SURVEY BULLETIN

Forest Insect and Disease Conditions in Ontario
Summer 1991

Forestry Canada Forêts Canada

Canada

FOREST INSECT AND DISEASE CONDITIONS IN ONTARIO[1]

Summer 1991

This is the second of three annual bulletins issued by the Forest Insect and Disease Survey (FIDS) of Forestry Canada, Ontario Region. It describes pest conditions in Ontario forests in 1991. The information originated from ground and aerial surveys carried out between early May and mid-July. Figures presented in this bulletin are preliminary and subject to change, as ongoing surveys may disclose additional information.

FOREST INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

For the third consecutive year, spruce budworm populations increased. The total area of moderate-to-severe defoliation mapped by ground and aerial surveys was 9,065,781 ha, up from the 6,783,261 ha recorded in 1990 (Table 1). The main body of the infestation is still located in the Northwestern and North Central regions, but has now extended eastward to include areas in the northwestern corner of Wawa District and the southwestern side of Hearst District in the Northern and Northeastern regions (Fig. 1). The two large infestations mapped in 1989 and 1990 have again merged to form a single huge area of moderate-to-severe defoliation stretching from the Gourlay-Chelsea-Boyce townships area of Hearst District west to the Manitoba border. This area encompasses all or part of the following districts: Kenora, Red Lake, Sioux Lookout, Dryden, Fort Frances, Atikokan, Ignace, Thunder Bay, Nipigon, Terrace Bay, Wawa and Hearst. Increases in the area affected were recorded in all of these districts except Dryden, where a decline was recorded (Table 1).

Some of the increase occurred along the periphery of the main infestation in the Red Lake, Sioux Lookout and Thunder Bay districts, where isolated pockets of defoliation merged with the main body. The bulk of the increase, however, occurred in the eastern part of the outbreak, in northern and eastern Geraldton and Terrace Bay districts, with the main body of the outbreak now extending into Hearst and Wawa districts. The small infestation that occurred north of Nagagamisis Lake in Hearst District in 1990 expanded considerably this year. Numerous new pockets of defoliation were mapped east of the main infestation, mainly in Hearst District. Several of these occurred in long, narrow bands along northern rivers such as the Kenogami, Pagwachuan and Piwabiskau. The area infested also included most of the islands in Lake Nipigon and a number of the larger islands along the northern coast of Lake Superior, including Pie, St. Ignace, Simpson, Wilson and Pic islands. Small, discrete pockets of moderate-to-severe defoliation were mapped in Ratter and Dunnet townships, Sudbury District, and Hugel Township, North Bay

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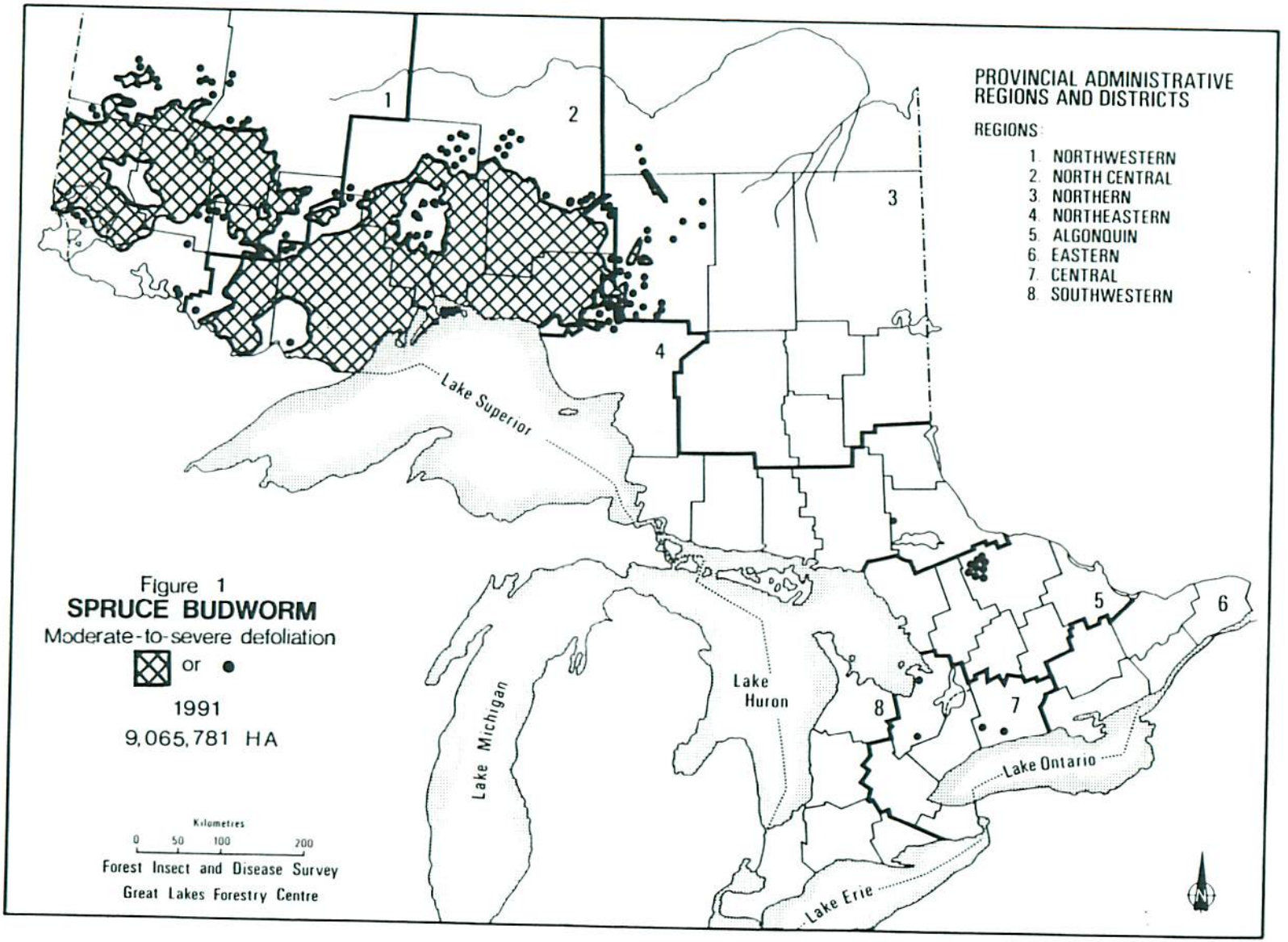
1. Cover photo: Female gypsy moths laying eggs on a host tree.

Table 1. Gross area of moderate-to-severe defoliation by the spruce budworm in Ontario from 1989 to 1991.

District	Area of moderate-to-severe defoliation		
	1989	1990	1991
Northwestern Region			
Ignace	419,620	314,071	351,536
Dryden	902,750	815,547	700,085
Sioux Lookout	586,772	523,344	589,537
Fort Frances	199,084	6,720	39,830
Kenora	897,779	859,395	865,468
Red Lake	199,054	228,747	299,329
	3,205,059	2,747,824	2,845,785
North Central Region			
Atikokan	482,208	410,377	550,264
Thunder Bay	597,382	1,273,723	1,861,617
Nipigon	940,513	1,087,868	1,403,210
Terrace Bay	624,724	761,251	1,081,938
Geraldton	389,750	493,011	1,146,368
	3,034,577	4,026,230	6,043,397
Northern Region			
Hearst	0	6,392	123,130
Northeastern Region			
Wawa	0	0	41,716
North Bay	0	0	10
Sudbury	0	0	70
	0	0	41,796
Algonquin Region			
Algonquin Park	0	2,815	11,640
Central Region			
Huronia	0	-	9[a]
Lindsay	0	-	2[a]
Maple	0	-	4[a]
	0		15
Southwestern Region			
Wingham	0	-	18[a]
Total	6,239,636	6,783,261	9,065,781

[a] based on ground observation


PROVINCIAL ADMINISTRATIVE REGIONS AND DISTRICTS
REGIONS:
1. NORTHWESTERN
2. NORTH CENTRAL
3. NORTHERN
4. NORTHEASTERN
5. ALGONQUIN
6. EASTERN
7. CENTRAL
8. SOUTHWESTERN
1
2
3
4
5
6
7
8
Lake Superior
Lake Michigan
Lake Huron
Lake Ontario
Lake Erie
Figure 1
SPRUCE BUDWORM
Moderate-to-severe defoliation
or
1991
9,065,781 HA
Kilometres
0 50 100 200
Forest Insect and Disease Survey
Great Lakes Forestry Centre
N

District. Moderate and occasionally severe damage was noted on ornamental spruce (*Picea* spp.) and fir (*Abies* spp.) in the city of Sault Ste. Marie, Sault Ste. Marie District, and occasional single white spruce (*Picea glauca* [Moench] Voss) sustained defoliation as high as 75% along the Moose River, at Moose River Crossing and at Moosonee and Moose Factory Island in Moosonee District. Increased numbers of larvae and light defoliation were noted at a number of other areas in the Northern and Northeastern regions.

In southern Ontario, infestations that occurred in Biggar, Osler and Devine townships in Algonquin Park District in 1990 increased approximately fourfold to 11,640 ha. Moderate-to-severe defoliation also recurred in white spruce plantations in Clarke Township, Lindsay District; Uxbridge Township, Maple District; Adjala and Tiny townships, Huronia District; and Minto Township, Wingham District. In a departure from previous issues of the *Survey Bulletin*, the small infestations in the white spruce plantations listed above have now been included in Table 1 and Figure 1.

The Ontario Ministry of Natural Resources (OMNR) aerially sprayed approximately 65,000 ha of budworm-damaged stands in the North Central and Northern regions. Commercial stands, plantations, provincial parks and wildlife habitat areas were included in the program in the Thunder Bay, Nipigon, Geraldton, Terrace Bay and Hearst districts. All areas were treated with either single or double applications of *Bacillus thuringiensis* (*B.t.*) in late May and early June. Unusually warm and dry weather in northern Ontario in May and June resulted in early emergence and accelerated development of budworm larvae. This, along with unfavorable spraying conditions in June, led to the omission of several thousand hectares from the treatment program.

Egg-mass surveys to determine population trends for 1992 are currently under way and the results will be reported in the fall *Survey Bulletin*.

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

A sharp increase in the area affected by this pest was recorded in 1991. Province-wide, some 133,618 ha of moderate-to-severe defoliation were mapped, compared with 30,325 ha in 1990 (Fig. 2, Table 2).

In Red Lake District of Northwestern Region, populations were expected to subside after a sharp decline in numbers in 1990. Instead, a large area of moderate-to-severe defoliation was mapped in an area bordered on the north and south by Kirkness and Little Vermilion lakes and on the east and west by Nungesser and Borel lakes. Some 14 additional pockets of defoliation surrounded the larger area, with a combined total of 69,903 ha affected. A new infestation straddled the boundary between Thunder Bay and Ignace districts in the area west of Metionga Lake, encompassing a total area of 2,591 ha. A small pocket of about 20 ha persisted near Goodie Lake, Sioux Lookout District.

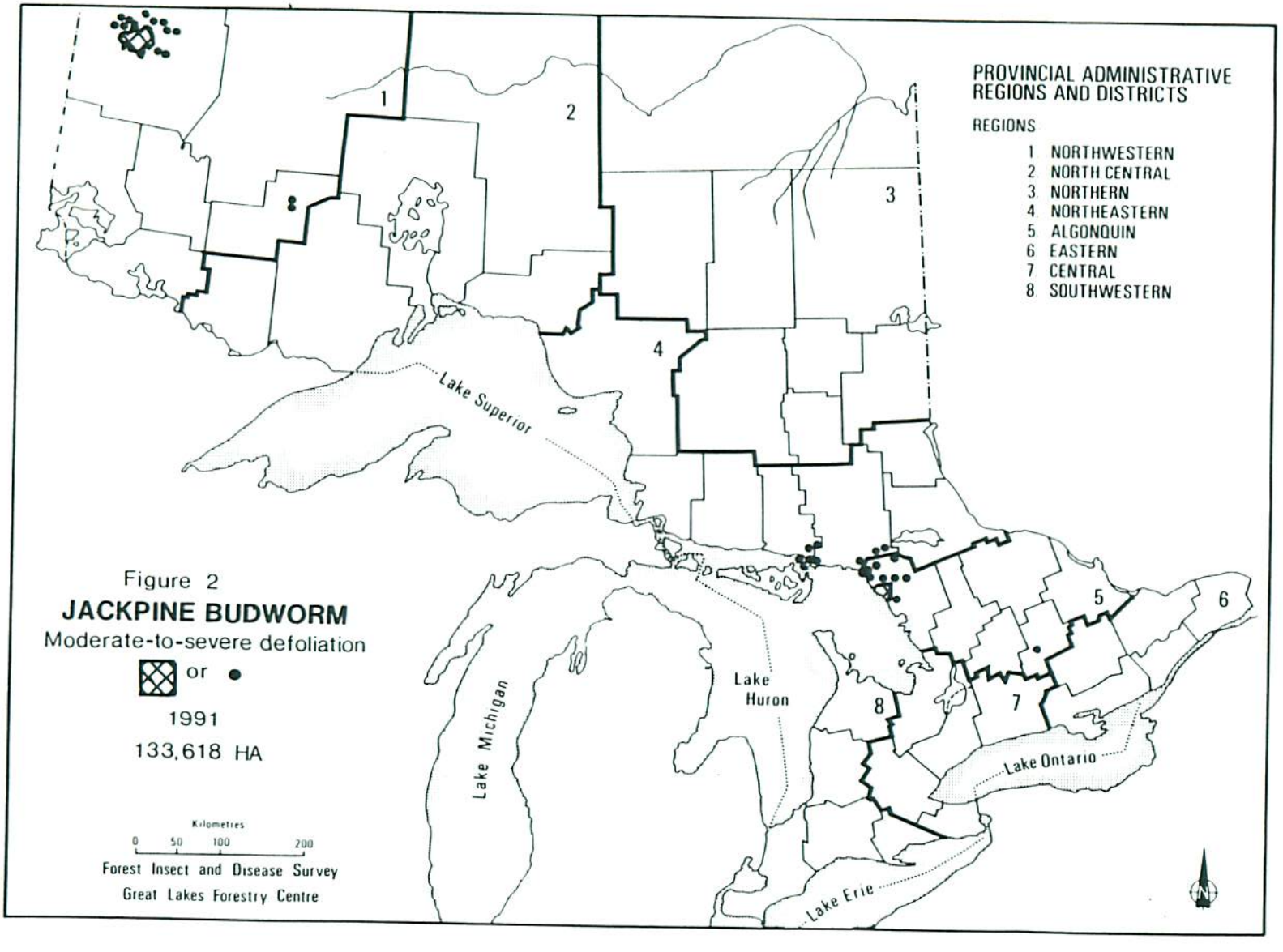

PROVINCIAL ADMINISTRATIVE REGIONS AND DISTRICTS
REGIONS
1 NORTHWESTERN
2 NORTH CENTRAL
3 NORTHERN
4 NORTHEASTERN
5 ALGONQUIN
6 EASTERN
7 CENTRAL
8 SOUTHWESTERN
Lake Superior
Lake Michigan
Lake Huron
Lake Ontario
Lake Erie
Figure 2
JACKPINE BUDWORM
Moderate-to-severe defoliation
or
1991
133,618 HA
Kilometres
0 50 100 200
Forest Insect and Disease Survey
Great Lakes Forestry Centre

Table 2. Gross area of moderate-to-severe defoliation by the jack pine budworm in 1990 and 1991.

District	Area of moderate-to-severe defoliation (ha) 1990	1991
Northwestern Region		
Red Lake	655	69,903
Sioux Lookout	10	20
Ignace	0	1,721
	665	71,644
North Central Region		
Thunder Bay	0	870
Northeastern Region		
Espanola	0	810
Sudbury	0	2,710
North Bay	0	290
	0	3,810
Algonquin Region		
Parry Sound	29,660	57,274
Bancroft	0	20
	29,660	57,294
Total	30,325	133,618

In southern Ontario, infestations that developed in Parry Sound District in 1990 expanded considerably this year, increasing from 29,660 to 57,274 ha. The largest infestation was located along the Georgian Bay coastline between Henvey Inlet and Pointe au Baril, including some 41,830 ha in Harrison, Wallbridge, Mowat and Henvey townships as well as the Henvey Inlet Indian Reserve. Three other sizable pockets of defoliation were located as follows: southwest of French River (1,271 ha), between the mouths of the French and Pickerel rivers (4,350 ha) and northeast of Island Lake in Wilson Township (7,485 ha). An additional 13 smaller pockets ranging from 50 to 850 ha in size were mapped in northern Parry Sound District. A 1,985-ha infestation was mapped south of Rutter in Allen and Bigwood townships, Sudbury District, and three small pockets were recorded along the northern channel of the French River in Scollard Township, North Bay District. Several small scattered pockets of defoliation occurred near the town of Espanola and in the area of Great La Cloche Island, Espanola District. A single, small jack pine (*Pinus banksiana* Lamb.) plantation was infested in Methuen Township, Bancroft District.

Egg-mass surveys are also under way to determine population trends for the jack pine budworm in 1992 and the results will be included in the fall *Survey Bulletin*.

Gypsy Moth, *Lymantria dispar* (L.)

There was a dramatic increase in the area affected by the gypsy moth in 1991. Moderate-to-severe defoliation was mapped over 347,415 ha, compared with 77,648 ha in 1990. This is the largest area of moderate-to-severe defoliation by this pest ever recorded in the province (Table 3).

Table 3. Gypsy moth infestations in Ontario, 1981-1991.

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

Small decreases in the area affected were recorded in the oldest part of the outbreak in Eastern Region and in the extreme southwestern part of the province in Southwestern Region. However, these declines were overwhelmed by major increases in the Algonquin and Central regions (Tables 4 and 5). The largest infestation is located between the western side of Gull Lake and Georgian Bay, encompassing parts of western Minden District, southern Bracebridge and Parry Sound districts, and northern Huronia District. Many smaller pockets of defoliation were mapped around the periphery of this major infestation, particularly in the Point au Baril-Huntsville area of the Parry Sound and Bracebridge districts and the Christian Island-Rama Township area of Huronia District (Fig. 3). Numerous small pockets of defoliation were also recorded in northern Lindsay and southwestern Bancroft districts in the Balsam Lake-Peterborough-Methuen township area.

Most of the defoliation in Algonquin Region occurred as scattered pockets in a wide band from the Bark Lake-Kaminiskag Lake area northeast to the Ottawa River between Pembroke and Petawawa in Pembroke District.

Table 4. Gross area of moderate-to-severe defoliation by the gypsy moth in Ontario, 1987-1991.

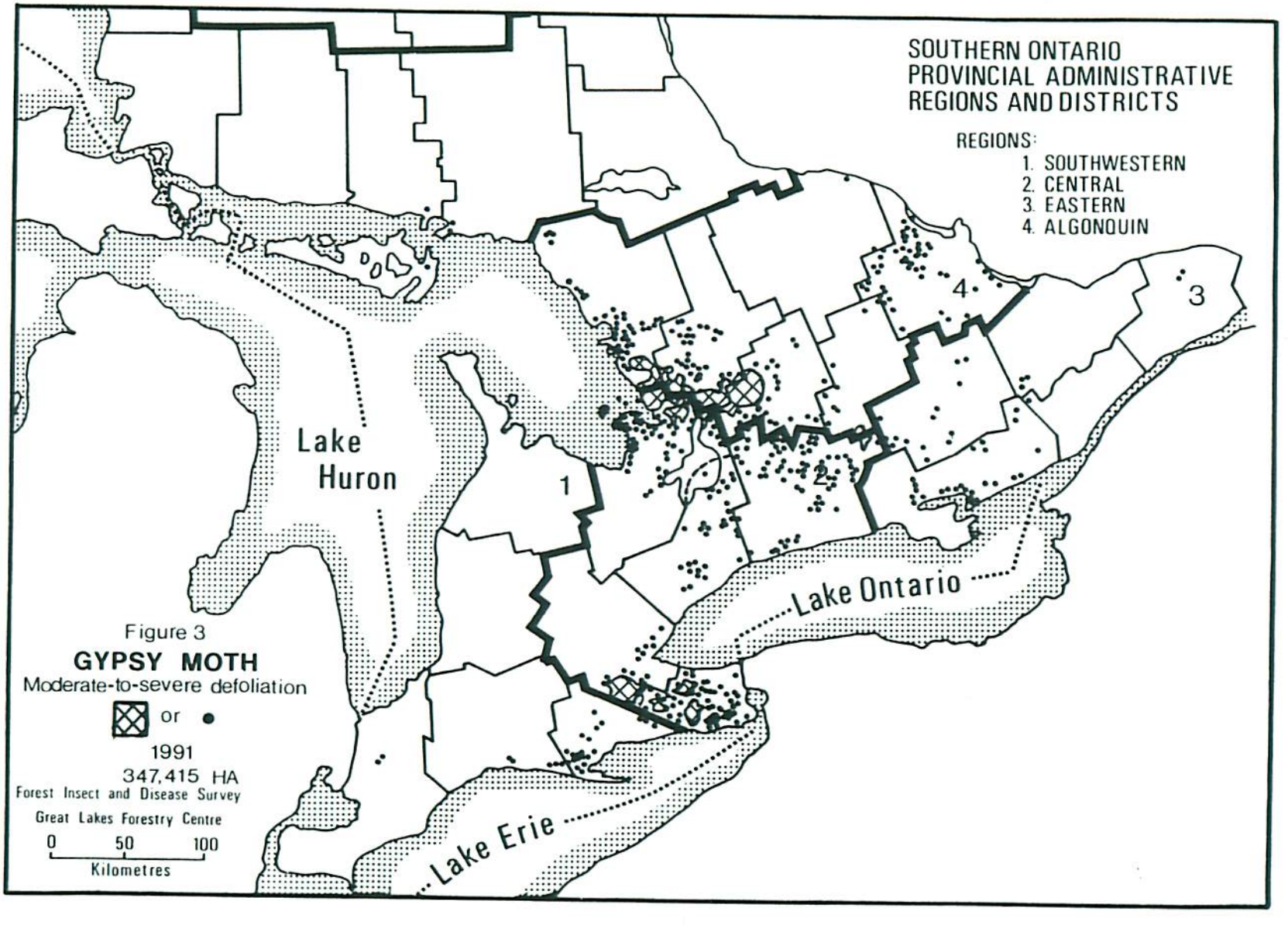
Region	District	Gross area of defoliation (ha)				
		1987	1988	1989	1990	1991
Eastern	Tweed	3,329	16,089	39,096	1,259	1,085
	Napanee	4,781	6,198	15,001	4,086	4,285
	Carleton Place	1,355	3,918	2,634	143	105
	Brockville	2,099	1,865	12,250	395	85
		0	0	0	0	90
		11,564	28,070	68,981	5,883	5,650
Algonquin	Algonquin Park	0	0	0	172	1,172
	Bracebridge	0	0	0	4,359	85,405
	Pembroke	0	124	1,154	7,148	16,554
	Bancroft	111	370	15	13,133	6,110
	Minden	0	0	65	5,056	56,163
	Parry Sound	0	0	0	9,367	43,079
		111	494	1,234	39,235	208,483
Central	Cambridge	0	0	0	3,323	15,432
	Huronia	0	0	0	2,418	65,775
	Lindsay	888	861	4,071	1,118	11,418
	Niagara	0	28	2,177	19,474	30,718
	Maple	0	0	370	2,291	6,110
		888	889	6,618	28,624	129,453
Southwestern	Aylmer	0	0	0	30	230
	Chatham	0	0	0	20	80
	Simcoe	115	240	4,807	3,856	3,078
		115	240	4,807	3,906	3,388
Northeastern	Espanola	0	0	0	0	56
	Sudbury	0	0	0	0	385
		0	0	0	0	441
Total		12,678	29,693	81,640	77,648	347,415

A number of small pockets also occurred along the western side of the Ottawa River between the southern end of Grand Calumet Island and the northern end of Horton Township in Pembroke District. Infestations in Eastern Region were mainly in Adolphustown, Fredericksburgh and Tyendinaga townships in central Napanee District. Several widely scattered infestations occurred in Tweed District, with the largest of these

Table 5. Gross area (ha) of moderate-to-severe defoliation by the gypsy moth, 1987-1991.

Locality	Gross area (ha) of defoliation				
	1987	1988	1989	1990	1991
Brant[a]	0	0	0	2,574	14,330
Durham[b]	118	51	50	567	2,838
Elgin[a]	0	0	0	30	230
Frontenac[a]	1,775	1,861	11,625	3,234	225
Glengarry[a]	0	0	0	0	60
Haldimand-Norfolk[b]	115	240	4,937	12,061	18,346
Haliburton[a]	0	0	0	4,187	14,201
Halton[b]	0	0	0	397	320
Hamilton-Wentworth[b]	0	0	0	352	782
Hastings[a]	4,511	5,625	22,262	806	2,740
Kent	0	0	0	0	45
Lambton[a]	0	0	0	20	35
Lanark[a]	1,355	3,918	2,590	143	105
Leeds and Grenville[a]	2,099	1,865	12,250	395	85
Lennox and Addington[a]	407	10,007	12,660	905	2,625
Manitoulin District	0	0	0	0	156
Muskoka[a]	0	0	0	10,137	116,327
Niagara[b]	0	28	2,047	11,269	15,450
Nipissing District	0	0	0	172	1,172
Northumberland[a]	2,131	5,341	8,231	607	665
Ottawa-Carleton[b]	0	0	44	0	0
Parry Sound District	0	0	0	3,589	35,592
Peterborough[a]	167	565	3,045	14,554	13,202
Prescott[a]	0	0	0	0	30
Prince Edward[a]	0	0	340	74	140
Renfrew[a]	0	124	1,154	7,148	16,554
Simcoe[a]	0	0	0	2,418	45,625
Victoria[a]	0	68	35	123	43,825
York[b]	0	0	370	1,886	4,710
Total	12,678	29,693	81,640	77,648	347,415

[a] County
[b] Regional Municipality
[c] District


SOUTHERN ONTARIO
PROVINCIAL ADMINISTRATIVE
REGIONS AND DISTRICTS
REGIONS:
1. SOUTHWESTERN
2. CENTRAL
3. EASTERN
4. ALGONQUIN
Lake Huron
Lake Ontario
Lake Erie
1
2
3
4
Figure 3
GYPSY MOTH
Moderate-to-severe defoliation
or
1991
347,415 HA
Forest Insect and Disease Survey
Great Lakes Forestry Centre
0 50 100
Kilometres

in Marmora and Lake townships. Two small patches of defoliation were mapped near Dalhousie Lake in Carleton Place District and two new small patches of defoliation occurred along Highway 417 west of the hamlet of Skye in Cornwall District.

In Central Region, small patches of defoliation were mapped north of Highway 401 between Oshawa and Port Hope in southern Lindsay District. A similar pattern of small patches of defoliation occurred south of Uxbridge, south of Lake Simcoe, and between Newmarket and Richmond Hill in Maple District. In Cambridge District, a number of widespread pockets of defoliation occurred north of the Queen Elizabeth Way between Oakville and Hamilton, and a large infestation encompassed most of Tuscarora Township and the Six Nations Indian Reserve southeast of Brantford. Large infestations occupied much of western Niagara District between the Grand River in the vicinity of Cayuga and the city of Welland. A cluster of small pockets was mapped between the Welland Canal and the Niagara River.

In Southwestern Region, infestations occurred mainly in Simcoe District south of Tillsonburg, in the Courtland-Staffordville area. Small pockets of defoliation were recorded south of the city of Aylmer, in Aylmer District, and in Rondeau Provincial Park and west of Oil Springs along Black Creek, in Chatham District. Moderate-to-severe defoliation was recorded for the first time in Northeastern Region, with small infestations north of the village of Killarney in Sudbury District and near Wikwemikong and Sheguiandah on Manitoulin Island in Espanola District. A single, small pocket was also mapped north of the village of Birch Island on the Whitefish Indian Reserve in Espanola District.

In 1991, OMNR aerially sprayed approximately 34,000 ha with *B.t.* to reduce defoliation levels in high-value stands. The treatment was carried out on Crown land (approximately 4,000 ha) and private land (approximately 30,000 ha) including parks, conservations areas, woodlots and cottage areas. All spray blocks received two applications of *B.t.* (30 BIU/ha/application) between mid-May and mid-June. Control operations took place in the Carleton Place, Minden, Lindsay, Huronia, Maple, Cambridge, Niagara, Chatham, Simcoe and Parry Sound districts.

A small experimental program was carried out over 90 ha in Pembroke District to evaluate the potential of a single *B.t.* application of Foray 48B® to protect infested stands. A new high-potency formulation, Foray 75B®, was also tested as part of the program. The effectiveness of these control programs is currently being assessed.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Forest tent caterpillar infestations developed much as predicted by egg counts carried out in the fall of 1990. Large increases in the area affected occurred in the northwestern and northern parts of the province, whereas declines occurred in central and southern areas (Table 6). Province-wide, a total of 18,870,518 ha of moderate-to-severe defoliation was mapped, compared with 9,480,408 ha in 1990.

Table 6. Gross area of current moderate-to-severe defoliation by the forest tent caterpillar in Ontario from 1989 to 1991.

District	Area of moderate-to-severe defoliation (ha)			
	1988	1989	1990	1991
Northwestern Region				
Dryden	610	564,902	974,160	1,185,900
Fort Frances	257,305	1,048,876	1,080,680	1,056,860
Ignace	0	12,403	577,960	1,146,300
Kenora	15,070	553,487	965,400	1,024,036
Red Lake	0	0	37,954	940,840
Sioux Lookout	0	450	436,703	3,386,280
	272,985	2,180,118	4,072,857	8,740,216
North Central Region				
Atikokan	28,160	423,404	816,998	565,366
Geraldton	0	180	74,730	1,227,585
Nipigon	560	8,535	176,686	1,955,390
Terrace Bay	690	4,255	35,065	125,284
Thunder Bay	4,230	19,739	310,307	1,716,802
	33,640	456,113	1,413,786	5,590,427
Northeastern Region				
Blind River	102,852	208,878	200,445	68,338
Espanola	415,273	615,345	657,717	140,322
North Bay	856,053	1,031,622	145,570	59,912
Sault Ste. Marie	26,560	116,107	102,669	3,045
Temagami	252,650	160,770	330	0
Sudbury	442,274	843,409	849,127	541,260
Wawa	12,087	80,143	499,697	847,431
	2,107,749	3,056,274	2,455,555	1,660,308
Northern Region				
Chapleau	0	300	0	0
Hearst	10,550	150,438	789,396	1,580,289
Kapuskasing	0	7,482	85,981	762,729
Moosonee	0	0	46,446	90,015
Timmins	0	0	170	495
	10,550	158,220	921,993	2,433,528
Algonquin Region				
Algonquin Park	62,579	171,988	330	0
Bancroft	148,125	212,540	260	300
Bracebridge	330,845	174,171	39,106	9,272
Minden	268,633	267,576	49,675	63,830
Parry Sound	408,302	390,886	102,714	15,376
Pembroke	39,425	102,795	85	0
	1,257,909	1,319,956	192,170	88,778

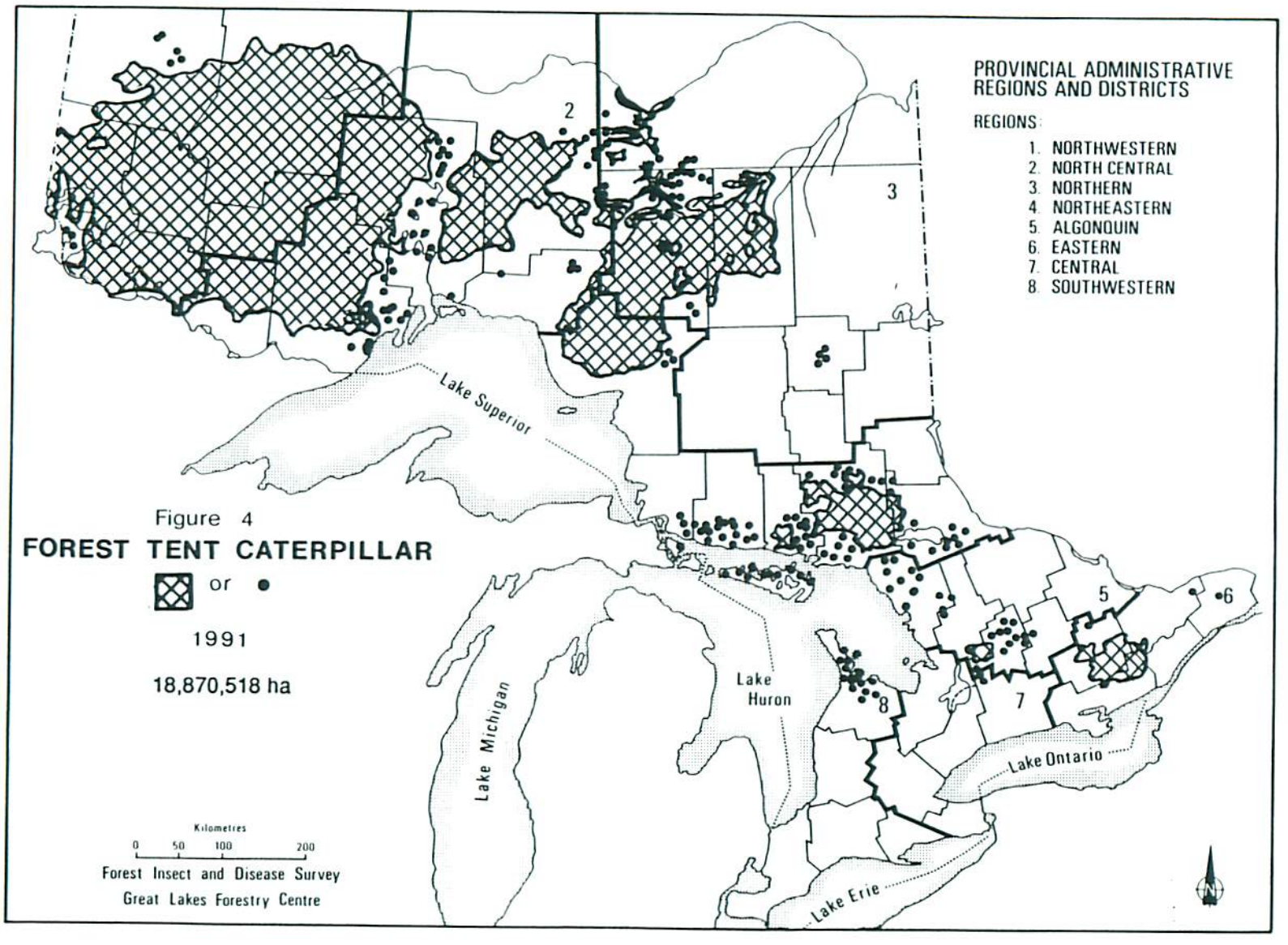
(cont'd)

Table 6. Gross area of current moderate-to-severe defoliation by the forest tent caterpillar in Ontario from 1989 to 1991 (concl.).

District	Area of moderate-to-severe defoliation (ha)			
	1988	1989	1990	1991
Eastern Region				
Brockville	0	720	22,020	23,548
Carleton Place	3,835	11,847	14,367	24,336
Cornwall	445	0	0	1,238
Napanee	190	81,248	78,479	64,268
Tweed	121,174	345,104	215,441	215,633
	125,644	438,919	330,307	329,023
Central Region				
Lindsay	47,752	132,578	350	1,236
Huronia	104,240	124,513	29,166	325
Maple	0	2,130	1,335	551
	151,992	259,221	30,851	2,112
Southwestern Region				
Owen Sound	4,760	46,290	62,889	26,116
Total	3,965,229	7,915,111	9,480,408	18,870,508

In northwestern Ontario, infestations extended from the American and Manitoba borders northward into southern Red Lake and Sioux Lookout districts and eastward to include northern and central Thunder Bay District and western Nipigon District (Fig. 4). This huge infestation was separated by a narrow band north of Lake Nipigon from another large infestation that encompassed large portions of eastern Nipigon District and southern Geraldton District. This infestation was joined by a narrow band to a third large infestation that occupied most of Hearst District and expanded eastward to include most of northern Kapuskasing District and southward to include large portions of northern Wawa District. A number of small pockets of moderate-to-severe defoliation were mapped around and between the larger infestations, including most of the islands in Lake Nipigon.

In central Ontario, an infestation in 1990 that occupied large areas in the Sudbury, Blind River, Sault Ste. Marie and Espanola districts, including most of Manitoulin Island, broke up into one large pocket and numerous smaller ones. The remaining large pocket occupies most of central Sudbury District and a small area on the western edge of North Bay District. Another sizable pocket occurred in southwestern Espanola district and numerous small patches of defoliation were recorded


PROVINCIAL ADMINISTRATIVE
REGIONS AND DISTRICTS
REGIONS:
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6. EASTERN
7. CENTRAL
8. SOUTHWESTERN
Lake Superior
Lake Michigan
Lake Huron
Lake Ontario
Lake Erie
Figure 4
FOREST TENT CATERPILLAR
or
1991
18,870,518 ha
Kilometres
0 50 100 200
Forest Insect and Disease Survey
Great Lakes Forestry Centre

in southern Sault Ste. Marie, Blind River, North Bay and Espanola districts, including Manitoulin Island.

Infestations in southern Ontario were further reduced following the declines that occurred in 1990. The largest remaining area occurred in southeastern Tweed District, extending into adjacent areas of southwestern Carleton Place District, northwestern Brockville District and northeastern Napanee District. A sizable pocket of defoliation occurred in west-central Minden District, extending into southern Bracebridge District. However, much of the defoliation in this area was caused by the gypsy moth, making it difficult to distinguish between damage caused by the two insects. A few small pockets of defoliation persisted in western Bracebridge and northern Parry Sound districts. Egg-band counts in the fall of 1990 indicated that infestations in Owen Sound District might expand somewhat in 1991; however, the expansion did not occur, and infestations were reduced to numerous small pockets in the central and northern parts of the district.

Egg-band counts to determine population trends in 1992 will be carried out later this fall and the results will be included in the fall *Survey Bulletin*.

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

Increased populations were reported across much of southern Ontario. The insect was most prevalent in Algonquin Region, where numerous young red pine (*Pinus resinosa* Ait.) and white pine (*P. strobus* L.) plantations and ornamentals were attacked. In cases where population levels were extremely high, larvae, which normally eat the old foliage, also consumed the current year's needles. Some of the most severe damage occurred as follows: in McMurrich Township, Bancroft District, where two red pine plantations had 100% of the trees infested, with 72 and 88% damage to old foliage and 10 and 16% damage to new foliage, respectively; in Armour Township, Bracebridge District, where 99% of the trees were infested, with damage to old and new foliage of 24 and 6%, respectively; in Horton Township, Pembroke District, where 99% of the trees sustained 73% damage to old foliage and 69% of the trees sustained 16% damage to new foliage; and in Mayo Township, Bancroft District, where 88.9% of the trees had 61% damage to old foliage and 61% had 20% damage to new foliage.

The webworm was also more abundant in Owen Sound and Huronia districts, where defoliation levels of 50% occurred in small portions of red pine plantations in Essa and Oro township, Huronia District, and defoliation levels of 30% occurred in a white pine plantation in Sullivan Township, Owen Sound District. Severe damage was reported in several plantations in Tweed District and on scattered ornamental trees in the cities of Sault Ste. Marie and Sudbury. Low population levels were reported at a number of other locations in the North Bay, Sudbury and Espanola districts.

Grasshoppers, Acrididae

Unusual and severe damage caused by grasshopper feeding occurred on jack pine container stock in a newly established jack pine seed orchard at Leether Lake, Sioux Lookout District. Losses of newly planted trees ranged from 0.5 to 62% in several blocks, with a total of approximately 8,000 seedlings lost. The trees were attacked in late May during and immediately after planting; the insects consumed bark, needles and, in some cases, severed the main stem of the trees.

Fall Cankerworm, *Alsophila pometaria* (Harr.)

For the fourth consecutive year, large populations of this early-season pest caused severe defoliation of ornamental Manitoba maple (*Acer negundo* L.) trees in the towns of Kenora, Dryden, Fort Frances and Sioux Lookout, and new heavy infestations were observed in the town of Hudson in Northwestern Region. Heavy infestations recurred on the same host in the city of Thunder Bay and in adjacent Paipoonge Township in Thunder Bay District of North Central Region. Defoliation levels were in the 70-90% range in most instances. In southern Ontario, hardwood bush lots totaling 51 ha in Burford Township, Simcoe District, sustained defoliation ranging from 40 to 100%. Similar damage levels occurred in a 10-ha woodlot in Caradoc Township, Aylmer District. The tree species most commonly affected in these areas were sugar maple (*Acer saccharum* Marsh.), silver maple (*A. saccharinum* L.), white elm (*Ulmus americana* L.) and white ash (*Fraxinus americana* L.).

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

A substantial decrease in the numbers of these insects was evident in the Brockville and Carleton Place districts, where high population levels have prevailed for several years. The largest remaining populations were at the G. Howard Ferguson forest tree nursery, where 21% foliar damage was recorded on windbreak trees. These trees were treated with the insecticide Cygon 2E® by OMNR in an effort to suppress populations. In Lindsay District, light or occasionally moderate leafmining were observed in Eldon, Cavan, Clarke and Belmont townships. Defoliation in these areas ranged from 15 to 30%. High leafminer population levels were reported in Uxbridge and Pickering townships of Maple District, with defoliation in the 50-70% range. Foliar damage ranging from 25 to 40% occurred on cedar (*Thuja* spp.) windbreaks at the St. Williams forest tree nursery in South Walsingham Township, Simcoe District. Low population levels were observed at a few other locations in southern Ontario and along the southern shore of Manitoulin Island in Espanola District.

Larch Casebearer, *Coleophora laricella* (Hbn.)

Numbers of this insect varied considerably across the province in 1991. In Northeastern Region, populations declined generally, particularly in Sault Ste. Marie District, where a number of heavy infestations occurred in 1990. Small pockets of moderate-to-severe defoliation of tamarack (*Larix laricina* [Du Roi] K. Koch) were mapped at three locations in Espanola District and one location in Tweed District.

In contrast, high population levels were observed on tamarack and European larch (*Larix decidua* Mill.) in the Algonquin and Eastern regions. Defoliation ranged from 20 to 80% in small tamarack stands in a number of townships in the Bracebridge and Minden districts. Similar damage levels were recorded in small stands of tamarack and plantations of European larch and Japanese larch (*Larix leptolepis* [Sieb. & Zucc.] Gord.) in the Cornwall, Carleton Place, Brockville, Napanee and Tweed districts of Eastern Region. The largest infestation in this area was in a 25-ha tamarack stand north of Smiths Falls in Montague Township, Carleton Place District, where 75% defoliation was recorded. Infestations were widespread and heavy in Lindsay District of Central Region. Here, numerous small stands of native tamarack and occasional Japanese larch and European larch plantations sustained defoliation ranging from 30 to 80%. Populations generally declined in the rest of Central Region except in the Minesing Swamp in Vespra Township, Huronia District. At this location, approximately 370 ha of native tamarack sustained nearly 100% defoliation, an increase from the 100 ha recorded last year.

Defoliation ranging from 40 to 60% was recorded in a few other stands in Huronia District and in several areas in Maple District. A heavy infestation with 75 to 100% foliar damage was reported in one mature European larch plantation near the town of Simcoe, and defoliation of from 25 to 60% occurred on Japanese larch and European larch in the St. Williams forest tree nursery, Simcoe District. Elsewhere in the province, low population levels were reported at a number of widespread areas in the Chapleau and Kirkland Lake districts.

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

Populations of this early-season pest of oak (*Quercus* spp.) remain at low levels in the province. Defoliation levels in the 10-20% range were reported in red oak (*Quercus rubra* L.) stands in Thessalon and Long townships, Blind River District. Defoliation of about 20% was also recorded on red oak in one stand in Pelham Township, Niagara District. The insect was not observed elsewhere in the province.

Birch Leafminer, *Fenusa pusilla* (Lep.)

The most severe foliar damage in forest situations was reported from southeastern Thunder Bay and southwestern Nipigon districts. Severe damage was observed on individual trees and small clumps of white birch

(*Betula papyrifera* Marsh.) in the Pigeon River-Dog Lake-Red Rock area. Larger stands ranging in size from 20 to 50 ha (totaling 165 ha) were severely defoliated in five townships west and north of Thunder Bay. A 25-ha stand in Nipigon Township, Nipigon District, was also severely defoliated. Aerial surveys disclosed pockets of heavy infestation in numerous small white birch stands up to 2 ha in size between Timmins and Matheson in the Kirkland Lake and Timmins districts. Somewhat smaller pockets of foliar damage were reported along Highway 631 north of the town of Hornepayne in Hearst District and in Greenwater Provincial Park in Cochrane District, although population levels in these districts appeared to be somewhat lower than last year. Defoliation in the 80-100% range was observed on single trees and in small clumps of white birch in the Goulais River, Ranger Lake and Searchmont areas of Sault Ste. Marie District. Sporadic damage to ornamentals occurred in the town of Chapleau and in a number of other urban areas in northern Ontario. In southern Ontario, foliar browning in the 80-100% range was reported on ornamental birch trees in a number of urban areas in the Huronia, Maple, Cambridge, Simcoe, Niagara and Aylmer districts.

American Aspen Beetle, *Gonioctena americana* (Schaeff.)

Heavy infestations by this early-spring defoliator occurred in Chapleau District. As usual, damage was heaviest on young trembling aspen (*Populus tremuloides* Michx.) reproduction in cutover areas and other open-growing situations. However, in a 3-ha stand of 7-m trees in Deans Township and a 5-ha stand of the same height in Chappise Township, defoliation levels in the 50-60% range were recorded. In a small stand in Gurd Township, North Bay District, 30% defoliation was recorded on 80% of the trees. Heavy defoliation ranging as high as 90% was reported in several townships in Bancroft District and at one location in Pembroke District. The insect was also observed in low numbers at a few locations in the Kirkland Lake, Temagami, Bracebridge and Minden districts.

Satin Moth, *Leucoma salicis* (L.)

This introduced pest extended its range into Huronia District in 1990 when a small stand of European white poplar (*Populus alba* L.) in Tosorontio Township sustained 80% foliar damage from feeding larvae. The same stand sustained similar damage in 1991. New infestations were discovered on Carolina poplar (*Populus X canadensis* Moench) at Canadian Forces Base Borden, where large trees in several areas were completely defoliated. New infestations were also discovered causing heavy defoliation of European white poplar at two locations in Essa Township, Huronia District. Single trees and small clumps of the same host were severely defoliated at a number of locations in the Brockville, Carleton Place, Tweed and Cornwall districts.

Eastern Tent Caterpillar, *Malacosoma americanum* (F.) and
Northern Tent Caterpillar, *M. californicum pluviale* (Dyar)

High population levels of the eastern tent caterpillar were reported across much of southern Ontario in 1991. Roadside and other open-grown shrubbery, including pin cherry (*Prunus pensylvanica* L.f.) and choke cherry (*Prunus virginiana* L.), were heavily defoliated in a number of areas in the Eastern and Central regions as well as in Owen Sound District of Southwestern Region and the Minden, Bracebridge and Parry Sound districts of Algonquin Region. In Owen Sound District, black cherry (*Prunus serotina* Ehrh.) trees in both open-grown and forest situations were heavily attacked in Sullivan, Euphrasia, Holland, Amabel and Keppel townships. Small and declining populations were reported in a number of areas in the Sudbury, North Bay and Espanola districts of Northeastern Region. Large numbers of tents were observed at one location in Sault Ste. Marie District.

The northern tent caterpillar was widely distributed in Northwestern Region and was particularly abundant on roadside pin cherry and choke cherry in the Sioux Lookout and Red Lake districts. It was also present in high numbers in the Geraldton and Terrace Bay districts. Somewhat lower population levels were reported at locations in the Kenora, Thunder Bay and Wawa districts.

Sawyer Beetles, *Monochamus* spp.

Feeding damage by adult sawyer beetles caused top and whole-tree mortality at three locations in each of the Red Lake and Sioux Lookout districts. The damage occurred along the edges of a road and around the periphery of newly cut areas. Black spruce (*Picea mariana* [Mill.] B.S.P.) and jack pine were the principal species affected within areas ranging from 5 to 7 ha at each location. Similar damage, with about 10% mortality, occurred at one location on the Mawn Road, Geraldton District.

Balsam Fir Sawfly, *Neodiprion abietis* complex

A general upsurge in populations of this insect was evident in Eastern Region and parts of Algonquin Region. Heavy infestations with corresponding high defoliation levels recurred in Fitzroy Township, Carleton Place District, and new heavy infestations were recorded in Osgoode Township, Carleton Place District, and Effingham Township, Tweed District. Severely defoliated single trees and small clumps of balsam fir (*Abies balsamea* [L.] Mill.) were reported as numerous at locations throughout the remainder of the Carleton Place and Tweed districts as well as in the Napanee, Brockville and Cornwall districts.

Less severe but more general and widespread damage occurred in balsam fir stands in central Minden District, northern Lindsay District, southern Bracebridge District and at a few locations in northern Bracebridge and eastern Parry Sound districts. Defoliation in these areas ranged from 10 to 30% (occasionally as high as 60%) on trees

ranging from 4 to 15 m in height. Small populations of the sawfly were also reported at single locations in the Bancroft, Hearst and Thunder Bay districts.

Pine Sawflies, *Neodiprion pratti paradoxicus* Ross, *N. pratti banksianae* Roh., *N. nanulus nanulus* Schedl. and *N. maurus* Roh.

Widespread but generally small populations of the jack pine sawfly (*N. pratti banksianae*) were reported in the Sioux Lookout, Ignace, Red Lake and Fort Frances districts. The most notable damage in these districts was in a 10-ha jack pine stand at the end of Highway 613; 73% of the trees were infested, with defoliation levels of 5%. Population levels were lower in North Central Region, although a small group of young trees near Mink Lake, Atikokan District, sustained 40% defoliation. Increased populations caused 30 and 25% defoliation at locations in Shoals Provincial Park, Chapleau District, and near Muldrew Lake, Gogama District, in Northern Region.

In southern Ontario, increased populations caused varying defoliation at a few locations in Eastern Region and in the Minden and Bracebridge districts of Algonquin Region. In the latter districts, defoliation of as high as 90% was recorded on open-grown jack pine at several locations. Large numbers of sawflies were recorded on a few trees at one location in Maple District.

A closely related jack pine sawfly (*N. pratti paradoxicus*) caused defoliation ranging from 20 to 75% in a number of jack pine plantations in the Brockville, Napanee and Carleton Place districts. Small populations of the red pine sawfly (*N. nanulus nanulus*) occurred on jack pine and red pine in the Chapleau, Gogama, Sudbury, North Bay and Espanola districts. The usually rare pine sawfly *N. maurus* was much more in evidence this year in the Chapleau and Gogama districts and small numbers of this pest were also reported at single locations in the Hearst, Geraldton and Kirkland Lake districts.

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

Increased numbers of this introduced pest were recorded on jack pine, Scots pine (*Pinus sylvestris* L.) and red pine in the Napanee, Cornwall, Brockville, Carleton Place and Tweed districts. Defoliation in plantations ranged from 2 to 20%. Single, open-grown Scots pine at several locations, including the G. Howard Ferguson forest tree nursery, sustained 100% loss of old foliage. Low populations levels were reported on planted red pine at a number of locations in the Minden and Lindsay districts and on red pine and Scots pine in the Maple and Huronia districts. Widespread but generally small populations occurred in Scots pine Christmas tree plantations in the Simcoe and Aylmer districts. Although the proportion of trees infested was as high as 92%, actual foliar loss was usually less than 15%. Low population levels were reported on Scots pine trees across Manitoulin Island in Espanola District and in the city of Sault Ste. Marie, Sault Ste. Marie District, and in Kirkwood Township, Blind River District.

Northern Pitch Twig Moth, *Petrova albicapitana* (Bsk.)

Increased populations of this jack pine pest were reported at a number of locations in Northern Region. The most severe damage was reported in a 15-ha stand of 1.5-m jack pine near Foleyet, Chapleau District, where 34% of the trees were infested, 29% with leader damage. In a jack pine seed orchard in Playfair Township, Kirkland Lake District, 46% of the 1.1-m trees were infested, with 22.7% leader damage, and in Ossian Township, Kirkland Lake District, 28% of the 1.2-m trees were infested, with 22% leader damage. Similar damage levels (23.3% infested and 22% leader damage) occurred in a 0.9-m jack pine plantation in Firstbrook Township, Temagami District. Somewhat lower damage was recorded in a number of other young jack pine stands in the Temagami, Kirkland Lake, Timmins, Cochrane, Chapleau and Gogama districts of Northern Region as well as in the Thunder Bay and Terrace Bay districts of North Central Region.

Early Aspen Leafcurler, *Pseudexentera oregonana* (Wlsm.)

Heavy infestations that occurred on trembling aspen stands in northwestern Kirkland Lake District and southeastern Cochrane District in 1990 increased substantially in 1991. A total area of 147,620 ha of moderate-to-severe defoliation was aerially sketch-mapped this year, compared with 23,270 ha in 1990. The bulk of the defoliation occurred in a large infestation that occupied the adjoining northeastern corner of Timmins District and northwestern corner of Kirkland Lake District, along with a sizable area on the south-central edge of Cochrane District. A long, narrow band joined this infestation with a smaller pocket centered in the town of Cochrane--the entire infestation encompassed some 130,658 ha between the town of Cochrane, Cochrane District, and the town of Ramore, Kirkland Lake District. A long, narrow pocket of defoliation (4,262 ha) was mapped along Highway 574 between the Sucker and Low Bush rivers. Similarly, another pocket of defoliation occupied 10,938 ha along Highway 101 between Schumacher and Nighthawk Centre in Timmins District. Thirteen smaller patches of moderate-to-severe defoliation were mapped around the perimeter of the main body of the infestation. A small pocket (5 ha) of moderate-to-severe defoliation was mapped at Kap-Kig-Iwan Provincial Park, Kirkland Lake District. Light defoliation was reported north of the main infestation in the Cochrane-Gardiner-Smooth Rock Falls area of Cochrane District and south of the main infestation in the area between Butler Lake and Nighthawk Lake in the Kirkland Lake and Timmins districts.

Other Noteworthy Insects

Populations of the large aspen tortrix (*Choristoneura conflictana* [Wlk.]) declined to very low levels across the province except for a small, moderate infestation in a 3-ha trembling aspen stand near the town of Chapleau.

Large numbers of the spruce coneworm (*Dioryctria reniculelloides* Mut. & Mun.) were found in conjunction with the spruce budworm at the Pearson Seed Orchard and in the Brightsands area of Thunder Bay District.

Populations of the pine spittlebug (*Aphrophora cribrata* [Wlk.]) declined in 1991, with only small and occasionally medium populations reported in the Timmins, Temagami, Kirkland Lake, Wawa and Kenora districts.

The spiny ash sawfly (*Eupareophora parca* [Cress.]) was widespread in the Chapleau and Gogama districts. The largest populations were observed in 10- and 15-ha black ash (*Fraxinus nigra* Marsh.) stands in Ivanhoe and Carty townships, Chapleau District, where defoliation levels of 30 and 35%, respectively, were recorded.

A leafminer (*Japanogromyza viridula* [Coq.]) caused 75 to 100% foliar damage to white oak (*Quercus alba* L.) and red oak in a 28-ha stand at Rondeau Provincial Park, Chatham District. Light damage occurred at Wheatley Provincial Park, Chatham District, and at many points in Simcoe District.

The pine root collar weevil (*Hylobius radicis* Buch.) was found in single jack pine and Scots pine plantations in Kennedy Township, Cochrane District, where 8 and 2% mortality, respectively, were recorded.

The imported willow leaf beetle (*Plagiodera versicolora* [Laich.]) caused severe damage to willows along river and stream banks and in other lowlying areas at a number of locations in the Carleton Place, Napanee, Huronia, Simcoe, Niagara, Chatham and Wingham districts.

The orange spruce needleminer (*Coleotechnites piceaella* [Kft.]) mined 75% of the foliage on 15-m white spruce at one location in Plummer Additional Township, Sault Ste. Marie District.

The white-marked tussock moth (*Orgyia leucostigma intermedia* Fitch) caused defoliation of as high as 75% on a variety of deciduous hosts in the city of Sault Ste. Marie.

TREE DISEASES

Armillaria Root Rot, *Armillaria ostoyae* (Romagn.) Herink and *A. mellea* (Vahl:Fr.) Kummer

These closely-related diseases are widespread in young coniferous plantations and natural regeneration across the province. However, with a few exceptions, infection levels and consequent mortality were 2% or less. The exceptions were as follows: 4% current mortality occurred in a 10-ha area of 5.0-m jack pine regeneration on the Sawden Lake Road, Ignace District; 3% mortality occurred in a 50-ha stand of 0.4-m jack pine in Reaney Township, Chapleau District; 4% mortality occurred in a 30-ha stand of 0.5-m jack pine in Strom Township, Chapleau District; 4% mortality occurred in a 2-ha block-cut regeneration area in McQuesten

Township, Geraldton District; and 4.7% mortality occurred in a 1.5-ha plantation of 2-m jack pine in Kennedy Township, Cochrane District.

Armillaria root rot was also associated with widespread mortality of severely stressed white birch south of Highway 17 in the Sudbury and Espanola districts.

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

European Race

The European race of this disease has been confirmed at 11 locations so far in 1991. Five of the collections were from McMurrich Township (Parry Sound District), two from Ryerson Township (Parry Sound District), one from Stephenson Township (Bracebridge District) and three from Mayo Township (Bancroft District). Although the frequency of the disease has increased this year, all collections were from the vicinities of previous finds and did not represent any significant spread of the disease. The European race was not found elsewhere despite a program of intensive surveys.

North American Race

Reports of the North American race of the disease are scarce so far in 1991. Low infection levels were reported from red pine plantations in McMurrich Township, Parry Sound District, and in Perry and Joly townships, Bracebridge District. Three red pine plantations were infected in Olrig Township, North Bay District, with the highest infection levels (35.3% of the trees infected) in a 5-ha, 2.5-m stand, but no mortality was observed. In Smilsky Township, Sault Ste. Marie District, a 4-ha jack pine stand had 67% of the trees infected and 44.6% of the trees in the plantation were severely damaged. A current infection level of 14%, with 14% mortality, was recorded in a 5-ha, 1.3-m jack pine stand in Recollet Township, Wawa District.

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

There was a marked decline in the incidence of this leaf disease of aspen (*Populus* spp.) in 1991. The only reports of the disease were in Villeneuve Township, Blind River District, where a 2-ha trembling aspen stand sustained an infection level of 100% and foliar damage of 25%, and in Bomby Township, Terrace Bay District, where 40% foliar damage was recorded in a 0.5-ha stand.

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

This disease was most common in the Chapleau and Gogama districts. Evaluations in 21 young jack pine stands revealed infection levels of from 3 to 100% and foliar damage of from 3 to 33%. The most severely damaged trees were in a 100-ha stand of 0.5-m jack pine in

Warren Township, Chapleau District, where an infection level of 75% and 33% foliar damage were recorded. A 75-ha stand of 0.3-m trees in Paul Township was 60% infected, with 27% foliar damage. Infection levels ranging from 63 to 100% and corresponding foliar damage of 20% were recorded in Alcona, Hill, Nimitz, Reaney and Topham townships. Reports of the disease in young stands were also received from the Geraldton, Terrace Bay, Hearst, Cochrane, Timmins, Kirkland Lake, Temagami and Nipigon districts. Although infection levels of as high as 65% were recorded in these districts, foliar damage levels were usually less than 10%.

Sweetfern Blister Rust, *Cronartium comptoniae* Arthur

This disease, which causes basal stem cankers on jack pine, was again prevalent in Northern Region, particularly in Chapleau District. An infection level of 11% was recorded on young, 1.9-m jack pine in a 25-ha stand in Hutcheon Township and 16% infection was recorded on mature trees in a 20-ha stand in Neelands Township. The disease was observed in a number of other areas in the Chapleau, Gogama, Hearst and Terrace Bay districts, but infection levels were usually quite low.

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

This disease is found commonly throughout the range of white pine in the province. The most severe damage reported this year was in Temagami District, where a 10-ha stand of 1.2-m trees in Milne Township had 34.7% of the trees infected and 18.7% severely affected (i.e, with stem cankers). High infection levels in young white pine regeneration in this district have prompted OMNR to begin a sanitation and tending program of clipping susceptible low branches from young trees in an effort to reduce losses. In a young mixedwood stand underplanted with white pine in Lyell Township, Algonquin Park District, 38% of the young trees were infected and 18% had stem cankers. In Edwardsburgh Township, Brockville District, a 0.5-ha, 2-m white pine progeny test for white pine blister rust resistance had 21% of the untended trees infected, 12% with stem cankers, and a mortality rate of 3%. Numerous other reports of the disease revealed infection levels ranging from 1 to 37% and severe damage (stem cankers) on from 1 to 7% of the trees.

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

This foliar disease was widely distributed in young jack pine stands in northern Ontario, particularly in the Chapleau and Gogama districts. The highest infection levels were recorded in a 15-ha stand of 1-m jack pine in Invergarry Township, Gogama District, where 99% of the trees were infected and foliar damage averaged 40%. Similar damage occurred in Battersby Township, Gogama District, where a 500-ha stand of 2.0-m jack pine had 90% of the trees infected, with foliar damage of 40%. The disease was also very heavy on a small group of trees on the Fowler Lake Road, Sioux Lookout District, where approximately 33% branch-tip

mortality occurred. The remainder of this stand had an infection level of 20%. Reports of the disease were received from numerous other areas in northern Ontario, with infection levels ranging from 1 to 35% and foliar damage ranging from trace levels to 30%.

Western Gall Rust, *Endocronartium harknessii* (J.P. Moore) Y. Hirats.

Western gall rust was widely distributed in young jack pine stands in northern Ontario. The proportion of trees severely affected was usually low, with the exception of several areas in Sioux Lookout District and single areas in each of the Blind River and Chapleau districts. In Blind River District, a 16-ha block of 2.9-m jack pine in Lane Township had an infection level of 64.6% and 36% of the trees were severely damaged (i.e., had a main-stem gall). In Copperfield Township, Chapleau District, a 25-ha, 1.6-m stand had 8% of the trees severely affected and a mortality level of 14%. The most severe damage in Sioux Lookout District was in a 25-ha stand of 4-m jack pine at the junction of Highway 511 and Fowler Lake Road, where 53% of the trees were infected and 27% were severely damaged. Young stands at Burma Lake Road, Discovery Lake and Goodie Lake Road had infection levels of 27, 63 and 21% and 12, 14 and 19% of the trees, respectively, were severely affected.

In a single report from southern Ontario, a 2.5-ha, 18-m Scots pine Christmas tree plantation in Charlotteville Township, Simcoe District, had 20% of the trees severely galled.

Other Noteworthy Diseases

Diplodia tip blight (*Sphaeropsis sapinea* [Fr.] Dyko & B. Sutton) was reported causing 10 to 50% branch mortality on ornamental and roadside mugho pine (*Pinus mugo* Turra var. *mughus* Zenari) and Austrian pine (*Pinus nigra* Arnold) at a number of locations in the Tweed, Carleton Place, Brockville and Napanee districts. The disease caused similar damage to Austrian pine in the Aylmer, Simcoe, Chatham and Niagara districts and in a single Scots pine Christmas tree plantation in Burford Township, Simcoe District. Light damage occurred on jack pine at one location in Kenora District.

Unusually high infection levels (5 to 10%) of comandra blister rust (*Cronartium comandrae* Peck) occurred at the Kakabeka Falls jack pine seedling seed orchard, Thunder Bay District.

Shoot blight of aspen (*Venturia macularis* [Fr.] E. Müller & v. Arx.) caused widespread infection, with shoot damage in the 10-15% range in Hearst District. A single infection, causing 20% leader damage, was reported in Wiggins Township, Terrace Bay District.

The spruce broom rust (*Chrysomyxa arctostaphyli* Dietel) was found infecting 20% of the trees in a white spruce stand in Pic Township, Terrace Bay District.

A needle blight (*Kabatina juniperi* [A. Schneider & v. Arx] Morelet) infected 75% of eastern white cedar (*Thuja occidentalis* L.) transplants in one compartment at the Thunder Bay forest tree nursery, causing 25% foliar damage and 3% mortality.

Tomentosus root rot (*Inonotus tomentosus* [Fr.] Teng) was associated, along with several other agents, with deteriorating mature jack pine stands in Larkin Township, Hearst District.

ABIOTIC CONDITIONS

Blowdown

A severe windstorm on 18 July 1991 caused widespread damage to forest stands in northwestern Kenora District and southwestern Red Lake District. The main area of damage extended from the northeastern corner of the Whitedog Indian Reserve and the eastern side of Umfreville Lake in Kenora District in a northeasterly direction to the Longlegged Lake-Dixie Lake area of Red Lake District. This damage occurred over approximately 164,685 ha, of which 55,155 ha were in Kenora District and 109,530 ha were in Red Lake District. Two smaller pockets of damage were located in the Gullrock Lake area of Red Lake District, immediately north of the main body described above; they encompassed an additional 2,240 ha. Most of the damage described above occurred in large stands of jack pine, jack pine and black spruce, and mixed spruce-fir stands. This represented significant timber loss.

The same storm also caused sizable areas of damage immediately east of Dryden around the adjacent corners of the Dryden, Ignace and Sioux Lookout districts. In this area, the damage took the form of smaller scattered pockets of damage which totaled 40,790 ha in area (Fig. 5). Damage in each district was as follows: Sioux Lookout, 13,190 ha; Dryden, 7,615 ha; and Ignace, 19,985 ha. The damage was in less valuable forest in which much of the area had been cut over. Aerial mapping of the blowdown in Northwestern Region was largely carried out by OMNR personnel, although area calculations were made by FIDS staff.

Storm damage also occurred in northeastern Ontario, where severe storms on 27 June 1990 caused numerous pockets of damage. The damage was scattered through southern Kapuskasing (15,855 ha) and Cochrane (13,910 ha) districts, northwestern Timmins District (7,395 ha), Kirkland Lake District (5,350 ha) and central Chapleau District (5,590 ha). In addition, small pockets of damage were located in Invergarry Township, Gogama District (1,300 ha), and in Barr and Dane townships, Temagami District (1,340 ha) (Fig. 6). The total area affected in northeastern Ontario was 50,740 ha, bringing the provincewide total to 258,455 ha (Table 7). Much of the damage in Chapleau District occurred on trembling aspen, with minor areas of black spruce and jack pine affected. In the Timmins, Kirkland Lake and Temagami districts, the bulk of the storm damage occurred on white birch and trembling aspen remnants and fringes of cutovers, with occasional black spruce stands damaged along creeks and lakeshores. Damage in the Cochrane and Kapuskasing districts was mixed,

NORTHWESTERN ONTARIO

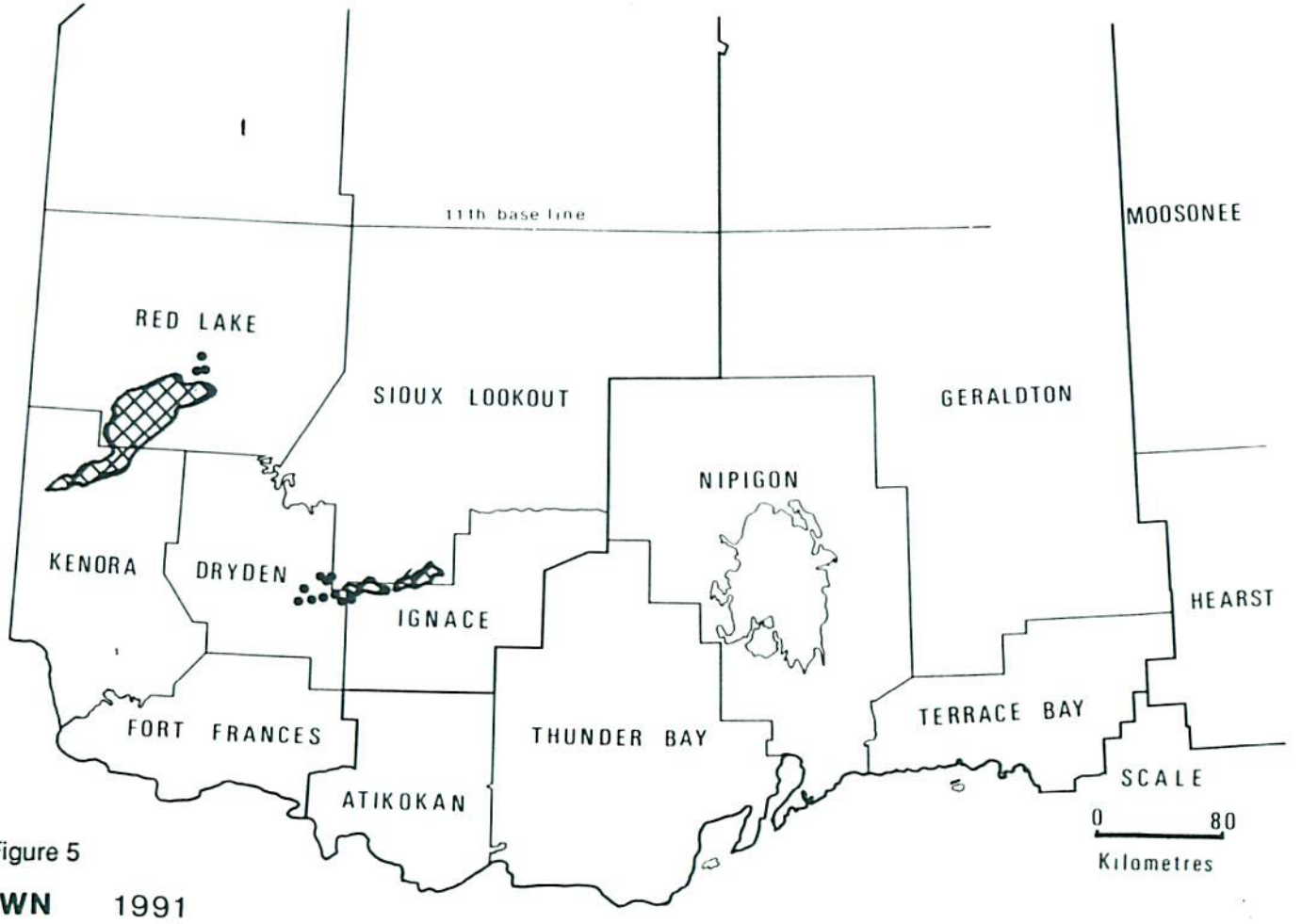

Figure 5

BLOWDOWN 1991

Areas within which damage occurred • or

NORTHEASTERN ONTARIO

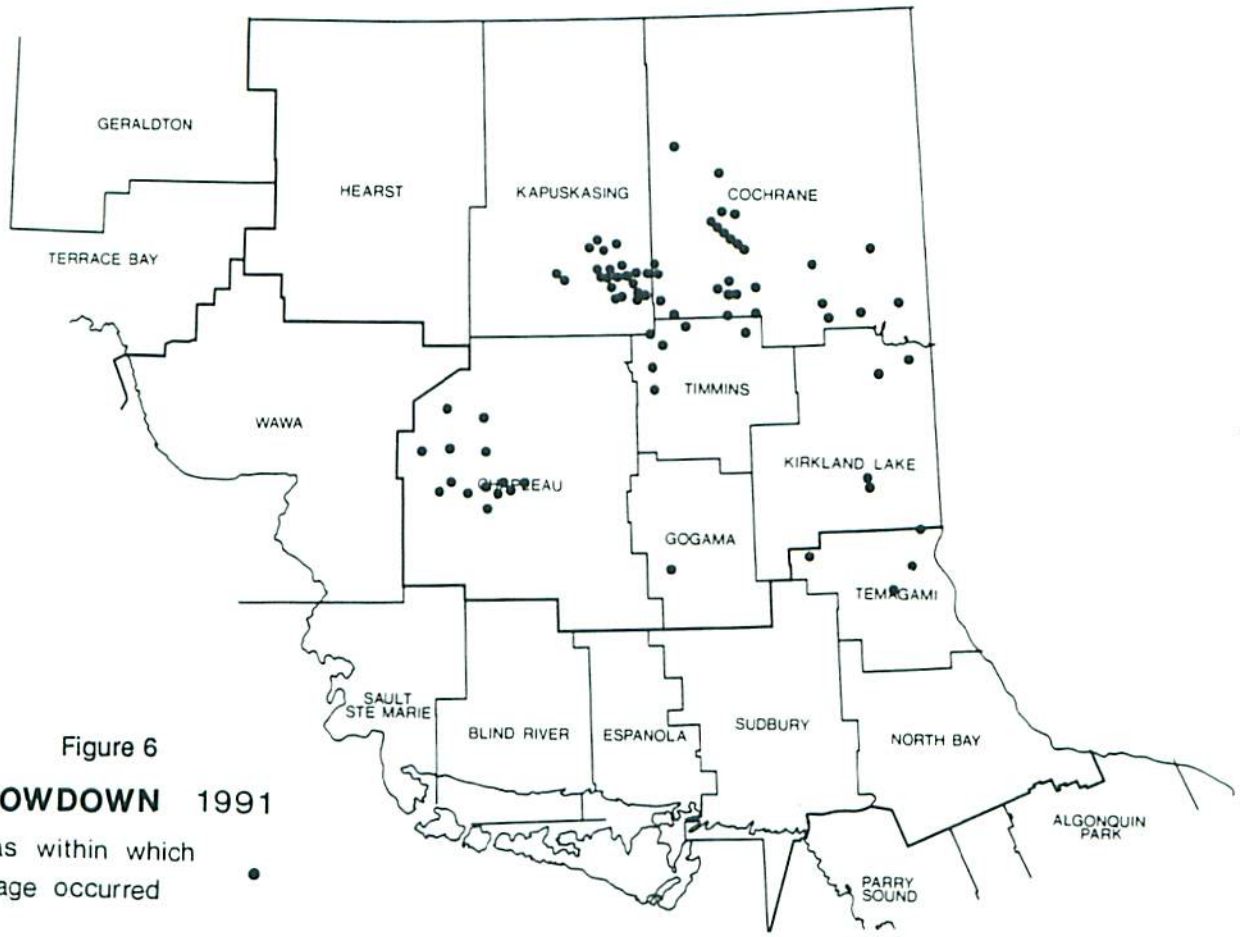

Figure 6

BLOWDOWN 1991

Areas within which damage occurred •

with most species affected, and the single area of blowdown in Gogama District occurred in a large jack pine stand.

Table 7. Summary of blowdown damage in Ontario in 1991.

District	Area within which damage occurred (ha)
Northwestern Region	
Kenora	55,155
Red Lake	11,770
Sioux Lookout	13,190
Dryden	7,615
Ignace	19,985
	207,715
Northern Region	
Kapuskasing	15,855
Cochrane	13,910
Timmins	7,395
Kirkland Lake	5,350
Chapleau	5,590
Gogama	1,300
	49,400
Northeastern Region	
Temagami	1,340
Total	284,455

Drought

Unusually warm and dry conditions in May and June, combined with the lingering effects of drought in 1989, damaged forest trees in a number of areas in Northwestern Region. Generally, trees growing along rocky shorelines, on ridges with shallow soils or in other stressful situations were damaged most seriously. Foliar damage ranging from 25 to 100% and scattered mortality of balsam fir, red pine, white pine and eastern white cedar was noted along Highway 71 between Caliper Lake and Sioux Narrows in Kenora District. Jack pine and balsam fir in 1- to 5-ha pockets were damaged in the Ash Bay and Northwest Bay areas of Rainy Lake, north of Manville Lake in Fort Frances District, and south of the Alneau Peninsula on Lake of the Woods, Kenora District. Red oak, and to a lesser extent, bur oak (*Quercus macrocarpa* Michx.), were damaged along the shore of Lake of the Woods near the mouth of Rainy River, Kenora District.

Drought damage to jack pine, in the form of small pockets of 2 to 20 dead or dying trees, was reported in the Goose Lake, Nungesser Lake, Trout Lake and Red Lake areas of Red Lake District. Similar damage occurred in the Cat Lake, St. Joseph Lake, Savant Lake and Minnitaki Lake areas of Sioux Lookout District and in the Sturgeon Lake, Lake of Bays, Basket Lake and Bending Lake areas of Ignace District. Drought damage also occurred across Northern Region, with six scattered pockets of mature jack pine damaged across southern Hearst, Kapuskasing and Cochrane districts, and one area of white spruce damage along the Moose River in Moosonee District. Scattered pockets of damage were also reported on a variety of trees on dry sites in southern Kirkland Lake District and northern Temagami District.

In southern Ontario, drought damage was reported on a variety of hardwood species in Pakenham and March townships in Carleton Place District.

Other Abiotic Conditions

Hail damaged approximately 100 ha of mature jack pine, with foliar damage ranging from 10 to 90% (average 35%) south of Entwine Lake, Fort Frances District.

Frost caused severe damage in a 4-ha experimental plantation by E.B. Eddy of hybrid Chinese larch-European larch in Espanola District. Light frost damage was also reported on balsam fir, white spruce and black spruce at several points in the Timmins, Kirkland Lake and Temagami districts.

Salt damage was reported on roadside plantings of red pine, white pine and Scots pine in a number of areas in the Espanola, Sudbury, North Bay, Chapleau, Gogama, Blind River, Sault Ste. Marie and Pembroke districts. As usual, trees growing in highly salted areas such as hills, curves, intersections and other high-volume traffic areas were damaged most seriously.

Severe winter drying occurred at one location in Bonfield Township, North Bay District, where 95% of 1.7-m red pine were affected, with foliar damage of 55%.

Heavy snow caused severe breakage of the lower branches of jack pine in a 7-ha, 2.5-m jack pine plantation in Smilsky Township, Sault Ste. Marie District.

Herbicide spraying damaged four 5-ha black spruce family test areas in Cochrane District. The plantations were located in Tweed, Teefy, Mewhinney and Mann townships. The proportions of trees affected were 50, 71, 4 and 68%, respectively, with corresponding foliar damage levels of 20, 19.5, 33 and 23.3%. Mortality levels of 12, 22.7, 0 and 28%, respectively, were also recorded.

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