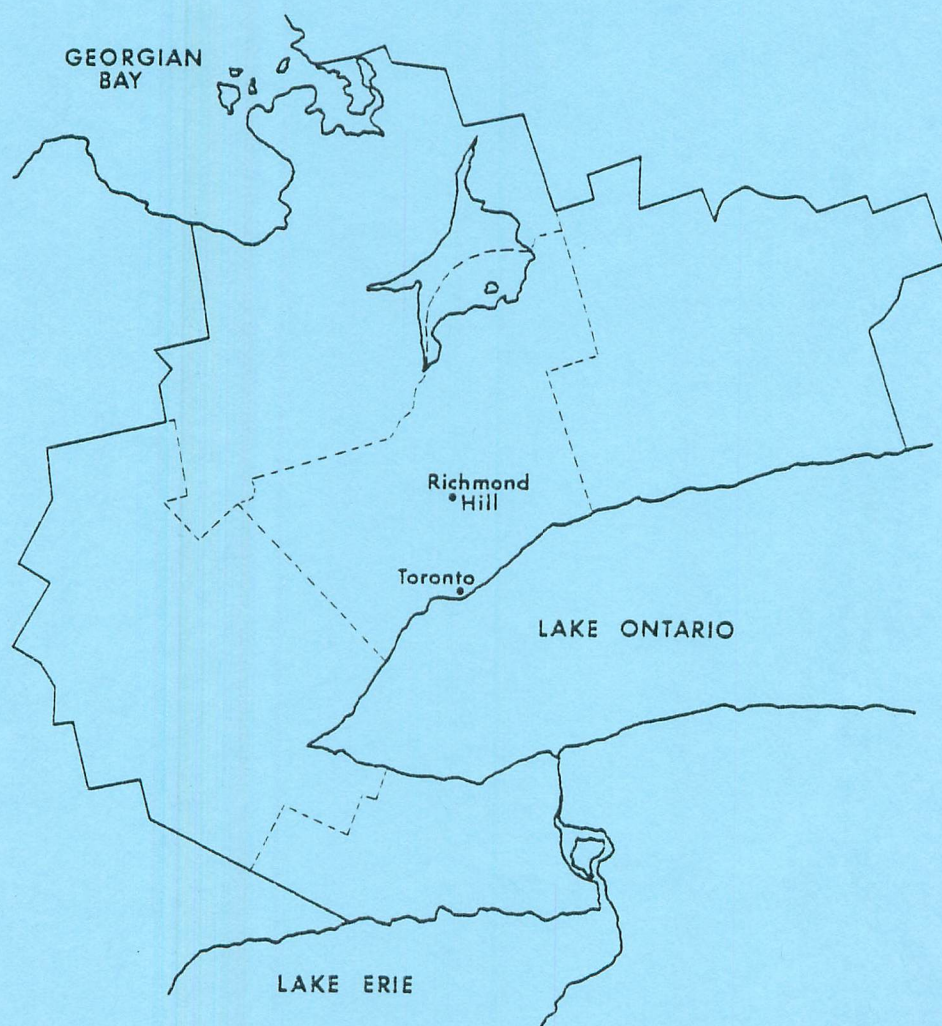


# Results of forest insect and disease surveys in the CENTRAL REGION of Ontario, 1981



CARRIED OUT BY THE GREAT LAKES FOREST  
RESEARCH CENTRE IN CO-OPERATION WITH  
THE ONTARIO MINISTRY OF NATURAL RESOURCES

## SURVEY HIGHLIGHTS

This report deals with forest insect and disease conditions in the Central Region in 1981.

After five years as a representative of the Forest Insect and Disease Survey Unit in the Central Region, M. J. Applejohn has been promoted to the position of Chief of Survey Technicians with year-round headquarters in Sault Ste. Marie. H. J. Evans has joined incumbents H. J. Weir and C. A. Barnes of the Survey staff for the Central Region.

Highlights of insect surveys include increased populations of the fall cankerworm, redheaded pine sawfly and poplar leafrollers whereas populations of the oak leaf shredder, larch casebearer and cedar leaf-miner complex declined. There was a heavy infestation of a usually incidental pest, the cherry scalloped moth, and a small infestation of another relatively rare insect, the maple leafcutter, continued.

Surveys for the European race of Scleroderris canker continued, but results were negative. However, a disease new to Ontario, brown spot needle blight of pines, was found for the first time in the Region. Other diseases found at damaging levels included Dothistroma needle blight, Diplodia tip blight and poplar leaf disease.

In recent years the Survey Unit has conducted special surveys for specific purposes. In 1981, white spruce plantations were examined for the presence and impact of pests, and problems connected with white spruce cone and seed production were also investigated.

A slightly different format has been adopted for this year's report. Insects and diseases have been categorized as either major or minor, and to enable readers to determine the importance of a pest, the following definitions have been provided.

### *Major Insects or Diseases*

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

### *Minor Insects or Diseases*

Capable of 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, and 2) those which are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage in 1981.



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

H. J. Evans

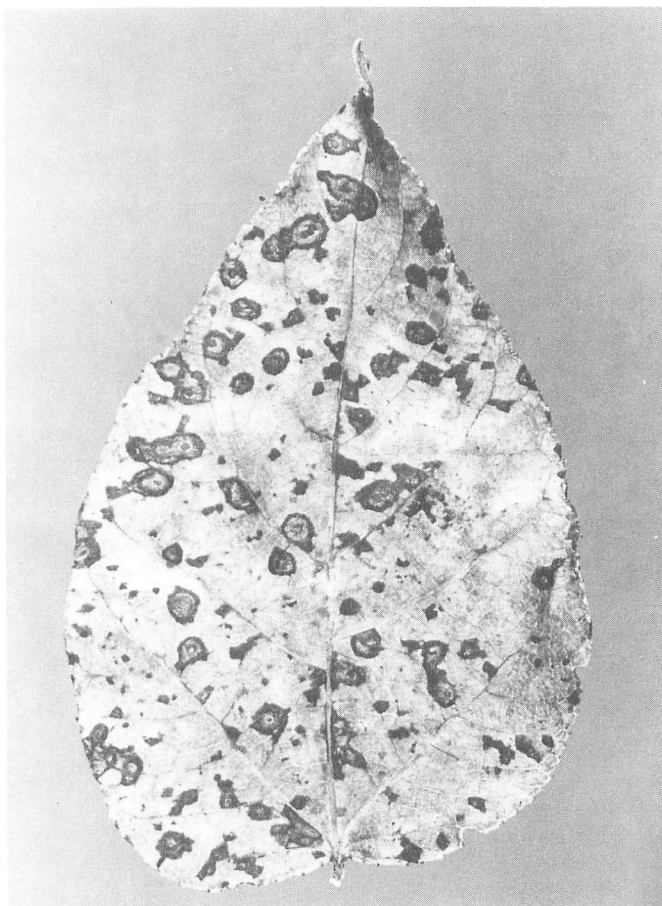
H. J. Weir

C. A. Barnes

## Frontispiece



Defoliation of black  
walnut (*Juglans nigra* L.)  
roadside trees by the  
walnut caterpillar  
(*Datana integerrima*  
G. & R.)



Fruiting bodies on balsam poplar  
(*Populus balsamifera* L.) leaf  
caused by poplar leaf disease  
(*Mycosphaerella populicola*  
G.E. Thomps.)

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## INSECTS

### Major Insects

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

Populations of this insect, which have been increasing in the past few years, appear to have leveled off. Although all size classes of pine were affected, sapling-sized trees and recently planted seedlings suffered the most severe damage. Infestations were recorded on red pine (*Pinus resinosa* Ait.), white pine (*P. strobus* L.) and Scots pine (*P. sylvestris* L.). The area of distribution of this pest increased slightly and now includes most of Lindsay, Huronia, Maple and Cambridge districts. There has been no record of the insect in the Niagara District.

Heavy infestations persisted at locations in Flos, Vespra, Oro and Tosorontio townships, Huronia District. High numbers were again encountered through many parts of the Lindsay District. In the Cambridge District low populations were evident in the Guelph-Cambridge area. The situation was similar in the Maple District, although a moderate infestation was recorded in Albion Township (Table 1).

Table 1. Summary of damage caused by the pine false webworm in three districts in 1981 (counts based on the examination of 150 trees at each location).

Location (Twp)	Host	Avg ht of trees (cm)	Affected area (ha)	Estimated trees per ha	Trees infested (%)	Foliar damage (%)
Lindsay District						
Harvey	rP	2.5	40.0	2,990	100	25
Douro	rP	2.0	15.0	2,990	35	25
Belmont	rP	3.0	1.0	2,990	5	5
Haldimand	rP	1.0	15.0	2,990	60	25
Haldimand	wP	12.0	0.5	2,990	2	25
Orono	wP	5.0	1.2	1,400	50	10
Bexley	wP	4.0	25.0	1,400	25	5
Huronia District						
Flos	rP	1.6	2.0	2,500	100	40
Maple District						
Albion	rP	1.3	2.0	2,500	67	14



Fall Cankerworm, *Alsophila pometaria* (Harr.)

New, heavy infestations of the fall cankerworm were noted at many locations in the Niagara District in 1981. The most notable infestation was in mixed hardwood woodlots in the Vineland area where such species as butternut (*Juglans cinerea* L.), red oak (*Quercus rubra* L.), shagbark hickory (*Carya ovata* [Mill.] K. Koch) and sugar maple (*Acer saccharum* Marsh.) were severely defoliated. Populations also increased sharply near Fonthill, Welland, Thorold and Niagara Falls. Foliar damage exceeded 50% at all locations. Smaller but significant increases were noted near Cayuga and Dunnsville. A total area of approximately 40 ha was affected in the Niagara District.

In the Cambridge District moderate numbers were recorded on roadside Manitoba maple (*A. negundo* L.) in the Brantford area. This insect was not reported elsewhere in the Region.

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

Heavy infestations, which covered most of the Region in 1980, continued in 1981 but over a smaller area. The total infested areas within which eastern white cedar (*Thuja occidentalis* L.) suffered moderate-to-severe foliar damage encompassed 19,100 km<sup>2</sup>--a net reduction of 5,400 km<sup>2</sup> from the 24,500 km<sup>2</sup> infested in 1980 (Fig. 1). The main areas of decrease were in the northern half of the Huronia District and along Lake Ontario in the Maple and Lindsay districts.

Within the infested area most stands sustained moderate-to-severe foliar damage. At several locations accumulated damage over several years has caused twig and branch kill, and in extreme cases, whole-tree mortality. Some mortality was noted in a 3 ha stand in North Monaghan Township, Lindsay District, in the Mono Mills-Hockley Valley area of Huronia District and in a few small stands in the Newmarket area of Maple District.

Poplar Leafrollers, *Choristoneura conflictana* (Wlk.), *C. rosaceana* (Harr.), *Pseudexentera oregonana* Wlshm. and *Sciaphila duplex* Wlshm.

The total area infested by this complex of insects increased in 1981. The large aspen tortrix (*Choristoneura conflictana* [Wlk.]) was the most abundant species found. In the Huronia District moderate-to-severe defoliation of trembling aspen (*Populus tremuloides* Michx.) and to a lesser degree largetooth aspen (*P. grandidentata* Michx.) was recorded on 400 ha at Canadian Forces Base Borden and in surrounding Toronto. Small areas of moderate damage totalling about 50 ha were evident at scattered points in Essa, Sunnidale, Flos, Tecumseth and W. Gwillimbury.

## CENTRAL REGION

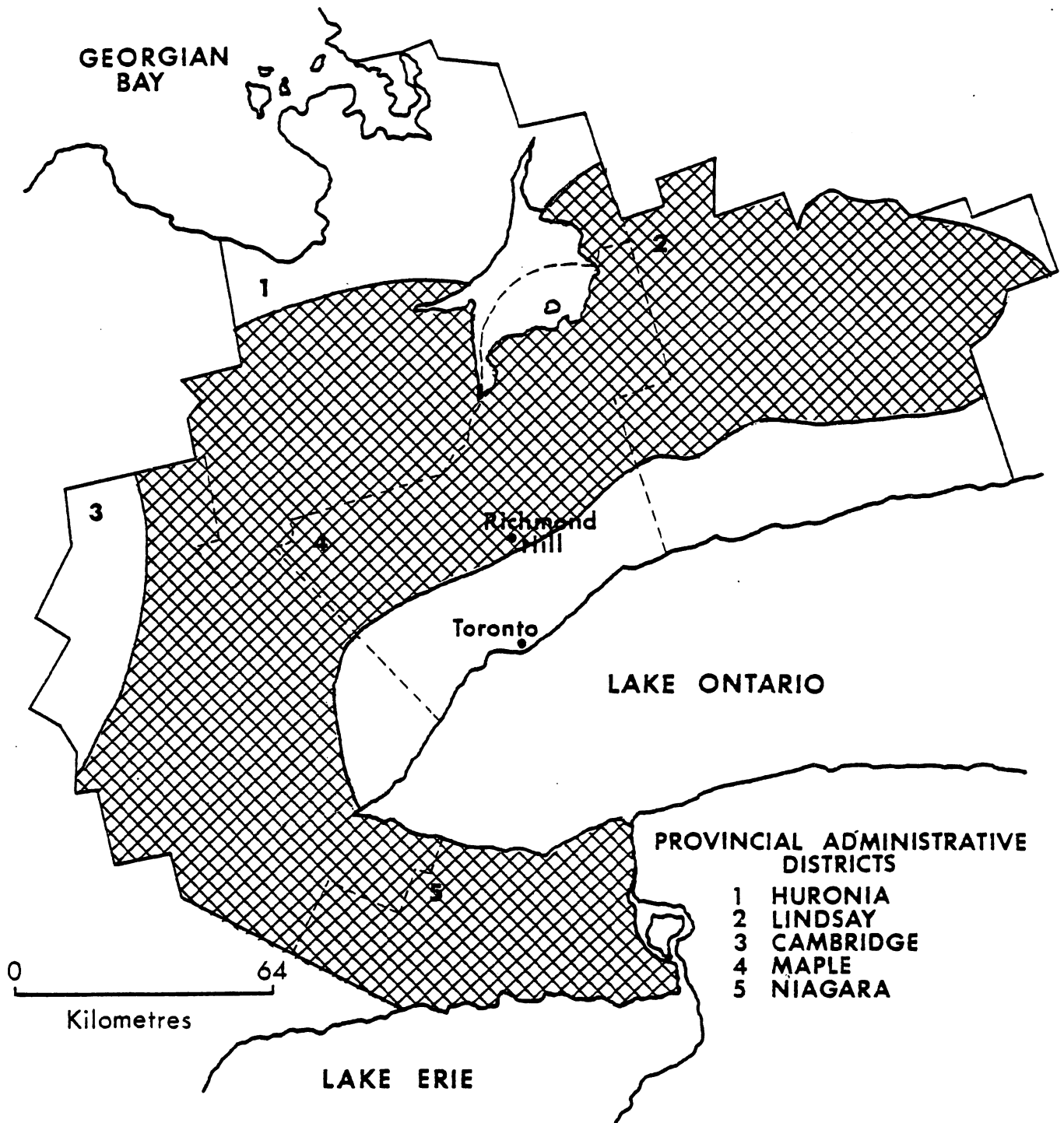


Figure 1. Cedar leafminers (*Argyresthia* spp. and *Pulicalvaria thujaella* [Kft.])

Areas within which medium-to-heavy infestations occurred in 1981 . . .



townships. In the Maple District severe foliar damage was noted in the Pefferlaw area and also at a location in King Township. The total area affected was 60 ha. Previous infestations in Cambridge and Lindsay districts declined to very low levels in 1981.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The results of damage surveys, population sampling, and egg-mass counts will be included with those of other Regions in a special report to be published later this year. That report will provide a complete description and analysis of developments in the spruce budworm situation in Ontario in 1981 and will give infestation forecasts for the province for 1982.

Larch Casebearer, *Coleophora laricella* (Hbn.)

A general decline in the population levels of this insect was evident throughout the Region in 1981. Moderate damage to tamarack (*Larix laricina* [Du Roi] K. Koch) in Puslinch Township and to European larch (*L. decidua* Mill.) in Woolwich Township, Cambridge District was noted, but usually damage was lighter, as it was in the Maple District. Light damage was recorded from a previously heavily infested area at the Orono Forest Station, Lindsay District. In the Huronia District numbers also decreased to light in W. Gwillimbury Township; in the Minesing swamp a heavy infestation continued, but the infested area was reduced to approximately 2 km<sup>2</sup>.

European Pine Needle Midge, *Contarinia baeri* (Prell)

This needle midge, which was considered to be confined to eastern Ontario, has been increasing its distribution in southwestern and central Ontario in recent years. The insect includes Scots pine and red pine among its hosts, and it has the most impact in Christmas tree plantations and on ornamentals. In the Huronia District light damage was noted at locations in Tiny, Tay, Rama, Flos, Vespra and Sunnidale townships. A small but heavy infestation reported in 1980 in Flos Township decreased to light intensity in 1981. Traces of the pest were also detected in King Township, Maple District.

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

Numbers of this insect were drastically reduced in the northern part of Huronia District where heavy infestations had persisted for several years. Only small pockets of moderate-to-severe defoliation of red oak remained, the most notable being on Beausoleil Island in the

Georgian Bay Islands National Park and at scattered locations in the townships of Tiny, Flos, Medonte and Oro. However, at the Main Tract of the Dufferin County Forest in Mulmer Township and in adjacent Tosorontio Township, populations increased, with about half the oak stands suffering up to 70% defoliation.

In the Niagara District slight increases were experienced, with defoliated areas noted in the towns of Lincoln, Pelham and Thorold and in the city of St. Catharines. Foliar damage did not exceed 20% at any of the locations. Small numbers were also evident along the Niagara River from Fort Erie to Niagara-on-the-Lake.

Populations decreased in the Maple District although small areas of medium infestation remained in the Uxbridge and Vivian areas.

A total of 1,100 ha of oak sustained moderate-to-severe defoliation in the Region in 1981. At many locations, particularly in the Niagara District, other insects were found in conjunction with the oak leaf shredder. These included the fall cankerworm (*Alsophila pometaria* [Harr.]), tortricid oakworm (*Argyrotaenia quercifoliana* Fitch), palmerworm (*Dichomeris ligulella* Hbn.), linden looper (*Erannis tiliaria* [Harr.]) and another oak leafroller (*Pseudexentera cressoniana* Clem.).

Ontario Ministry of Natural Resources (OMNR) staff did not spray any areas in 1981 but one section of private land in Uxbridge Township was treated with an aerial application of Sevin. Generally, only low populations were noted at locations treated in 1980; however, Dufferin County Forest and the Wildman Tract of the Simcoe County Forest, last treated in 1979, are showing signs of being reinfested. This reinfestation is evident in egg surveys conducted to provide defoliation forecasts for 1982 (Table 2).

In an effort to assess the value of sex attractant as a survey technique for the oak leaf shredder, adult traps containing a sex pheromone lure were set out at various locations in the Region. Results of the trap catches are summarized in Table 3.

Table 2. Summary of oak leaf shredder egg counts and defoliation estimates for four districts in 1981.

Location	Plot no. or property owner	1979	1980	1981	Defolia- tion forecast for 1982 <sup>a</sup>
Huron District					
Awenda Park	1	1.1	0	1.4	L
	2	4.1	0.4	2.5	L
	3	15.6	0.3	3.4	L
	4	13.6	0.8	2.3	L
	5	4.2	0.1	2.6	L
	6	5.9	0.5	3.0	L
	7	5.1	1.8	4.4	L
	8	2.7	0.1	3.0	L
	9	12.5	1.0	2.5	L
	10	65.5	6.8	4.5	L
	11	37.6	28.6	6.6	L
	12	10.5	4.3	10.3	M
	13	23.8	1.6	2.3	L
	14	3.6	2.5	6.6	L
	15	1.4	0.6	2.5	L
	16	1.6	1.4	0.4	L
	17	36.7	4.1	7.9	L
	26	24.2	1.9	3.3	L
	30	11.8	3.3	0.7	L
	31	1.7	0.3	0	N
Wildman Tract	1	0.9	3.1	25.8	M
	2	0.7	2.2	8.9	M
	3	2.5	2.2	3.3	L
	4	0.5	0.9	4.6	L
	5	20.0	1.3	5.1	L
	6	1.6	.3	4.9	L
	7	1.3	15.3	15.9	M
Hendrie Forest	1	74.1	0	2.6	L
	2	32.8	0.3	0.1	L
	Check 1	-	13.1	4.4	L
Midhurst Nursery	1	4.6	0.5	3.9	L
	2	34.1	0.3	2.1	L
	3	25.6	0.8	1.6	L
	Check 1	-	5.8	7.8	L

(continued)



Table 2. Summary of oak leaf shredder egg counts and defoliation estimates for four districts in 1981 (continued).

Location	Plot no. or property owner	1979	1980	1981	Defolia- tion forecast for 1982 <sup>a</sup>
Huron District (concluded)					
Orr Lake Tract	1	-	45.6	-	L
	Danials	-	34.8	4.9	L
Dufferin Co. Forest	1	0.9	3.8	5.3	L
	2	0.1	0.3	0.4	L
	3	2.1	18.3	13.0	M
	4	0.8	1.1	11.3	M
	5	0.3	2.8	13.3	M
	6A	1.9	4.0	10.1	M
	7	1.0	9.6	10.4	M
	8	(not sampled in 1981 - private land)			
	9	29.4	103.9	34.0	H
	10	27.7	69.3	28.9	H
	11	3.8	12.1	14.0	M
	12	10.3	6.3	22.0	M
	13	1.7	7.4	17.5	M
	14	4.6	9.8	12.3	M
	95	11.3	16.8	15.8	M
	Check 1	26.0	44.4	31.9	H
	Check 2	0.4	18.0	28.6	H
	Check 3	29.5	44.3	27.0	M
Randwick Tract		-	-	0	N
Maple District					
Uxbridge Forest	1	-	16.7	20.8	M
	2	-	2.0	25.1	M
Niagara District					
Town of Pelham	Iwasykiew	-	12.0	7.3	L
	Hinan	-	-	5.5	L
Township of West Lincoln	Wilkins	-	-	6.5	L
	Hignell	-	-	3.1	L

(continued)

Table 2. Summary of oak leaf shredder egg counts and defoliation estimates for four districts in 1981 (concluded).

Location	Plot no. or property owner	1979	1980	1981	Defolia- tion forecast for 1982 <sup>a</sup>
Niagara District (concluded)					
Town of Lincoln	Balls Falls Conservation Area	-	-	4.8	L
		-	-	4.8	L
Town of Thorold	Derwinski	-	-	3.6	L
N. Cayuga Township	Martin	-	-	4.3	L
Cambridge District					
Town of Burlington		-	-	2.3	L

<sup>a</sup> N = Nil, L = Light, M = Moderate, H = Heavy

Table 3. Results of oak leaf shredder pheromone trapping in three districts in 1981.

Location	Plot no. or property owner	Total adults captured	Avg no. per trap	Leaves attacked (%)	Foliar damage (%)
Huron District					
Awenda Park	4	725	145	13	7
	5	711	142	8	3.5
	11	517	103	66	23.5
Wildman Tract	4	500	100	50	15
	7	705	141	96	47
Midhurst	1	371	74	13	7
Orr Lake Tract	Danials	722	144	99	41
Dufferin Co. Forest	3	1,202	240	98	34
	9	1,056	211	94	57
	10	972	194	100	69

(continued)

Table 3. Results of oak leaf shredder pheromone trapping in three districts in 1981 (concluded).

Location	Plot no. or property owner	Total adults captured	Avg no. per trap	Leaves attacked (%)	Foliar damage (%)
Maple District					
Uxbridge Forest	1	612	122	90	28
	2	908	151	85	22
Niagara District					
Town of Pelham	Iwasykiw	170	34	16	1
	Hinan	31	6	5	1
Twp of West Lincoln	Wilkins	50	10	23	1
	Hignell	18	3	18	1
Town of Thorold	Derwinski	571	114	10	1
Twp of N. Cayuga	Martin	74	14	17	1

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Populations increased in both white pine and red pine plantations at Orono Forest Station and in Manvers Township, Lindsay District (Table 4). Conspicuous flagging was evident on white pine in Puslinch Township, Cambridge District and in Albion Township, Maple District.

Table 4. Summary of eastern pine shoot borer damage at three locations in the Lindsay District.

Location	Host	Avg ht of trees (m)	Area affected (ha)	Estimated trees/ha	Trees infested (%)	No. of infested shoots per infested tree	No. of leaders infested
Orono Nursery	rP	3.5	2	750	100	2.1	0
Orono Nursery	wP	3.5	2	750	42	2.9	0
Manvers Twp	rP	2.0	4	2,990	90	1.2	1

### Birch Leafminer, *Fenusa pusilla* (Lep.)

Forest trees suffering damage from this leafminer were found at several points in the northern part of Huronia District. Moderate-to-severe defoliation was recorded in Vespra, Flos and Oro townships with lighter damage being evident in Mara, Orillia and Medonte townships. Roadside white birch (*Betula papyrifera* Marsh.) was moderately damaged along Highway 9 west of Newmarket and along Highway 400 in Maple District. In Cambridge and Niagara districts ornamental and open-growing trees were often injured seriously by this pest. Populations declined in Lindsay District.

### Fall Webworm, *Hyphantria cunea* (Dru.)

Pockets of high populations were common from Port Hope to Whitby in the lower part of Lindsay District, and along the Niagara Parkway and in the vicinity of Welland, St. Catharines and Pelham in the Niagara District. In the northern part of Maple District and in the townships of Orillia and Rama in Huronia District, numerous colonies were found in low-lying areas. A wide variety of hosts was affected, particularly black ash (*Fraxinus nigra* Marsh.). In the more southerly parts of the Region, such as in the Cambridge-Brantford area, black walnut (*Juglans nigra* L.) was often the preferred host.

### Redheaded Pine Sawfly, *Neodiprion lecontei* (Fitch)

Population increases of the redheaded pine sawfly were evident again in 1981 in the northern part of Huronia District. Heavy infestations were recorded on red pine regeneration in Vespra and Orillia townships and lower numbers were noted in Flos and Rama townships (Table 5). Low numbers were also observed in Medonte, Oro, Tiny and Innisfil townships. In Lindsay District there was a small increase in Clarke Township in the Durham County Forest.

Table 5. Summary of redheaded pine sawfly damage at five locations in two districts in 1981.

Location (Twp)	Avg ht of trees (m)	Area affected (ha)	Estimated trees/ ha	Trees infested (%)	Defoliation (%)
Huronia District					
Vespra	2.2	7	2,500	45	24
Flos	2.3	2	2,000	13	12
Orillia	1.4	2	1,600	42	38
Rama	1.9	1	2,300	6	5
Lindsay District					
Clarke	3.0	3	-	21	5

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

High populations of this imported sawfly were detected on 0.5 m red pine trees in a 5 ha plantation in Haldimand Township, Lindsay District. Stocking in this plantation was 2,990 trees per ha. A cooperative control was carried out by staff of the Forest Pest Management Institute (Sault Ste. Marie) and OMNR with aerially applied nuclear polyhedrosis virus. Excellent results were achieved. Control measures (with insecticides) were also required on recently planted red pine in a privately owned plantation in Guelph Township, Cambridge District. Elsewhere in the Region low populations of this insect prevailed.

Maple Leafcutter, *Paraclemensia acerifoliella* (Fitch)

Heavy damage by this relatively rare insect was again recorded in the Robertson Tract of the Halton Regional Forest, Cambridge District. In 1981, approximately 15 ha of semimature sugar maple were infested, and defoliation averaged 50%. Numerous individual trees were completely defoliated. In the Lindsay District light-to-medium browning caused by the insect's feeding was evident near Buckhorn in Harvey Township and was also reported in mature sugar maple bushes in Asphodel and Dummer townships.

White Pine Weevil, *Pissodes strobi* (Peck)

As has been recorded in the past, high numbers of this pest were much in evidence at Balsam Lake Provincial Park, Lindsay District. Populations were also high at the white pine seed orchard in Orono Nursery (Table 6). In Huronia District considerable damage was reported in Essa and Tay townships and on experimental plantings at the Midhurst Research Unit in Vespra Township. A private white pine plantation in Uxbridge Township, Maple District was also heavily infested. Only incidental damage was observed in the Niagara and Cambridge districts.

Table 6. Summary of white pine weevil leader damage to white pine at three locations in two districts in 1981.

Location	Avg ht of trees (m)	Area affected (ha)	Estimated trees/ ha	Leaders affected (%)
Lindsay District				
Clarke Twp Seed Orchard	8.0	2	1,000	36
Bexley Twp Balsam Lake Park	5.0	20	2,990	41
Huronia District				
Essa Twp	2.0	5	2,500	28



Larch Sawfly, *Pristiphora erichsonii* (Htg.)

High numbers of larvae were recorded again at numerous points in the Region. A total of approximately 50 ha of larch plantings (mostly European larch) were moderately or heavily infested and an additional 60 ha of natural tamarack were similarly infested. Most of the damage to tamarack was reported in the Cambridge District in Blenheim and North Dumfries townships and in the Luther marsh. Damage to European larch was also reported at several points in this district.

European larch was heavily infested throughout Huronia District. The heaviest damage was reported at Canadian Forces Base Borden where defoliation averaged 85% over an 8 ha planting. Damage was less consistent in the Maple District but medium and heavy infestations were evident in E. Gwillimbury and Uxbridge townships.

A total of 3 ha of European larch was lightly to moderately defoliated at two separate plantations in the Durham-Ganaraska County Forest, Lindsay District and ornamentals suffered some damage near Vineland in the Niagara District, but generally only very light populations were evident in these two districts.

Minor Insects

Poplar Flea Beetle, *Altica populi* Brown

This flea beetle caused considerable damage to balsam poplar (*Populus balsamifera* L.) in the Region in 1981. Trees of all ages and size classes were affected but immature trees in low-lying areas sustained the heaviest damage. Affected areas were usually under 5 ha. Although the insect was widespread, the most severe defoliation was reported in the Fergus-Guelph-Erin area, Cambridge District; in Alnwick, Darlington and Clarke townships, Lindsay District; and in the Orangeville area, Huronia District.

Oak Leafrollers, *Argyrotaenia quercifoliana* Fitch and  
*Pseuderxentera cressoniana* Clem.

Populations of this combination of leafrollers declined to very low levels in parts of the Huronia District in which high numbers had been encountered in 1979 and 1980. In the Cambridge District, white oak (*Quercus alba* L.) suffered up to 100% defoliation in Brantford Township, but damage was lighter on both white oak and bur oak (*Q. macrocarpa* Michx.) in Beverly Township. The insects were also found in association with the oak leaf shredder (*Croesia semipurpurana* [Kft.]) at several locations.

Cherry Casebearer, *Coleophora pruniella* Clem. (formerly *C. innotabilis*)

Small, discrete pockets of moderate-to-severe damage to balsam poplar were noted in Wilmot Township, Cambridge District and in Melancthon Township, Huronia District; the total area infested was 1 ha. In the Lindsay District, a single heavy infestation was reported on 12 m hedgerow white birch in Hamilton Township. Populations which had been high in the Huronia District declined to generally low levels.

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

Heavy infestations of this insect continued at many points in the southern part of the Region. Foliar damage up to 100% was common but was generally confined to ornamental, open-growing and hedgerow black walnut although some light damage to walnut plantations, particularly in the Cambridge District, was also noted (see Frontispiece). Colonies of larvae were observed on butternut and shagbark hickory as well.

The areas most heavily damaged were along the Niagara Parkway, Niagara District; in Blenheim, Brantford and S. Dumfries townships, Cambridge District; in the Mississauga-Brampton area, Maple District; and in Whitby, Cartwright and Haldimand townships, Lindsay District. This is the first record of the insect in the Lindsay District since 1969.

Zimmerman Pine Moth, *Dioryctria zimmermani* (Grt.)

This insect, which was first recorded infesting new shoots of red pine in Ontario in 1964, has since caused heavy damage periodically in the Huronia District. In 1981, moderate and heavy shoot damage was recorded on approximately 300 ha of red pine plantations in Mulmur, Tosorontio, Essa and Sunnidale townships. Generally, light damage was evident in the surrounding area of the district. In the northern part of Maple District, light damage was evident in Uxbridge and Albion townships. Although trees of all sizes were affected, pole-sized trees 15-22 m in height exhibited the most conspicuous damage.

Cherry Scallopshell Moth, *Hydria prunivorata* Ferg.

Severe browning and consequent defoliation as a result of this insect's feeding on black cherry (*Prunus serotina* Ehrh.) and pin cherry (*P. pensylvanica* L.f.) were noted throughout the Durham-Ganaraska County Forest, Lindsay District. In addition, pockets of moderate damage were recorded in the southern part of the District, notably in Clarke and Whitby townships. In Maple District heavy damage to black cherry was evident in Uxbridge Township, but only moderate foliar damage was recorded in Vespra and Medonte townships, Huronia District. Elsewhere in the Region damage was light.

Oak Leafmining Sawfly, *Profenusa lucifer* (Ross)

In the Lindsay District populations declined in the area south of Rice Lake in Hamilton and Haldimand townships but increases were evident in Harvey Township. A new infestation was detected in Cavan Township (Table 7). Light damage recurred on red oak at the Midhurst Forest Station, Huronia District.

Table 7. Summary of leaves mined by the oak leafmining sawfly at three locations in the Lindsay District from 1978 to 1981 (counts based on an examination of 100 leaves selected randomly from five trees at each location).

Location (Twp)	Host	Area affected (ha)	1978	1979	1980	1981
Hamilton	wO	400	87	69	76	31
Harvey	wO	4	63	27	67	96
Cavan	wO	1	-	-	-	76

Maple Webworm, *Tetralopha asperatella* (Clem.)

A heavily infested sugar bush reported in 1980 in Woolwich Township, Cambridge District sustained only moderate damage in 1981. All size classes of trees were affected and an area of approximately 10 ha was infested. The insect was common at low levels through much of the remainder of the Region, particularly in Wilmot and N. Dumfries townships, Cambridge District and in Essa and Medonte Townships, Huronia District. The webworm was often found in association with the maple trumpet skeletonizer (*Epinotia aceriella* [Clem.]).

Table 8. Other forest insects.

Insect	Host(s)	Remarks
<i>Acleris variana</i> (Fern.) Eastern blackheaded budworm	wS	declined to light in Oro Twp, Huronia District; low numbers in Arthur Twp, Cambridge District and in Albion Twp, Maple District

(continued)

Table 8. Other forest insects (continued).

Insect	Host(s)	Remarks
<i>Acrobasis juglandis</i> (LeBar.) Pecan leaf casebearer	Wa, Hi	moderate damage near Port Colborne, Niagara District
<i>Anisota finlaysoni</i> Riotte Shorthorned oakworm	oak	declined to light in the Brantford and Milton areas, Cambridge District
<i>Aphrophora cribrata</i> (Wlk.) Pine spittlebug	scP	moderate to heavy in approximately 40 ha of plantations in Clarke Twp, Lindsay District and Glanbrook Twp, Cambridge District
<i>Archips cerasivoranus</i> (Fitch) Uglynest caterpillar	cherry	shrubs moderately defoliated in the Niagara District; common throughout the Region
<i>Caliroa</i> sp. Slug sawfly	rO	high numbers on planted trees in Adjala Twp, Huronia District
<i>Cameraria hamadryadella</i> (Clem.) Solitary oak leafminer	bO	moderate numbers on roadside oak near Milton, Cambridge District
<i>Caulocampus acericaulis</i> MacG. Maple petiole borer	sM	conspicuous damage at locations in Erin and Puslinch Twps, Cambridge District
<i>Cenopsis acerivorana</i> MacK. Maple leafroller	sM	low numbers common in much of the Region
<i>Cenopsis pettitana</i> (Rob.) Maple basswood leafroller	Ba	common in North Cayuga Twp and in the town of Lincoln, Niagara District
<i>Choristoneura pinus pinus</i> Free. Jack pine budworm	jP, scP	low numbers common in plantations in Oro, Essa and Tosorontio Twps, Huronia District and in Maryborough Twp, Cambridge District
<i>Cinara strobil</i> (Fitch) White pine aphid	wP	heavily damaged 2 m trees in King Twp, Maple District

(continued)

Table 8. Other forest insects (continued).

Insect	Host(s)	Remarks
<i>Cryptococcus fagisuga</i> Lindinger Beech scale	Be	confirmed collection of this scale near Holland Landing, Maple District
<i>Croesus latitarsus</i> Dusky birch sawfly	wB	single tree with several colonies in Ennismore Twp, Lindsay District
<i>Datan ministra</i> (Dru.) Yellownecked caterpillar	Ba	severe defoliation of 15 m hedgerow trees in Clarke Twp, Lindsay District
<i>Dioryctria disclusa</i> Heinr. Webbing coneworm	scP	moderate number of cones damaged in Maryborough and Beverley Twps, Cambridge District
<i>Diprion similis</i> (Htg.) Introduced pine sawfly	wP, scP	light in a seed orchard in the Orono Nursery, Lindsay District for the 4th consecutive year; common at numerous points elsewhere in the Region
<i>Ectoedemia argyropeza downsesi</i> Wilk. & Scoble Aspen petiole miner	tA	high populations in W. Gwillimbury and Orillia Twps, Huronia District
<i>Ectoedemia lindquisti</i> (Free.) Small birch leafminer	wB	small pocket of heavily infested trees at Awenda Park, Huronia District
<i>Epicauta murina</i> Lec. Dark blister beetle	Caragana	severe defoliation of numerous seedlings, Orono Nursery, Lindsay District
<i>Fenusa ulmi</i> Sund. Elm leafminer	wE	regeneration moderately infested in Essa Twp, Huronia District and in Puslinch Twp, Cambridge District

(continued)



Table 8. Other forest insects (continued).

Insect	Host(s)	Remarks
<i>Gonioctena americana</i> (Schaeef.) American aspen beetle	tA	severe damage in conjunction with poplar leafrollers at Canadian Forces Base Borden, Huronia District
<i>Heterocampa guttivitta</i> (Wlk.) Saddled prominent	deciduous	light damage recurred at Awenda Park, Huronia District
<i>Hylobius pales</i> (Hbst.) pales weevil	scP	reported in a Christmas tree plantation in Tiny Twp, Huronia District
<i>Japanagromyza viridula</i> (Coq.) a leafminer	wO	numerous on ornamentals in the city of Peterborough
<i>Lecanium corni</i> Bouche European fruit lecanium	English oak	four 19 m shade trees in Port Perry, Lindsay District severely infested
<i>Malacosoma americanum</i> F. Eastern tent caterpillar	cherry	occasional nests along road-sides and in open fields, especially in Niagara District
<i>Messa nana</i> (Klug) Early birch leaf edgeminer	wB	low populations, particularly in Lindsay District
<i>Neodiprion abietis</i> Balsam fir sawfly	bF	moderate and heavy damage in Medonte Twp, Huronia District; common at low levels elsewhere
<i>Neodiprion pratti banksianae</i> Roh. Jack pine sawfly	jP	light infestation again near Palgrave, Maple District; new area of light damage in Tosorontio Twp, Huronia District
Notodontidae	Ba	severe damage to scattered trees in Awenda Park, Huronia District
<i>Nymphalis antiopa</i> (L.) Mourningcloak butterfly	W, wE, tA	occasional severely defoliated saplings in Huronia and Cambridge districts

(continued)

Table 8. Other forest insects (concluded).

Insect	Host(s)	Remarks
<i>Otiorhynchus ovatus</i> (Linn.) Strawberry rootweevil	bIS	heavy root damage to private nursery trees near Midhurst, Huronia District
<i>Paraleucoptera albella</i> (Cham.) Cottonwood leafminer	bPo, tA	severe defoliation of roadside trees and ornamentals in Nestleton and Orono Nursery, Lindsay District and in Mono Twp, Huronia District
<i>Pikonema alaskensis</i> (Roh.) Yellowheaded spruce sawfly	wS, bS	moderate damage in Balsam Lake Park and near Peterborough, Lindsay District, and on hedgerow trees near Angus, Huronia District
<i>Pissodes approximatus</i> Hopk. Northern pine weevil	wP	caused some mortality to seedlings in burned over area in Flos Twp, Huronia District
<i>Rhyacionia buoliana</i> (Schiff.) European pine shoot moth	rP	common in the Cambridge District; heavy in a 2 ha plantation near Kitchener
<i>Sphingicampa</i> sp. Caterpillar	Kentucky coffee tree	low numbers of this rare insect near Hornby, Cambridge District
<i>Tlascala reductella</i> Wlk. A locust leaf-tier	bl Loc	up to 80% defoliation of hedgerow trees in Uxbridge Twp, Maple District
<i>Zeiraphera canadensis</i> Mut. & Free. and <i>Zeiraphera destitutana</i> (Wlk.) Spruce shootworms	wS	high incidence of this combination of insects at numerous locations in the Cambridge and Maple districts
<i>Zeiraphera improbana</i> (Wlk.) Larch needleworm	tL	moderate numbers recorded in a 6 m plantation in Arthur Twp, Cambridge District
<i>Zelleria haimbachi</i> Busck Pine needle sheathminer	jP	light damage to new shoots common in Cambridge District

## TREE DISEASES

*Major Diseases*

Dutch Elm Disease, *Ceratocystis ulmi* (Buism.) C. Moreau

Although large white elm (*Ulmus americana* L.) have virtually disappeared in the Central Region as a result of this well known disease, an abundance of elm reproduction is present at some locations. This regeneration is similarly subjected to infection by the fungus. This was most apparent on roadside trees in Hope and Fenelon townships, Lindsay District (Table 9).

Table 9. Summary of current infections by Dutch elm disease at two locations in the Lindsay District (based on the observation of symptoms of the disease on trees along 1 km of roadside).

Location (Twp)	Host	Avg DBH (cm)	No. of trees examined	Currently diseased (%)
Fenelon	wE	12	88	41
Hope	wE	10	96	40

Diplodia Tip Blight, *Diplodia pinea* (Desm.) Kickx

This disease has caused considerable damage in some areas of the Region in the past few years. Quantitative data from Scots pine plantations in Maple, Huronia and Cambridge districts are given in Table 10. The disease was also observed on ornamental ponderosa pine (*Pinus ponderosa* Laws.) near Midhurst, Huronia District.

Symptoms of the fungus are most evident in the spring when new shoots are infected. Wet weather at this time increases the chance of infection. The new shoots are killed and repeated attacks then can cause branch mortality. Trees suffering continued infections become deformed and unsightly and may ultimately die. New shoots of pines of all ages are susceptible to infection but damage is more severe in older plantations. The increased damage to older trees is probably related to the fact that seed cones become infected and produce an abundance of fruiting bodies of the fungus.

Table 10. Summary of damage caused by *Diplodia* tip blight on Scots pine at four locations in 1981 (150 trees examined at each location).

Location (Twp)	Area (ha)	Host basal area (m <sup>2</sup> /ha)	Avg ht of trees (m)	Trees affected (%)	Foliar damage (%)	Mortality (%)
Cambridge District						
Woolwich	2	23.5	12	92	39	3
Maple District						
E. Gwillimbury	6	24.0	14	48	19	1
Huron District						
Tay	10	15.0	9	26	12	0
Flos	2	17.5	9	28	14	0

Scleroderris Canker, *Gremmeniella abietina* (Lagerb.) Morelet

The North American race of this disease was first confirmed in the Region in 1980, in the Melancthon Tract of the Dufferin County Forest. Despite a thorough search of the area in 1981, no symptoms of the disease were detected elsewhere, and the Melancthon Tract siting appears to have been an isolated incident. In Tiny Township, also in the Huronia District, the organism was suspected of being present in one stand but a survey of this stand failed to reveal any symptoms of the disease.

The more virulent form of the disease, the European race, has yet to be found in Ontario. It has been present for several years in neighboring New York state and was recently found in Quebec, New Brunswick and Newfoundland. In 1981, as in previous years, a special survey was conducted for the European race. In the Central Region a total of 19 stands were examined specifically for the organism and numerous other stands were also checked during routine survey work. Aerial surveys were conducted in many of the planted areas of the Region, but the disease was not detected.

Leaf Anthracnose of Maple, *Kabatella apocrypta* (Ell. & Ev.) Arx

This disease, common on ornamental and roadside maple, was again present at widely scattered locations. Heavy infection centres were usually small and localized, the conspicuous browning not being as widespread as in previous years. Quantitative data from the districts of Huronia, Cambridge and Maple are given in Table 11. Only very light damage was evident in the Lindsay and Niagara districts.

Table 11. Summary of damage caused by leaf anthracnose on roadside sugar maple at seven locations in 1981.

Location (Twp)	Avg ht of trees (m)	Trees affected (%)	Foliar damage (%)
Maple District			
Scott	16	10	20
Brock	15	46	25
Cambridge District			
Eramosa	18	35	25
Pilkington	13	17	18
Huron District			
Melancthon	17	23	17
Oro	15	7	10
Mono	17	41	34

Poplar Leaf Disease, *Mycosphaerella populicola* G.E. Thomps.

This disease organism caused heavy foliar damage again in 1981. Balsam poplar, the host tree, was hard hit, particularly in low-lying areas where it frequently grows in association with other poplars. Within the affected areas, the defoliation averaged approximately 75% and by early September many trees were completely denuded of foliage (see Frontispiece).

The most severe and consistent damage occurred in the Huron District. Most stands in an area encompassed by Orillia and Bradford on the east and Collingwood and Shelburne on the west suffered heavy damage. Serious defoliation was also evident in the area south of Lake Simcoe in the Maple District and in the Erin-Guelph area of the Cambridge District.

Brown Spot Needle Blight of Pines, *Scirrhia acicola* (Dearn.) Siggers

This potentially dangerous disease was first recorded in Ontario in 1980 at Sauble Falls Provincial Park in the Owen Sound District of the adjacent Southwestern Region. There, ornamental mugho pine (*Pinus mugo* Turra) and a small stand of Austrian pine (*P. nigra* Arnold) sustained considerable damage.



In 1981 the disease was collected near Perkinsfield in Tiny Township, Huronia District, where a small stand of 10 m Austrian pine was infected. Approximately 50% of the trees were affected, with defoliation averaging 24%. A similar disease, *Dothistroma* needle blight, was also recovered at this location; consequently, the total foliar damage may be attributable to both diseases. An adjacent stand of Scots pine has suffered extremely heavy damage in the previous two years from unknown causes and it is now thought that brown spot needle blight was likely responsible. Surveys in the surrounding area failed to reveal the disease elsewhere, but more intensive surveys are planned for 1982.

The fungus is characterized by straw-yellow spots which appear on the needles from May through October. These later turn dark brown, the needles begin to die, and usually are shed in the fall. In severe cases branches may be killed but usually buds of infected branches will remain healthy and produce foliage the following year. While brown spot needle blight is not usually fatal, it causes extensive losses to Christmas tree growers and producers of ornamental pine planting stock, as the browning and shedding of foliage often render trees unmerchantable.

*Dothistroma* Needle Blight, *Scirrhia pini* Funk & A.K. Parker

Damage caused by this needle blight was evaluated at three locations, all in small Austrian pine plantations, in the Huronia District in 1981 (Table 12). At all three sites considerable foliar damage was evident, the browning of the needles often extending half way up the crowns of the trees. It was collected on Austrian pine at two other locations in the district as well.

Table 12. Summary of damage caused to Austrian pine by *Dothistroma* needle blight at three locations in the Huronia District in 1981.

Location (Twp)	Area affected (ha)	Host basal area (m <sup>2</sup> /ha)	Avg ht of trees (m)	Trees affected (%)	Foliar damage (%)
Tay	2	20.0	10	47	18
Flos	1	7.5	8	50	21
Medonte	4	22.5	8	59	19

Although this disease has not been widely reported in Ontario, it is widespread in the midwestern United States where it causes extensive damage to ornamental, windbreak and Christmas tree plantings. It has been recorded on several pine species, but in the states adjacent to Ontario, Austrian pine is the host most seriously affected.

Table 13. Other forest diseases.

Organism	Host(s)	Remarks
<i>Apiognomonia quercina</i> (Kleb.) Hoehn. Oak anthracnose	rO	light infection in the under- story at Randwick Tract, Mulmer Twp, Huronia District
<i>Arceuthobium pusillum</i> Eastern dwarf mistletoe	bS	brooms common on scattered trees in the Minesing swamp, Vespra Twp, Huronia District
<i>Armillaria mellea</i> (Vahl ex Fr.) Kumm. Armillaria root rot	rO	often associated with oak decline in the Region
<i>Botrytis cinerea</i> (Fr.) Pers. Grey mold	honeysuckle	moderate damage to nursery stock at the Midhurst Forest Station
<i>Ceratocystis coerulescens</i> (Munch) Bak. Sapstreak disease	sM	collected at one point near Coldwater in the Huronia District
<i>Ciborinia whetzelii</i> (Seaver) Seaver Ink spot of aspen	tA	small pocket of moderate foliar damage in Medonte Twp, Huron District
<i>Coccomyces hiemalis</i> Cherry shot-hole	cCh	light foliar damage to nursery stock at the Midhurst Forest Station
<i>Coleosporium asterum</i> (Diet.) Syd. Pine needle rust	rP	moderate foliar damage to young trees in Uxbridge Twp, Maple District and in Orillia Twp, Huron District
<i>Cylindrosporium juglandis</i> A leaf spot of walnut	wA	first Forest Insect and Disease Survey record in Ontario; col- lected in Blenheim Twp, Cambridge District

(continued)

Table 13. Other forest diseases (concluded).

Organism	Host(s)	Remarks
<i>Gnomonia leptostyla</i> (Fr.) Ces. & de N. Leaf spot	Wa	Common in some young plantations in the Cambridge District
<i>Guignardia aesculi</i> (Pk.) V.B. Stewart Horse chestnut leaf blotch	horse chestnut	heavy infections common, particularly in the Niagara District
<i>Gymnosporangium globosum</i> Farl. Leaf and twig gall rust	Haw	heavy infections north of Kleinburg, Maple District and in Alnick Twp, Lindsay District
<i>Heterobasidion annosum</i> (Fr.) Bref. (formerly <i>Fomes annosus</i> (Fr.) Karst.) Annosus root rot	rP, scP	no new infection centres located
<i>Marssonina brunnea</i> (Ell. & Ev.) Magn. Leaf spot	tA	moderate leaf damage in the town of Pickering, Maple District
<i>Naemacyclus minor</i> Butin Needlecast	scP	associated with heavy foliar damage to Christmas trees in Oro Twp, Huronia District
<i>Nectria cinnabarina</i> (Tode ex Fr.) Fr. Nectria dieback	sM	severe branch dieback on ornamentals in Bobcageon, Lindsay District
<i>Puccinia sparganioides</i> Ell. & Barth. Ash leaf rust	WAs	light incidence in Essa Twp, Huronia District; first Forest Insect and Disease Survey record in Ontario
<i>Rhizina undulata</i> Fr. Rhizina root rot	wP	considerable number of dead seedlings in recently planted burned over area near Orr Lake, Huronia District
<i>Rhytisma acerinum</i> (Pers. ex St. Amons) Fr. Tar spot of maple	siM	light-to-moderate foliar damage in Tiny Twp, Huronia District
<i>Verticillium</i> spp. Verticillium wilt	sM	Decline due to this organism was evident on ornamentals at several locations.

### *Diebacks and Declines*

#### Ash Dieback

Varying degrees of damage to white ash (*Fraxinus americana* L.) were noted along roadsides and in woodlots, particularly in the Cambridge and Niagara districts.

#### Maple Decline

There was no change in the status of this condition.

#### Oak Decline

Plots, totalling 100 trees each, were established in 1977 in oak stands at four locations in the Region to monitor the condition of red oak. These plots have been checked annually to rate the proportion of the crown that is dead and to record any insect and disease activity. Oak leaf shredder is considered one of the major factors involved in the decline. In 1980 another plot was added at Farlain Lake in Tiny Township near the previously established Awenda Provincial Park plot. This was to determine the long-term effect of aerially spraying for control of the shredder. Results of all plots are summarized in Table 14. The plots were originally to be monitored for three to five years but it has been decided to increase the length of the study.

No new areas of decline were detected in the Region in 1981; however, six new plots were established in the Niagara District to monitor the decline further.

### *Abiotic Damage*

#### Frost Damage

Very light damage was recorded in some plantations in the Region.

#### Salt Damage

This annual problem was again noticeable on roadside trees at points throughout the Region. The damage was evident along well travelled routes, where heavy applications of salt are common, such as Highways 6, 24, 400 and 401. Many coniferous hosts were affected, particularly red pine and white pine and eastern white cedar. Deciduous trees are generally less susceptible to damage from salt spray; however, beech (*Fagus grandifolia* Ehrh.) suffered heavy damage at one point along Highway 24.

Table 14. Summary of oak decline at five locations in the Central Region from 1977 to 1981.

Location	Avg DBH (cm)	Avg ht (m)	Year	Percentage of crown dead				Tree dead	Oak leaf shredder activity <sup>a</sup>
				0-20	21-40	41-60	>60		
Central Region - Huronia District									
Tiny Twp Awenda Park	25.9	21.9	1977	54	7	27	12	0	T <sup>b</sup>
			1978	48	5	22	6	4	T <sup>b</sup>
			1979	58	9	3	4	8	T <sup>b</sup>
			1980	61	8	4	4	8	T <sup>b</sup>
			1981	57	14	2	3	8	T
Tiny Twp Farlain Lake	26.0	22.0	1977			not sampled			S
			1978			"	"		S
			1979			"	"		S
			1980	0	4	45	25	26	S
			1981	0	11	35	25	29	L
Mulmur Twp Dufferin Co. Forest	28.2	21.0	1977	64	15	20	1	0	S <sup>b</sup>
			1978	64	15	19	1	1	L <sup>b</sup>
			1979	68	15	15	1	1	T
			1980	57	28	13	1	1	L
			1981	43	34	16	2	1	M
- Maple District									
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 <sup>b</sup>
			1980	38	14	25	7	16	L <sup>b</sup>
			1981	27	22	26	6	19	L
- Lindsay District									
Clarke Twp Durham-Ganoraska Forest	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	13	12	L
			1981	2	26	47	13	12	T

<sup>a</sup> N = Nil, T = Trace, L = Light, M = Moderate, S = Severe<sup>b</sup> Aerially sprayed for control of oak leaf shredder

## Winter Drying

Damage to conifers was below normal throughout the Region.

## Storm Damage

A total of eight areas of pole-sized red pine that had suffered damage from lightning strikes were detected in the townships of Tiny, Medonte, Vespra, Tosorontio and Mulmer in the Huronia District. The strikes likely occurred in the summer of 1980 as in all areas the trees were in the same stage of decline. At each location a circular group of trees was killed. (An average of 50 trees per group were killed, and a high of 85 were affected at one point.) In each group, only one or two trees exhibited the typical spiral scars on the bole, all other trees having died without showing external injuries. The areas involved were all less than 0.2 ha each and the average tree height was 18 m.

There is no definitive explanation for this type of group tree mortality as the result of a lightning storm. Some forest researchers have proposed that the electrical discharge affects root systems of trees surrounding the tree initially struck while others have suggested that lightning may strike a few trees in a group, travel along their trunks and cross to neighboring trunks by way of their branches.

Another type of storm caused tree damage in the Maple District in 1981. Gale force winds and hail in July in the Thornhill area caused considerable property and tree damage. In one 32 ha overmature sugar maple bush in the vicinity, approximately 225 trees were blown down, and shredded foliage as the result of hail was much in evidence.

## *Special Surveys*

### White Spruce Plantation Survey

In 1981 the Forest Insect and Disease Survey Unit carried out a special survey of white spruce (*Picea glauca* [Moench] Voss) plantations on a province-wide basis. In the Central Region five plantations at scattered points were examined to determine the presence and impact of specific insects and disease organisms and to record any other damaging pests that might be present. Two visits were made to each of the locations because of the differences in the occurrence of the various pests. The first visit was scheduled between 10 and 30 June and the second between 15 and 31 July.

Specific insect pests that were detected are summarized in Table 15. These include spruce budworm, spruce coneworm, shootworms, and the yellowheaded spruce sawfly. The white pine weevil in particular was

Table 15. Summary of the results of a white spruce plantation survey carried out in the Central Region in 1981.

Location (Twp)	<u>INSECTS</u>					
	<u>Spruce budworm</u> trees affected (%)	<u>Spruce coneworm</u> trees affected (%)	<u>Spruce shootworm</u> trees affected (%)	<u>Spruce budworm and spruce coneworm</u> defoliation (%)	<u>Yellowheaded spruce sawfly</u> trees affected (%)	<u>defoli- ation</u> (%)
Lindsay District						
Bexley	87	0	5	0	4	5
Cambridge District						
Arthur	100	67	7	80	0	0
Maple District						
Caledon	14	2	2	56	0	0
Huron District						
Medonte	13	0	1	60	7	2
Essa	22	2	2	42	0	0

(continued)

Table 15. Summary of the results of a white spruce plantation survey carried out in the Central Region in 1981 (concluded).

<u>DISEASES</u>								
Location (Twp)	Area (ha)	Avg ht of trees (m)	Estimated trees per ha	Frost		Needle rust		Armillaria root rot
				trees affected (%)	foliar damage (%)	trees affected (%)	foliar damage (%)	trees affected (%)
Lindsay District								
Bexley	50.6	3.5	2,000	0	0	0	0	0
Cambridge District								
Arthur	1.5	8.4	1,600	0	0	0	0	1
Maple District								
Caledon	2.0	2.8	1,500	5	1	0	0	0
Huron District								
Medonte	2.0	2.5	1,000	33	2	0	0	0
Essa	1.0	1.8	2,000	83	5	4	1	0



sought, but it was absent from all locations. Other insects that were detected include the eastern spruce gall adelgid (*Adelges abietis* [Linn.]) which occurred on 2% and 9% of the trees at the Essa and Medonte locations, respectively. The spruce gall adelgid (*A. lariciatus* [Patch]) was found on 16% of the trees at the Caledon plot. Also at this plot 55% of the trees were infested to some degree by the spruce needleminer (*Endothiana alboineana* [Kft.]). At the Essa location this needleminer in combination with another, the orange spruce needleminer (*Pulicalvaria piceaella* [Kft.]), was lightly infesting 63% of the trees.

The incidence of frost damage, spruce needle rust (*Chrysomyxa ledi* [Alb. & Schw.] d By.) and Armillaria root rot is also recorded in Table 15. Other problems that were surveyed for but proved to be absent from all locations were the abiotic condition known as white spruce chlorosis, spruce broom rust (*Chrysomyxa arctostaphyli* Diet.) and Eastern dwarf mistletoe.

To determine the incidence of root rot in the older plantations (over 6 m) increment cores were taken. Results of samples from the Arthur Township location were negative.

#### Seed and Cone Pests of White Spruce

A survey of white spruce cone insects and diseases was conducted throughout Ontario in 1981. In the Central Region samples of both female flowers and cones were made at two locations, at Balsam Lake Provincial Park in Bexley Township, Lindsay District and at the Porritt Tract of the York Regional Forest, Maple District.

The flower collection was made in mid-May in the late flowering stage. The greatest damage to female flowers (conelets) at both locations was caused by spruce budworm, followed by the spruce bud moth and the orange spruce needleminer. At the Bexley Township location some damage was also caused by spruce coneworm, the purplestriped shootworm and the obliquebanded leafroller (*Choristoneura rosaceana* [Harr.]). Approximately 30% of the conelets were affected at each location.

The conelet sample was followed by a collection of the mature cones in mid-August. Insect damage to the cones was caused primarily by earlier Lepidopterous larvae, the spruce cone maggot (*Hylemya anthracina* [Czerny]) and the spruce seed moth (*Laspeyresia youngana* [Kearfott]). Another insect often present but doing little damage was the spruce cone gall midge (*Dasineura canadensis* Felt). Incidence of these cone insects at the above locations is summarized in Table 16. Other insects collected were the spruce cone axis midge (*Dasineura rachiphaga* Tripp) and a seed chalcid (*Megastigmus atedius* Wlk.) from Bexley Township, and the fir coneworm (*Dioryctria abietivorella* [Grt.]) and the spruce cone geometer (*Eupithecia mutata* Pears.) from the Porritt Tract.

Table 16. Summary of white spruce cone and flower damage at two locations in the Central Region in 1981.

Location	<u>Female flowers</u>		<u>Developed cones</u>		<u>Cones damaged by<sup>a</sup></u>			
	No. exam-ined	Dam-aged (%)	No. exam-ined	Dam-aged (%)	Earlier insects (%)	Spruce cone maggot (%)	Spruce seed moth (%)	Spruce cone midge (%)
Lindsay District								
Bexley Twp	323	29.7	46	95	9	20	56	93
Maple District								
Porritt Tract	258	29.6	100	84	66	46	0	6

<sup>a</sup> Damage to an individual cone may be caused by more than one insect.

No evidence of disease-caused damage was detected.

A further summary of these findings on white spruce and also of seed damage will be published on a provincial basis at a later date.

#### Other Seed and Cone Pest Surveys

In response to a request from the OMNR Tree Seed and Forest Genetics Section, three seed orchards and a seed improvement area in the Central Region were surveyed in mid-August for seed and cone pest damage. Locations, tree species involved, and the percentage of cones affected by the major pests are listed in Table 17. Cones were not abundant in any of the areas, but were particularly scarce at the F Tract and Orono sites. Sampling involved taking two cones from at least 25 randomly selected trees if sufficient cones were present.

White spruce cones at all three collection sites were seriously damaged. The heaviest damage resulted from spruce seed moth feeding on the seeds. This insect leaves no signs of external damage on the cone. Also present in all white spruce collections were the spruce cone maggot, the spruce cone gall midge and damage from earlier Lepidopterous insects. Other insects recorded were the fir coneworm and the spruce cone geometer, the latter being recorded only at the F Tract. In general the cone-producing trees were in good shape; however, at the Glencairn location light foliar damage resulting from late spring frosts was observed, and there was some light damage caused by the eastern spruce gall adelgid (*Adelges abietis* [Linn.]) as well.

Table 17. Summary of insect damage to cones at four locations in two districts in 1981.

Location	Species	Developed cones		Cones damaged by <sup>a</sup>					
		No. exam- ined	dam- aged (%)	earlier Lepidopter- ous insects (%)	spruce cone maggot (%)	spruce seed moth (%)	spruce cone gall midge (%)	fir coneworm (%)	white pine coneworm (%)
Huronian District									
F Tract Seed Orchard	wS	51	90	8	24	61	43	2	-
Ballycroy Seed Improve- ment Area	wS	61	75	13	18	48	5	0	-
Glencairn Seed Orchard	wS	88	68	8	9	40	27	1	-
Glencairn Seed Orchard	bS	100	14	12	0	0	0	0	-
Lindsay District									
Orono Seed Orchard	wP	29	55	-	-	-	-	3	45

<sup>a</sup> Damage to an individual cone may be caused by more than one insect.

The black spruce cones, by contrast, were of good size, well formed and virtually insect free. Some damage caused by earlier Lepidopterous insects was evident, and the spruce cone axis midge was also present (though considered a minor pest). There was some light foliar damage caused by another adelgid, the redspruce adelgid (*Pineus floccus* [Patch]).

White pine cones were most heavily damaged by the white pine cone-worm (*Eucosma tocullionana* Heinr.). Gall midges (Cecidomyiidae) were found infesting 7% of the cones and the fir coneworm was also recorded at low levels. Insects affecting other portions of the tree included the eastern pine shoot borer, pine false webworm and the introduced pine sawfly. These were all found in low quantities and have been mentioned previously in this report.