

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

(FOREST DISTRICTS: HURONIA, LINDSAY,
CAMBRIDGE, MAPLE AND NIAGARA)

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SURVEY HIGHLIGHTS

This report describes the more important forest insect and disease conditions encountered in the Central Region in 1985. Populations of eastern tent caterpillar, walnut caterpillar and redheaded pine sawfly increased and new distribution points were reported for the gypsy moth. New infestations of Bruce spanworm occurred and a snout weevil was detected causing mortality of young conifer seedlings. Armillaria root rot and tip blight of Scots pine were again found at damaging levels; however, continued surveys for Scleroderris canker were negative. Tornadoes that occurred on 31 May, 1985 caused considerable blow-down.

A special survey was conducted in red pine plantations and a cone and seed pest survey was conducted, also in red pine. Special emphasis was placed on sampling recently dead conifers for pinewood nematode. The Acid Rain National Early Warning System program was continued and an additional plot was established.

The format for this report remains unchanged from that of 1985. Insects and diseases are categorized as follows:

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

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 valuable assistance and cooperation of personnel of the Ontario Ministry of Natural Resources, Agriculture Canada, other government agencies and private individuals during the 1985 field season are gratefully acknowledged.

*No minor diseases were reported in the Central Region in 1985.

H.J. Evans

R.J. Sajan

H. Brodersen

Frontispiece



Blowdown of red pine (*Pinus resinosa* Ait.)
following tornado of 31 May 1985



Larvae of oak skeletonizer, *Bucculatrix*
ainsliella Murt.

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INSECTS

Major Insects

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

In 1985, population levels of the pine false webworm continued to decline in most areas of the Region. Damage was generally much lighter and often only traces of the insect were found. The heaviest damage occurred in a red pine (*Pinus resinosa* Ait.) plantation in Harvey Township, Lindsay District, where 100% of the trees were affected with an average defoliation of 60% (Table 1).

Populations of the insect were also recorded on eastern white pine (*P. strobus* L.) and Scots pine (*P. sylvestris* L.).

Cedar Leafminers, *Arygresthia aureoargentella* Brower, *A. canadensis* Free., *A. thuiella* (Pack.) and *Pulicalvaria thujaella* (Kft.)

Damage from this complex of leafminers remains at low levels through most areas of the Region. Affected stands of white cedar (*Thuja occidentalis* L.) typically display discoloration in early summer as a result of larval feeding; however, when only lightly affected, these trees 'green up' once the growth of new foliage is complete. Notable areas of light damage occurred at points in Woolwich and Erin townships, Cambridge District; in occasional stands in the Newmarket-Aurora area, Maple District; and at numerous locations through the southern and western portions of the Huronia District. Populations were at very low levels in the Niagara and Lindsay districts.

Oak Skeletonizer, *Bucculatrix ainsliella* Murt.

Moderate and severe damage was again evident in some oak stands in the Cambridge and Niagara districts in 1985 as a result of skeletonizer feeding. Damage was most severe on red oak (*Quercus rubra* L.); however, the pest was also recorded on white oak (*Q. alba* L.) and bur oak (*Q. macrocarpa* Michx.). The insect typically causes light foliar damage in the summer but, following second-generation larval feeding in late summer and early autumn, heavier damage often results, as the damage is cumulative (see Frontispiece).

In the Cambridge District, moderate-to-heavy infestations with defoliation ranging from 50% to 90% occurred in stands of primarily red oak in the townships of North and South Dumfries, within the city of Cambridge and in the Ancaster-Dundas area. Light-to-moderate defoliation (10-30%) occurred in the Brantford and Hamilton areas of the Cambridge District and in the Richmond Hill area of the Maple District. In the Niagara District, the insect was recorded in nine of eleven stands surveyed throughout the district, where it caused varying degrees of damage. The heaviest damage, averaging 50% defoliation, occurred in

Table 1. Summary of damage caused by the pine false webworm in three districts in 1985 (counts based on the examination of 150 trees at each location)

Location (Twp)	Host	Avg ht of trees (m)	Affected area (ha)	Trees infested (%)	Foliar damage (%) ^a
<u>Huron District</u>					
Mulmur	rP	1.5	10	10	5
Tosorontio	rP	2.0	12	30	10
<u>Maple District</u>					
Albion	rP	1.4	2	30	20
<u>Lindsay District</u>					
Harvey	rP	2.5	6	100	60
Bexley	wP	6.0	10	3	1
Dummer	rP	1.7	2	7	2
<u>Cambridge District</u>					
Puslinch	wP	1.2	5	35	15

^aDamage to old foliage only

stands in West Lincoln and North Cayuga townships and in the town of Thorold.

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.

Larch Casebearer, *Coleophora laricella* (Hbn.)

The total area within which medium and heavy infestations occurred in 1985 was approximately 50 ha, a considerable reduction from the 150 ha infested in 1984. Defoliation was observed both on native tamarack (*Larix laricina* [Du Roi] K. Koch) and in plantations of Euro-

pean larch (*L. decidua* Mill.). The heaviest defoliation occurred in Reach Township, Lindsay District, where an area of European larch sustained 100% defoliation. Moderate damage (30-50% defoliation) was evident on both species in areas of Uxbridge Township, Maple District, and in Vespra and West Gwillimbury townships, Huronia District. Numerous areas of relatively light damage were reported elsewhere in the Huronia, Maple, Lindsay and Cambridge districts.

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

This insect, which was a serious defoliator of red oak in specific areas of the Region in previous years, remained at low levels in 1985. The heaviest damage recorded, with defoliation ranging up to 25%, occurred in Uxbridge Township, Maple District, and at one point in Tiny Township, Huronia District, where similar defoliation was observed in the upper crowns of a small number of trees. Elsewhere in these two districts the pest was present in most red oak stands, but damage was generally light. Even less damage occurred in the Niagara District, and there was no record of the insect in the Lindsay and Cambridge districts.

Summarized in Table 2 are the results of egg counts from 21 locations in the Region. Little change is evident since 1984 except in Uxbridge Township, Maple District, where counts are up marginally and moderate defoliation is forecast for 1986. An experimental pheromone trapping program was repeated in 1985 at the egg count locations. Results of this program and estimates of defoliation are summarized in Table 3.

Walnut Caterpillar, *Datana integerrima* G. & R.

A definite increase in numbers of walnut caterpillar occurred in the Niagara District in 1985. Most affected black walnut (*Juglans nigra* L.) trees were mature and either open-grown shade trees or windrow trees. In this district an average of 50% of all trees inspected were affected with varying but generally light (5-25%) foliar damage. Light defoliation was also recorded in Brantford Township, Cambridge District, and in the rural area of Brampton, Maple District.

Birch Leafminer, *Fenusa pusilla* (Lep.)

This pest of white birch (*Betula papyrifera* Marsh.) and other ornamental varieties of birch (*Betula* spp.) was again prevalent on shade trees throughout the entire Region. Damage was variable as many homeowners attempted some type of control measures, but regardless of these efforts, moderate and severe foliar damage was evident at many locations. Moderate-to-severe damage to naturally occurring white birch was

Table 2. Summary of oak leaf shredder egg counts and defoliation forecasts for three districts for 1985.

Location	Plot no. or property owner	Mean no. of eggs per 38-cm sample		Defoliation forecast for 1986 ^a
		1984	1985	
<u>Huron District</u>				
Awenda Provincial Park	4	1.6	4.5	L
	5	0	0.2	L
	11	0.5	0.8	L
Wildman Tract	4	1.5	0.9	L
	7	0.1	0.5	L
Midhurst	1	0.1	0	N
Orr Lake Tract	Danials	0.9	0.1	L
Hendrie	1	0.4	0.1	L
Dufferin County Forest	3	0	0.1	L
	9	0.5	0.8	L
	10	0.4	0.5	L
	95	0.2	0.4	L
	12	0	0	N
	Check plot 3	1.0	1.2	L
<u>Maple District</u>				
Uxbridge Forest	1	2.6	8.6	M
	2	9.1	12.8	M
<u>Niagara District</u>				
Town of Pelham	5	0.6	0.1	L
	7	0	0	N
Twp of West Lincoln	2	0	0	N
Town of Thorold	6	0.1	0.3	L
Twp of Cayuga	1	0	0	N

^aN = nil, L = low, M = moderate

Table 3. Results of oak leaf shredder pheromone trapping in three districts in 1985.

Location	Plot no. or property owner	Concen- tration of phero- mone (%)	Total adults captured	Avg no. per trap	1985 Defolia- tion (%)
<u>Huron District</u>					
Awenda Provincial Park	4	0.03	541	108	8
	5	0.003	96	19	3
	11	0.3	551	110	7
Wildman Tract	4	0.03	319	64	7
	7	0.3	217	43	5
Midhurst	1	0.003	8	2	4
Orr Lake Tract	Danials	0.003	88	18	10
Hendrie	1	0.003	43	9	4
Dufferin County Forest	3	0.3	35	7	4
	9	0.003	46	9	10
	10	0.03	187	37	9
	95	0.003	51	10	6
	12	0.03	3	1	9
	Check plot 3	0.3	176	35	7
<u>Maple District</u>					
Uxbridge Forest	1	0.03	823	165	25
	2	0.3	1,042	208	21
<u>Niagara District</u>					
Town of Pelham	5	0.003	53	11	1
	7	0.003	7	1	1
Twp of West Lincoln	2	0.3	27	5	1
Town of Thorold	6	0.3	273	55	1
Twp of Cayuga	1	0.3	18	4	1

evident in Medonte, Baxter, Flos and Nottawasaga townships, Huronia District, and in the Kawartha Lakes area in the northern part of the Lindsay District. Contributing to the overall damage at the locations in the Huronia District was the early birch leaf edgeminer, *Messa nana* (Klug).

Fall Webworm, *Hyphantria cunea* (Dru.)

Damage as the result of feeding by fall webworm was again prevalent in areas of the Region in 1985. Across the northern end of the Lindsay District from Highway 35 east to Lakefield, black ash (*Fraxinus nigra* Marsh.) swamps were heavily infested with the insect and defoliation ranged upwards to 100%. Heavy webbing was also noted on roadside cherries (*Prunus* spp.) in the same area. Pockets (generally less than 0.1 ha) of moderate-to-severe defoliation of black ash in low lying areas also occurred in the northern half of the Huronia District, and sustained up to 100% foliar damage. Another notable area of damage was along the Niagara Parkway, Niagara District, where an average of 12 trees per km were attacked.

In other areas of the Region, the insect and webs were common on a wide variety of deciduous hosts.

Gypsy Moth, *Lymantria dispar* (L.)

In 1985, readily discernible defoliation by the gypsy moth was recorded for the first time in the Central Region. The first area of significant defoliation was recorded in Belmont Township, Lindsay District, where approximately 10 ha of light defoliation occurred adjacent to a larger area to the north in Methuen Township, Bancroft District, Algonquin Region. A delineation and egg count survey in this area indicate that this infestation will continue in 1986 at its present level of infestation. In Belmont Township small numbers of larvae were found on roadside bur oak along Highway 7 between Havelock and Preneveau.

In the Niagara District the Forest Insect and Disease Survey Unit (FIDS) found very low populations of gypsy moth larvae in the Silver Bay Park area, Humberstone Township, near the town of Canborough, Canborough Township, and near the city of Welland, Crowland Township. Small numbers of egg masses were again noted at Silver Bay Park and in the Crystal Beach area in Bertie Township (Fig. 1).

The gypsy moth larval trapping program was carried out again in 1985, in cooperation with Ontario Ministry of Natural Resources (OMNR), in 16 provincial parks in the region. The burlap traps were placed on susceptible hosts within campgrounds and monitored routinely during the larval feeding period. Results in all instances were negative. Two pheromone traps, used to entice and trap male moths, were also deployed

in each of these parks. The results of this survey are compared with those of 1984 in Table 4. Significant catches were made at Bronte Creek, Cambridge District, and at Darlington, Emily, Mark S. Burnham and Serpent Mounds parks, Lindsay District.

Table 4. Summary of gypsy moth pheromone and burlap trappings in 1985.

Location (Park)	No. of burlap traps	No. of larvae caught	No. of pheromone traps	No. of moths caught	
				1984	1985
<u>Huron District</u>					
Awenda	10	0	2	11	1
Bass Lake	10	0	2	1	4
Devil's Glen	10	0	2	1	0
Earl Rowe	10	0	2	2	0
Mara	10	0	2	0	2
McRae Point	10	0	1	0	3
Six Mile Lake	10	0	2	3	1
Springwater	10	0	2	2	1
Wasaga Beach	10	0	2	1	1
<u>Maple District</u>					
Sibbald Point	10	0	2	3	2
<u>Cambridge District</u>					
Bronte Creek	10	0	2	15	26
<u>Lindsay District</u>					
Balsam Lake	10	0	2	2	3
Darlington	10	0	2	16	37
Emily	10	0	2	3	11
Mark S. Burnham	10	0	2	12	40
Serpent Mounds	10	0	2	4	30

CENTRAL REGION

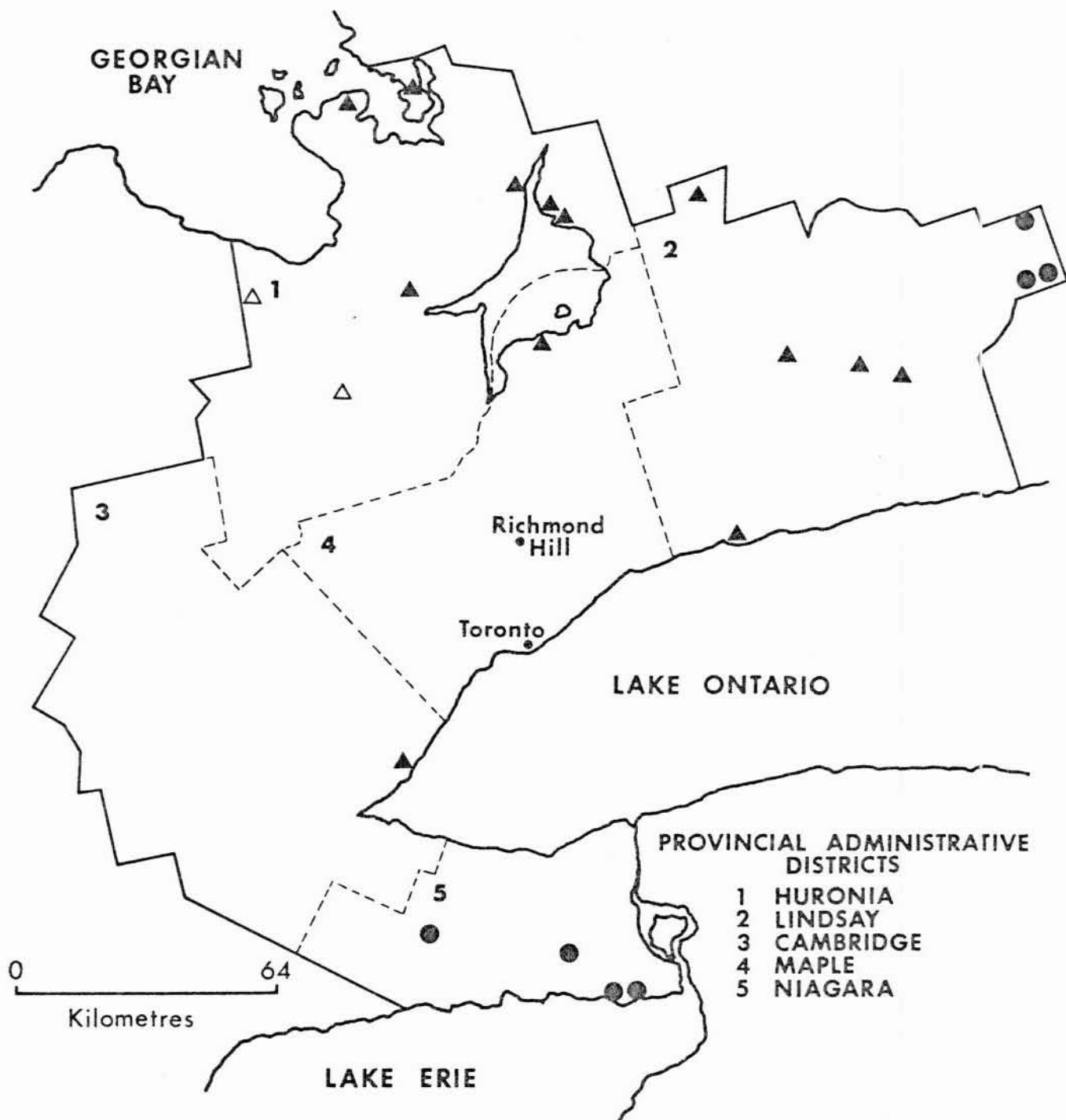


Figure 1. Gypsy Moth, *Lymantria dispar* (L.)
 Locations at which pheromone traps were deployed
 negative results \triangle
 positive results \blacktriangle
 Locations at which collections of the insect were
 made (other than male moths) \bullet

Redheaded Pine Sawfly, *Neodiprion lecontei* (Fitch)

Increased populations of this sawfly of red pine occurred at several locations in the Region in 1985. In the Huronia District foliar damage ranging from 10% to 30% occurred on small groups of plantation trees in Vespra, Rama and Mara townships. A small pocket of moderate-to-severe defoliation occurred in Flos Township where 12 trees sustained an average of 40% foliar damage. Similar damage was reported from another location in Tiny Township.

In the Lindsay District low populations of the insect occurred in Dummer Township and trace numbers were evident on nursery transplant stock at the Orono Nursery.

European Pine Sawfly, *Neodiprion sertifer* (Geoff.)

Increased populations of this early defoliator were reported from a number of areas in the Region. In Mulmur Township, Huronia District, damage to planted red pine averaged 15%, with the exception of a few individuals where recorded damage reached 90% (Table 5) (see photo page). Low numbers of this sawfly were recorded on ornamental Scots pine at the Heber Down Conservation Area, Whitby Township, Lindsay District.

Table 5. Summary of damage caused by the European pine sawfly in two districts in 1985 (counts based on the examination of 100 trees at each location).

Location (Twp)	Host	Avg ht of trees (m)	Area affected (ha)	Trees infested (%)	Foliar damage (%) ^a
<u>Huronian District</u>					
Mulmur	rP	0.8	1	20	15
Mono	rP	1.8	6	28	13
<u>Maple District</u>					
Albion	rP	1.4	1	5	10

^aDamage to old foliage only

A Snout Weevil, *Otiorhynchus raucus* (F.)

Unusually high populations of this introduced pest caused serious defoliation of recently planted red pine and white spruce (*Picea glauca* [Moench] Voss) trees near Palgrave in Albion Township, Maple District. The heaviest damage occurred in a 1-ha area that was replanted to red pine in the spring of 1985. This area was in a pocket surrounded by older plantation trees and had been site-prepared with an overspray of simazine in 1984. Feeding damage to the foliage by the adult weevil created enough stress on the newly planted trees to cause whole-tree mortality of approximately two-thirds of the planted stock. On the older red pine (which averaged 0.8 m in height) in the immediate area, foliar damage ranged up to 75%. Damage was also noted on white pine and white spruce in this area. At a nearby location in Albion Township, numerous adults were observed feeding on 4-year-old white spruce and foliar damage of about 15% occurred to 10% of white spruce Christmas trees in a plantation in Mono Township, Huronia District.

Minor Insects

Eastern Tent Caterpillar, *Malacosoma americanum* F.

Populations of this insect were at the highest levels recorded over the past several years. Unusually heavy infestations occurred, particularly in the northern parts of Lindsay and Huronia districts. In many areas, high numbers of larvae stripped roadside, open-grown and fringe trees of their foliage. Cherries were the favored hosts in most instances but willows (*Salix* spp.), apple (*Malus* spp.), white birch, red oak and trembling aspen (*Populus tremuloides* Michx.) were also affected.

Bruce Spanworm, *Operophtera bruceata* (Hlst.)

In 1985, new infestations of this looper were detected in hardwood stands in the Huronia District. The larval feeding period of this insect is in the spring when leaves of the preferred hosts, sugar maple (*Acer saccharum* Marsh.) and beech (*Fagus grandifolia* Ehrh.), are still developing. The heaviest damage occurred on a 15-ha stand of hardwood in Oro Township where the insect caused approximately 25-40% defoliation in the upper canopy of the stand. However, as in other locations, foliar damage was most severe on regeneration and suppressed trees and on the lower branches of trees in the main canopy (see photo page). Several other stands in Oro and Medonte townships sustained light foliar damage.

Maple Leafcutter, *Paraclemensia acerifoliella* (Fitch)

This late-summer defoliator of sugar maple was once again encountered at damaging levels in the Region. In the Lindsay District a 126-ha area of heavy defoliation (>75%) was aerially mapped in Belmont Township. Lighter damage, primarily on regeneration and suppressed trees, was recorded in sugar maple stands in Clarke, Haldimand and Fennelon townships, also in the Lindsay District. Similar light damage occurred on Beausoleil Island in the Huronia District. In the Cambridge District, a stand of maple on the Robertson Tract of the Halton Regional Forest has sustained moderate and severe levels of defoliation for the past several years; however, in 1985 damage was considerably reduced. Understory and regeneration trees at this location suffered 40% defoliation, while overstory trees had approximately 10-15% defoliation, down significantly from previous years.

Flat Leaf-tier, *Psilocorsis reflexella* Clem.

Severe browning of foliage by this late-season insect was evident on oaks and aspen at several locations in the Huronia and Lindsay districts. Damage was sporadic and usually confined to pockets of two or three trees in the case of oaks and generally less than 0.5 ha when aspen was affected. The heaviest damage, with defoliation of 75%, occurred to trembling aspen in Bexley Township, Lindsay District, and in Georgian Bay Township, Huronia District. Similar damage levels occurred on bur oak in the Northumberland County Forest, Hamilton Township, and on red oak in Manvers Township in the Lindsay District.

Table 6. Other forest insects.

Insect	Host(s)	Remarks
<i>Acordulecera</i> sp. Sawfly	Bu	light damage on scattered trees, Halton Regional Forest, Cambridge District
<i>Acrobasis juglandis</i> (LeBar.) Pecan leaf casebearer	Wa	low numbers through a 2-ha plantation, Puslinch Twp, Cambridge District
<i>Adelges abietis</i> (L.) Eastern spruce gall adelgid	WS	trace numbers on semimature hedgerow trees in Bertie Twp, Niagara District
<i>Agonopterix robiniella</i> Pack. Micro moth	black locust	moderate population on several trees, King Twp, Maple District

(cont'd)

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

Insect	Host(s)	Remarks
<i>Alsophila pometaria</i> (Harr.) Fall cankerworm	mM	average of 80% foliar damage to hedgerow trees, Tecumseth Twp, Huronia District
<i>Anisota finlaysoni</i> Riotte Shorthorned oakworm	wO, bO	10-20% defoliation of roadside trees in Flamborough and Blenheim twps, Cambridge District
<i>Aphrophora cribrata</i> (Wlk.) Pine spittlebug	scP	High numbers were observed on 8-m trees in Glenbrook and Flamborough twps, Cambridge District
<i>Arge pectoralis</i> (Leach) Birch sawfly	wB	small trees with up to 100% foliar damage, Georgian Bay Twp, Huronia District
<i>Argyrotaenia quercifoliana</i> Fitch Tortricid oakworm	oaks	associated with other insects at low levels in Mulmur Twp, Huronia District, and in Flamborough Twp, Cambridge District; common at trace levels in Haldimand Twp, Lindsay District
<i>Bucculatrix canadensisella</i> Cham. Birch skeletonizer	wB	trace populations recorded in previously heavily infested areas of the Huronia District
<i>Callirhytis cornigera</i> (O.S.) Horned oak gall wasp	pO	several small pockets have branch and crown mortality in the Niagara District; at one location in Bertie Twp 90% of the trees suffered an average of 15% branch mortality in a 36-ha area
<i>Cameraria hamadryadella</i> (Clem.) Solitary oak leafminer	oaks	moderate numbers causing 30% foliar damage in King Twp, Maple District, and in Esquesing Twp, Cambridge District

(cont'd)

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

Insect	Host(s)	Remarks
<i>Choristoneura pinus pinus</i> Free. Jack pine budworm	jP, rP	50% of staminate flowers with larval activity on red pine, Whitchurch Twp, Maple District; elsewhere, populations very light
<i>Coleophora tiliaefoliella</i> Clem. Basswood casebearer	Ba	trace numbers on fringe trees, Mark S. Burnham Provincial Park, Lindsay District
<i>Coleophora ulmifoliella</i> McD. Elm casebearer	elm	in association with other insects causing 70% defoliation of fringe trees in Caledon Twp, Maple District
<i>Conophthorus coniperda</i> (Sz.) White pine cone beetle	wP	retards cone development and causes premature cone drop; conspicuous damage in Angus area, Huronia District, and in Albion Twp, Maple District
<i>Cryptococcus fagisuga</i> Lindinger Beech scale	Be	This vector of beech bark disease was recorded in three stands in the Cambridge District; the disease was not found
Cynipidae Gall wasp	p0, r0	causing varying levels of crown dieback on mature trees, Bertie Twp, Niagara District
<i>Datana angusii</i> G. & R. Striped caterpillar	Hi, w0	single occurrences of colonies of this insect on Beausoleil Island, Huronia District, and in S. Cayuga Twp, Niagara District
<i>Datana ministra</i> (Dru.) Yellownecked caterpillar	Ba	80% defoliation on fencerow trees, South Monaghan Twp, Lindsay District

(cont'd)

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

Insect	Host(s)	Remarks
<i>Diprion similis</i> (Htg.) Introduced pine sawfly	wP	conspicuous damage to 5% of 1.0-m plantation trees, Rama Twp, Huronia District, and low numbers recorded on most trees at the Clairville Conservation Area, Maple District
<i>Disholcaspis</i> sp. poss. <i>spongiosa</i> (Karsch) A gall wasp	bO	low numbers on scattered mature individual trees in Bertie Twp, Niagara District
<i>Ectoedemia lindquisti</i> (Free.) Small birch leafminer	wB	moderate - to - high populations along the Georgian Bay Shoreline in Tiny Twp, and on Beausoleil Island, Huronia District
<i>Epinotia aceriella</i> (Clem.) Maple trumpet skeletonizer	sM	generally present at low levels in most maple stands across the Region; defoliation usually less than 10%
<i>Exartema nigranum</i> Heinr. Basswood leafroller	sM, Ba	low numbers on fringe trees, Mark S. Burnham Provincial Park, Lindsay District
<i>Fenusa dohrmii</i> (Tischb.) European alder leafminer	Euro-pean alder	a compartment at Orono Forest Station, Lindsay District heavily affected
<i>Fenusa ulmi</i> Sund. Elm leafminer	elm	moderate damage to roadside trees, Caledon Twp, Maple District, and in Esquesing Twp, Cambridge District
<i>Formica</i> sp. Mound ant	wP, wS	two pockets of up to 15 dead and dying 1-2 m plantation trees in Amaranth Twp, Huronia District

(cont'd)

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

Insect	Host(s)	Remarks
<i>Hylobius radicis</i> Buch. Pine root collar weevil	rP, scP	associated with mortality of 10-m red pine trees in Vespra Twp, and with Scots pine in Mulmur and Tosoronto twps, Huronia District
<i>Lepidosaphes ulmi</i> (L.) Oystershell scale	ash	approximately 5% of nursery stock with heavy infestations on main stem, Mono Twp, Huronia District
<i>Malacosoma disstria</i> Hbn. Forest tent caterpillar	deciduous	Very low but significant increase in numbers occurred at several points in the Lindsay, Huronia and Maple districts
<i>Messa nana</i> (Klug) Early birch leaf edgeminer	wB	an estimated 40% defoliation of scattered trees on the Robertson Tract, Halton Regional Forest, Cambridge District
<i>Neodiprion pratti paradoxicus</i> Ross Jack pine sawfly	jP	a single ornamental with over 60% old foliar damage, Humberstone Twp, Niagara District
<i>Nephoteryx subfuscella</i> Rag. Striped sumac leafroller	Sumac	heavy damage (more than 75%) at several locations in Maple and Huronia districts
<i>Neuroterus exiguissimus</i> Bass. and <i>N. vernus</i> Gill. Gall wasps	bO	dwarfed and distorted foliage at low levels along the Niagara Parkway, Niagara District
<i>Oligonychus ununguis</i> (Jac.) Spruce spider mite	European larch	30% foliar damage to half the trees in a 1-ha plantation in Adjala Twp, Huronia District
<i>Petrova albicapitana</i> (Busck) Northern pitch twig moth	jP	moderate numbers in Flam- borough Twp, Cambridge District

(cont'd)

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

Insect	Host(s)	Remarks
<i>Pineus similis</i> (Gill.) Ragged spruce gall adelgid	bS	low numbers on potted seed orchard stock, Orono Forest Station, Lindsay District
<i>Pissodes approximatus</i> Hopk. Northern pine weevil	conifers	infested ornamentals found at two locations in the Huronia District
<i>Pissodes strobi</i> (Peck) White pine weevil	wP	33% leader damage in Orillia Twp, Huronia District, 18% in Albion Twp, Maple District, and 17% at Balsam Lake Provincial Park, Lindsay District
<i>Podapion gallicola</i> Riley Pine gall weevil	rP	continues to cause branch mortality and contribute to whole-tree mortality at several locations in the Northumberland County Forest, Haldimand Twp, Lindsay District
<i>Pristiphora erichsonii</i> (Htg.) Larch sawfly	tL, larch	Populations remain at very low levels across the Region.
<i>Pristiphora geniculata</i> (Htg.) Mountain-ash sawfly	Mo	Varying degrees of damage were recorded on ornamentals throughout the Region.
<i>Profenusa lucifer</i> (Ross) Oak leafmining sawfly	bO	moderate damage to a small group of ornamentals in Barrie, Huronia District
<i>Pseuderxentera cressoniana</i> Clem. Oak olethreutid leafroller	bO	caused 20% foliar damage to roadside trees in conjunction with other insects in Flamborough Twp, Cambridge District
<i>Psilocorsis cryptolechiella</i> (Cham.) & <i>P. quercicella</i> Clem. Oak leaftiers	oak	populations and damage to oak reduced to low levels

(cont'd)

Table 6. Other forest insects (concl.)

Insect	Host(s)	Remarks
<i>Psilocorsis</i> sp. Leaftier	Be	conspicuous browning of foliage, Erin Twp, Cambridge District
<i>Rhyacionia buoliana</i> (Schiff.) European pine shoot moth	rP	70% of 1.5-m trees affected, with 20% leader damage in a plantation in Wilmot Twp, Cambridge District
<i>Scolioneura betuleti</i> (Klug) A birch edgeminer	birch	Moderate damage recurred on roadside trees, King Twp, Maple District.
<i>Tetralopha asperatella</i> (Clem.) Maple webworm	sM	Populations remain at low levels across the Region.
<i>Zelleria haimbachi</i> Busck Pine needle sheathminer	jP	medium population levels in a small stand in W. Gwillimbury Twp, Huronia District



Damage caused by the
European pine sawfly,
Neodiprion sertifer (Geoff.)

Damage caused by the Bruce spanworm,
Operophtera bruceata (Hlst.)



TREE DISEASES

Major Diseases

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

The occurrence of this disease increased significantly over previous years. Areas of dead and dying trees were evident at a number of locations and particularly notable damage occurred to semimature and mature red pine plantation trees. In the Huronia District red pine was affected on the Main Tract of the Dufferin County Forest and on the Orr Lake, Hendrie, Waverley and Tottenham tracts of the Simcoe County Forest. Mortality of red pine was also evident on the Patterson Tract of the York Regional Forest and on the West and Main tracts of the Durham Regional Forest in the Maple District. In the Lindsay District two areas of *Armillaria*-killed trees were found on 13-m-tall red pine in Cartwright Township, and a young plantation of 1.8-m-tall trees in Clarke Township had a current mortality rate of 2%.

Other tree species were also found damaged by this disease in 1985. In Tiny Township, Huronia District, the root rot was associated with mortality of red oak and of Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) Christmas trees. Scots pine Christmas trees were damaged by the disease in association with the pine root collar weevil in Mulmur Township, also in the Huronia District. Recently dead red oak with this disease organism were detected in Uxbridge Township, Maple District, and in Clarke Township, Lindsay District.

Research on *Armillaria* root rot is being conducted in the Central Region and elsewhere. There is evidence that more than one species of the genus *Armillaria* may be involved and different strains of the fungus may occur. The incidence of *Armillaria* can be reduced if the vigor of the stand is maintained by providing optimum spacing. Salvage of affected trees should be prompt before advanced rot renders the wood useless.

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

Surveys were conducted for the eighth consecutive year for the European race of *Scleroderris* canker disease. In all, 39 susceptible pine stands in the Region were examined for the presence of the fungus (Fig. 2). To augment these ground surveys, an aerial reconnaissance of concentrated areas of conifer plantations was performed and subsequent ground checks were carried out where branch flagging, off-color or dead trees were visible. Results in all instances were negative for both the European and the North American races of the disease.

CENTRAL REGION

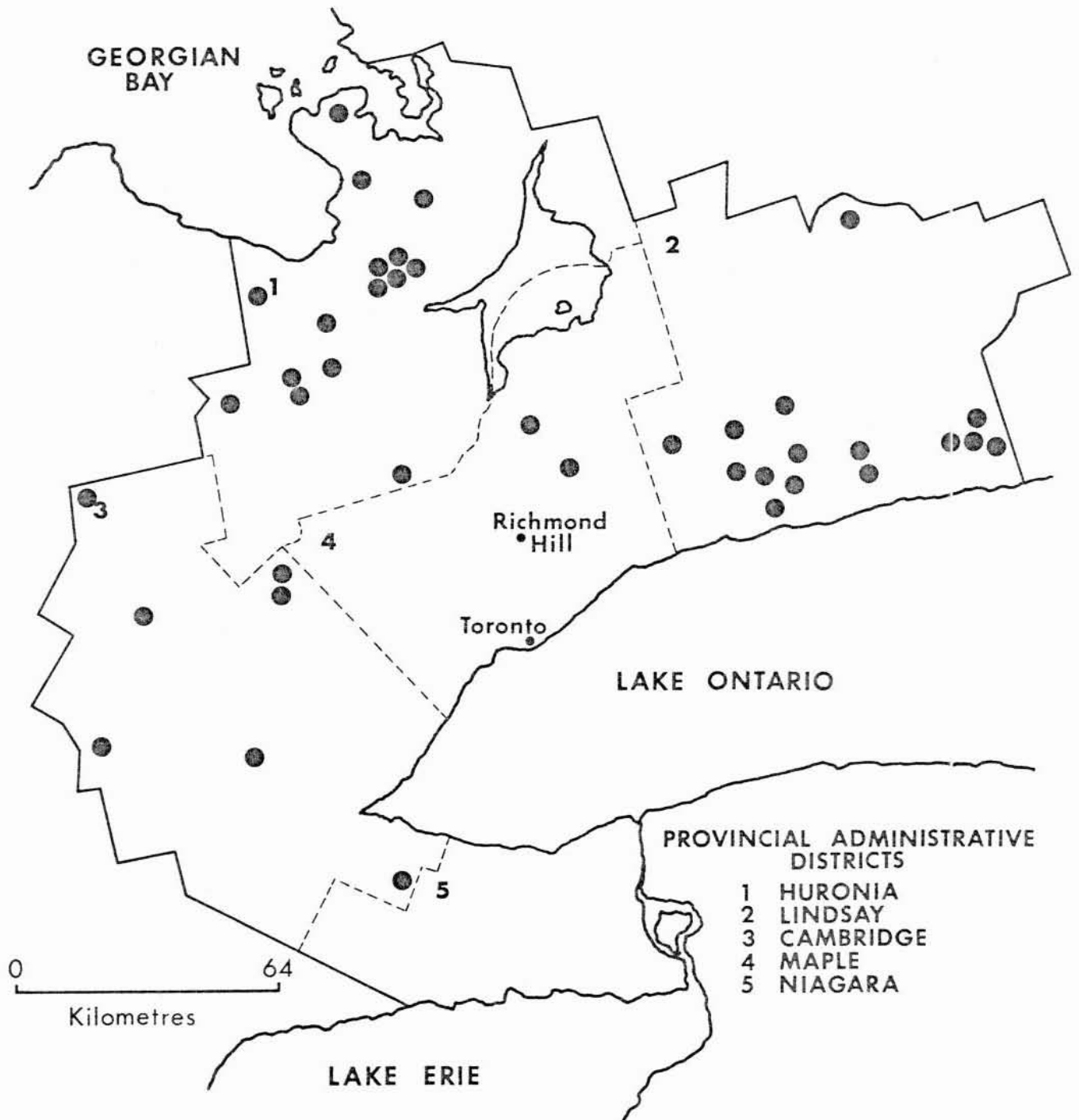


Figure 2. Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer Bernhard
Locations at which pine (*Pinus* spp.) plantations were surveyed to determine the presence of the European race of this disease in 1985
negative results ●

In areas of the Algonquin Region, the North American race has been present for several years. In 1985 for the first time the European race was detected from three locations in this Region. All infected material was burned at these sites to hopefully abate any spread of the fungus from these areas.

Tip Blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton

This disease continues to cause tree mortality and devastate Scots pine stands in both the Cambridge and the Maple districts. Stands affected are typically semimature, in the 8- to 12-m height category, and have reached the cone-bearing age.

In the Cambridge District, mortality counts revealed 66% of the trees dead in a stand in Puslinch Township and 50% dead in another stand in the adjacent township of Beverly. In both areas numerous living trees were on the verge of dying.

The incidence of the disease in the Maple District has caused OMNR to initiate a stand conversion program in heavily affected plantations. To date approximately 48 ha of Scots pine have been clear cut in Whitchurch Township to make way for the planting of other tree species.

The tip blight was also collected from ornamental Austrian pine (*Pinus nigra* Arnold) along the Niagara Parkway in the city of Niagara Falls, Niagara District. All 10 trees examined were lightly damaged.

Table 7. Other forest diseases.

Organism	Host(s)	Remarks
<i>Apiognomonia quercina</i> (Kleb.) Höhnelt Anthracnose	wO, bO	medium-to-heavy infections, with defoliation ranging from 30% to 75%, occurred in Baxter, Matchedash, Medonte and Orillia twps, Huronia District
<i>Aureobasidium apocryptum</i> (Ell. & Ev.) Hermanides-Nijhof Anthracnose	Sy	foliar damage of 10% in a 1-ha area on the Niagara Parkway, Niagara District
<i>Cenangium ferruginosum</i> Fr.:Fr. Twig blight	AusP	associated with top mortality of ornamentals, Mulmur Twp, Huronia District

(cont'd)

Table 7. Other forest diseases.

Organism	Host(s)	Remarks
<i>Cercospora microsora</i> Sacc. Leaf spot	Ba	Moderate damage (up to 40% defoliation) occurred to young trees in Flamborough Twp, Cambridge District.
<i>Ceratocystis ulmi</i> (Buism.) C. Moreau Dutch elm disease	elm	an average of 5% of young regeneration affected in the southern part of the Niagara District in the rural areas
<i>Coleosporium asterum</i> (Dietel) Sydow Pine needle rust	rP	up to 13% foliar damage at four of six plantations surveyed; an average of 20% foliar damage on ornamentals at the Heber Down Conservation Area, Whitby Twp, Lindsay District
<i>Diplodia juglandis</i> Fr. Diplodia canker	Wa	associated with twig dieback in a 1-ha area of severe accumulated dieback, Newmarket, Maple District
<i>Discula umbrinella</i> (Berk. & Morelet) Anthracnose	sM	light damage common on fringe and roadside trees through the Maple, Cambridge and Niagara districts
<i>Gnomonia leptostyla</i> (Fr.) Ces. & de Not. Anthracnose	Wa, Bu	Heavy defoliation (up to 100%) occurred in many areas, particularly to butternut (<i>Juglans cinerea</i> L.) in the Lindsay District and to walnut in the Cambridge District.
<i>Guignardia aesculi</i> (Peck) Stewart Leaf blotch	horse chest-nut	Moderate-to-severe infections were common on ornamentals in much of the Region.

(cont'd)

Table 7. Other forest diseases (cont'd).

Organism	Host(s)	Remarks
<i>Heterobasidium annosum</i> (Fr.) Bref. Fomes root rot	rP	several pockets of mortality in a stand in Tosorontio Twp, at one point in Mulmur Twp, Huronia District, and two small pockets in Cartwright Twp, Lindsay District
<i>Inonotus tomentosus</i> (Fr.) Gilbertson Root and butt rot	WS	fruiting bodies of this fungus common in a pocket of 25 dead and declining trees at CFB Borden and near declining hedgerow trees at the Midhurst Forest Station, Huronia District
<i>Leptostroma</i> sp. Needle cast	rP	associated with severe damage to one compartment of rising 2-0 stock at the Midhurst Forest Station, Huronia District
<i>Lophodermium</i> sp. Needle cast	rP	Approximately 10% of rising 2-0 and 3-0 stock were affected in two compartments at the Orono Forest Station, Lindsay District; foliar damage of 42% on 60% of 8-m trees in Vespra Twp, Huronia District
<i>Marssonina populi</i> (Lib.) Magnus Leaf spot	bPo	Foliar damage levels of 50% to 90% were common throughout the Lindsay District.
<i>Meria laricis</i> Vuill. Larch needle cast	Euro-pean larch	Trace amounts of damage occurred in Flamborough Twp, Cambridge District.
<i>Microstroma juglandis</i> (Bereng.) Sacc. White mold	sHi	trace-to-light foliar damage in a 1-ha area, Stamford Twp, Niagara District

(cont'd)

Table 7. Other forest diseases (concl.).

Organism	Host(s)	Remarks
<i>Mycosphaerella populicola</i> G.E. Thompson Leaf spot	bPo	caused browning and premature drop of foliage in areas of the Maple, Cambridge and Huronia districts
<i>Tubakia dryina</i> (Sacc.) B. Sutton	wO, bO	associated with oak anthracnose in the northern part of Huronia District
<i>Uncinula flexuosa</i> Peck Powdery mildew	Ohio buckeye	trace amounts of damage in North Dumfries Twp, Cambridge District
<i>Verticillium albo-atrum</i> Reinke & Berth. Verticillium wilt	sM	light infection recorded in an ornamental planting, Puslinch Twp, Cambridge District

DIEBACKS AND DECLINES

Maple Dieback

In 1984, seven sugar maple stands in the Region were examined for *Eutypella* canker, *Eutypella parasitica* Davidson & Lorenz, and within these stands individual tree crowns were rated for both current and cumulative dieback. All of these stands were revisited in 1985 and visually observed for any significant change in stand character. Upon re-examination it was concluded that all the stands were in a similar condition to that of 1984, when no abnormal amount of dieback was found.

Oak Decline

Plots were established in 1977 to monitor decline and dieback of red oak in the Huronia, Maple and Lindsay districts. The results of accumulated crown deterioration are listed in Table 8. In general, a gradual recovery in the crowns of most trees is indicated, although recent single-tree mortality occurred on three of the five plots in 1985. All of these trees were affected by *Armillaria* root rot. Current dieback was also rated on the plot trees, but this was either absent or insignificant. Elsewhere in the Region no new areas of oak decline were detected.

Table 8. Summary of oak decline at five locations in the Central Region from 1977 to 1984.

Location	Avg DBH (cm)	Avg ht (m)	Year	Percentage of crown dead				No. of trees dead	Oak leaf shredder activity ^a
				0-20 - - -	21-40 No. of trees	41-60 - - -	>60 - - -		
<u>Huron District</u>									
Tiny Twp Awenda Provincial Park	25.9	21.9	1977	54	7	27	12	0	T ^b
			1978	48	5	22	6	4	T ^b
			1979	58	9	3	4	8	T ^b
			1980	61	8	4	4	8	T
			1981	57	14	2	3	8	T
			1982	63	9	1	3	8	T
			1983	61	11	2	2	9	T
			1984	62	9	4	1	9	T
			1985	66	9	0	1	9	T
Tiny Twp Farlain Lake	26.0	22.0	1977	- - - - -	not	sampled	- - - - -		S
			1978	- - - - -	not	sampled	- - - - -		S
			1979	- - - - -	not	sampled	- - - - -		S
			1980	0	4	45	25	26	S
			1981	0	11	35	25	29	L
			1982	7	30	22	9	32	L
			1983	11	32	19	5	33	L
			1984	31	25	6	5	33	T
			1985	49	12	3	1	34	T
Mulmur Twp Dufferin County	28.2	21.0	1977	64	15	20	1	0	S
			1978	64	15	19	1	1	L ^b
			1979	68	15	15	1	1	T
			1980	57	28	13	1	1	L
			1981	43	34	16	2	1	M
			1982	44	39	10	1	2	M ^b
			1983	48	33	11	2	2	L ^b
			1984	53	33	6	0	4	T
			1985	71	19	2	0	4	T

(cont'd)

1977	2	26	17	100	20	1
1978	1	35	24	100	20	1
1979	2	52	29	100	20	1
1980	26	10	1	100	10	1
1981	28	15	1	100	11	1

Table 8.1 Summary of oak decline at five locations in the Central Region from 1977 to 1984 (concl.).

Location	Avg DBH (cm)	Avg ht (m)	Year	Percentage of crown dead				No. of trees dead	Oak leaf shredder activity ^a
				0-20 - - -	21-40 No. of trees	41-60 - - -	>60 - - -		
<u>Maple District</u>									
Uxbridge Twp Durham Forest	26.1	21.2	1977	42	9	31	18	0	M
			1978	42	9	31	11	7	L
			1979	40	13	26	6	15	M
			1980	38	14	25	7	16	L ^b
			1981	27	22	26	6	19	L
			1982	29	33	12	6	20	M
			1983	33	31	9	4	23	M
			1984	40	27	6	3	24	L
1985	53	7	4	1	25	L			
<u>Lindsay District</u>									
Clark Twp Durham Ganaraska	22.9	20.6	1977	38	11	32	19	0	L
			1978	4	36	39	13	8	L
			1979	3	32	41	16	8	L
			1980	2	26	47	16 ^c	9 ^c	L
			1981	2	26	47	16 ^c	9 ^c	T
			1982	1	32	44	14 ^c	9 ^c	N
			1983	5	57	26	3	9	N
			1984	76	10	2	2	10	N
1985	66	19	2	2	11	N			

^a N = nil, T = trace, L = light, M = moderate, S = severe

^b aerially sprayed for control of oak leaf shredder

^c data correction for years 1980-1982

ABIOTIC DAMAGE

Tornado and Wind Damage

The much-publicized tornadoes that occurred in the Central Region on 31 May, 1985 seriously damaged forested and urban areas (see Frontispiece). Treed areas within the path of the tornadoes were severely affected, as considerable stem breakage, blowdown and uprooting resulted from the storm. Whole stands were levelled in the most heavily affected areas. All species of trees in all age classes under all site conditions were affected.

The majority of damage occurred in the Huronia District. Here, two parallel paths of destruction were evident. The first tornado started in the vicinity of the village of Corbetton and tracked eastward through Melancthon and Mulmur townships. It then caused spot damage in Tosorontio, Essa and Innisfil townships before smashing into the city of Barrie. The total forested area damaged along this path amounted to approximately 245 ha. The second tornado started west of Grand Valley, caused considerable property damage to that village, then proceeded eastward in a more or less continuous line through Amaranth, Mono, Adjala, Tecumseth and West Gwillimbury townships. Timbered land damaged in this path of destruction totalled about 460 ha.

In the Cambridge District another tornado resulted in blowdown on approximately 20 ha of forest cover. This storm started in Peel Township and tracked southeastward across Belwood Lake in West Garafraxa Township. An area of 4 ha of white spruce plantation on the Cumnock Tract of the Wellington County Forest was levelled by this blow.

Further to the east in Lindsay District damage occurred in small pockets or to individual trees. The most severe damage was through the Fenelon Falls-Bobcaygeon area but scattered areas of damage extended as far as the east end of Rice Lake.

Table 9. Other abiotic damage.

Type of damage	Host(s)	Remarks
Late spring frost damage	hybrid poplar	average of 2 shoots per stool affected on 75% of the stools at Orono Forest Station, Lind- say District

(cont'd)

Table 9. Other abiotic damage (concl.).

Type of damage	Host(s)	Remarks
Salt damage	conifer	Varying degrees of damage were evident along most major highways of the Region, with conifers sustaining the most obvious damage; particularly heavy discoloration occurred to pines along highways 115 and 35 in the Lindsay District.
Winter drying	rP, wP	Conspicuous damage occurred in the Kitchener area, Cambridge District and in King Twp, Maple District; a single young red pine plantation had 67% foliar damage on 6% of the trees in Mulmur Twp, Huronia District.

SPECIAL SURVEYS

Red Pine Plantation Survey

In 1985, six red pine plantations in the Central Region were examined for the presence of insect and disease pests. Two visits were made to each of the plantations to provide for differences in the seasonal occurrences of the pest organisms. The first visit was scheduled between 3 and 21 June and the second was between 29 July and 31 August. Two plantations in each of three height categories, <2 m, 2-6 m and >6 m, were examined.

The eastern pine shoot borer, *Eucosma gloriola* Heinr., the pine false webworm, and the European pine sawfly occurred at three of the six locations; however, damage was light in all instances. Pine needle rust was present at four locations, with foliar damage ranging from 2% to 13%. The most significant damage was caused by the European pine shoot moth at one location where 70% of the trees were infested, and by the needle cast, *Lophodermium* sp., which occurred on 60% of the trees at another location. Overall results did not significantly differ from those of a similar survey conducted in 1982, except for the aforementioned damage from shoot moth and needle cast. Results of the 1985 survey are summarized in Table 10.

Other instances of damage were the result of mammal girdling at the butt, which caused 3% mortality at the Wilmot plantation; winter drying at the Mulmur location resulted in 67% defoliation on 6% of the trees; and jack pine budworm was present on about 50% of the male staminate flowers at the Whitchurch plantation.

Organisms that were specifically searched for but were not present included the pine root collar weevil, redheaded pine sawfly, *Armillaria* root rot, *Scleroderris* canker and black root stain, *Verticicladiella procera* Kendr.

Red Pine Cone and Seed Survey

Surveys of cone and seed pests were continued in 1985. Red pine was the host species and samples were submitted to FIDS laboratory personnel for detailed analysis. Samples of second-year immature cones were taken in early July at Seed Production Areas on the Lynn Tract of the Simcoe County Forest in Oro Township, Huronia District, and at the Orono Forest Station, Clarke Township, Lindsay District. Results of this survey are listed in Table 11.

Table 10. Summary of the results of a red pine plantation survey carried out in the Central Region in 1985.

Location (Twp)	Area (ha)	Avg ht of trees (m)	Esti- mated no. of trees/ ha	European pine sawfly	Eastern pine shoot borer	European pine shoot moth		Pine false webworm		Pine needle rust		Needle cast	
				Trees affected (%)	Trees affected (%)	Trees with laterals affected (%)	Trees with leaders affected (%)	Trees affected (%)	Foliar damage (%)	Trees affected (%)	Foliar damage (%)	Trees affected (%)	Folia damage (%)
<u>Cambridge District</u>													
Wilmot	10	1.5	2,000	1	2	70	20	0	0	29	12	0	0
Fuslinch	20	3.4	2,000	6	1	4	0	4	2	55	13	0	0
<u>Maple District</u>													
Whitchurch	7	7.5	2,000	2	2	0	0	2	1	7	5	0	0
<u>Huronia District</u>													
Vespra	6	8.3	2,000	0	0	0	0	0	0	0	0	60	42
Mulmur	11	0.6	2,500	0	0	0	0	2	5	2	2	0	0
<u>Lindsay District</u>													
Clarke	7	4.8	2,500	0	0	0	0	0	0	0	0	0	0

Table 11. Summary of red pine cone and seed surveys at two locations in the Central Region in 1985.

Location	Cones		Seeds
	Sound (%)	Damaged (%)	Loss in damaged cones (%)
<u>Huron District</u>			
Lynn Tract	19	81	44
<u>Lindsay District</u>			
Orono Forest Station	6	94	39

The primary cause of damage at both locations was the red pine coneworm, *Eucosma monitorana* Heinr., followed by the webbing coneworm, *Dioryctria disclusa* Heinr. Other agents responsible for damage at the Lynn Tract, in order of importance, were: the disease tip blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton; a small midge of the genus *Resseliella*; the red pine cone beetle, *Conophthorus resinosae* Hopk.; followed by damage by unidentifiable Lepidoptera insects. At the Orono location other damage to the cones, in order of importance, was attributed to the following: another species of the genus *Dioryctria*; unknown Lepidoptera insects; and the fir coneworm, *Dioryctria abietivorella* (Grt.)

Surveys for Pests Found in Adjoining Provinces

Surveys were again conducted for pests that occur in neighboring jurisdictions, but have not yet been found in Ontario. One of these is the European race of Scleroderris canker referred to previously in this report. Another is the birch casebearer, *Coleophora serratella* (L.), which has caused extensive damage to birches and alders (*Alnus* spp.) in the provinces east of Ontario but has yet to be confirmed from Ontario. In 1985, casebearers were submitted from six locations in the Region; however, these were not identified as the birch casebearer but as sibling species of the genus *Coleophora*. These were the lesser birch casebearer, *C. comptoniella* (McD.); the elm casebearer, *C. ulmifoliella* McD.; and the cherry casebearer, *C. pruniella* Clem.

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

The pinewood nematode has now been positively identified from samples taken at three locations in the Central Region. In addition to the collection made last year from the North Tract of the York Regional Forest, Maple District, this nematode was confirmed from a private red pine plantation near Port Perry, Lindsay District, and from a location on Simcoe County Forest property in Vespra Township, Huronia District. As part of a provincewide sampling program, 36 samples were taken in the Central Region in 1985. A few of these have been processed as negative but the majority are still in the process of identification. Figure 3 depicts locations of positive, negative and pending instances of the pinewood nematode.

Acid Rain National Early Warning System (ARNEWS)

In 1984, a national program to detect acid rain damage on forested areas was initiated by FIDS. At that time a study plot was established in a sugar maple stand in Oro Township, Huronia District. A second study plot was established in a white pine plantation in Erin Township, Cambridge District, in 1985. These two plots were monitored three times during the field season to obtain baseline data on mensuration, ground vegetation and regeneration in addition to information on incidence of insect and disease attack and specific acid rain symptoms. Foliar samples were collected for laboratory chemical analysis and increment cores were taken for growth pattern studies.

Preliminary results are not available at this time.

Climatic Data

Weather has an important effect on the development and occurrence of both forest insects and diseases. It can also be instrumental in the rise and decline of pest populations and is directly responsible for abiotic damaging conditions to trees such as winter drying, late spring leaf scorch and frost. Two of the most common standards of weather recording are measurements of temperatures and precipitation. Table 12 provides monthly summaries for these measurements for 1985 and compares them with normals for two locations in the Central Region.

CENTRAL REGION

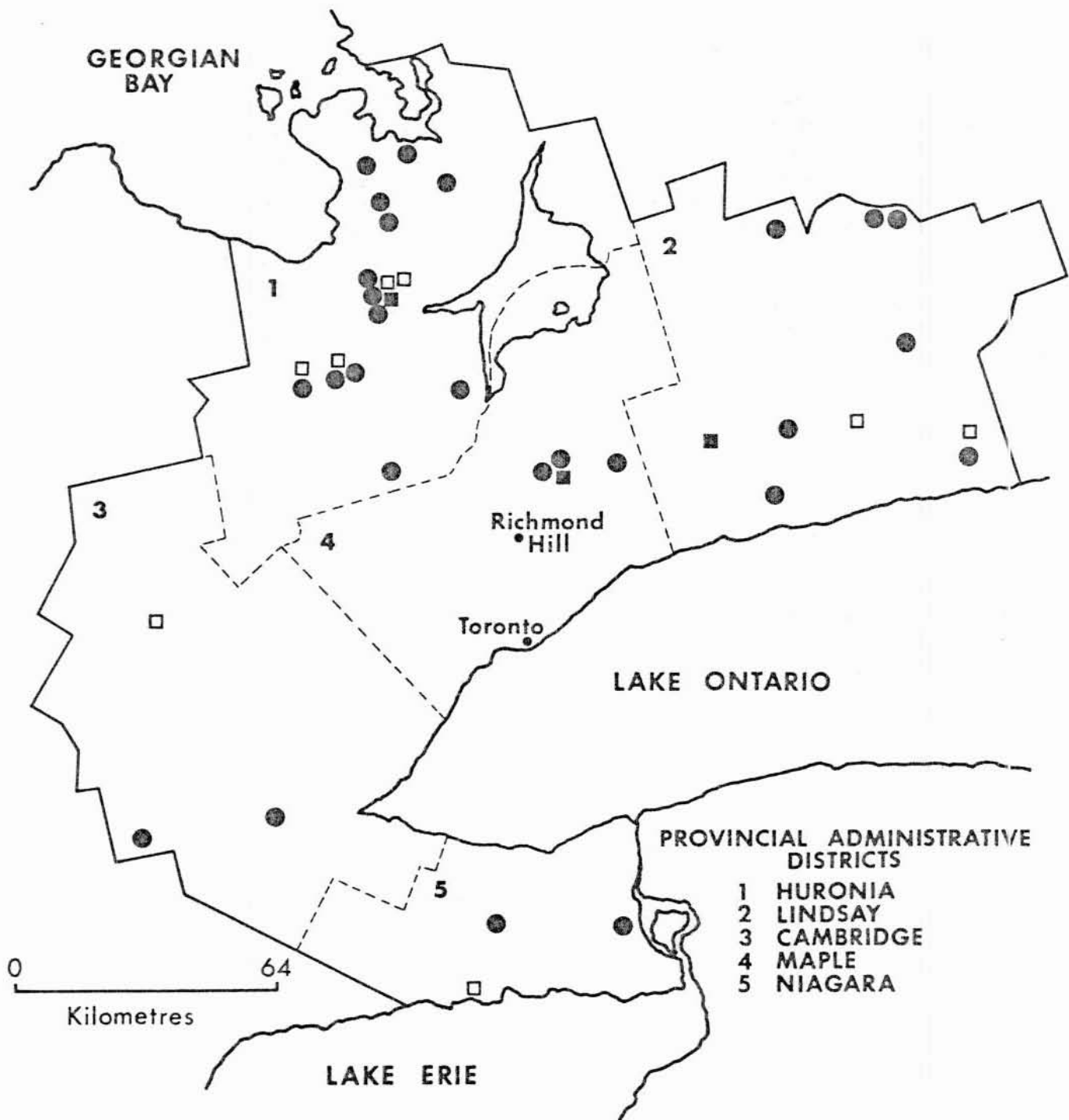


Figure 3. Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer) Nickle

Positive■
Negative□
Pending●

Table 12. Summary of mean temperature and total precipitation at two locations in the Central Region in 1985^a.

Location	Month	Mean temperature (°C)		Deviation from normal (°C)	Total precipitation (mm)		Deviation from normal (mm)
		Normal ^b	Actual		Normal ^b	Actual	
Peterborough Airport	January	-9.3	-10.8	-1.5	44.1	61.3	+17.2
	February	-8.5	-7.4	+1.1	48.9	113.3	+64.4
	March	-2.5	-1.1	+1.4	62.9	78.6	+15.7
	April	6.0	6.6	+0.6	71.8	41.1	-30.7
	May	12.1	12.2	+0.1	57.1	119.1	+62.0
	June	16.8	14.6	-2.2	60.4	47.2	-13.2
	July	19.2	18.0	-1.2	77.9	71.8	-6.1
	August	18.1	17.2	-0.9	74.2	131.2	+57.0
	September	14.0	15.0	+1.0	72.9	77.8	+4.9
	October	7.9	8.1	+0.2	59.9	82.1	+22.2
	November	2.1	1.8	-0.3	69.4	154.3	+84.9
	December	-6.0	-7.1	-1.1	74.3	49.8	-24.5
Lester B. Pearson International Airport	January	-6.7	-8.4	-1.7	50.4	76.6	+26.2
	February	-6.1	-5.8	+0.3	46.0	83.1	+37.1
	March	-1.0	0.3	+1.3	61.1	78.6	+17.5
	April	6.2	7.4	+1.2	70.0	33.1	-36.9
	May	12.3	13.1	+0.8	66.0	75.9	+9.9
	June	17.7	15.7	-2.0	67.1	37.3	-29.8
	July	20.6	19.6	-1.0	71.4	91.5	+20.1
	August	19.7	19.4	-0.3	76.8	152.2	+75.4
	September	15.5	17.0	+1.5	63.5	57.6	-5.9
	October	9.3	9.4	+0.1	61.8	52.3	-9.5
	November	3.3	3.4	+0.1	62.7	161.8	+99.1
	December	-3.5	-4.6	-1.1	64.7	35.9	-28.8

^a Data obtained from Atmospheric Environment Service, Environment Canada

^b Normal temperature and precipitation are based on the period 1930-1980.