times during the season. Table 8 summarizes the data collected on the pests present at each location.

The redheaded pine sawfly was found at very low levels at four locations, as was the European pine shoot moth, *Rhyacionia buoliana* (Schiff.). The pine false webworm was detected at the trace level at one location only in the Minden District. The pine needle rust, *Coleosporium asterum* (Dietel) Sydow, was present at three locations, one at a moderate incidence level and two at the trace-to-low level. Scleroderris canker was found at the trace level at two locations, one in McMurrich Township, Parry Sound District (the native race) and the other in Mayo Township, Bancroft District (the European race) (see discussion, page 25).

Not found were the European pine sawfly, pine root collar weevil, a root rot, *Verticicladiella* sp., needle cast, *Lophodermium pinastri* (Schrader ex Hook) Chev., and Armillaria root rot.

Special surveys were also conducted in red pine plantations in the Region in 1979 and 1982. In 1979 pine needle rust was detected at two locations at a low level and light damage caused by Armillaria root rot was found at one location. The 1982 survey revealed the pine false webworm at low levels in two plantations; needle cast at three locations, one at a moderate level and one each in the trace and low categories; and Armillaria root rot at a trace level at one location.

Red Pine Cone Survey

A special collection of 100 semimature red pine cones was made during the first week of July at Shrinehill in Richards Township, Pembroke District. The collection was made to determine the various pests affecting green, succulent cones close to full size, in the second year of development. The cones were randomly selected from the total length of the cone-bearing crown of five 30-year-old trees. In all, 83% of the cones were found to be damaged by insect feeding. The mean seed count per sound cone was 15, whereas the mean seed count per damaged cone was only 10. Therefore, 33% of the possible total seed production in this particular stand is being lost to feeding insects.

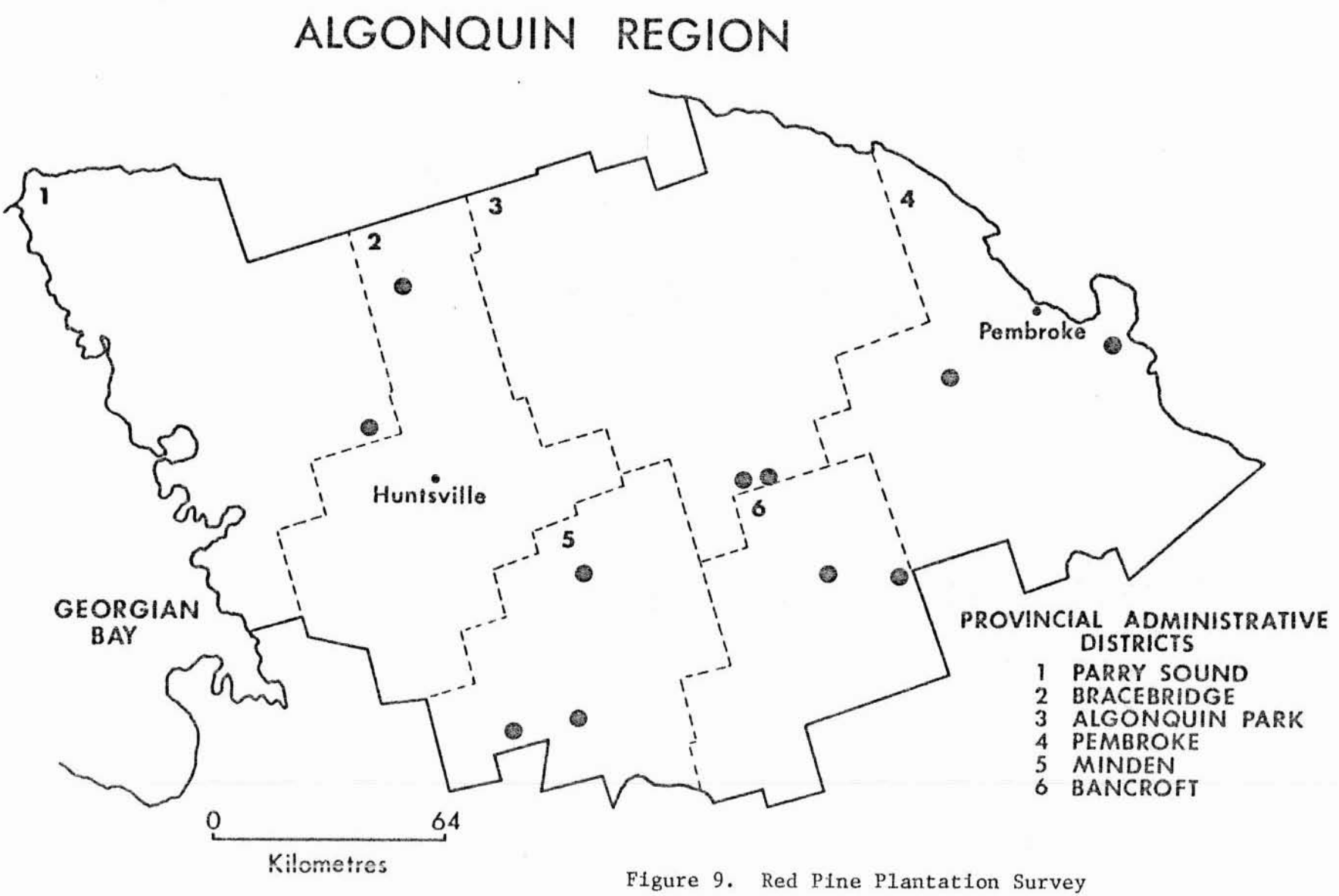


Figure 9. Red Pine Plantation Survey

Locations of plantations surveyed . . . . . ●

Forest Insect and Disease Survey
Great Lakes Forestry Centre

Table 8. Summary of the results of a red pine plantation survey conducted at 11 randomly selected locations in the Algonquin Region in 1985 (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)	Total no. of stand openings	Redheaded pine sawfly		Pine false webworm		European pine shoot moth	
					% infested	Avg no. of colonies per tree	% infested	Avg % defoliation	% infested	% leaders attacked
Algonquin Park District										
Sabine Twp	10	2,000	14.3	0	0	0	0	0	0	0
Sabine Twp	2	2,900	4.8	0	1	1	0	0	0	0
Bancroft District										
Monteagle Twp	3	2,800	0.5	0	0	0	0	0	2	0
Hayo Twp	5	2,500	4.9	0	1	1	0	0	3	1
Bracebridge District										
Strong Twp	2	2,000	12.5	2	0	0	0	0	0	0
Minden District										
Somerville Twp	20	2,200	13.0	0	0	0	0	0	0	0
Laxton Twp	8	2,000	1.4	11	4	1	0	0	1	1
Stanhope Twp	2	1,000	0.9	0	1	1	1	2	0	0
Parry Sound District										
McMurrich Twp	3	2,700	2.7	4	0	0	0	0	3	1
Pembroke District										
Hagarty Twp	8	2,800	1.1	0	0	0	0	0	0	0
Westmeath Twp	8	500	16.6	0	0	0	0	0	0	0

(cont'd)

Table 8. Summary of the results of a red pine plantation survey conducted at 11 randomly selected locations in the Algonquin Region in 1985 (counts based on the examination of 150 trees at each location) (concl.).

Location (Twp)	Estimated area of stand (ha)	Estimated no. of trees per ha	Avg ht of trees (m)	Total no. of stand openings	Pine needle rust		Scleroderris canker		Current mortality (%)
					% affected	Avg % defoliation	% affected	% Stem cankered	
Algonquin District									
Sabine Twp	10	2,000	14.3	0	0	0	0	0	0
Sabine Twp	2	2,900	4.8	0	3	3	0	0	0
Bancroft District									
Monteagle Twp	3	2,800	0.5	0	0	0	0	0	3
Mayo Twp	5	2,500	4.9	0	7	3	1	0	0
Bracebridge District									
Strong Twp	2	2,000	12.5	2	0	0	0	0	0
Minden District									
Somerville Twp	20	2,200	13.0	0	0	0	0	0	0
Laxton Twp	8	2,000	1.4	11	0	0	0	0	0
Stanhope Twp	2	1,000	0.9	0	59	4	0	0	1
Parry Sound District									
McMurrich Twp	3	2,700	2.7	4	0	0	1	0	1
Pembroke District									
Hagarty Twp	8	2,800	1.1	0	0	0	0	0	0
Westmeath Twp	8	500	16.6	0	0	0	0	0	0

The following insects were recovered from the sample and are listed in order of importance with respect to the total amount of damage in the sample attributed to that particular pest: the red pine cone beetle, *Conophthorus resinosae* Hopk., unknown insect feeding; unknown Lepidoptera; red pine coneworm, *Eucosma monitorana* Heinr.; fir coneworm, *Dioryctria abietivorella* (Grt.); and *Dioryctria* sp.

Light Trap

The annual operation of a light trap was conducted at the Petawawa National Forestry Institute at Chalk River, Pembroke District. The primary purpose of operating the light trap is to monitor the flight period of adult spruce budworm moths.

A light trap can be used to indicate that populations are present in an area and to determine when they are active. The total numbers trapped each year indicate changes in population levels.

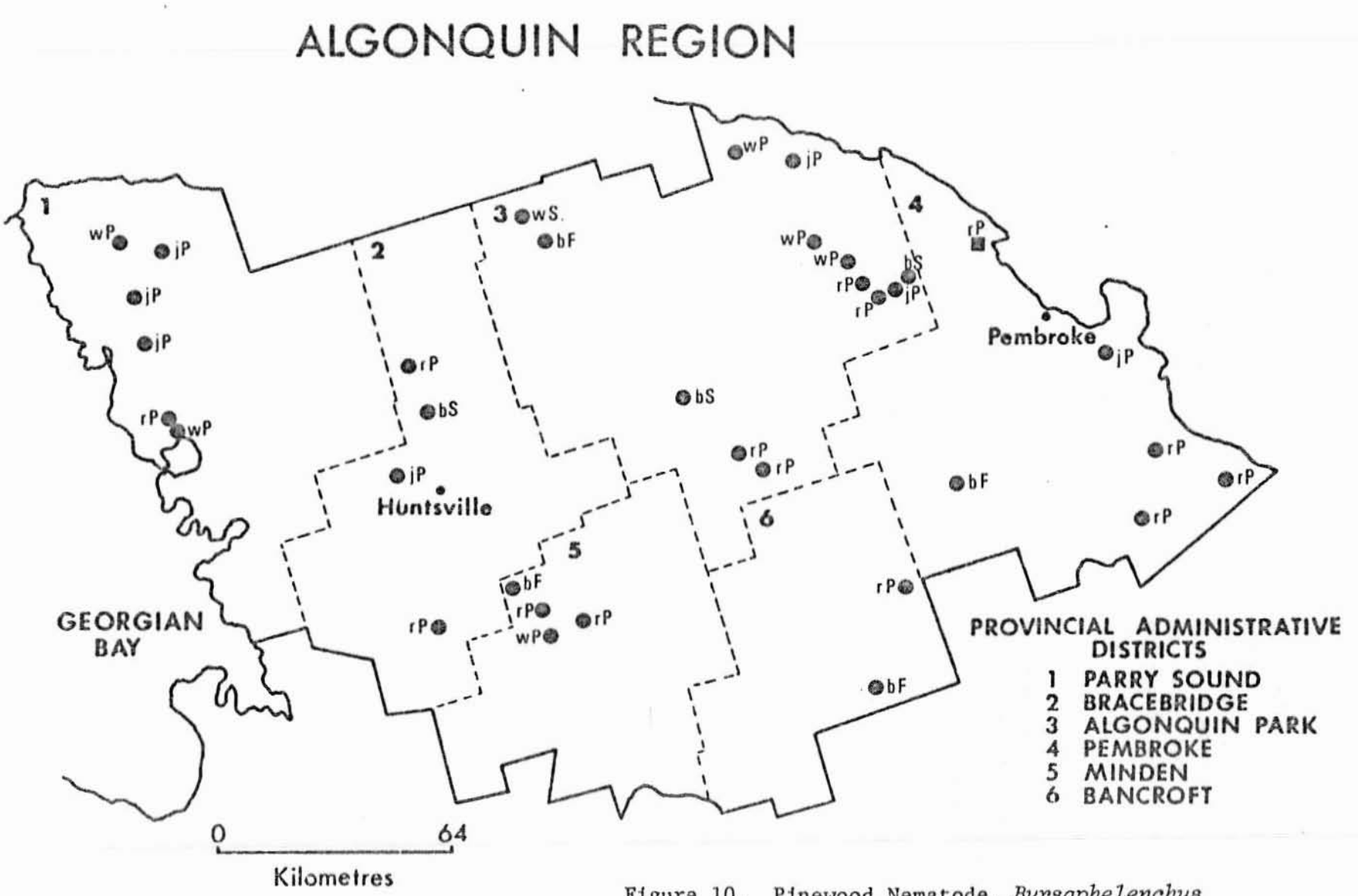
The light trap was operated every night from 20 June to 1 August. The first spruce budworm moth was collected on 6 July. The peak of the flight occurred on the same night with the capture of five moths. In 1985, 14 moths were captured. (The 1983 and 1984 counts were 2,360+ and 183, respectively.)

The light trap also captured 557 forest tent caterpillar moths in comparison with 168 in 1983 and 331 in 1984.

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

A special survey was conducted across the Region to sample recently dead or dying conifers for any evidence of this pest. In all, 35 stands were sampled, 14 red pine, 7 jack pine, 6 white pine, 4 balsam fir, 3 black spruce (*Picea mariana* [Mill.] B.S.P.) and 1 white spruce (Fig. 10). In the majority of the areas mortality was attributed to causes other than the pinewood nematode, such as root rot fungi, flooding or animal damage.

Less than a third of the samples have been completely processed, and to date the pest has been recovered only from a patch of dead red pine at the Canadian Forces Base at Petawawa in Buchanan Township, Pembroke District. In the 0.5-ha plantation of 20-m trees, approximately 20 trees were found to be completely dead. These were surrounded by an additional 30 chlorotic trees, on which the foliage was very sparse and yellow. In an attempt to control the spread of the nematode in the plantation, the CFB forestry personnel cut and burned all dead or dying trees in the plantation.



Forest Insect and Disease Survey
Great Lakes Forestry Centre

Figure 10. Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer) Nickle

Locations at which samples were taken . . . . . ●

Location of positive sample . . ■

Acid Rain National Early Warning System (ARNEWS)

Three new permanent ARNEWS plots were established in the Region this season, bringing the total number to five. Two of these plots were located in the PNFI spruce graft arboretum in the Pembroke District and one at Grundy Lake Provincial Park in the Parry Sound District (Fig. 11). The plots measure 40 m x 10 m and each tree on the plot was mapped and numbered. In addition, for each tree species that made up more than 10% of the trees on the plot, 10 trees of that particular species were numbered and located in the immediate vicinity outside the plot. These trees are referred to as *off-plot* trees.

During three visits at specifically scheduled intervals the following data were recorded on each of the on-plot and off-plot trees: the dominance, height, DBH, length and width of crown, height of crown, length of dead top if present, foliage color and size, the current and old levels of defoliation by any and all forest pests that might be present, and the magnitude of the seed crop. Six regeneration subplots, each 1 m^2, were located within the plot and all ground vegetation, including tree seedlings, occurring on the subplots, was identified and counted. Foliage samples were collected in August from the hardwoods and in September from the softwoods. The samples were air dried and are scheduled for a complete chemical analysis.

No serious pest problem was encountered on any of the plots, and overall vigor and crown conditions of the trees were good.

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 been known to play an important part in controlling insect outbreaks. Monitoring of daily weather conditions permits predictions such as the emergence of overwintering larvae or the onset of drought conditions to be made accurately. For these reasons, FIDS keeps daily and monthly averages of weather conditions on file for numerous locations across the province. Table 9 summarizes weather data for 1985 (January to December). The information was 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.

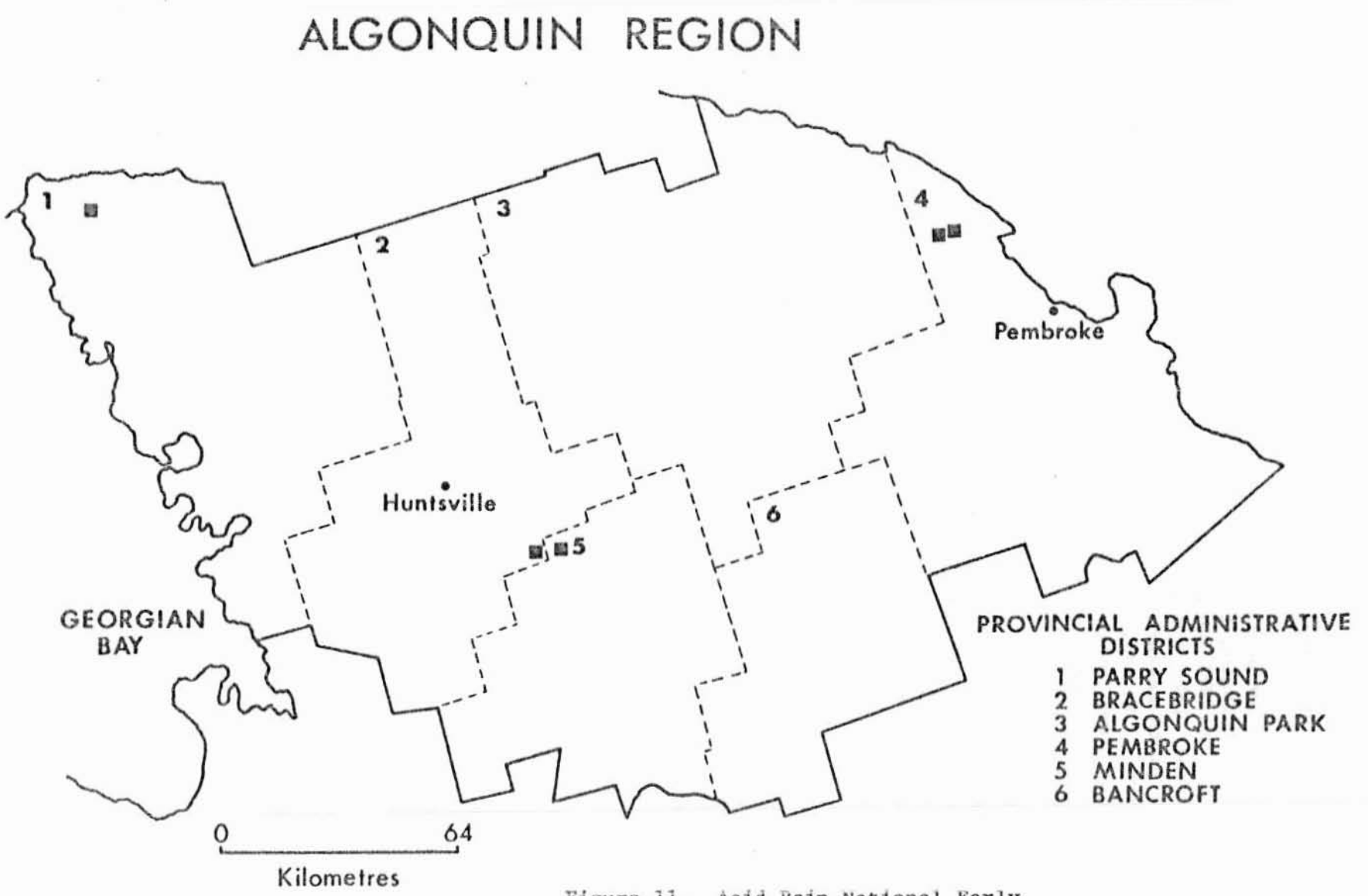


Figure 11. Acid Rain National Early Warning System (ARNEWS)

ARNEWS plot locations . . . ■

Table 9. Summary of climatic data covering the 12-month period, January to December 1985, from two locations in the Algonquin Region.

Location	Month	Mean temperature		Total precipitation	
		Actual (°C)	Normal (°C)	Actual (mm)	Normal (mm)
Bracebridge District					
Muskoka Airport	Jan.	-12.6	-10.4	86.7	85.9
	Feb.	- 7.3	- 9.6	109.1	62.4
	Mar.	- 3.2	- 3.8	106.6	66.3
	Apr.	+ 4.7	+ 4.5	113.8	73.3
	May	+11.4	+10.9	100.1	77.8
	June	+13.9	+15.9	65.6	81.9
	July	+17.6	+18.3	155.1	77.5
	Aug.	+16.6	+17.4	130.2	89.0
	Sept.	+14.3	+13.2	190.2	102.4
	Oct.	+ 7.7	+ 7.5	149.0	93.9
	Nov.	+ 0.8	+ 1.1	130.9	101.0
	Dec.	- 8.5	- 7.1	146.9	97.8
Pembroke District					
Petawawa Weather Station	Jan.	-16.1	-12.8	56.1	46.7
	Feb.	- 9.1	-11.2	51.0	51.0
	Mar.	- 3.1	- 4.6	85.2	50.5
	Apr.	+ 3.8	+ 4.2	77.0	59.6
	May	+11.1	+11.5	47.0	60.0
	June	+14.7	+16.3	63.0	87.5
	July	+17.9	+18.7	89.8	84.5
	Aug.	+17.4	+17.6	64.1	79.8
	Sept.	+14.0	+12.6	54.8	83.1
	Oct.	+ 7.1	+ 7.1	51.8	66.7
	Nov.	- 0.7	- 0.1	68.9	65.8
	Dec.	-11.6	- 9.7	60.1	64.8