FOREST INSECT AND DISEASE SURVEYS IN THE SOUTHERN SURVEY REGION

(FOREST DISTRICTS: KEMPTVILLE, TWEED, LINDSAY, LAKE SIMCOE, LAKE HURON AND LAKE ERIE), 1970

by

R. L. Bowser, V. Jansons,
H. J. Weir and M. J. Applejohn

FOREST RESEARCH LABORATORY
ONTARIO REGION
SAULT STE. MARIE, ONTARIO
INFORMATION REPORT O-X-142

CANADIAN FORESTRY SERVICE
DEPARTMENT OF FISHERIES AND FORESTRY
APRIL, 1971

Great Lakes Forest Research Centre
Canada Department of the Environment
Box 490
Sault Ste. Marie, Ontario

Erratum

Information Report, O-X-142, Forest Research Laboratory, Ontario Region, Sault Ste. Marie, entitled "Forest Insect and Disease Surveys in the Southern Survey Region".

Under Zimmerman pine moth, P. 4, Lines 7 and 8 - delete the sentence, "Following a control operation-----partially effective".

Management Forester M. Schaefer from the Kemptville District office, Ontario Dept. of Lands and Forests has advised us that the control project was actually not carried out as proposed and therefore the sta"ement is inappropriate.

W. L. Sippell
Head
Forest Insect and Disease Survey

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ACKNOWLEDGEMENT

The authors of this report are grateful to personnel of the Ontario Department of Lands and Forests for the co-operation and assistance extended to them in 1970. The assistance of several sawmill operators who supplied valuable information pertaining to heart rots and stains of hardwoods in Southern Ontario is also appreciated.

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SURVEY HIGHLIGHTS

In 1970, the working unit for surveying forest insect and disease conditions in Ontario was changed from an individual technician assigned to a forest district, to a survey team led by an experienced supervisor and consisting of one to three additional technicians. Each team covered three to six forest districts. The Southern Survey Region, which was designated to include six forest districts, was staffed by a 4-man team as follows:

Lake Simcoe District: - R. L. Bowser, Supervisor

Lake Huron and
Lake Erie districts: - V. Jansons

Lindsay District: - H. J. Weir

Tweed and Kemptville
districts: - M. J. Applejohn

This report deals with the more important, or potentially more important, forest insect and disease conditions found by the team in 1970.

Among the insect pests, the European pine sawfly continued to be a major problem in the Region. Cedar leaf miners, birch skeletonizer and fall webworm also attracted more than the usual amount of public interest owing to the damage they caused to shade trees, natural stands and ornamental plantings. Heavy infestations of a needle midge on Scots pine proved to be a costly problem to several Christmas tree growers in the Kemptville District. Populations of the cottony maple scale, previously causing much concern to property owners in the Windsor area, declined to very low levels and damage caused by the saddled prominent and the oak skeletonizer was much lower than in 1969.

Dutch elm disease continued to ravage elm trees throughout the Region and unusual weather caused severe browning of red spruce foliage over approximately 100,000 acres in the northern parts of the Lindsay and Tweed districts. No positive signs of oak wilt disease were found either in the Sarnia or Petrolia areas where the disease had been suspected. Intensive surveys in the Region did not reveal the presence of *Scleroderris lagerbergii*.

R. L. Bowser
Supervisor
Southern Survey Region

INSECTS

Cedar Leaf Miners, *Argyresthia aureoargentella* Brower.
Argyresthia freyella Wlshm.
Argyresthia thuiella Pack.
Pulicalvaria thujaella Kft.

These miners caused varying degrees of damage to white cedar trees throughout the southern part of the Southern Survey Region. Although four species were involved, *A. thuiella* and *P. thujaella* were the main species responsible.

High populations caused severe damage to cedar trees in Simcoe County, and in the southern townships of Ontario County in the Lake Simcoe District, south of the Trent Canal system between Oshawa and Trenton in the Lindsay District, and across the southern part of the Tweed and Kemptville districts. One particularly heavy infestation occurred along Highway 43 near Kemptville. Within these infestations, small pockets of cedar trees were relatively free of infestation but no apparent reason could be found.

Light to moderate discoloration of cedar foliage was observed in the central part of the Lake Huron District, and in Middlesex and Lambton counties in the Lake Erie District.

A. thuiella and *P. thujaella* were first reported as causing damage to cedar trees in Peterborough, Northumberland and Durham counties in the Lindsay District in 1955. This infestation declined to very light intensity in 1958, the same year *A. aureoargentella* was first reported as belonging to this complex. In 1961 an outbreak began in the Tweed and Kemptville districts but only *A. aureoargentella* and *A. freyella* were collected. In 1962 all four species caused widespread severe damage to cedar trees in most of the southern districts. The current infestations are a continuation of this outbreak except for temporary local declines between 1966 and 1969.

In areas where cedar trees have been heavily infested for a number of years the crowns of the trees are very thin and some twig, branch and in numerous cases tree mortality is occurring (see photograph). However, as a rule one year's heavy defoliation causes an unsighty appearance and has an adverse effect on the foliage which is used extensively for wreath manufacturing. This current condition is also causing concern to owners of ornamental trees and producers of cedar leaf oil.

The Oak Skeletonizer, *Bucculatrix ainsliella* Murt.

In 1970 small pockets of medium to heavy infestation occurred in red oak stands along the north shore of the St. Lawrence River in the Kemptville District. In the Tweed District a medium infestation was noted in Dungannon Township and larval populations in the Lake Simcoe

District declined to very low levels.

The current outbreak began in 1968, when red oak trees in a few scattered woodlots in the Uxbridge area, Lake Simcoe District, were severely defoliated. In 1969 heavy infestations recurred in the Uxbridge area. New heavy infestations were noted in Front of Yonge Township in the Kemptville District and in Sunnidale Township in the Lake Simcoe District.

Although this insect was a recognized forest pest in the United States, it was first collected by the Forest Insect Survey in Ontario in 1951. At this time appreciable foliar damage was recorded in red oak stands in Lincoln, Welland, Elgin, and Middlesex counties in the Lake Erie District. In 1952 infestations declined considerably and larval populations remained very low through to 1967.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

The last outbreak of this insect in Southern Ontario occurred in the Lake Erie District between 1956 and 1962. A new outbreak developed in 1970, particularly in the western districts. In the Lake Simcoe District, high populations defoliated white birch stands in the Angus-Barrie area, in the southern part of Adjala Township, near Cookstown in West Gwillimbury Township, near Sandford in Scott Township, in the vicinity of Holt in East Gwillimbury Township, and in the Lake Erie District, damage occurred in the Simcoe-Delhi area. In the Lake Huron District, light to moderate damage was noted at numerous locations in Bruce County. One small pocket of light infestation was recorded on wire birch in Osgoode Township, Kemptville District, in the eastern part of Southern Ontario.

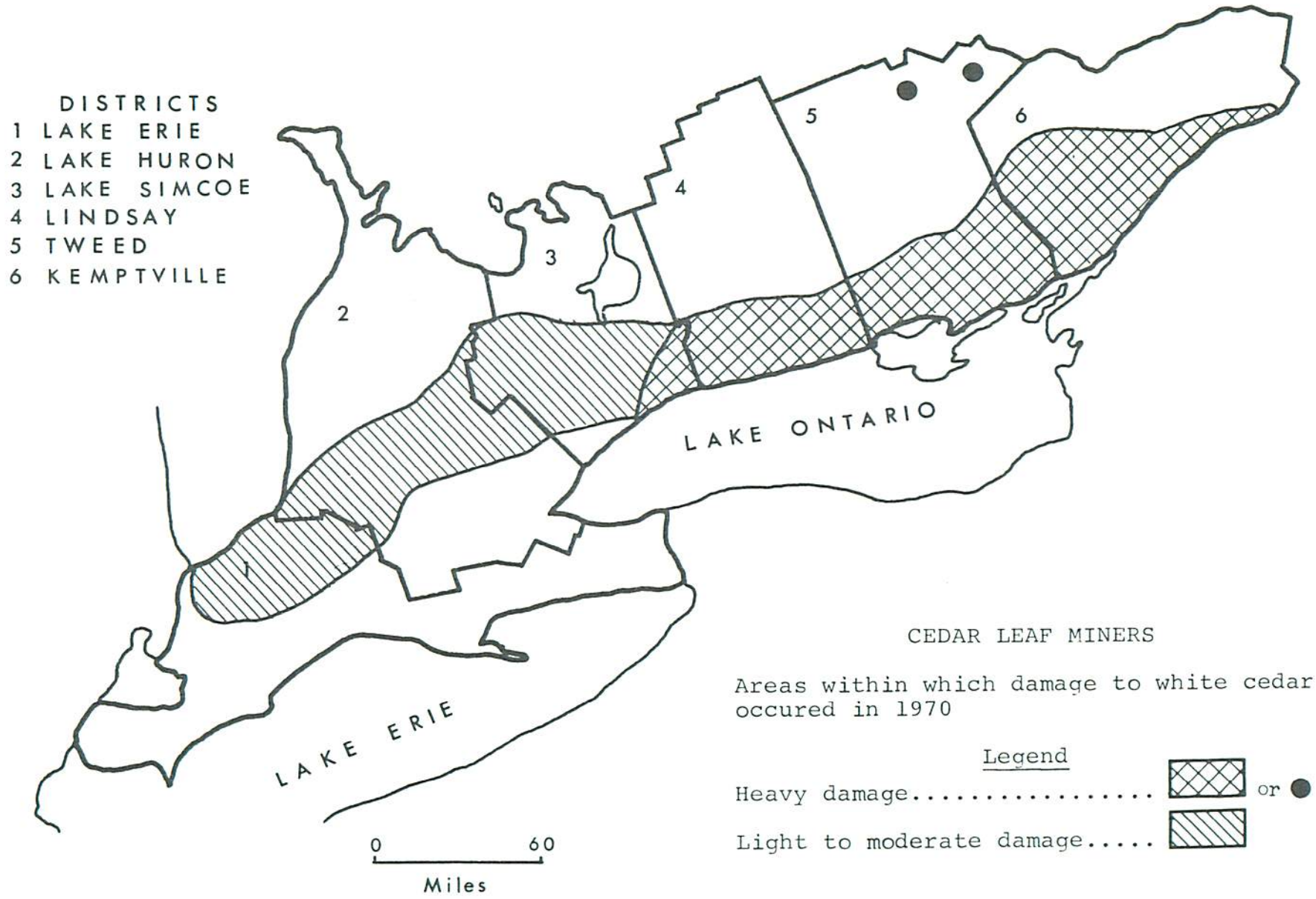
A Needle Midge on Scots Pine, *Cecidomyidae*

Surveys in 1970 showed this insect to be present in most of the Kemptville District. Heavy infestations were observed in Goulbourn, Marlborough, Montague, Oxford, Winchester, and North Plantagnet townships. Light to medium infestations were observed at numerous other locations in the district.

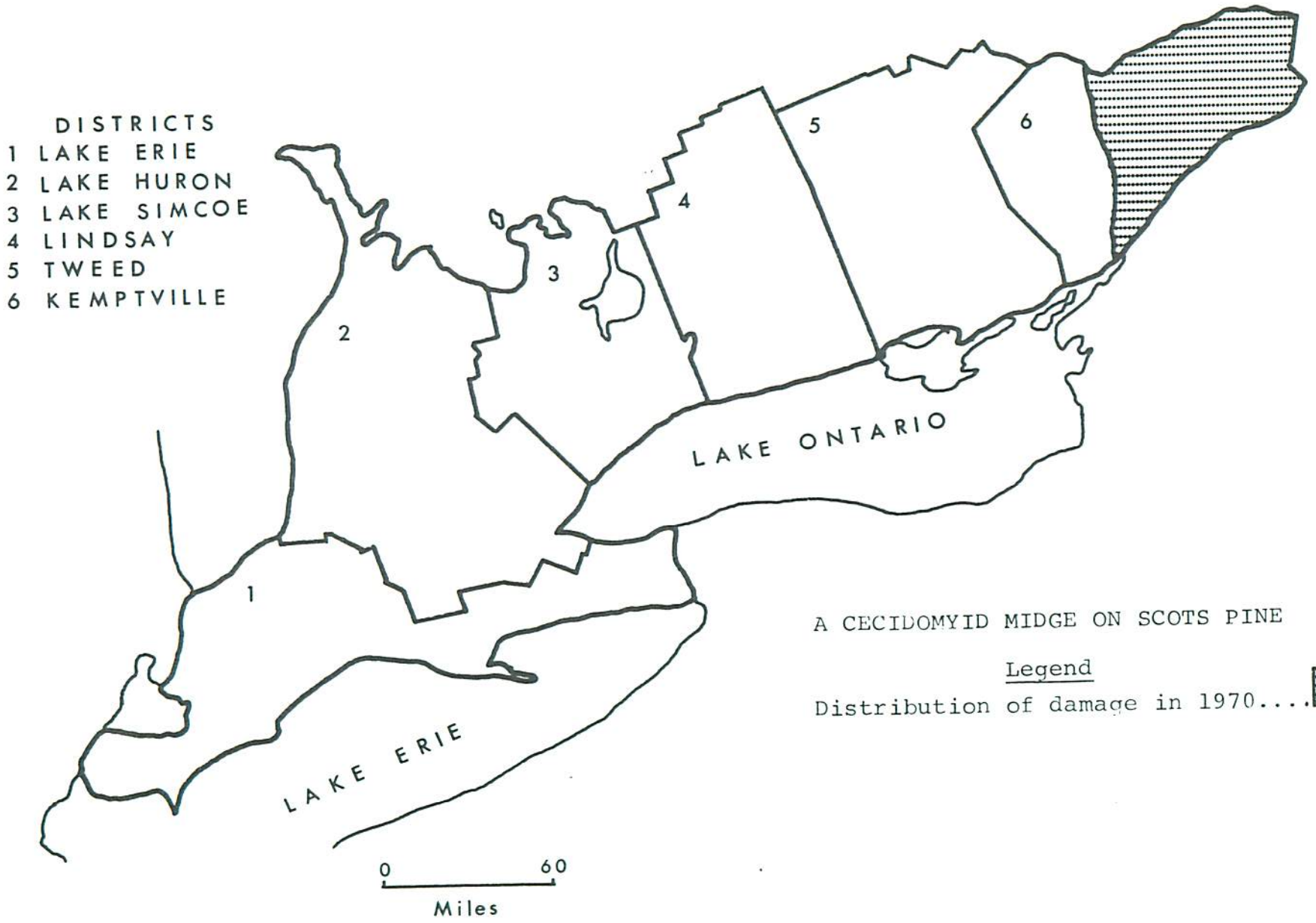
The first instance of severe damage by this midge occurred in 1969 in a Scots pine Christmas tree plantation in Oxford Township. Re-examination of this stand in 1970 revealed no permanent damage. However, the insect is of economic importance to Christmas tree growers, because the many infested needles are shed in the fall before harvesting causing a thinning of the crown.

The larvae attack the new growth mainly in the upper third of the crown and infested needles tend to bend over at the sheath. Up to five

SOUTHERN SURVEY REGION



SOUTHERN SURVEY REGION



A CECIDOMYID MIDGE ON SCOTS PINE

Legend

Distribution of damage in 1970....

larvae were found in a single needle sheath and they are present from early August to early September. Life history studies are planned for 1971.

Spruce Budworm, *Choristoneura fumiferana* Clem.

The importance of this pest and the widespread damage it caused in 1970 led to a separate report outlining its activities on a province-wide basis. Specific information summarizing the various outbreaks is provided in Information Report O-X-147 included herein.

A Tortricid on Oak, *Croesia semipurpurana* (Kft.)

Infestations of this tortricid, varying in intensity from light to severe, have been recorded on red oak trees in the Lake Simcoe District every year since 1958.

In 1970 medium infestations occurred in Tiny, Mulmur, Oro and Vespra townships where occasional fringe trees were severely damaged. In Uxbridge Township infestations declined from medium in 1969 to light intensity in 1970.

Due to several successive years of infestation in the Dufferin County Forest in Mulmur and Tosorontio townships crown deterioration is becoming increasingly more evident. Tree mortality is negligible to date.

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

Heavy infestations of this defoliator occurred in Montague, Winchester, Charlottenburg and Front of Leeds townships in the Kemptville District. In the Tweed District, scattered walnut, hickory and butternut trees were severely defoliated in the Kingston-Napanee area and along Highway 37 between Tweed and Actinolite. Moderate defoliation of black walnut was observed in McGillivray and Windham townships in the Lake Erie District. Light to medium infestations were noted in the southern part of the Lake Simcoe District, in the Picton and Trenton-Belleville areas, in the Tweed District, and in Ottawa and Chesterville in the Kemptville District.

Numbers of this caterpillar declined slightly in the southern part of the Lake Huron District where moderate to severe defoliation of single and small groups of walnut has prevailed for several years.

A Zimmerman Pine Moth, *Dioryctria* (new sp.) *zimmermani* Group

Infestations of varying intensity have been reported, affecting new shoots of semi mature red pine trees in the Lake Simcoe District since 1965. Occasional occurrences of stem attack on Scots pine have been reported in the Region.

In 1970 moderate to heavy shoot damage occurred in the central and northern parts of the Lake Simcoe District. As high as 50 per cent of new red pine shoots were infested in plantations in Essa, Mulmur, Tosorontio, Vespra and Medonte townships.

In Kemptville District, a heavy infestation was noted in stems of pruned Scots pine trees in a small plantation in Osgoode Township. Following a control operation using Cygon 2 E, surveys revealed numerous living pupae indicating the treatment was only partially effective.

Maple Trumpet Skeletonizer, *Epinotia aceriella* Clem.

A heavy infestation persisted for the fourth consecutive year in Colborne Township, Lake Huron District, where 50 per cent of the foliage was infested in a 50-acre sugar maple woodlot. High numbers also occurred in Waterloo and Puslinch townships and in the Bruce Peninsula. Medium infestations were noted in Whitchurch and Nottawasaga townships in the Lake Simcoe District. Low numbers were common elsewhere in the area.

This skeletonizer of sugar maple spins a silken web on the underside of the leaf causing it to fold. Within this fold it forms a trumpet-like frass tube from which the larva feeds, the tube increasing in size with the development of the larva.

Although not considered a serious pest, an increase in larval populations has occurred in the western part of the Region in recent years.

Birch Leaf Miner, *Fenusa pusilla* (Lep.)

In the Kemptville District, heavy infestations persisted in white and wire birch stands in Prescott and Russell counties, in the southern parts of Grenville, Stormont, Dundas and Glengarry counties and in small pockets in Elizabethtown Township, Leeds County. In the Tweed District, heavy infestations occurred near Trenton in Ameliasburg Township and east of Marmora in Marmora Township. Light to medium infestations were recorded in Blenheim Township, Lake Huron District. Results of quantitative samples made at four locations in the Kemptville District are summarized in Table 1.

TABLE 1

Summary of Damage Caused by the Birch Leaf Miner in the Kemptville District in 1969 and 1970 (Based on the examination of 100 leaves taken at random from three trees at each location.)

Location (township)	Host	Av. d.b.h. of sample trees in inches	Per cent of leaves infested		Total no. of mines	
			1969	1970	1969	1970
Elizabethtown	wiB	4	96	55	288	119
East Hawkesbury	wiB	3	53	76	97	41
Williamsburg	wiB	2	89	93	197	207
Oxford	wB	3	100	100	237	214

The Saddled Prominent, *Heterocampa guttivitta* Wlk.

In 1970 infestations caused 75 to 100 per cent defoliation of sugar maple and beech trees on Hope Island in the Lake Simcoe District, and in Lindsay and St. Edmunds townships in the Lake Huron District. In Lindsay Township several patches of severe defoliation were recorded in a two square mile area adjacent to a five acre stand that was stripped of foliage in 1969. A new pocket of heavy infestation was noted in St. Edmunds Township where 50 acres of sugar maple suffered severe foliar damage. Medium infestations recurred on high ground on Beckwith Island, on the east half of Christian Island and in a small woodlot near Laurin in Tiny Township, in the Lake Simcoe District. Pockets of medium and heavy infestation in Oro, Medonte and Uxbridge townships in the last named district; and in Eastnor Township in the Lake Huron District declined to trace populations in 1970. A small light infestation recurred in North Sherbrooke Township in the Kemptville District for the second consecutive year, and in the Lindsay District only small numbers of larvae were found.

Numerous predators such as birds, mice and ground beetles were present in most infestations, and sporadic occurrences of a species of *Beauveria* fungus found in the larval stage and *Isaria* fungus attacking the pupal stage partly controlled populations in some areas from 1967 to 1969. In 1970, a high incidence of *Entomophthora* fungus was responsible for high mortality of late instar larvae in most areas of heavy infestation. This would suggest a sharp decline in larval population in 1971.

This insect has ravaged small acreages of hardwoods at scattered locations in the Southern Survey Region since 1967. Previous to this, outbreaks of one year duration were reported only twice in Ontario. In

1938, heavy infestations occurred in woodlots in Durham and York counties and a hardwood stand in Wellington County was severely defoliated in 1954. The persistence of this current outbreak, which started in 1967, run counter to infestation histories in Ontario and the Lake States where outbreaks have been of only one or two years' duration.

Fall Webworm, *Hyphantria cunea* (Drury)

In the Lake Simcoe District a medium infestation in Orillia Township in 1969 increased to heavy intensity in 1970 and caused complete defoliation of numerous 30-foot green ash trees. Scattered host trees in the Bass Lake Provincial Park were also heavily defoliated. Heavy infestations occurred in a two square mile area east of Port Colborne in Humberstone Township, Lake Erie District, where numerous 30 to 50-foot host trees were severely defoliated. In addition, heavy infestations were recorded in the Kingston-Landon Bay area in Pittsburg Township, Tweed District, and in Cumberland, Torbolton, Mountain, Osgoode and Nepean townships in the Kemptville District.

In the Lake Huron District a medium infestation was recorded on large black walnut trees in the town of Paris. Heavy infestations in Edwardsburg, Charlottenburg, and Lancaster townships in the Kemptville District declined to medium intensity in 1970. Light infestations were more common in the Southern Survey Region than in recent years.

Infestations of this pest of fruit, shade and forest trees have occurred in Ontario over many years, but as they are usually of short duration and occur late in the growing season, permanent damage seldom ensues.

A Maple Leaf Miner, *Lithocolletis aceriella* Clem.

In 1970, heavy infestations of this leaf miner were noted in Orillia and Mara townships in the Lake Simcoe District, in Oso and Olden townships in the Tweed District, and in Clarence, Rear of Leeds and Lansdowne townships in the Kemptville District. Light to medium infestations occurred in Flos, Whitchurch and Nottawasaga townships in the Lake Simcoe District, and were widespread in the Tweed and Kemptville districts.

Although sugar maple regeneration and saplings were the preferred hosts, mature trees were severely damaged in some areas of heavy infestation. Several mines were commonly found on single leaves.

Previous to 1970 only one reference to this insect was made in annual Survey Reports in Ontario. In 1943 considerable injury to sugar maple was reported from Durham County in the Lindsay District.

The Solitary Oak Leaf Miner, *Lithocolletis hamadryadella* Clem.

Scattered infestations of this leaf miner occurred throughout the Southern Survey Region. Heavy infestations were recorded on red and white oak at points in Charlotteville, McGillivray and Humberstone townships in the Lake Erie District and along the north shore of the St. Lawrence River between Brockville and Gananoque, in the Kemptville District. Heavy infestations were also observed on burr oak in the Lake Simcoe District, and on white and burr oak at points in Marmora, Madoc, Thurlow and Sidney townships in the Tweed District. Low numbers were present at numerous locations across the remainder of the Region.

Balsam-fir Sawfly, *Neodiprion abietis* complex

Populations of this sawfly remained high in the eastern part of the Region for the third consecutive year. Heavy infestations were observed in Horton, McNabb, Effingham and Herchel townships in the Tweed District, and in Fitzroy, Huntley, March and Pakenham townships in the Kemptville District. A particularly heavy infestation occurred in Pakenham Township where 40-foot balsam fir trees were completely stripped of old foliage. Severe defoliation was also observed on small, scattered clumps of balsam fir in the lower Ottawa Valley, in Gloucester, East Hawkesbury and Longeuil townships.

Light to moderate infestations were common on scattered balsam fir in the Bonnecherre and Madawaska Valleys in the Tweed District, and in Fitzroy and Torbolton townships in the Kemptville District.

Jack Pine Sawflies, *Neodiprion pratti paradoxicus* Ross and *Neodiprion pratti banksianae* Roh.

Heavy infestations of *N. pratti paradoxicus* occurred in Bathurst, Clarence and Nepean townships in the Kemptville District, and in Hungerford Township, Tweed District. Medium infestations were recorded in Lanark, Drummond and Oxford townships in the Kemptville District, and in Sidney and Anglesea townships, Tweed District. Medium infestations of *N. pratti banksianae*, a closely related species, occurred in King and Tosorontio townships in the Lake Simcoe District. In Tosorontio Township the number of colonies increased nearly eightfold from 0.6 per tree in 1969 to 4.7 per tree in 1970 (Table 2). Scattered colonies and occasional light infestations were observed at many widespread locations in the Kemptville and Tweed districts.

TABLE 2

Summary of Jack Pine Sawfly Colony Counts in the Southern Survey Region in 1970. (One hundred jack pine trees were examined at each location.)

Location (township)	Av. height of sample trees in feet	Per cent of trees infested	Av. no. of colonies per infested tree
Kemptville District			
Lanark	15	100	5.9
Bathurst	15	100	10.0
Nepean	5	-	0.9
Bastard	12	-	0.3
Lake Simcoe District			
Melancthon	20	36	1.0
Tosorontio	12	100	4.7
W. Gwillimbury	15	58	2.4

European Pine Sawfly, *Neodiprion sertifer* Geoff.

Heavy infestations recurred in pine plantations in the Vivian-Uxbridge area, in York and Ontario counties and in Adjala and Albion townships in the Lake Simcoe District (Table 3). Severe defoliation occurred for the second consecutive year in a Scots pine plantation in Beverley Township in the Lake Huron District; and in three to five foot Scots and red pine trees at several locations in the Durham County Forest in the Lindsay District.

A medium to heavy infestation was recorded in a Scots pine plantation in the Lake Erie District. A small area of large jack pine trees were moderately defoliated in Keppel Township in the Lake Huron District.

Elsewhere, in the Lake Simcoe District, light and moderate defoliation was observed in Peel, Dufferin and Simcoe counties, and at the St. Williams Nursery and in Adelaide and Mosa townships in the Lake Erie District. Light and moderate defoliation occurred at several locations in the Lake Huron District and in most of the area south of the Trent Canal system in the Lindsay District.

Scattered colonies were found in the southwest corner of the Tweed District with collections made as far east as the town of Deseronto

in Tyendinaga Township, representing a minor eastward extension. Single colonies were observed in Prince Edward County. In the Kemptville District the insect is confined to the Metropolitan Ottawa area where ornamentals, particularly Mugho pine on occasion suffered severe defoliation. No insects were found in the National Capital Commission Greenbelt plantations surrounding the city.

A concentrate of *sertifer* virus, collected in the Lake Simcoe District in 1969, was used in preparing suspensions to introduce the virus into infested areas in 1970 and infected larvae were again collected for future use.

TABLE 3

Summary of European Pine Sawfly Colony Counts and Degrees of Infestation in the Southern Survey Region in 1970 (Counts based on the examination of 100 trees at each location.)

Location (township)	Host	Av. height of trees in feet	Av. no. colonies per infested tree	Per cent of trees infested	Degree of infestation
Lake Huron District					
Sullivan	scP	6	1.6	71	Light
Eramosa	jP	6	2.6	91	Light
Amabel	scP	7	1.4	42	Light
Lake Simcoe Dist.					
Tosorontio	rP	12	1.0	27	Light
Tosorontio	scP	12	1.5	32	Light
Adjala	scP	8	4.0	97	Medium
Albion	scP	12	9.5	100	Heavy
Orillia	scP	10	1.0	21	Light
Tiny	rP	6	1.0	44	Light
Uxbridge	rP	5	1.0	19	Light
Lindsay District					
Darlington	scP	6	0.9	-	Light
Hope	scP	10	-	-	Heavy
Cartwright	scP	10	2.2	-	Moderate
Haldimand	rP	8	1.7	-	Light
Clarke	scP	4	4.3	-	Heavy
Clarke	rP	6	1.0	-	Light

White Pine Weevil, *Pissodes strobi* (Peck)

Although the overall population level in the Southern Survey Region showed little change, the incidence of weevil attack remained high at numerous locations.

Heavy infestations caused severe leader damage to white pine in Flos, Essa, Whitchurch and King townships, Lake Simcoe District, Haldimand and Somerville townships, Lindsay District, Fitzroy, Bathurst and Dalhousie townships, Kemptville District, and in Madoc, McNab, Hungerford and Effingham townships in the Tweed District. In the Orr Lake forest infestation in Flos Township, 69 per cent of the trees were weevilled and up to three weevilled leaders per tree were observed. Norway spruce plantations in Oro Township in the Lake Simcoe District and in Somerville Township in the Lindsay District were again heavily attacked (Table 4). New heavy infestations on white and Norway spruce were observed in Finch and Roxborough townships in the Kemptville District and in Bagot Township in the Tweed District.

Moderate infestations recurred on white pine in Matchedash and Oro townships, Lake Simcoe District, Sullivan Township, Lake Huron District, South Walsingham Township, Lake Erie District, Dalton and Clarke townships in the Lindsay District and Walford and Kaladar townships in the Kemptville and Tweed districts respectively.

Light infestations were reported on planted stock and natural regeneration throughout most of the Southern Region.

TABLE 4

Summary of Leader Damage by White Pine Weevil in the Southern Survey Region in 1969 and 1970 (Based on the examination of 100 trees at each location.)

Location (township)	Host	Av. d.b.h. in inches	Per cent of trees infested 1969	1970
Lake Erie District				
South Walsingham	wP	2	12	6
Charlotteville	wP	2	7	3
Lake Huron District				
Culross	wP	1	12	8
Kinloss	wP	2	3	4
Sullivan	wP	2	23	22
N. Dumfries	wP	2	2	2
Waterloo	wP	3	5	3
Sullivan	wP	3	2	1
Lake Simcoe District				
Whitchurch	wP	3	28	34
Matchedash	wP	7	13	9
Essa	wP	4	27	33
Oro	wP	5	8	6
Vespra	nS	6	11	9
King	wP	3	31	35
Flos	wP	4	78	69
Lindsay District				
Somerville	nS	2	-	75
Haldimand	wP	2	28	87
Dalton	wP	2	-	6
Clarke	wP	3	-	9
Somerville	wP	2	78	56
Kemptville District				
Wolford	wP	3	25	16
Fitzroy	wP	2	37	45
Bathurst	wP	4	17	38
Dalhousie	wP	4	50	35
Tweed District				
Madoc	wP	3	-	23
McNab	wP	4	31	40
Kaladar	wP	3	-	18
Hungerford	wP	2	16	28
Effingham	wP	3	36	28

Gypsy Moth, *Porthetria dispar* L.

This dangerous pest of deciduous trees was first discovered in Ontario in 1969 by the Plant Protection Division, Canada Department of Agriculture. The infestation was located in the southeastern part of the Tweed District and encompassed parts of Wolfe Island, Howe Island and the adjoining mainland in the Pitts Ferry area. In the spring of 1970, this entire area, totalling approximately 6000 acres was treated by the Plant Protection Division with Sevin, at one pound per acre, in water with plyac as a sticker. Based on surveys carried out in the fall of 1970 they report that the insect is still present in the area although its numbers have been greatly reduced.

Larch Sawfly, *Pristiphora erichsonii* Htg.

A general increase in larval populations occurred in the Lake Erie and Lake Huron districts and heavy infestations persisted in numerous European larch stands in the Lake Simcoe District.

In the Lake Huron District European larch were severely defoliated in a ten acre stand in South Dumfries Township for the fourth consecutive year and heavy infestations were recorded in pockets of tamarack in Puslinch and Lindsay townships. In the Lake Simcoe District defoliation approximated 75 per cent in plantations in the Ballantrae area, Midhurst-Craighurst-Angus area, in the Uxbridge Headquarters Tract and in the Mono Mills area. Damage was generally much less severe on tamarack.

Medium infestations persisted in European larch stands at the St. Williams Nursery, and in South Walsingham and Charlotteville townships, Lake Erie District, in Woolwich and Minto townships, Lake Huron District and in the Abbey-Dawn conservation area in Pittsburg Township in the Tweed District. Also in the latter district small pockets of tamarack were moderately defoliated along Highway 509 between Sharbot Lake and Snow Road.

TABLE 5

Other Noteworthy Insects

Insect	Host(s)	Remarks
Acleris variana Fern.	wS, eH	Medium infestation in Adjala Twp., Lake Simcoe Dist. Light infestations at several other locations in the Region.
Alsophila pometaria (Harr.)	wE, Ba	Heavy in association with *Paleacrita vernata* (Peck) in Fitzroy and Pakenham twps., Kemptville Dist.
Altica populi Woods	bPo	Causing severe defoliation at several locations in the southern and central areas, Lake Simcoe Dist.
Anisota finlaysoni Riotte	bO, wO	Heavy at several locations in the Kingston-Napanee area, Tweed District.
Aphrophora parallela (Say)	wP, scP pP, bF	Heavy infestations at several locations in the Tweed and Kemptville dist. Found commonly elsewhere in the Region.
Arge pectoralis (Leach.)	wB, yB	Causing light to moderate defoliation at several locations in the Bruce Peninsula, Lake Huron Dist., and moderate to heavy defoliation at several points in the Tweed and Kemptville districts.
Choristoneura pinus pinus Free.	scP, jP mP	Light infestations on jack pine in Orillia and Adjala twps., Lake Simcoe Dist. Small numbers in the Lake Huron and Tweed districts.

TABLE 5 continued

Insect	Host(s)	Remarks
Coleophora laricella (Hbn.)	tL, eL	Declined from heavy to light infestation levels in Whitchurch Twp., Lake Simcoe Dist. Generally small numbers elsewhere in the Region.
Corythucha spp.	deciduous species	High populations on various species at several locations in the Kemptville and Tweed districts.
Dioryctria reniculella Grote	wS	Medium populations in association with spruce budworm in Essa Twp. Lake Simcoe District.
Diprion hercyniae (Htg.)	wS	Generally low populations throughout the Region.
Eucosma gloriola Heinr.	wP, rP scP, aP	Generally low numbers throughout the Region. Less than five per cent leader attack at all quantitative sample points.
Halisidota caryae Harr.	wO, Hi, wB Wa, Bu	Light defoliation in Norfolk Haldimand, Lincoln and Welland counties, Lake Erie District.
Hylobius radicis Buch.	scP	Causing notable tree mortality in the north half of Simcoe County, Lake Simoce District. Twenty per cent of trees infested at several locations in this area.
Ips grandicollis Eich.	pP	Heavy at one location in Front of Yonge Twp., Kemptville District.
Malacosoma americanum Dyar.	deciduous shrubbery	Moderate to heavy on roadside shrubs at numerous locations across the Region.
Malacosoma disstria Hbn.	tA, W wiB	Small pockets of heavy infestation in Mountain Twp., Kemptville District.

TABLE 5 continued

Insect	Host(s)	Remarks
Messa nana Klug	wB	Collections in Medonte Twp., Lake Simcoe Dist. and Pittsburg Twp., Tweed District represent notable northward and eastward extensions in the known range of this introduced insect.
Neodiprion lecontei (Fitch)	rP, scP jP	Small pockets of medium to heavy infestation in Vespra Twp., Lake Simcoe District were chemically treated; low populations elsewhere.
Paleacrita vernata (Peck)	wE	Causing moderate to severe defoliation.
Paraclemensia acerifoliella (Fitch)	sM	Single pocket of heavy infestation near Black Rapids, Kemptville Dist.
Paraphytomyza populicola Wlk.	lPo	Heavy infestations on ornamentals in Ottawa for the second consecutive year.
Phyllophaga sp.	sM, tA	Light to moderate defoliation by adult June beetles in Oxford Twp., Kemptville Dist. and in Olden Twp., Tweed District.
Pikonema alaskensis Roh.	wS	Heavy infestations on plantation spruce in Dungannon, Oso and Tyendinaga twps., Tweed Dist. and Bathurst Twp., Kemptville Dist.
Pineus similis Gill.	wS	High incidence on scattered trees in Albemarle Twp., Lake Huron District.

TABLE 5 concluded

Insect	Host(s)	Remarks
Profenusa lucifex Ross	bO	Heavy infections in Pickering Twp., Lake Simcoe Dist. and in Pittsburg Twp., Tweed District.
Psilocorsis querciella Clem.	rO, wO wB	Light to medium on oak in Pinery Provincial Park, Lake Erie District, and on white birch on Bruce Peninsula, Lake Huron District.
Pulvinaria innumerabilis (Rathv.)	siM	Declined to very low population levels in Windsor in 1970; some twig mortality noted in Windsor and at Holiday Beach Provincial Park, Lake Erie Dist., on trees which were heavily infested in 1967 and 1968.
Rhyacionia buoliana (Schiff.)	rP, mP	Medium infections in Ancaster Twp., Lake Huron Dist. and Caradoc Twp., Lake Erie Dist.; small numbers in the southern part of Lake Huron Dist.
Scolytus multistriatus Marsh.	wE, slE, rE	Slight northward extensions in the range of this introduced vector of Dutch Elm Disease were noted in the Lindsay and Tweed districts.

TREE DISEASES

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

In the Lake Simcoe District, infestations continued to cause light mortality in a white cedar hedge at Midhurst Nursery and in a private red pine plantation in Oro Township. A slight decline in infections of Scots pine regeneration occurred in Sunnidale Township where a count revealed five infected trees in 200 examined compared with ten infected in 300 examined in 1969.

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

This disease continued to ravage elm throughout the Southern Survey Region in 1970 (see photograph). High incidence was noted in Grey and Bruce counties in Lake Huron District, in the central and northern parts of Lake Simcoe District, along the north shore of Lake Ontario and along Highway 7 near Madoc in Tweed District, and along the north shore of the St. Lawrence River in the Kemptville District. Per cent mortality remained high in the southwestern part of the Region where the disease has been present for many years. Incidence was generally lower elsewhere in the Region (Table 6).

TABLE 6

Summary of Dutch Elm Disease Surveys Carried out at Seventeen Locations in the Southern Survey Region in 1970

Location (township)	No. of trees examined	Per cent of trees		
		Healthy	Diseased	Dead
Lake Huron District				
Sydenham	52	58	15	27
Keppel	55	67	18	4
Albemarle	50	86	6	8
Holland	27	41	26	33
Lindsay	52	75	8	17
Normanby	50	52	28	20
Lake Simcoe District				
Melancthon	100	20	40	40
Essa	50	14	72	14
Pickering	50	4	64	32
Albion	50	10	48	52
Markham	50	22	42	36
Tweed District				
Kingston	100	37	41	22
Madoc	100	33	30	37
Kemptville District				
Edwardsburg	100	16	35	49
E. Hawkesbury	100	84	16	-
Pakenham	100	89	11	-
Front of Escott	100	93	7	-

Needle Rust of Pine, *Coleosporium asterum* (Diet.) Syd.

This organism recurred at varying levels of infection throughout the Southern Survey Region. High infection occurred on red pine trees for the second consecutive year in North Dumfries Township, Lake Huron District, and light infection occurred for the third consecutive year in a jack pine plantation in Tosorontio Township in the Lake Simcoe District.

Cytospora Canker, *Cytospora kunzei* Sacc.

High levels of infection were evaluated in a pruned white spruce plantation in Vespra Township, Lake Simcoe District, and in an unpruned plantation in Cambridge Township in the Kemptville District (Table 7).

In the Lake Huron District the organism was associated with white pine and European larch mortality in Beverley Township. A count on white pine in this area revealed 16 dead, 14 infected, and 70 healthy. In Sullivan Township an examination of 165 white pine trees, 3.5 to 15-feet in height, revealed 25 cankered, two dead and one with a dead leader. In Glenelg Township seven per cent of the trees were cankered in a ten acre white pine plantation.

In Beverley Township, site may have been partially responsible for the condition as the infected trees were growing on a thin layer of soil over limestone. In the latter two areas pruning was carried out in 1969.

Elsewhere in the Lake Simcoe District light infections continued in white spruce plantings in Essa and Uxbridge townships.

TABLE 7

Summary of Damage Caused by Cytospora Canker in the Southern Survey Region in 1970

Location (township)	Host	Tree height in feet	Level of incidence in per cent	Level of infection
Lake Simcoe District				
Vespra	wS	45	25	High
Kemptville District				
Cambridge	wS	25	30	High
Lake Huron District				
Holland	wP	7	2	Light

DUTCH ELM DISEASE

Damage to hedgerow by Ceratocystis ulmi (Buism.) C. Moreau

CEDAR LEAF MINERS

Severe defoliation of white cedar trees by the cedar leaf miner complex

Hemlock Cone Rust, *Melampsora abietis canadensis*, Ludw. ex Arth.

A single, heavy infection was observed on cones and twigs of small hemlock near Maberley in Bathurst Township in the Kemptville District. A medium infection occurred on cones of semi-mature hemlock in Madoc Township in the Tweed District. Light infections were recorded in south Burgess and Darling townships in the Kemptville District and a single collection was made from the alternate host, largetooth aspen, in Olden Township in the Tweed District.

Anthracnose of Sugar Maple, *Sphaeropsidales*

Symptoms of this condition were evident in the foliage of sugar maple when leaves turned brown in July. A high incidence of affected leaves occurred on single and groups of roadside trees in Huron, Grey, Waterloo and Oxford counties in the Lake Huron District and along major highways at several locations in the southern part of the Lake Simcoe District. This condition was more common on trees that showed signs of deterioration in past years.

Climatic Damage to Red Spruce

Moderate to severe reddening of the foliage of red spruce and the failure of many buds to open was observed throughout the northern part of the Lindsay District and in part of McLure Township in the Tweed District (see map). In Eyre Township, Lindsay District, incidence was rated at 100 per cent and the degree of damage was moderate. In Clyde Township incidence was 85 per cent and the degree of damage was moderate. Mortality of host trees was 5 and 2.5 per cent respectively.

This condition affected all age classes of red spruce in mixed stands of maple, white spruce, balsam fir and red spruce. Affected trees examined were growing on various sites and exposures. Immature red spruce growing in openings in a stand are susceptible to this condition at the northern extremity of their range, but as a rule mature trees are not affected. Similar damage was observed on mature red spruce in a natural stand north of Hawkesbury in the Province of Quebec in 1968.

Winter Drying

This abiotic condition was more common than usual throughout the Southern Survey Region. Light to severe browning of foliage was observed in plantations and windbreaks although damage along highways was probably caused by a combination of salt and winter drying. Incidence at quantitative sample locations ranged from 40 to 100 per cent but level of infection was generally light, except in Amaranth and Melancthon townships in the Lake Simcoe District (Table 8). White pine and Norway spruce appeared to be more susceptible although red pine, Scots pine, pitch pine, eastern cedar and several other species were also damaged.

TABLE 8

Summary of Damage Caused by Winter Drying in the Southern Survey Region in 1970

Location (township)	Host	Tree height in feet	Per cent incidence	Level of infection
Lake Erie District				
N. Dorchester	wP	6	90	Light
Lake Huron District				
Lindsay	nS	10	60	Light
Blandford	rP	4	80	Moderate
W. Luther	wP	10	50	Light
W. Luther	scP	10	90	Moderate
Glenelg	wP	10	50	Light
Keppel	nS	10	40	Light
Euphrasia	wP	8	67	Light
Lake Simcoe District				
Medonte	wP	4	90	Light
W. Gwillimbury	wP	12	97	Moderate
Melancthon	wP	25	100	High
Amaranth	wP	4	100	High
Amaranth	wS	5	50	Light
Lindsay District				
Eldon	rP	8	94	Light

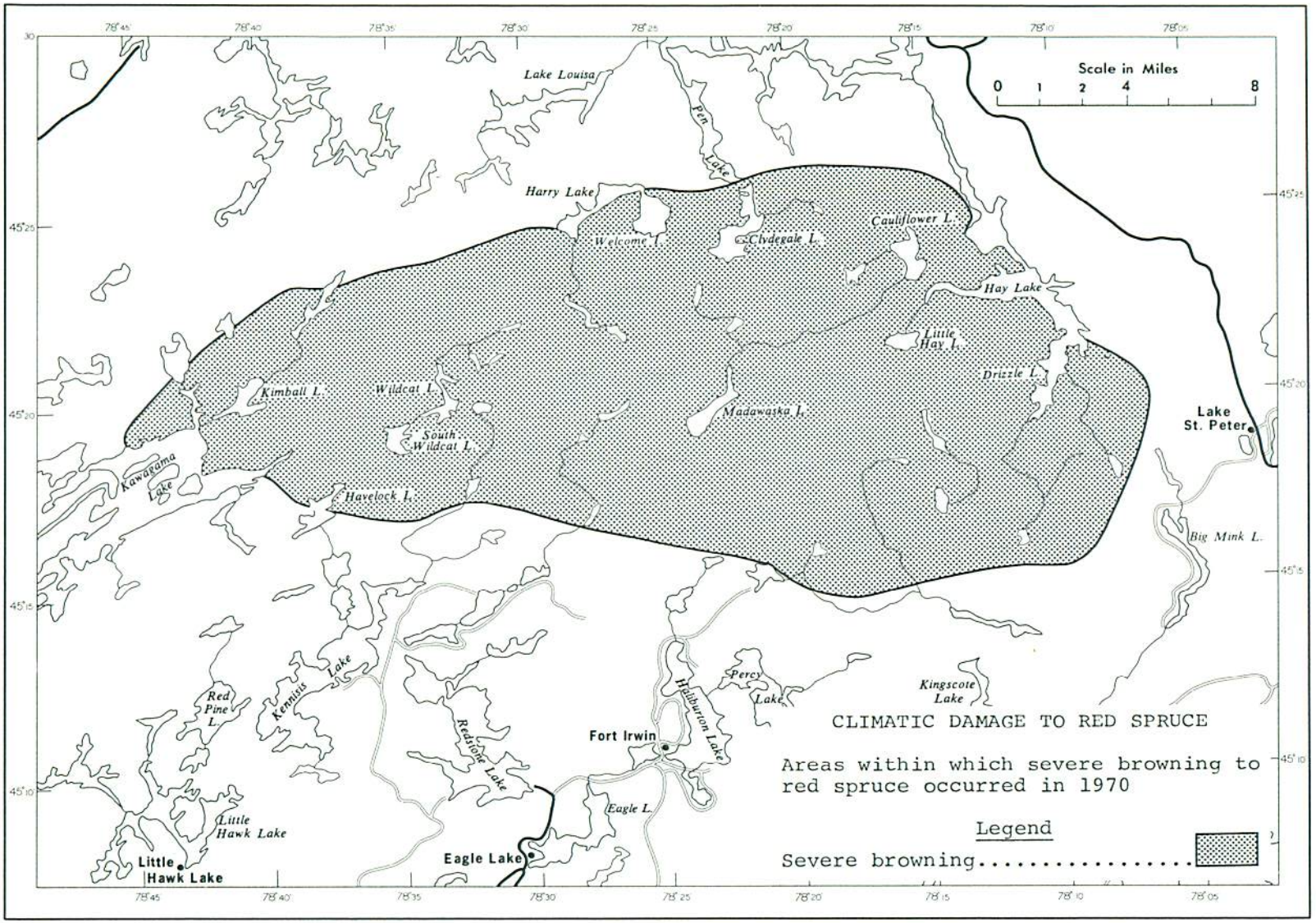

Scale in Miles
0 1 2 4 8
Lake Louisa
Pen Lake
Harry Lake
Welcome L.
Clydegale L.
Cauliflower L.
Hay Lake
Little Hay L.
Drizzle L.
Madawaska L.
Kimball L.
Wildcat L.
South Wildcat L.
Havelock L.
Kawagama Lake
Lake St. Peter
Big Mink L.
Kingscote Lake
Percy Lake
Hollburton Lake
Fort Irwin
Redstone Lake
Kennisis Lake
Red Pine L.
Little Hawk Lake
Little Hawk Lake
Eagle Lake
Eagle L.
CLIMATIC DAMAGE TO RED SPRUCE
Areas within which severe browning to red spruce occurred in 1970
Legend
Severe browning.....
78°45
78°40
78°35
78°30
78°25
78°20
78°15
78°10
78°05
45°30
45°25
45°20
45°15
45°10

TABLE 9

Other Noteworthy Diseases

Organism	Host(s)	Remarks
Asterosporium asterospermum (Pers. ex S. F. Gray)	Ba, Be	Associated with branch mortality in Mulmur and Uxbridge twps., Lake Simcoe District.
Chrysomyxa pirolata Wint.	wS	Light infections on cones in Base Borden, Essa Twp., Lake Simcoe District and in Clarence and East Hawkesbury twps., Kemptville District.
Ciborinia whetzelii (Seaver) Seaver	tA, lA	Trace infections in Orillia Twp., Lake Simcoe District, McLure and Oso twps., Tweed District, Glamorgan and Carden twps., Lindsay Dist.
Cronartium coleosporioides Arth. complex	cow wheat	Fruiting on cow wheat in Sunnidale Twp., Lake Simcoe District.
Cronartium comandrae Pk.	bastard toad	Fruiting found in Bruce Peninsula, Lake Huron Dist. and in Matchedash Twp., Lake Simcoe District.
Cytospora chrysosperma (Pers.) Fr.	W	Causing mortality in the town of Dunnville, Lake Erie District.
Cytospora cincta Fries.	Mo	Causing extensive damage to ornamentals in the City of Cornwall, Kemptville District, in conjunction with bacterial fire blight *Erwinia amylovora* (Burr.) Winsl.
Cytospora sp.	wP	Light canker infections caused top killing of planted trees in Sullivan and Glenelg twps., Lake Huron Dist. and in Walford Twp., Kemptville Dist.

TABLE 9 continued

Organism	Host(s)	Remarks
Dothiorella quercina (Cke. & Ell.) Sacc.	rO	Cankers associated with branch mortality in Toronto Twp., Lake Simcoe District.
Endocronartium harknessii (J. P. Moore) Y. Hiratsuka	scP	Light infections found commonly throughout the region with occasional trees heavily infected.
Erwinia amylovora (Burr.) Winsl.	Mo	High infections noted on ornamentals in Cornwall, Kemptville, Gananoque and Ottawa in the Kemptville Dist.
Eutypella parasitica Davidson & Lorenz.	sM	High infections observed in mature sugar bush, Locheil Twp., Kemptville District.
Fomes annosus (Fr.) Karst.	rP, wP scP, jP	No appreciable change was observed in the status of this root rot in Southern Ontario in 1970.
Fomes pini (Brot. ex Fr.) Karst.	eL	Light mortality and numerous fruiting bodies observed in a plantation previously weakened by larch sawfly attack in Vespra Twp., Lake Simcoe District.
Gymnosporangium globosum Farl.	rJ, Haw	High infections at scattered locations in the Kemptville District.
Linospora tetraspora G. E. Thompson	bPo	Moderate to high infections in Kaladar and Clarendon twps., Tweed Dist., and in Oxford and Lavant twps., Kemptville District.
Melampsora medusae Thuem.	Co	Severe infections of this rust on cottonwood leaves in seedbeds at the St. Williams Nursery, Lake Erie Dist.

TABLE 9 continued

Organism	Host(s)	Remarks
Melampsora sp.	tL, W	Trace to light infections at numerous locations in Tweed and Kemptville dist. A suspected new species was collected causing rust cankers on willow stems in Palmerston Twp., Tweed District.
Puccinia caricis-sheperdia J. J. Davis	soapberry	High infections in March Twp., Kemptville Dist. First herbarium record.
Puccinia recondita Rob. ex Desm.	jewelweed	High infections in Huntington Twp., Tweed District.
Uncinula salicis (DC.) Wint.	bPo	Moderate infections on scattered trees in Whitchurch and Medonte twps., Lake Simcoe District.
Verticillium albo-atrum Reinke & Berth.	sM	Single infection on ornamental sugar maple in the town of Kemptville.
Rodent damage	sM	Caused 12 per cent mortality at one location in Sullivan Twp. and light girdling of fringe trees at several other locations in Lake Huron Dist.
Semi-mature Tissue Blight	wP	Conspicuous discoloration of white pine foliage was widespread in southern Tweed and Kemptville dist. Also noted near the Gull River in Laxton Twp., Lindsay District.