SURVEY BULLETIN

Forest Insect and Disease Conditions in Ontario
Fall 1992

Forestry Canada Forêts Canada

Canada

FOREST INSECT AND DISEASE CONDITIONS IN ONTARIO

Fall 1992

This is the third and final bulletin describing forest pest conditions in Ontario in 1992. The spring and summer issues of the *Survey Bulletin* for this year contained maps and data based on the old regional structure of the Ontario Ministry of Natural Resources (OMNR). Information in this and subsequent bulletins is based on the new structures now in effect. Data for such major pests as the spruce budworm, the forest tent caterpillar, the gypsy moth and the jack pine budworm have been repeated in the new format, along with 1991 data for comparative purposes.

FOREST PEST REVIEW

The sixteenth annual Ontario Forest Pest Review was held in Sault Ste. Marie on 27 October 1992. Speakers from OMNR, the Michigan Department of Natural Resources, the E.B. Eddy Paper Company, the Forest Pest Management Institute, Forestry Canada Headquarters, and Forestry Canada, Ontario Region, addressed a variety of topics, including: situation updates and forecasts for the spruce budworm, the jack pine budworm, the gypsy moth, the forest tent caterpillar and the pine shoot beetle; losses to forest pests; special surveys for Scleroderris canker and in seed orchards; updates on nursery pests; an industry perspective on the jack pine budworm; pests in Michigan; and an update on vegetation management and spraying plans for 1993. The meeting was attended by 94 people.

FOREST INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The 1992 spruce budworm situation was detailed in the summer *Survey Bulletin*. Briefly, the gross area of moderate-to-severe defoliation increased from 9,065,781 ha in 1991 to 9,595,762 ha in 1992. Major increases occurred on the eastern edge of the outbreak in the Hearst, Wawa and Moosonee districts, along with smaller increases on the northern periphery of the infestation in the Geraldton, Sioux Lookout and Red Lake districts. These were somewhat offset by decreases on the southern edge of the main infestation in the Kenora, Fort Frances, Thunder Bay and Nipigon districts (Table 1). The main infestation extends in a large unbroken band from the Manitoba border eastward to the Wawa and Hearst districts (Fig. 1). Several sizeable patches of defoliation occurred along the Minnesota–Ontario border in eastern Fort Frances District and southern Thunder Bay District. Numerous smaller pockets of defoliation were mapped around the periphery of the main infestation, including many islands in Lake Nipigon and along the northern coast of Lake Superior.

Populations increased in the central part of the province, with small areas of defoliation detected in the Sault Ste. Marie, Sudbury and North Bay districts, including several pockets on Manitoulin Island. The infestation in Algonquin Park District more than doubled in size, to 26,900 ha, and small pockets of moderate-to-severe defoliation were recorded in white spruce (*Picea glauca* [Moench] Voss) plantations in the Kemptville, Midhurst and Maple districts.

Surveys for spruce budworm-induced mortality were carried out in the latter part of the field season. These showed that the total area of budworm-related mortality of balsam fir (*Abies balsamea* [L.] Mill.) and white spruce increased by some 207,063 ha, from 3,736,379 ha in 1991 to 3,943,442 ha. Most of the mortality and the increase occurred in northwestern Ontario, where host trees have been infested for the longest period of time (Fig. 2). The largest increases were in the Kenora and Nipigon districts, where 80,840 and 33,585 ha of new mortality were mapped, respectively. Some 21,554 and 21,731 ha of new mortality were mapped in the Dryden and Red Lake districts, respectively. Smaller areas of new mortality were reported in the Fort Frances, Geraldton, Sioux Lookout, Thunder Bay and Wawa districts (Table 2). The first mortality associated with the current infestation in southern Ontario was recorded this year. Balsam fir and white spruce mortality were mapped within an area of some 2,590 ha in Biggar Township, Algonquin Park District.

Cover photo: Shoreline egg-mass sampling for spruce budworm

Table 1. Gross area of moderate-to-severe defoliation by the spruce budworm in Ontario in 1991 and 1992.

Region / District	Area of moderate-to-severe defoliation (ha) 1991	1992
Northwest		
Dryden	947,061	853,616
Fort Frances	590,094	424,784
Geraldton	960,702	1,138,621
Kenora	1,088,331	867,632
Nipigon	2,028,532	1,488,098
Red Lake	319,121	805,912
Sioux Lookout	479,096	533,554
Thunder Bay	1,754,081	1,361,666
	8,167,018	7,473,883
Northeast		
Hearst	34,685	458,578
Moosonee	2,360	11,205
Wawa	849,965	1,621,297
	887,010	2,091,080
Central		
Algonquin Park	11,640	26,900
North Bay	10	1,545
Sault Ste. Marie	0	965
Sudbury	70	1,365
	11,720	30,775
Southern		
Cambridge	18	0
Kemptville	0	10
Maple	6	2
Midhurst	9	12
	33	24
Total	9,065,781	9,595,762

The annual spruce budworm egg-mass survey of 488 locations was carried out in the latter part of the field season in order to predict population trends in 1993. A comparison of egg-mass densities at 398 locations sampled in 1991 and 1992 revealed an overall decrease of 7% (Table 3). In spite of the decline, egg-mass densities remain high enough to cause moderate-to-severe defoliation within most of the area infested in 1992. A major expansion of the infestation is not likely in northwestern Ontario, but new pockets of defoliation could develop in the southern portion of Fort Frances District. Populations, and consequently defoliation, may continue to decline in the southern parts of the Thunder Bay and Nipigon districts. In northeastern Ontario, a major expansion of the outbreak is not expected but infestations in the Hearst and Wawa districts will persist and may intensify somewhat.

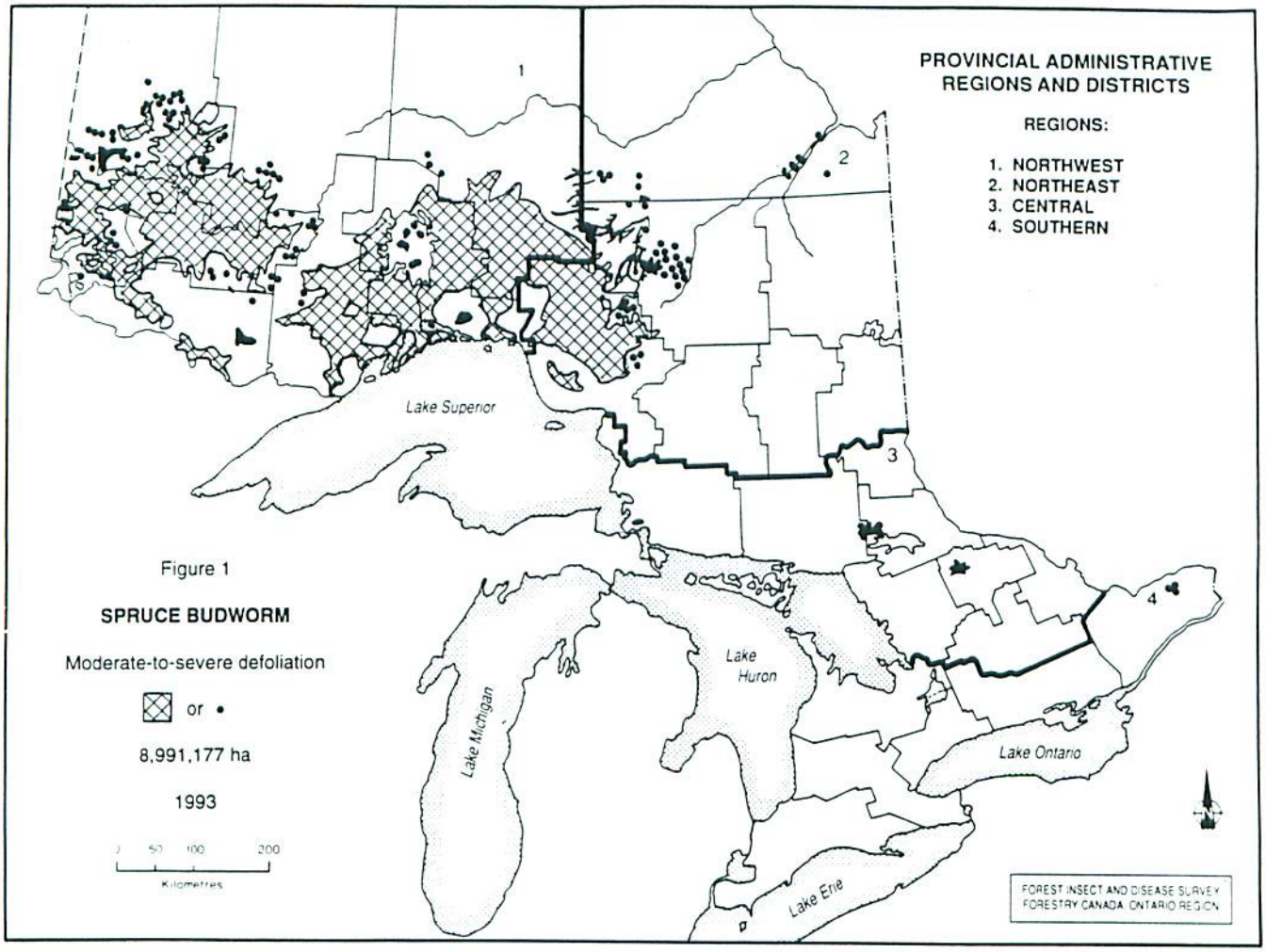
The infestation will likely continue to expand in the Sudbury, North Bay and Sault Ste. Marie districts and new pockets of defoliation may appear in these areas.

In southern Ontario, it is probable that the infestation in Algonquin Park will enlarge somewhat and it is possible that new areas of defoliation may be detected.

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Jack pine budworm infestations declined considerably in northwestern Ontario and increased substantially in northeastern Ontario, with the province-wide total of moderate-to-severe defoliation increasing from 133,618 ha in 1991 to 158,704 ha in 1992 (Table 4, Fig. 3). In northwestern Ontario, infestations, which totaled 72,514 ha in the Dryden, Red Lake and Sioux Lookout districts, were reduced to a remnant 693 ha in the Nungesser and Pedlar lakes area of Red Lake District. In northeastern Ontario, infestations in the Central Region increased from 61,104 ha to 157,478 ha. There were major expansions of existing infestations in the Parry Sound, Sudbury and North Bay districts and new areas of moderate-to-severe defoliation in the Pembroke, Bancroft and Algonquin Park districts. New infestations totaling 533 ha were mapped in Tweed District of Southern Region.

Late-season surveys in Parry Sound District disclosed an area of some 22,912 ha within which varying degrees of jack pine (*Pinus banksiana* Lamb.) tree mortality were recorded. The largest area was located on the Georgian Bay coast between Pointe au Baril and Byng Inlet, stretching eastward to Highway 69. Smaller pockets of dead and moribund trees were mapped in Shawanaga and Henvey townships (Fig. 4). Most of the affected stands are on poor sites with shallow, rocky soils, and have been subjected to several years of heavy jack pine budworm feeding as well as several years of drought stress. Mortality plots showed that the combined proportion of whole-tree mortality and bare tops within the affected area ranged from 39 to 59%.



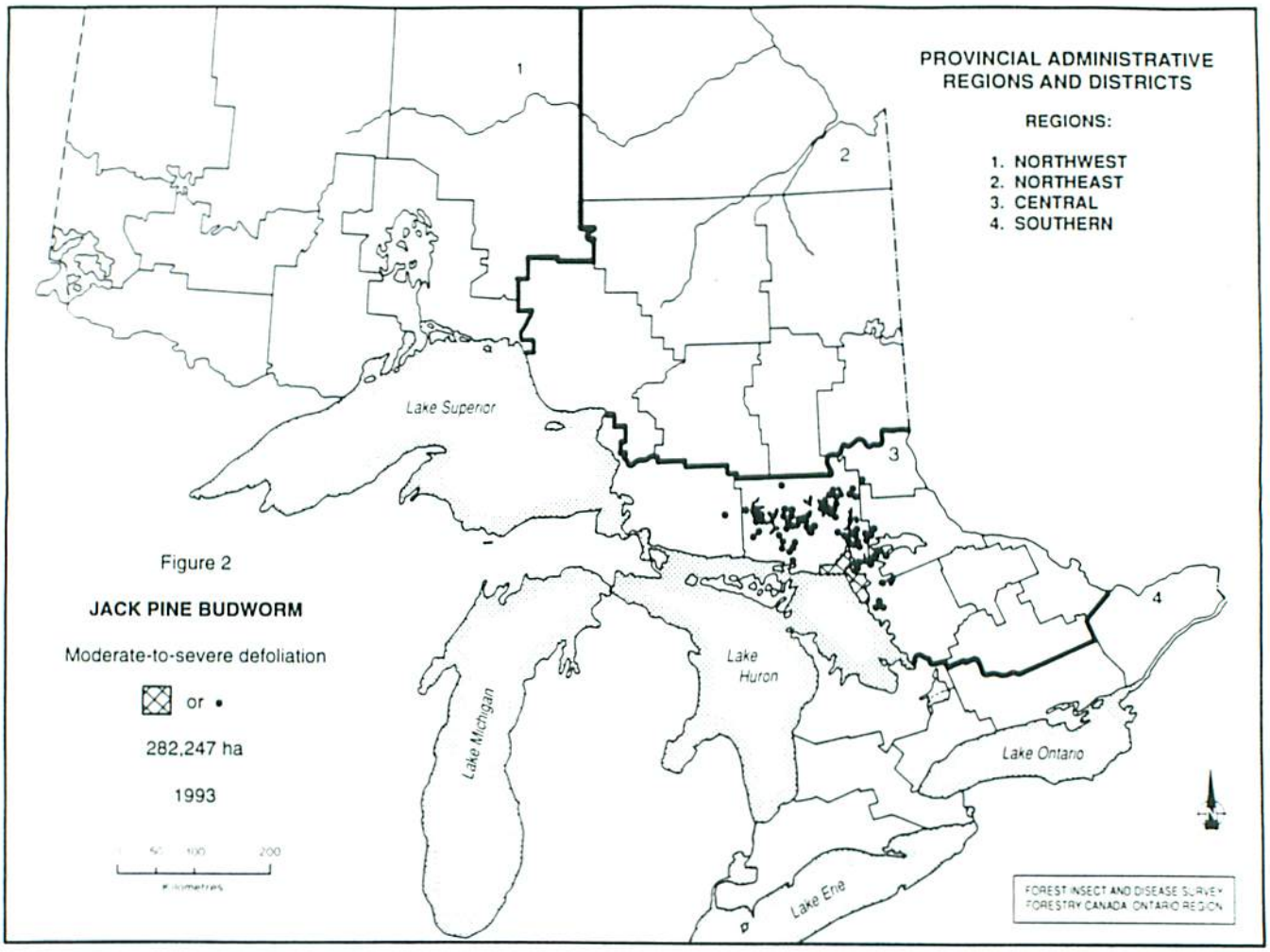
In Pembroke District, many of the same areas infested in 1992 were defoliated in 1993, with an increase of 1,500 ha in the total area of defoliation in the district. There was a small decrease in the area of defoliation in Algonquin Park District. Infestations occurred in Petawawa, Wylie, McKay, Alice, Richards and Burns townships in Pembroke District and in Guthrie and Stratton townships in Algonquin Park District.

In Tweed District, an infestation totalling some 533 ha was detected in Sheffield Township in 1992. However, populations collapsed and defoliation did not occur in 1993.

E.B. Eddy Forest Products, Ltd. aerially sprayed several budworm-infested jack pine plantations owned by E.B. Eddy in the vicinity of the town of Espanola. The total area treated was 127 ha and Foray 48B and 76B insecticides were the materials used.

Table 2. Gross area of moderate-to-severe defoliation by the jack pine budworm in Ontario, 1991–1993.

Region	Area of moderate-to-severe defoliation (ha)		
District	1991	1992	1993
Northwest			
Dryden	2,591	0	0
Red Lake	69,903	693	0
Sioux Lookout	20	0	0
	72,514	**693**	**0**
Central			
Algonquin Park	0	465	380
Bancroft	20	30	0
North Bay	290	16,379	19,035
Parry Sound	51,276	77,551	91,645
Pembroke	0	2,704	4,202
Sault Ste. Marie	0	0	1,095
Sudbury	9,518	60,349	165,840
Temagami	0	0	50
	61,104	**157,478**	**282,247**
Southern			
Tweed	**0**	**533**	**0**
Total	**133,618**	**158,704**	**282,247**

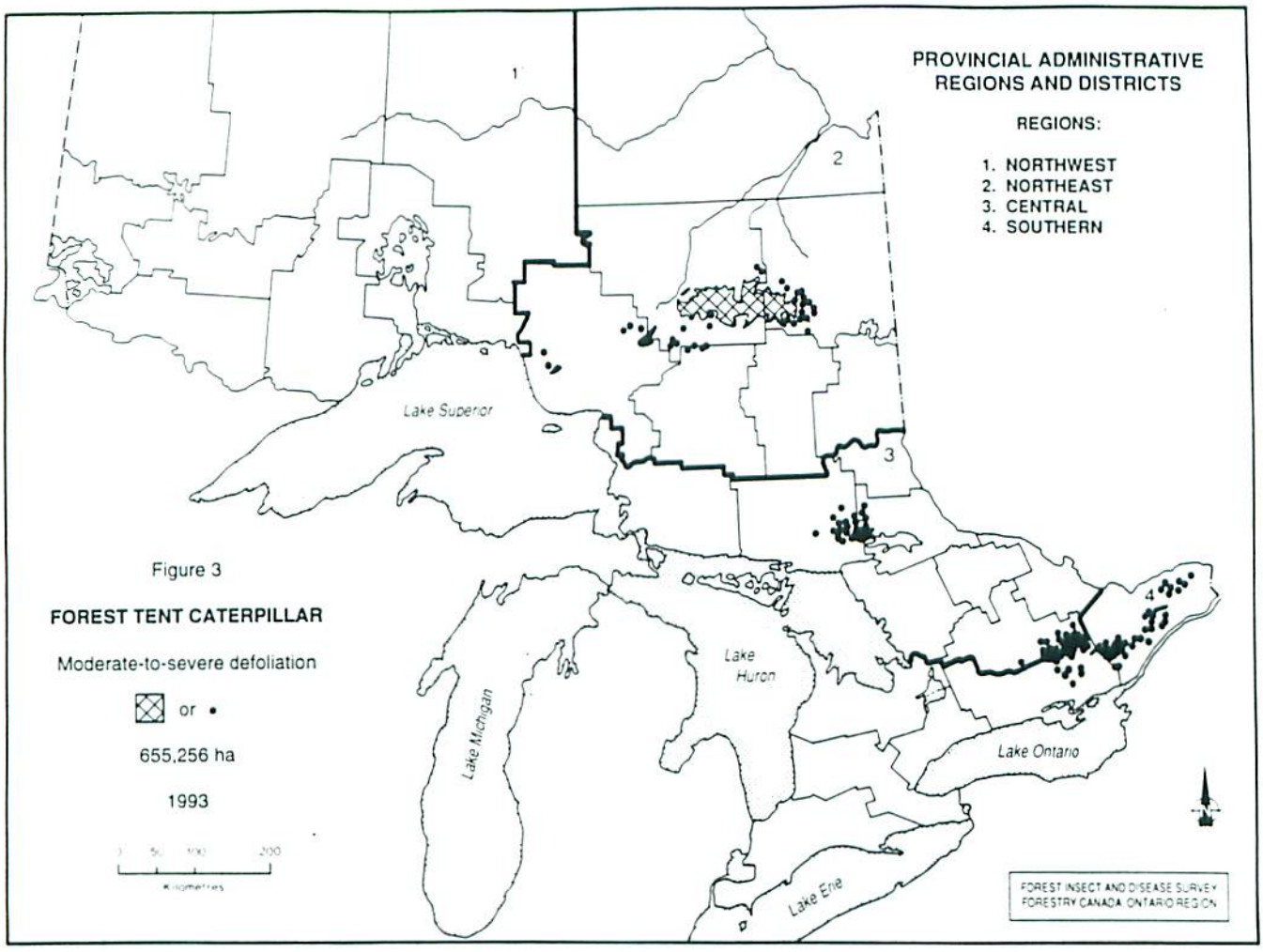


Forest Tent Caterpillar *Malacosoma disstria* Hbn.

Forest tent caterpillar populations declined drastically in Ontario, with the total area of moderate-to-severe defoliation reduced to 655,256 ha in 1993, compared with 16,051,424 ha recorded last year (Table 3). There was a total collapse of infestations in Northwest Region, with no significant defoliation observed and a large reduction in the area of moderate-to-severe defoliation, from 5,479,481 ha to 532,907 ha, in Northeast Region. The largest infestation remaining is located in the central portions of Hearst and Cochrane districts, extending in a long, rather narrow band from the Abbott–Cromlech townships area of Hearst District to Calder Township, Cochrane District (Fig. 3). A second large area of defoliation straddled the Wawa–Hearst district boundary in the area between Walls and Martin townships. Numerous small pockets of defoliation were mapped around the peripheries of these larger infestations. Three smaller pockets of defoliation occurred in western Wawa District, two on the northern boundary of Pukaskwa National Park and one in the Bomby–Brothers townships area.

In Central Region, the area of moderate-to-severe defoliation increased slightly, from 78,677 ha in 1992 to 85,463 ha in 1993. The largest infestation was located about midway between the cities of Sudbury and North Bay on the Sudbury–North Bay District boundary. A number of smaller patches of defoliation were located east and west of the city of Sudbury. A number of large pockets of defoliation were mapped in southern Bancroft District some of which extended south into adjacent areas of Tweed District in Southern Region.Most of the defoliation occurred in Grimsthorpe, Anglesea, Barrie, Clarendon and Palmerston townships in the southeastern corner of the district, with a number of pockets further west in Methuen Township.

The total area of defoliation also increased in Southern Region, from 35,520 ha to 36,886 ha. Most of the defoliation occurred in small scattered patches through central Kemptville District from the village of Caledonia to South Sherbrooke Township. A number of pockets were also recorded in the northeastern corner of Tweed District in the area between Hungerford and Oso townships. The decline in infestations that occurred in 1993 was expected and, indeed, was predicted in some areas by egg-band counts in the fall of 1992. The current forest tent caterpillar outbreak has persisted for a number of years and



natural control agents such as parasites, predators and disease had begun to take their toll on populations. Egg-band counts will be carried out later in the summer to assist in predicting populations in 1994 and the results will be presented in the fall *Survey Bulletin*.

Gypsy Moth
Lymantria dispar (L.)

Gypsy moth populations declined drastically in Ontario for the second consecutive year. The total area of moderate-to-severe defoliation mapped by ground and aerial surveys stood at 9,784 ha, compared with 34,460 ha in 1992 (Tables 4 and 5). For the first time in many years, there was no discernable moderate-to-severe defoliation in the Kemptville, Bancroft and Pembroke districts and in most of Tweed District in eastern Ontario. Similarly, there was no moderate-to-severe defoliation in the Parry Sound and Cambridge districts and defoliation was greatly reduced in the Maple and Midhurst districts in the central part of southern Ontario. The bulk of the defoliation this year occurred in Sudbury District, mostly south of the city of Sudbury, and in the western part of Aylmer District, in Pinery Provincial Park and south of the city of Sarnia (Fig. 4).

Although the total area of moderate-to-severe defoliation increased in Sudbury District, there were some population collapses in the Killarney Provincial Park area and on Manitoulin Island. These were offset by increased numbers of larvae on rocky ridges south of the city of Sudbury, where small red oak (*Quercus rubra* L.) and white birch (*Betula papyrifera* Marsh.) sustained the brunt of the defoliation, with less extensive damage on red pine (*Pinus resinosa* Ait.) and trembling aspen (*Populus tremuloides* Michx.). A few small pockets were mapped east of Espanola along the Vermilion River.

In Aylmer District, heavy infestations occurred in mixed oak (*Quercus* spp.) stands along the coast of Lake Huron between Canadian Forces Camp Ipperwash and Grand Bend, including a large area in Pinery Provincial Park. Infestations south of Sarnia occurred mainly on the Sarnia Indian Reserve and near the villages of Ladysmith and Brigden, where white oak (*Quercus alba* L.) was the major species attacked. Small pockets of damage persisted on willows (*Salix* spp.) and oaks in Rondeau Provincial Park.

Elsewhere in the province, small pockets of damage persisted in trembling aspen and balsam poplar (*Populus*

Table 3. Gross area of moderate-to-severe defoliation by the forest tent caterpillar in Ontario from 1991 to 1993.

Region	Area of moderate-to-severe defoliation (ha)		
District	1991	1992	1993
Northwest			
Dryden	2,119,485	461,440	0
Fort Frances	1,647,276	0	0
Geraldton	1,215,915	2,824,611	0
Kenora	1,306,741	192,154	0
Nipigon	1,468,417	1,751,983	0
Red Lake	1,248,065	1,263,947	0
Sioux Lookout	2,920,345	1,951,903	0
Thunder Bay	2,263,282	2,011,708	0
	14,189,526	**10,457,746**	**0**
Northeast			
Chapleau	0	0	1,520
Cochrane	0	541,507	141,389
Hearst	1,902,728	3,103,653	358,541
Moosonee	90,015	92,092	0
Timmins	495	0	0
Wawa	1,428,838	1,742,229	31,457
	3,422,076	**5,479,481**	**532,907**
Central			
Algonquin Park	0	3,555	0
Bancroft	115,720	28,279	31,628
North Bay	60,152	9,445	19,025
Parry Sound	24,408	3,993	0
Sault Ste. Marie	71,383	0	0
Sudbury	681,582	33,465	34,810
	933,245	**78,677**	**85,463**
Southern			
Kemptville	49,122	7,905	22,473
Maple	551	0	0
Midhurst	26,441	1,020	0
Tweed	229,547	26,595	14,413
	305,661	**35,520**	**36,886**
Total	**18,870,508**	**16,051,424**	**655,256**

Table 4. Gypsy moth infestations in Ontario, 1981–1993.

Year	Gross area of moderate -to-severe defoliation (ha)
1981	1,450
1982	4,800
1983	40,954
1984	80,624
1985	246,342
1986	167,776
1987	12,678
1988	29,693
1989	81,640
1990	77,648
1991	347,415
1992	34,460
1993	9,784

balsamifera L.) stands east of Lake Simcoe between Canal Lake and Beaverton in the adjacent Tweed and Maple districts. Small pockets of damage were mapped on the same hosts in the Southampton area of Midhurst District, most of which were located on the Saugeen Indian Reserve. Small infestations that occurred in Long and Striker townships in Sault Ste. Marie District in 1992 collapsed in 1993.

An aerial spraying operation was carried out against the gypsy moth at Canadian Forces Base Borden. A single 9.1-ha block of trembling aspen and balsam poplar along with ornamental Carolina poplar trees along streets in residential areas were treated. The biological insecticide *(B.t)* was applied at the rate of 40 BIU/ha by a Bell Jet Ranger helicopter on 29 May and 3 June. The operation appeared to be very successful as follow-up surveys failed to detect any defoliation within the treated area.

Pine False Webworm *Acantholyda erythrocephala* (L.)

The most severe defoliation in 1993 occurred in Oro Township, Midhurst District, where approximately 287 ha of red pine and white pine plantations were heavily infested. Tree height in affected stands ranged from 15 to 20 m. This was an unusual situation in that the trees were much larger than are usually infested by this insect. Defoliation averaged 75%, although in some of the most heavily infested plantations, 100% of the old foliage was consumed, along with 30% of the new foliage.

Infestations were also heavy and widespread in red pine plantations in much of the Parry Sound and Bancroft districts.The most severe damage occurred in two plantations in McMurrich Township, Parry Sound District, where 99% of the trees were infested, with an average of 66% of the old foliage destroyed. In some plantations, 82% of the trees had 31% of the new foliage destroyed. In contrast, populations declined somewhat in the Algonquin Park, Kemptville and Tweed districts, although a number of red pine plantations remained infested, with damage usually moderate. The insect was reported for the first time at infestation levels in Thunder Bay

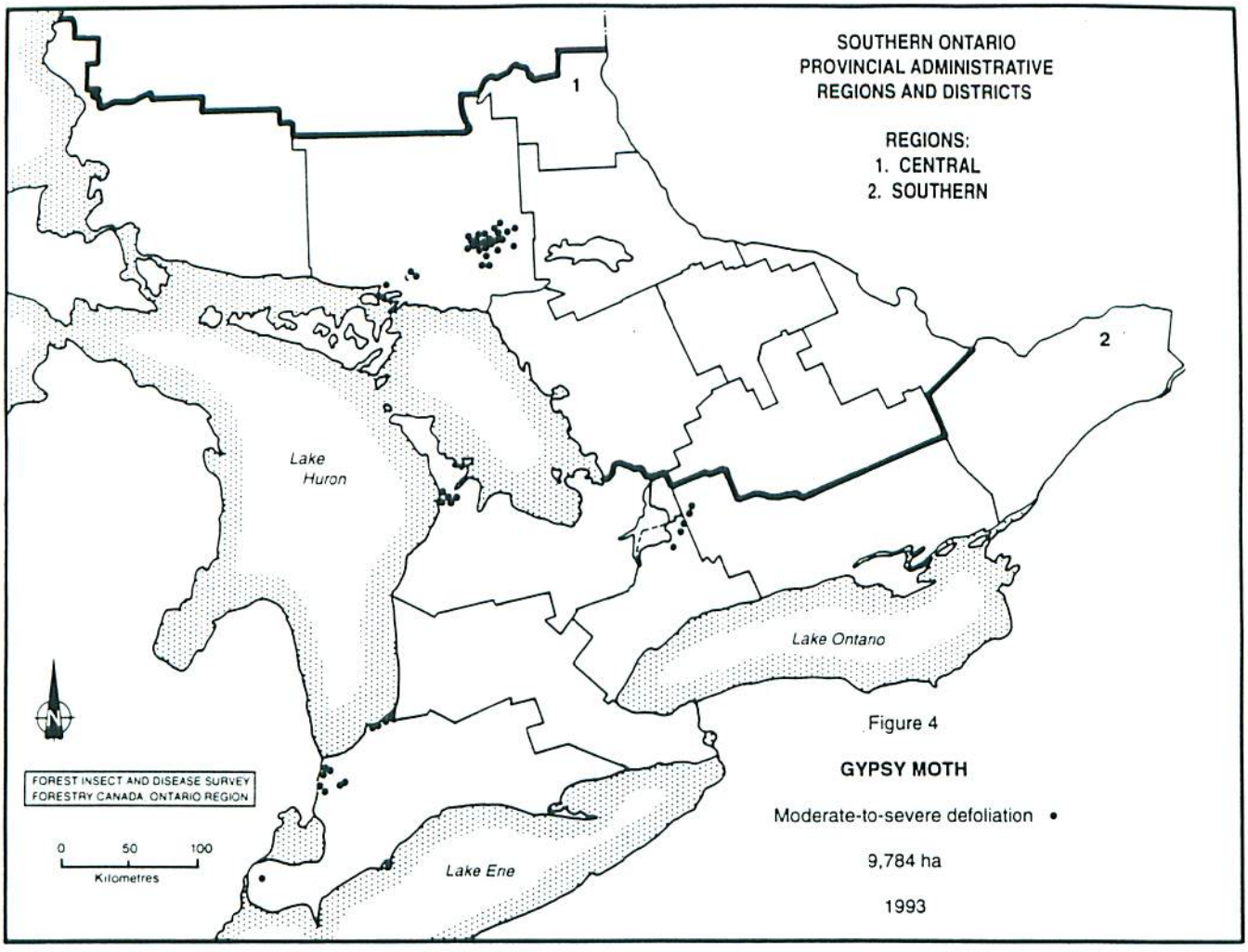


Table 5. Gross area of moderate-to-severe defoliation by the gypsy moth in Ontario from 1991 to 1993.

Region	Area of moderate-to-severe defoliation (ha)		
District	1991	1992	1993
Central			
Algonquin Park	915	591	0
Bancroft	61,840	13,205	0
Parry Sound	148,412	1,513	0
Pembroke	16,554	2,301	0
Sudbury	441	3,502	6,645
	228,162	**21,112**	**6,645**
Southern			
Aylmer	3,388	123	2,357
Cambridge	45,445	225	0
Kemptville	280	0	0
Maple	8,383	3,986	304
Midhurst	45,847	1,036	349
Tweed	15,910	7,978	129
	119,253	**13,348**	**3,139**
Total	**347,415**	**34,460**	**9,784**

District. Here, 31% of the 2.8-m jack pine were infested, with defoliation as high as 70%. Light infestations occurred on ornamental white pine and mugho pine (*Pinus mugo* Turra var. *mughus* Zenari) in the city of Sault Ste. Marie.

Fall Cankerworm
Alsophila pometaria (Harr.)

Infestations, which were heavy on ornamental trees in northwestern Ontario in 1992, collapsed in 1993, with no defoliation reported in the towns of Sioux Lookout, Hudson, Dryden, Fort Frances and Kenora. Populations also collapsed in southern Ontario, where only a few larvae were found in Burford and Caradoc townships, Aylmer District, where heavy infestations had occurred in 1991 and 1992.

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

Various degrees of cedar leafminer damage were reported in southern Ontario. The most severe damage occurred in Cambridge Township, Kemptville District, where 75% of foliar damage was recorded in a 5-ha eastern white cedar stand. Defoliation ranged from 10 to 40% in most other affected stands, but occasionally reached 50% at a few locations.

Jack Pine Resin Midge
***Cecidomyia resinicola* (O.S.)**

Unusually heavy infestations by this insect persisted in jack pine stands along Highway 17, between English River and Ignace in Dryden District. Numerous trees in this area had 100% of their new branch tips killed. Individual jack pine trees sustained similar damage levels at numerous other locations in the Dryden and Sioux Lookout districts. There were no reports of the insect from the Thunder Bay, Nipigon and Wawa districts, where infestations had occurred in 1992.

Large Aspen Tortrix
***Choristoneura conflictana* (Wlk.)**

Populations of this early-season defoliator of trembling aspen increased in 1993. The largest infestations, totalling approximately 40,305 ha, occurred in northeastern Wawa District, and in two pockets in Brackin and Marsh townships of the adjacent Chapleau District. The bulk of the defoliation occurred in three large pockets in the area between Jacobson and Nebotik townships, surrounded by a number of small, scattered patches of defoliation. Four pockets of generally moderate defoliation were reported west of Lake Nipigon in Thunder Bay District. These were located in the Nazotika Point area of Lake Nipigon and near Detour, Pangloss and Jackinnes Lakes. Defoliation in this area totalled 4,100 ha. Small pockets of defoliation totalling approximately 19 ha were recorded near Penetanguishene and Baxter in Midhurst District, and four small pockets totalling 260 ha were recorded near the city of Ottawa in Gloucester Township, Kemptville District. The total area infested by the large aspen tortrix in 1993 was 45,464 ha.

Larch Casebearer
***Coleophora laricella* (Hbn.)**

Widespread, small pockets of infestation were reported across much of southern Ontario. Defoliation was usually in the light-to-moderate range on European larch (*Larix decidua* Mill.), Japanese larch (*Larix leptolepis* [Sieb. & Zucc.] Gord.) and native tamarack (*Larix laricina* [Du Roi] K. Koch). The largest infestation again occurred in an 81-ha bog along Nicholas Creek in Marlborough Township, Kemptville District, where 17-m tamarack sustained defoliation averaging 90%. A 2-ha tamarack stand in Madoc Township, Tweed District, sustained an average of 85% defoliation. In Maple District, European larch at one location in Uxbridge Township sustained an average of 75% defoliation and windbreak European larch at the Orono Tree Nursery were 95% defoliated. A 4-ha stand of European larch in Townsend Township, Aylmer District, was 80% defoliated. Lower damage levels occurred at numerous other locations in southern Ontario and at one location near Dean Lake in the Sault Ste. Marie District of northern Ontario.

Satin Moth
***Leucoma salicis* (L.)**

Heavy infestations by this introduced pest occurred for the third consecutive year on mature Carolina poplar (*Populus* X. *canadensis* Moench) in residential areas of Canadian Forces Base Borden in Midhurst District. Good control of the pest was achieved in some parts of the Base with the insecticide *Bacillus thuringiensis* (*B.t.*); however, a 2-ha pocket of trembling aspen that was untreated sustained severe defoliation. Repeated defoliation by this insect is thought to be responsible for severe crown dieback that has occurred on many of the 15- to 20-m Carolina poplar on the Base.

In the Kemptville and Tweed districts, infestations declined slightly, but scattered pockets of severe defoliation persisted on European white poplar (*Populus alba* L.) and on Carolina poplar at a number of locations. Defoliation in these cases was in the 75–100% range.

Balsam Fir Sawfly
***Neodiprion abietis* complex**

Infestations persisted in much of the Parry Sound, Bancroft, Tweed and Kemptville districts, but defoliation levels in 1993 were generally lower than in 1992. The most widespread infestations occurred in western Bancroft District and central Parry Sound District. Average defoliation in Parry Sound District was about 20%, but ranged as high as 40%, whereas average defoliation in Bancroft District was 15% and ranged as high as 30%. In the Kemptville and Tweed districts, infestations were more scattered, with the most severe damage recorded in a 65-ha, 18-m balsam fir (*Abies balsamea* [L.] Mill.) stand in Pakenham Township, Kemptville District, where 84% of the trees were infested, sustaining 60% average defoliation. Widespread, small pockets of defoliation were recorded in southern North Bay District and eastern Sudbury District. The size of stands affected in these two districts ranged from 5 to 20 ha, with defoliation averaging 20%.

Pine Sawflies
***Neodiprion pratti banksianae* Roh.,**
***Neodiprion n. nanulus* Schedl.**

Widespread, heavy infestations occurred in the Tweed and Kemptville districts. Once again, the most severe damage occurred in a 500-ha stand of open-growing jack pine in Sheffield and Kennebec townships, Tweed District, where 100% of the trees were

attacked, sustaining an average of 58% defoliation. This was down from the nearly 90% defoliation recorded in 1992. Numerous other natural jack pine stands and plantations were attacked in the two districts, with defoliation ranging from 15 to 60%. A single infestation was reported in a jack pine plantation in McNabb Township, Pembroke District, where 45% defoliation was recorded, and scattered 4-m jack pine in the Big Sawbill Lake area of Fort Frances District sustained defoliation ranging from 10 to 20%.

The red pine sawfly, *N. n. nanulus* was prevalent in red pine plantations in the Bancroft and Pembroke districts. Infestation levels ranged from 10 to 55%, with accompanying defoliation varying from 12 to 17%. The insect was less widely distributed in the Kemptville, Sudbury and Parry Sound districts. The most severe damage in these districts was in Haddo Township, Sudbury District, where 30% of the 4-m trees sustained an average of 45% defoliation.

European Pine Sawfly *Neodiprion sertifer* Geoff.

Widespread but generally small populations of this early-season pine pest were encountered in the Midhurst, Aylmer, Maple, Tweed and Kemptville districts. The heaviest infestations occurred in a Scots pine clonal orchard at the Orono Forest Station, Maple District, and in a 2-ha Scots pine plantation in North Marysburgh Township, Tweed District. In both cases, more than 90% of the trees were infested, with average defoliation in excess of 50%. The insect was also reported in generally low numbers on Manitoulin Island, Sudbury District, and in a number of areas in southern Sault Ste. Marie District.

European Fruit Lecanium *Parthenolecanium corni* Bouché

Population levels which had been high in the Sudbury, North Bay, Parry Sound and Algonquin Park districts in 1992, declined markedly in 1993. High population levels persisted, however, in sugar maple (*Acer saccharum* Marsh.) stands in Eyre, Harburn and Havelock townships, Bancroft District, and in Ridout and Machar townships, Parry Sound District. In Machar Township, the insect has caused branch mortality ranging from 15 to 60% on young sugar maple. High population levels also persisted in Sproule and Airy townships, Algonquin Park District, and in Sisk Township, North Bay District. A single heavy occurrence was reported on white ash (*Fraxinus americana* L.) in Adjala Township, Midhurst District.

Early Aspen Leafcurler *Pseudexentera oregonana* (Wlsm.)

The total area of moderate-to-severe defoliation caused by this pest decreased from 1,867,828 ha in 1992 to 839,840 ha in 1993. Most of the decrease occurred in the Sudbury and Chapleau districts, where the heavy infestations of 1992 collapsed. Although the area infested was somewhat lower, moderate-to-severe defoliation persisted in trembling aspen stands throughout much of southern Cochrane District and extending into adjacent areas of northeastern Timmins district and northwestern Kirkland Lake District (Fig. 5). The main body of the infestation extended from the Wartman–Inglis township area of Cochrane District south to the Fallon–Fasken area of Timmins District and from the Ross–Turnbull Township area of Timmins District east to the Warden–Guilford Township area of Kirkland Lake District.

A number of smaller pockets occurred north of the main body of infestation in the area between Kesagami and Little Abitibi lakes and east of the main infestation between Sangster and Hoblitzell townships. Several pockets of heavy defoliation were apparent west of the main body of the infestation in Massey, Frey and Whitesides townships. Large pockets of moderate-to-severe defoliation were mapped in North Williams Township and in a wide east–west band in the central parts of Robillard, Dack and Evanturel townships, Kirkland Lake District. Scattered, small patches of defoliation were also mapped at a number of widespread locations in southern Temagami District and in Coderre, Valin and Cotton townships, Chapleau District.

Birch Edgeminer *Scolioneura betuleti* Klug.

Extensions in the range of this introduced insect were recorded in 1993 with the discovery of infestations in the Sault Ste. Marie and Sudbury districts. In Sudbury District, a 2-ha white birch stand along the Ramsay Lake Road in McKim Township sustained 10% defoliation on 60% of the trees. The insect was collected on ornamental white birch at two locations in the city of Sault Ste. Marie.

Pine Shoot Beetle *Tomicus piniperda* (L.)

This European insect was collected for the first time in Ontario when adults of the species were trapped by Agriculture Canada personnel in the Niagara Falls–Dunnville area of Cambridge District. Follow-up surveys by FIDS personnel disclosed feeding adults at sites in Cayuga and Bertie townships and at a third site in Flamborough Township, near the village of Rockton. White pine and Scots pine (*Pinus sylvestris* L.) were the species attacked. Infestations were light in all cases. Typical feeding damage was found but no insects were recovered at one site on the Niagara Parkway in Stanford Township, Cambridge District.

Spruce Bud Moths *Zeiraphera* spp.

Small pockets of heavy infestation were prevalent in southwestern Sudbury District, including parts of Manitoulin Island. Infestations usually occurred on single trees or small

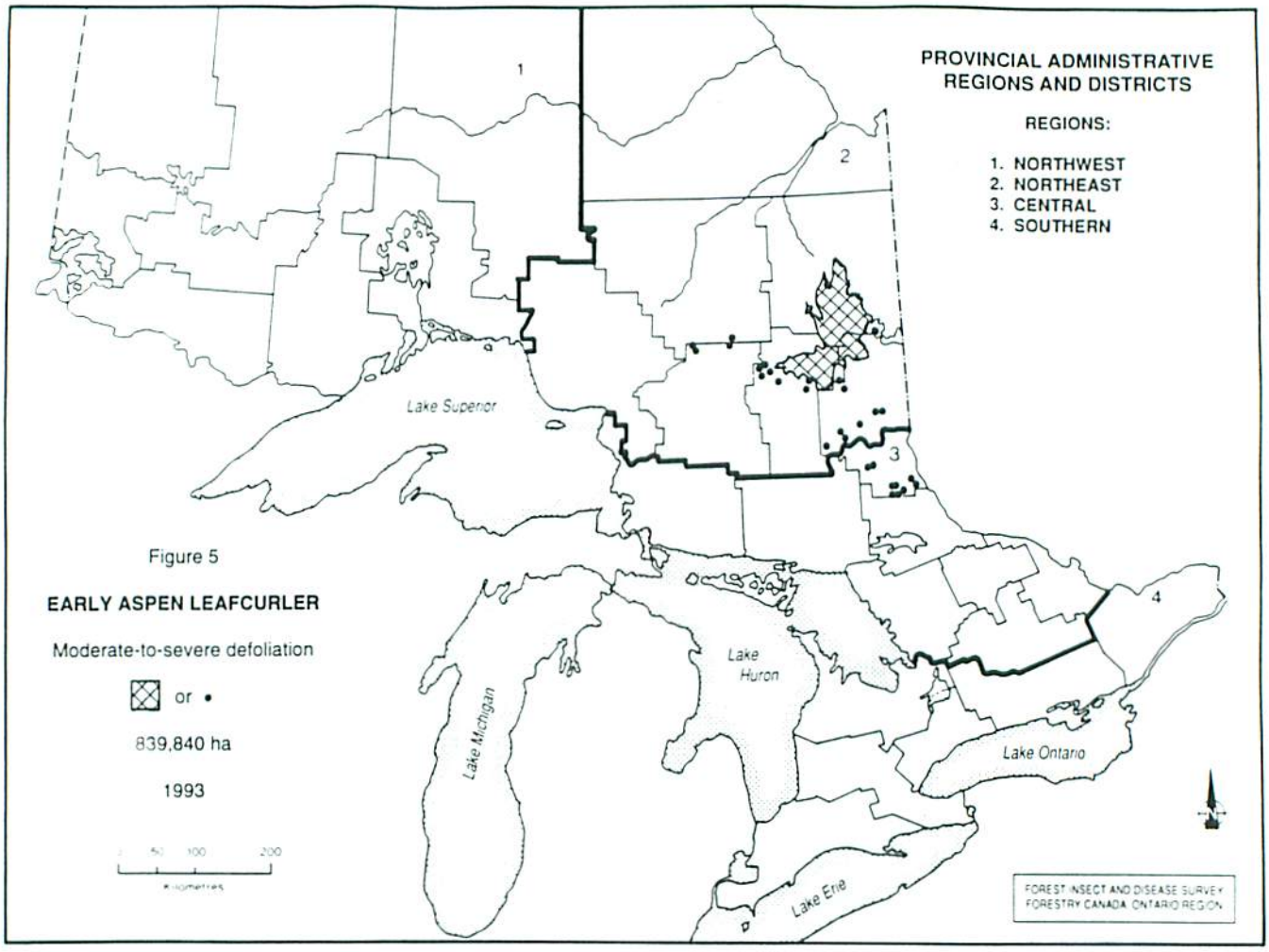


Figure 5

EARLY ASPEN LEAFCURLER

Moderate-to-severe defoliation

or •

839,840 ha

1993

involved roadside or fringe trees. Defoliation ranged from 40 to 90%. A similar situation prevailed in southern Sault Ste. Marie District between the city of Sault Ste. Marie and the Serpent River. High population levels were also observed at one location in Wawa District and two locations in North Bay District. Low population levels were reported at one location in Monmouth Township, Bancroft District, and in the O'Connor seed orchard in Thunder Bay District.

Other Noteworthy Insects

Larvae of the crane fly (*Tipula paludosa* Meigen) caused 60% mortality of rising 1-0 red pine in a seedbed at the Orono Tree Nursery, Maple District.

Heavy infestations by the eastern tent caterpillar (*Malacosoma americanum* [F.]) were apparent on small shrubbery in Midhurst District and southeastern Bancroft District. Lower population levels occurred in the remainder of southern Ontario and in the Sudbury District of northern Ontario.

The larger boxelder leafroller (*Archips negundana* [Dyar]) severely defoliated ornamental Manitoba maple (*Acer negundo* L.) in the towns of Sioux Lookout, Ear Falls, Kenora, Fort Frances, Dryden and Thunder Bay in northwestern Ontario.

Small populations of the pine tip moth (*Rhyacionia adana* Heinr.) were reported in young jack pine plantations in Timmins and Temagami District and in one plantation in Wawa District.

Adult sawyer beetles (*Monochamus* spp.) caused considerable mortality of 17-m jack pine and black spruce (*Picea mariana* [Mill.] B.S.P.) along road right-of-ways and the fringes of cutover areas along portions of the Nungesser and North roads, Sioux Lookout District.

Generally low population levels of the red pine cone beetle (*Conophthorus resinosae* Hopk.) were reported in young jack pine stands in the Timmins, Temagami and Thunder Bay districts. At the Kakabeka jack pine seed orchard in Thunder Bay District, 2.6% leader damage was observed.

The brownheaded ash sawfly (*Tomostethus multicinctus* [Roh.]) caused moderate defoliation of 12-m black ash (*Fraxinus nigra* Marsh.) at Middle Falls Provincial Park, Thunder Bay District.

Light infestations by the northern pitch twig moth (*Petrova albicapitana* [Bsk.]) were reported in several young jack pine plantations in the Thunder Bay, Temagami and Timmins districts.

A high level of infestation by the introduced pine sawfly (*Diprion similis* [Htg.]) occurred on young eastern

[Htg.]) occurred on young eastern white pine in the Glencairn seed orchard in Tosorontio Township, Midhurst District.

Unusually high population levels of the bronze birch borer (*Agrilus anxius* Gory) persisted in white birch stands on ridge tops around the city of Sudbury.

The pitted ambrosia beetle (*Corthylus punctatissimus* [Zimm.]) caused 20% mortality of small sugar maple regeneration in a 1-ha area in Chisholm Township, North Bay District. The insect also caused lower levels of damage to sugar maple regeneration in Gibson, Machar and Wood townships, Parry Sound District.

The bark beetle *Orthotomicus caelatus* (Eichh.) was associated with recent mortality of red pine in young plantations in Christie, McDougall, McMurrich and McKellan townships, Parry Sound District, and in Somerville Township, Bancroft District.

The American aspen beetle (*Gonioctena americana* [Schaeff.]) caused 60% defoliation of 2-m trembling aspen regeneration at one location in Mayo Township, Bancroft District. It also caused 20% defoliation to 10% of the 6-m trembling aspen trees in a 1-ha area in Halfway Lake Provincial Park, Sudbury District.

The oak leaf shredder (*Croesia semipurpurana* [Kft.]) caused light and occasionally moderate defoliation of individual trees in a number of red oak stands in Jones, Richards and Radcliffe townships, Pembroke District; in Effingham Township, Bancroft District; and in Long and Striker townships, Sault Ste. Marie District.

A heavy infestation by the pine flower sawfly (*Xyela minor* Nort.) occurred on the flowers of 7-m eastern white pine in Horton Township, Pembroke District.

TREE DISEASES

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

North American Race

The North American race of this fungus was most prevalent in Sault Ste. Marie District, where it was collected at nine widespread locations. The most significant damage occurred in a 2.2-m red pine plantation in Villeneuve Township, where 84% of the trees were infected, 10% severely. At another location in Kirkwood Township, 90% of the 3.1-m red pine were infected. An infection level of 32% was recorded in a 4.9-m jack pine stand in Sheldon Township, Cochrane District, and 28.7% of the trees were infected in a 10-ha, 2.1-m red pine plantation in Olrig Township, North Bay District. The North American race was also found at low infection levels in the Parry Sound, Bancroft, Kirkland Lake, Nipigon, Geraldton and Wawa districts.

European Race

Thirty-two collections from the Central Region, all on red pine, have been confirmed as the European race of Scleroderris canker disease. A total of 24 of these were from Macaulay, Perry, Strong, Stevenson, McMurrich, Ryerson and Mayo townships and were located at or near sites where the European race had been found in prevous years. Eight collections from Armour, Stisted, Galway, Watt, Strong, Chaffey and Ryde townships represent new distribution records for the disease. Although the new collection sites are within the same general area as previous finds, they do represent a significant spread (approximately 40 miles in one case) of the fungus. It is also apparent that infections at previously infected locations and in nearby areas have intensified. Mayo and Galway townships are in Bancroft District, whereas the remaining townships are in Parry Sound District.

Armillaria Root Rot, *Armillaria ostoyae* (Romagn.) Herink

This disease is common on coniferous and deciduous hosts in the province. Reports of the disease in young coniferous stands (e.g., red pine, jack pine and white spruce) were received from across the province. In all instances, infection levels and/or mortality were less than 3%.

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

This disease was reported on a number of coniferous hosts, including Scots pine, Austrian pine (*Pinus nigra* Arnold), red pine, white pine and blue spruce (*Picea pungens* Engelm.) in southern Ontario. Probably the most severe damage occurred near Angus in Midhurst District, where two 5-ha Scots pine Christmas tree plantations were cut and burned because the disease had completely destroyed their commercial value. Severe damage to plantings of Austrian pine was reported along Highway 401 in the Cambridge and Aylmer districts and along Highway 81 south of Strathroy in Aylmer District. At one location in the Copeland Forest in Medonte Township, Midhurst District, 30% of the open-grown Scots and Austrian pine were severely damaged.

The most severe damage in northern Ontario occurred at French Lake Provincial Park in Fort Frances District, where 75% shoot damage was recorded on 75% of 15-m red pine. The disease was also reported at lower infection levels in the Chapleau, Kirkland Lake and Temagami districts.

White Pine Blister Rust, Cronartium ribicola J.C. Fischer

The most severe damage reported in 1993 was in a 3-ha plantation of 2.4-m white pine in Monteagle Township, Bancroft District, where 40% of the trees had stem cankers and 8% recent mortality had occurred, partly due to rodents feeding on the bark of resinous cankers on the stems. In a 2-ha natural stand in Biggar Township, Algonquin Park District, 55% of the 3.5-m trees were infected, 37% with stem cankers. There was 15% recent mortality in the same stand. A 2-ha white pine plantation in Olrig Township, North Bay District, had 22% of the trees infected, 20% severely. Generally low levels of damage were reported on young white pine in a number of areas in the Parry Sound, Sudbury, Timmins, Pembroke, Temagami, Sault Ste. Marie, Wawa and Midhurst districts.

Western Gall Rust, *Endocronartium harknessii* (J.P. Moore) Y. Hirats. and Eastern Gall Rust, *Cronartium quercuum* (Berk.) Miyabe ex Shirai f. sp. *banksianae*

Western gall rust was widespread, particularly in jack pine stands in northern Ontario. The highest infection levels were in a number of jack pine plantations in Wawa District, where incidence ranged from 32 to 42%, with severely galled trees ranging from 3.3 to 4%. A jack pine plantation in McNaughton Township, Chapleau District, had 6.7% of the trees severely galled. Lower levels of infection were reported on jack pine in the Sault Ste. Marie, Nipigon, Geraldton, Timmins, Pembroke, Sudbury, North Bay and Thunder Bay districts, and on Scots pine in the Aylmer, Cambridge and Midhurst districts.

Eastern gall rust caused severe damage to Christmas tree plantations in Tiny Township, Midhurst District. Infection levels of 30% were recorded in two plantations, with 27 and 15% of the trees severely galled.

Tar Spot Needle Cast, *Davisomycella ampla* (J. Davis) Darker

There were widespread reports of this organism in northern Ontario. The more notable infections were as follows: 38% infection, with 38.5% foliar damage, in a 60-ha plantation in Vasiloff Township, Wawa District; 35% infection, with 30% foliar damage, at a 5-ha family-test site in Merrick Township, North Bay District; 60% infection, with 15% foliar damage, at a family-test site in Mandamin Township, Sudbury District; and 24% infection, with foliar damage of 25 and 20% at family-test sites in Lane and Kirkwood townships, Sault Ste. Marie District. Reports were also received from the Chapleau, Sioux Lookout, Geraldton, Nipigon, Thunder Bay, Timmins, Cochrane, Kirkland Lake, Temagami and Algonquin Park districts.

Black Canker of Willow, Glomerella cingulata (Stoneman) Spauld & H.S. Schrenk. and Willow Scab, Venturia saliciperda J. Nüesch

Unusually heavy infections occurred on willows in the area between Sudbury and Sault Ste. Marie. Infection was apparent on trees of all sizes but was more prevalent on open-grown ornamental, roadside and fringe trees. Although damage varied, it was often very severe, with up to 100% of the trees affected. Typically, only a small portion of the upper crowns of larger trees was unaffected. It was noted that some varieties of willow seemed to be much more susceptible than others.

Pine Needle Rust, *Coleosporium asterum* (Dietel) Sydow

There were numerous reports of this rust on young jack pine and red pine. Infection levels were sometimes as high as 100% but foliar damage was very low—less than 2% in most cases. A few exceptions to this trend occurred in Dryden District, where foliar damage sometimes reached 30% on individual trees. Foliar damage of 14% was recorded on 100% of the trees in a small red pine plantation in Mountain Township, Kemptville District, and foliar damage of 10% occurred on 100% of the trees in a 3.5-m jack pine stand near Shebandowan, Thunder Bay District.

Ink Spot of Aspen, *Ciborinia whetzelii* (Seaver) Seaver

The heaviest infection this year occurred in a 15-ha trembling aspen stand in Salter Township, where 90% of the trees were infected, with average foliar damage estimated at 40%. Several small pockets of about 0.5 ha in size were recorded within a 25-ha stand in Villeneuve Township, Sault Ste. Marie District; here, defoliation averaged 70%. A 1-ha stand in Oxford on Rideau Township, Kemptville District, sustained 85% foliar damage on the 18-m trees.

Other Noteworthy Diseases

Infection levels of Dutch elm disease (*Ophiostoma ulmi* [Buisman] Nannf. were high on remnant and reproduction white elm in the Aylmer, Cambridge, Fort Frances and Kenora districts.

Fomes root rot (*Heterobasidion annosum* [Fr.] Bref.) was found infecting 40% of the 50-year-old red pine in a 1-ha stand at the Orono Tree Nursery, Maple District. The stand was thinned in 1987, but it is unknown whether the stumps were treated at that time to prevent spread of the disease.

High infection levels of shoot blight of aspen (*Venturia macularis* [Fr.] E. Müller & v. Arx) were reported in the Shebandowan area of Hagey Township, Thunder Bay District. Infection levels ranged from 75 to 100%, with an average of 30% shoot damage. Low-to-moderate infection levels occurred at a number of locations in the North Bay and Sudbury districts.

Low infection levels of comandra blister rust (*Cronartium comandrae* Peck) were recorded on jack pine in the Kakabeka Falls seed orchard and at the Falls Lake family-test area, Thunder Bay District. A single tree was infected in a jack pine gene-pool test area in Noganosh Township, Wawa District.

Sweetfern blister rust (*Cronartium comptoniae* Arthur) was found infecting 13% of the stems in a semimature jack pine stand in Rioux Township, Sault Ste. Marie District.

Leaf anthracnose (*Apiognomonia errabunda* [Roberge] Höhnel) caused 75 to 100% foliar damage to bur oak (*Quercus macrocarpa* Michx.) in Caledonia and East Hawkesbury townships, Kemptville District.

In a 5-ha plantation of white spruce and balsam fir near Raynor Lake, Geraldton District, 10% of the balsam fir had stem cankers caused by Cytospora canker (*Leucostoma kunzei* [Fr.] Munk).

A leaf blister (*Taphrina caerulescens* [Desm. & Mont.] Tul.) was found infecting 20% of red oak seedlings in one compartment of the

Orono Tree Nursery, Maple District. The same organism caused foliar damage as high as 75% on open-grown ornamental red oak in the city of North Bay.

A shoot blight (*Sirococcus conigenus* [DC.] P. Cannon & Minter) caused an average of 24% shoot mortality on 70% of the 2.5-m jack pine regeneration at Agawa Bay in Lake Superior Provincial Park, Sault Ste. Marie District.

ABIOTIC DAMAGE

Jack pine mortality

An extensive area (24,515 ha) of jack pine mortality was aerially mapped in Bayfield, Beaton, Gourlay and Larkin townships in northeastern Wawa District. Numerous smaller pockets of damage were mapped in nine townships to the east and north of the main patch of damage and further small patches of similar damage were mapped in Burstall and McBrien townships, Hearst District, and Parliament Township, Cochrane District, bringing the total area affected to 31,260 ha.

Although various bark beetles, wood borers and some root rot was associated with the mortality, it appeared that the trees had been subjected to extreme stress by a number of abiotic factors such as drought, severe snowstorms and windstorms for the past several years. Damage in the form of broken branches, windthrown and wind-snapped trees, and drought-killed trees have provided brood material for the bark beetles and wood borers, which then attacked adjacent healthy trees.

Frost

Reports of frost damage were received from across the province in 1993. Although the proportion of trees affected in some areas was quite high (100%), associated foliar or shoot damage was usually quite low. An exception occurred in one compartment of the St. Williams tree nursery, in which 2–0 white ash sustained 85% foliar damage. In Mattawan Township, North Bay District, 20% of the 4-m balsam fir had 75% shoot damage over a 1-ha area and in Mayo Township, Bancroft District, 75% foliar damage was recorded in red oak over a 3-ha area. Foliar damage of 30% was observed on 50% of the white spruce at the Parkinson Township seed orchard in Sault Ste. Marie District.

Damage due to frost heaving was apparent on red pine and white spruce in two compartments of the Dryden tree nursery, Dryden District.

Winter Drying

This common spring problem was prevalent on young white pine in the area north of Kitchener in Cambridge District. The most severe damage in the area occurred in a 5-ha white pine plantation near the Luther Marsh, where 100% of the trees were affected with 85% foliar damage, and in a 5-ha plantation in West Garafraxa Township, where 60% of the trees were affected and foliar damage averaged 35%. The same levels of incidence and damage were recorded on 2-m red pine in a 2-ha plantation in Bonfield Township, North Bay District. An incidence level of 64% with 36% foliar damage occurred on 2.1-m black spruce in a seedling seed orchard in Paipoonge Township, Thunder Bay District. Foliar damage of 20% was observed on 70% of the 1.1-m red pine in a 20-ha plantation in Admaston Township, Pembroke District, and 75% of the 1.4-m red pine sustained 30% foliar damage in a 1-ha plantation in Pembroke Township, Pembroke District. Reports of winter drying, usually at low levels of damage, were also received from the Chapleau, Sudbury, Wawa, Midhurst, Maple and Tweed districts.

Salt Damage

Salt damage occurs every year along Ontario highways, particularly in highly salted areas such as curves, hills and major intersections. This year, the most severe damage was reported along Highway 11 in the Powassan area of North Bay District, where roadside white pine sustained foliar damage averaging 50%. Severe foliar damage was also reported in a roadside white pine plantation along Highway 24 in Charlotteville Township, Aylmer District.

Hardwood Decline

An extensive area of hardwood decline was evident around the city of Sudbury, Sudbury District. The condition, which affects mainly red oak, trembling aspen and white birch, is thought to be the result of several years of drought combined with insect defoliation and poor site conditions.

The red oak and white birch decline occurs in small pockets over a large area between the La Cloche mountains in southeastern Sudbury District and Wanapitei Lake. The trees in this area have sustained 3 to 4 years of forest tent caterpillar defoliation, in some cases combined with 1 or 2 years of gypsy moth defoliation. They are usually growing on exposed ridge tops with shallow soils. Other pests, such as Armillaria root rot and the bronze birch borer, are also prevalent in the white birch stands.

Widespread trembling aspen decline is also evident in small pockets in the area between Gaiashk Township and Capreol, with most of the decline in the Chelmsford area northwest of Sudbury. The latter area has also been subjected to several years of prolonged drought combined with 3 or 4 years of severe defoliation by the forest tent caterpillar.

Snowstorm Damage

Heavy snowstorms in October and November of 1992 caused widespread damage to a variety of tree species in the Chapleau, Timmins and Kirkland Lake districts. The damage, in the form of permanently bent and snapped off trees along with severe branch breakage, was most evident on the edges of stands along fields, roadways,

bodies of water and other stand openings.

Flood Damage

An unusually high incidence of flood damage was noted during ground and aerial surveys in the Bancroft and Parry Sound districts. Eastern white cedar, tamarack, black spruce and balsam fir in low-lying areas were the species most commonly affected.

Hail Damage

A hailstorm severely damaged balsam fir and white spruce in the Mott Lake–Keelor Lake area of Thunder Bay District. Foliar damage was around 75% and 5,570 ha were affected.

G.M. Howse
Chief, Forest Insect and Disease Survey

M.J. Applejohn
Head FIDS Ranger

September1993
ISSN 0832-7173