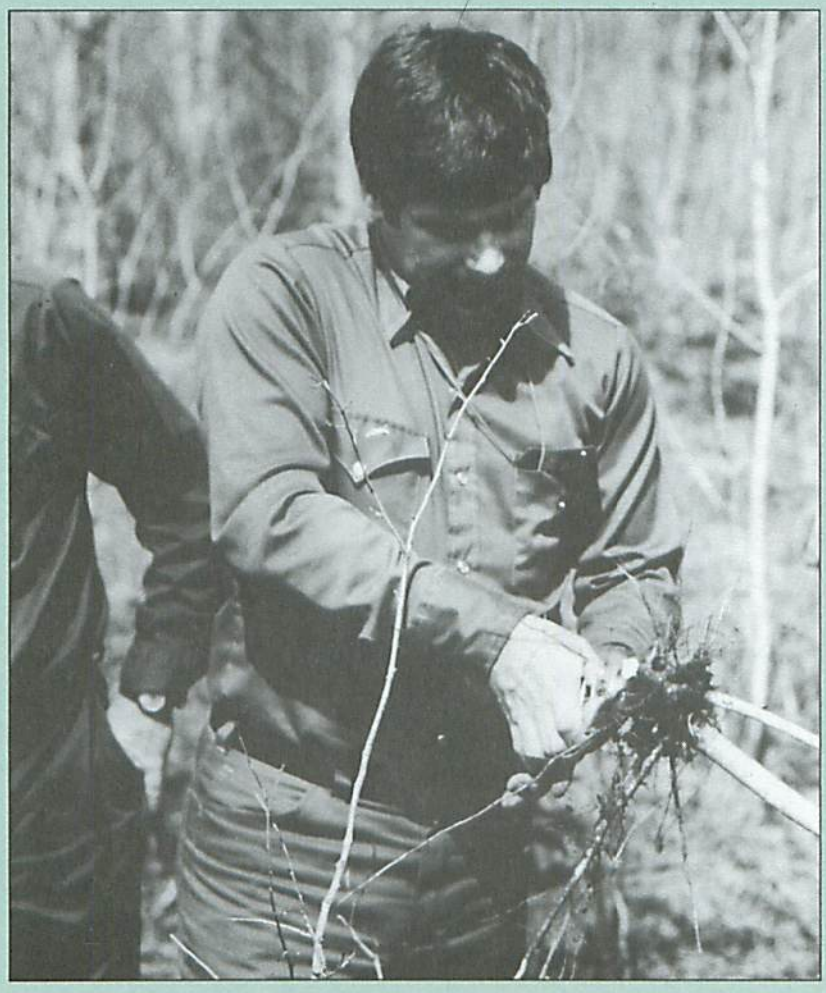
SURVEY BULLETIN

Forest Insect and Disease Conditions in Ontario

Fall 1995



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FOREST INSECT AND DISEASE CONDITIONS IN ONTARIO

Fall 1995

This is the third and last *Survey Bulletin* describing forest insect and disease and abiotic conditions in Ontario forests in 1995. The *Survey Bulletins* are produced annually by the Forest Insect and Disease Survey (FIDS) Unit of the Canadian Forest Service–Sault Ste. Marie.

FOREST PEST REVIEW

The nineteenth annual forest pest review for Ontario took place at Midhurst, Ontario, on 29 November 1995. Guests were welcomed to the review by Mr. Ed Sutherland, Ontario Ministry of Natural Resources (OMNR) and Mr. Al Pelletier, Clerk of Simcoe County. They were followed by Mr. Jim Farrell, Program Director, Canadian Forest Service–Sault Ste. Marie, who discussed changes now underway in the Forest Insect and Disease Survey Unit. Speakers from the Ontario Ministry of Natural Resources, the Ontario Ministry of Environment and Energy, Rohm & Haas, Agriculture Canada, the University of Toronto, and the Canadian Forest Service discussed a variety of topics. The morning session included updates on the jack pine budworm situation, spray operations, and results of operational trials for MIMIC and Dipel 76. Also discussed were quarantines for the gypsy moth and pine shoot beetle, and forest health, including FIDS monitoring and Ministry of Environment and Energy maple plots. The afternoon session included such topics as Leconte virus application on Christian Island, a gypsy moth virus update, scleroderris canker, and other diseases. Also included were prescribed burning for vegetation management, the OMNR stewardship initiative, pine shoot beetle impact, Trichogramma and the pine false webworm, an Ontario Forest Research Institute update, butternut canker, and an update on other pests. This latter topic included the spruce budworm gypsy moth, forest tent caterpillar, pine false webworm, hemlock looper, and introduced pine sawfly. The review was attended by approximately 62 people.

FOREST INSECTS

Eastern Spruce Budworm, *Choristoneura fumiferana* Clem.

The eastern spruce budworm situation in Ontario was described in detail in the summer *Survey Bulletin*. The total area of moderate to severe defoliation, which declined for the third consecutive year, was down from 4 266 656 ha in 1994 to 3 451 098 ha in 1995. Increases were recorded on the northern edge of the outbreak in the Sioux Lookout and Dryden districts and on the eastern edge in the Hearst District. These were more than offset by large population declines in the central and western parts of the Nipigon, Thunder Bay, Fort Frances, and Red Lake districts.

In northeastern Ontario new pockets of infestation were mapped in the Chapleau, Sault Ste. Marie, and Sudbury districts, and there were increases in the areas of several small existing infestations.

Several small, new infestations were mapped in southern Ontario. These were located in the Kemptville, Tweed, and Bancroft districts. A pocket of moderate to severe defoliation noted in the Pembroke District later in the field season is the reason for the change in the overall area of such defoliation from that reported in the summer *Survey Bulletin* (Table 1). Several small, existing infestations persisted in the Midhurst and Maple districts.

There was a modest increase in the area of budworm-caused tree mortality in 1995. The gross area within which mortality of balsam fir (*Abies balsamea* [L.] Mill.) and white spruce (*Picea glauca* [Moench] Voss) was mapped stood at 7 910 424 ha (Fig. 1). This was an increase of 127 088 ha over the 1994 figure of 7 783 336 ha. The largest increase occurred in the central Thunder Bay District (60 404 ha) and in the northern Nipigon District (45 673 ha) (Table 2). There were smaller increases in the Sioux Lookout, Wawa, and Hearst districts.

Spruce budworm egg-mass sampling was carried out at a total of 356 locations. Analysis of the results revealed an overall decrease of 38 percent in egg-mass densities, with declines recorded in each of the regions (Table 3). Declines notwithstanding, egg-mass densities remain high enough in some areas to cause widespread moderate to severe defoliation in 1996. This is particularly evident in the Dryden, Fort Frances, Sioux Lookout, and Red Lake districts, where infestations will likely

Cover photo: Sampling for root diseases in a young sampling.

Table 1. Gross area of moderate to severe defoliation caused by the eastern spruce budworm in Ontario, 1992–1995.

Region / District	Area (ha) 1992	1993	1994	1995
Central				
Algonquin Park	26 900	20 405	57 405	33 672
Bancroft	0	0	0	1 828
North Bay	1 545	10 468	27 995	28 269
Pembroke	0	0	0	30
Sault Ste. Marie	965	4 639	915	2 713
Sudbury	1 365	9 150	22 640	26 371
	30 775	**44 662**	**108 955**	**92 883**
Northeast				
Chapleau	0	0	0	2 695
Cochrane	11 205	11 647	0	0
Hearst	458 578	268 208	42 245	53 413
Wawa	1 621 297	1 370 822	241 340	221 446
	2 091 080	**1 650 677**	**283 590**	**277 554**
Northwest				
Dryden	853 616	997 273	507 450	601 490
Fort Frances	424 784	422 244	506 878	373 401
Kenora	867 632	850 187	571 555	513 141
Nipigon	2 399 493	2 583,644	355 699	95 569
Red Lake	805 912	638 964	559 847	392 031
Sioux Lookout	533 554	556 122	367 437	576 055
Thunder Bay	1 588 892	1 247 302	1 004 558	521 802
	7 473 883	**7 295 736**	**3 873 424**	**3 073 489**
Southern				
Cambridge	0	0	20	0
Kemptville	10	85	570	5 638
Maple	2	0	0	7
Midhurst	12	17	97	97
Tweed	0	0	0	815
	24	**102**	**687**	**6 557**
Total	**9 595 762**	**8 991 177**	**4 266 656**	**3 450 483**

persist although defoliation may be somewhat less intense. The situation is less clear in the Thunder Bay District, where further declines may occur. Infestations described in northeastern and southern Ontario will likely persist at about the same levels as in 1995. New pockets of defoliation may be discovered, but widespread damage is not expected.

Table 2. Gross area of spruce budworm-associated tree mortality in Ontario in 1994 and 1995.

Region / District	Total area (ha) 1994	1995	Increase since 1994 (ha)
Central			
Algonquin Park	15 582	15 582	0
Northeast			
Hearst	-	10 156	10 156
Wawa	418 266	421 646	3 380
	418 266	**431 802**	**13 536**
Northwest			
Dryden	1 282 939	1 289 550	6 611
Fort Frances	1 376 666	1 376 666	0
Kenora	906 587	906 587	0
Nipigon	1 705 588	1 750 261	45 673
Red Lake	631 132	631 132	0
Sioux Lookout	440 648	441 512	864
Thunder Bay	1 006 928	1 067 331	60 404
	7 349 488	**7 463 040**	**113 552**
Total	**7 783 336**	**7 910 424**	**127 088**

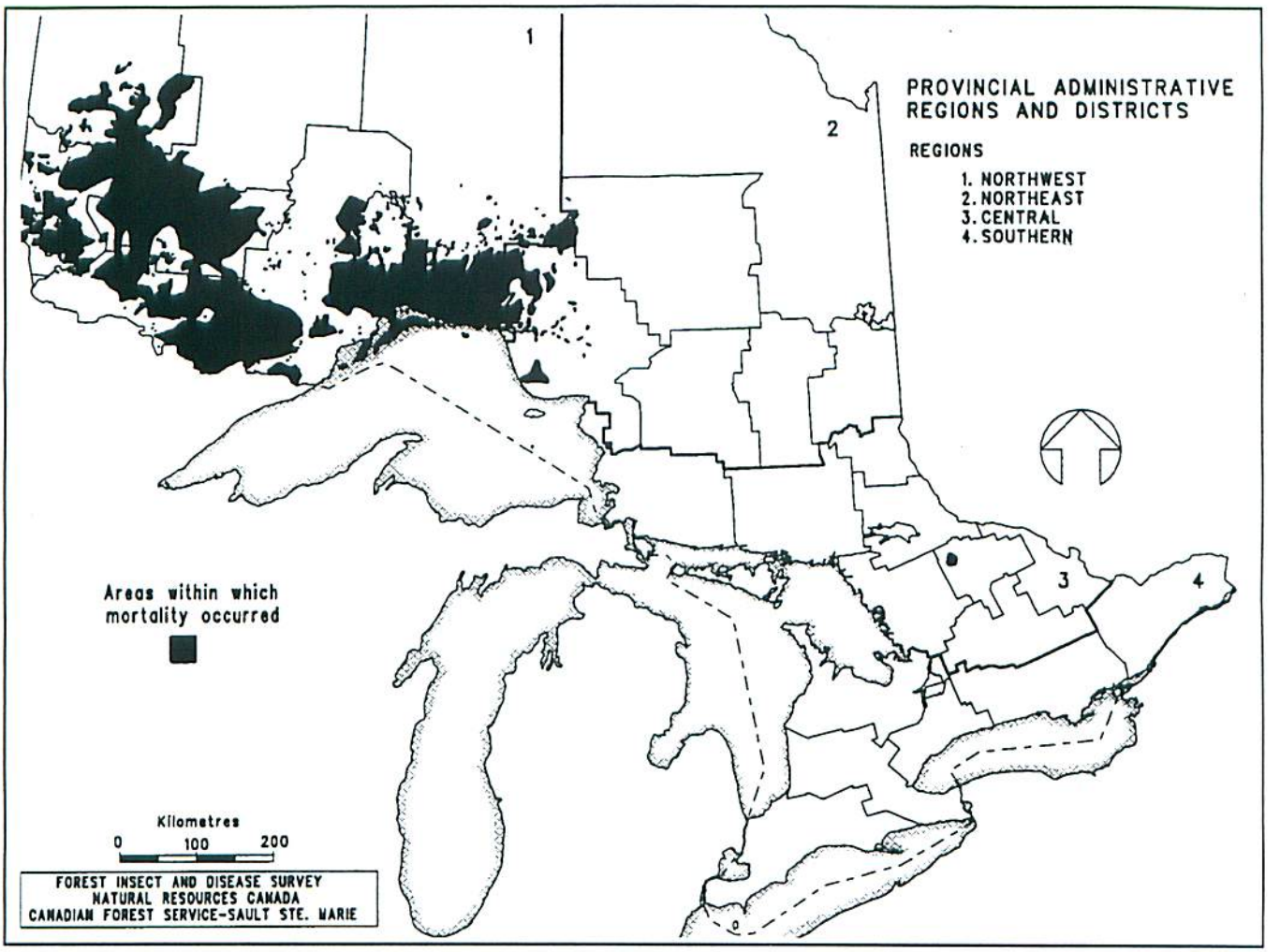

Figure 1. Eastern spruce budworm, Choristoneura fumiferana *(Clem.).*

Jack Pine Budworm, *Choristoneura pinus pinus* Free

A detailed description of the jack pine budworm situation was also carried in the summer *Survey Bulletin*. Populations declined in 1995 after 4 consecutive years of increase, and the total area of moderate to severe defoliation dropped from 419 344 ha to 293 292 ha. Most of the decline occurred in the Sudbury District, where the area affected decreased from 277 129 ha to 116 031 ha. As well, the intensity of damage was reduced as much of the defoliation was recorded as moderate rather than severe. The declines outlined above were somewhat offset by small increases in the Algonquin Park, Pembroke, North Bay, Parry Sound, and Sault Ste. Marie districts.

Top killing and whole-tree mortality caused by several years of severe jack pine budworm defoliation was mapped over an area of 99 932 ha in the Sudbury, North Bay, Temagami, and Parry Sound districts (Table 4). This represents an increase of 29 percent over the 77 498 ha recorded in 1994. The largest area of mortality is in the northwest Parry Sound District along the Georgian Bay coastline, where it extends for some distance into the southeast part of the Sudbury District. Sizeable pockets of top and whole-tree mortality were also mapped south of the west end of Lake Nipissing in the North Bay District (Fig. 2). A small (110 ha) pocket of mortality was mapped in the southwest corner of the Temagami District.

Egg-mass sampling to forecast jack pine budworm population trends was carried out at 176 locations in Ontario (Table 5). The results of this program show an overall decrease of 70 percent in egg-mass densities. Reductions were recorded in nine of the ten districts surveyed. Based on this and on observed declines in larval populations, infestations may collapse in most of the Central and Northeast regions, particularly in the Sudbury and North Bay districts. There were no egg-mass surveys conducted in the Parry Sound and Pembroke districts, but larval-L_2 surveys in the Parry Sound District indicate that populations may remain high enough to cause moderate to severe defoliation in 1996 in much of the area currently infested. Egg-mass counts remain very low in the Northwest Region and little or no defoliation is expected there in 1996.

Table 3. Comparison of eastern spruce budworm egg-mass densities in Ontario between 1994 and 1995.

Region / District	Number of locations: Sampled in 1995	Number of locations: Common to 1994 and 1995	Average egg-mass density per 9.29 m² of branch: 1994	Average egg-mass density per 9.29 m² of branch: 1995	Change (%)
Central					
Algonquin Park	10	8	2	0	-100
Bancroft	1	1	0	7	+100
North Bay	11	11	95	83	-13
Parry Sound	10	10	1	0	-100
Pembroke	4	2	0	0	0
Sault Ste. Marie	21	21	1	0	-100
Sudbury	16	14	0	1	+100
Temagami	5	4	0	0	0
	78	**71**	**16**	**13**	**-16**
Northeast					
Chapleau	17	15	0	2	+100
Cochrane	9	8	1	1	+17
Hearst	38	38	73	30	-60
Kirkland Lake	8	8	0	0	0
Timmins	15	15	12	0	-100
Wawa	14	12	120	97	-19
	101	**96**	**44**	**24**	**-45**
Northwest					
Dryden	27	22	292	198	-32
Fort Frances	11	9	384	115	-70
Kenora	18	16	395	199	-50
Nipigon	47	41	89	60	-33
Red Lake	7	7	461	163	-65
Sioux Lookout	12	9	192	177	-8
Thunder Bay	43	39	149	126	-15
	165	**143**	**214**	**131**	**-39**
Southern					
Cambridge	1	1	324	100	-69
Kemptville	4	4	516	333	-35
Maple	2	2	247	183	-26
Midhurst	3	3	681	373	-45
Tweed	2	1	255	578	+127
	12	**11**	**471**	**318**	**-32**
Total	**356**	**321**	**128**	**79**	**-38**

Table 4. Gross area of jack pine budworm tree mortality and top killing in Ontario in 1994 and 1995.

Region / District	Area (ha): 1994	Area (ha): 1995	Change (ha)
Central			
North Bay	1 308	8 498	+7 190
Parry Sound	63 739	64 222	+483
Sudbury	12 451	27 102	+14 651
Temagami	0	110	+110
Total	**77 498**	**99 932**	**+22 434**

Gypsy Moth, *Lymantria dispar* (L.)

Gypsy moth populations, which had declined steadily since 1991, began to increase in 1995. The total area of moderate to severe defoliation was 19 879 ha, up from 5 645 ha in 1994. Most of this defoliation occurred in the Sudbury District in and around the city of Sudbury. New infestations were discovered in the Parry Sound District between the Naiscoot River and the south part of the Magnetawan First Nation lands. Small pockets of new infestation were also mapped between the towns of Kingsville and Harrow in the Aylmer District. The insect was found for the first time in infestation proportions in the Sault Ste. Marie District, where nine small areas of severe defoliation were mapped near Granary and Duborne lakes north of the town of Blind River.

To help follow the spread of this introduced pest, a gypsy moth pheromone trapping program has been

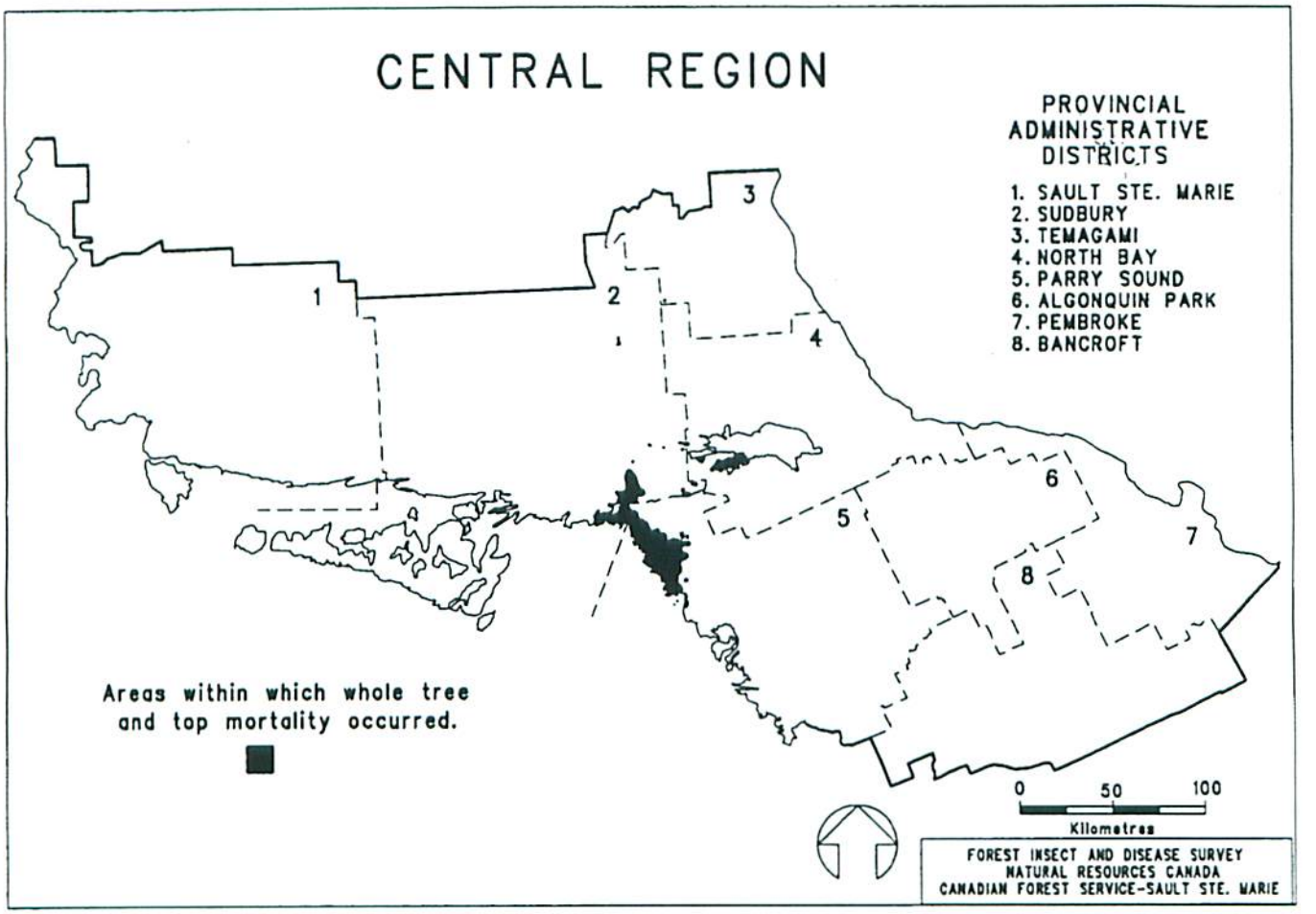

Figure 2. Jackpine budworm, Choristoneura pinus pinus *Free.*

Table 5. Comparison of jack pine budworm egg-mass densities in Ontario between 1994 and 1995.

Region District	Number of locations Sampled in 1995	Number of locations Common to 1994 and 1995	Total egg masses 1994	Total egg masses 1995	Change (%)
Central					
North Bay	2	2	10	18	+80
Sault Ste. Marie	18	18	38	5	-87
Sudbury	44	44	258	58	-78
	64	**64**	**306**	**81**	**-74**
Northeast					
Chapleau	15	15	1	0	-100
Timmins	14	9	36	22	-39
	29	**24**	**37**	**22**	**-40**
Northwest					
Dryden	17	17	1	1	0
Fort Frances	16	16	3	1	-67
Kenora	13	13	1	0	-100
Red Lake	24	24	7	2	-71
Sioux Lookout	18	18	4	0	-100
	88	**88**	**16**	**4**	**-75**
Total	**181**	**176**	**359**	**107**	**-70**

carried out in northern Ontario parks and campgrounds for a number of years (Fig. 3). Two traps are deployed at each park; one near the entrance and one in the camping area. Moth catches were much as expected. The highest numbers occurred in the North Bay–Sault Ste. Marie corridor more or less along the leading edge of the insects' established range. A total of 22 moths was caught at Finlayson Point Provincial Park in the Temagami District. Catches ranging from nine to 16 moths were made at several locations on Manitoulin Island, thereby indicating that low populations may be established there. Catches of one or two adults were made at three parks in the Chapleau District, two parks in the Hearst District, and one park in the Cochrane District. Four moths were caught at Pancake Bay Provincial Park and three were trapped at Agawa Bay in Lake Superior Provincial Park, Sault Ste. Marie District. A single adult was captured at Kakabeka Falls Provincial Park west of Thunder Bay, Thunder Bay District.

No egg-mass surveys were undertaken for gypsy moth in 1995; therefore, forecasts are based on historical trends and speculation. Based on these criteria, it is expected that the area of defoliation will likely increase in 1996 and that new infestations will probably be discovered.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Populations of this pest increased in 1995, and the total area of moderate to severe defoliation reached 243 125 ha, compared with 166 060 ha in 1994. Most of this defoliation occurred in adjacent areas of the southwest Cochrane District, the southeast Hearst District, and the northern Timmins District. Several small patches of defoliation, totaling 1 338 ha, were mapped in the Kemptville District. Further details on these infestations were recorded in the summer *Survey Bulletin*. Egg-band counts to forecast population trends in 1996 were carried out at eight locations in the southwest Cochrane District and southeast Hearst District. These indicated that severe defoliation is likely at all locations in 1996. As well, heavy moth flights in the city of Timmins indicate that infestations may increase and intensify in the northern Timmins District. There were no egg-mass

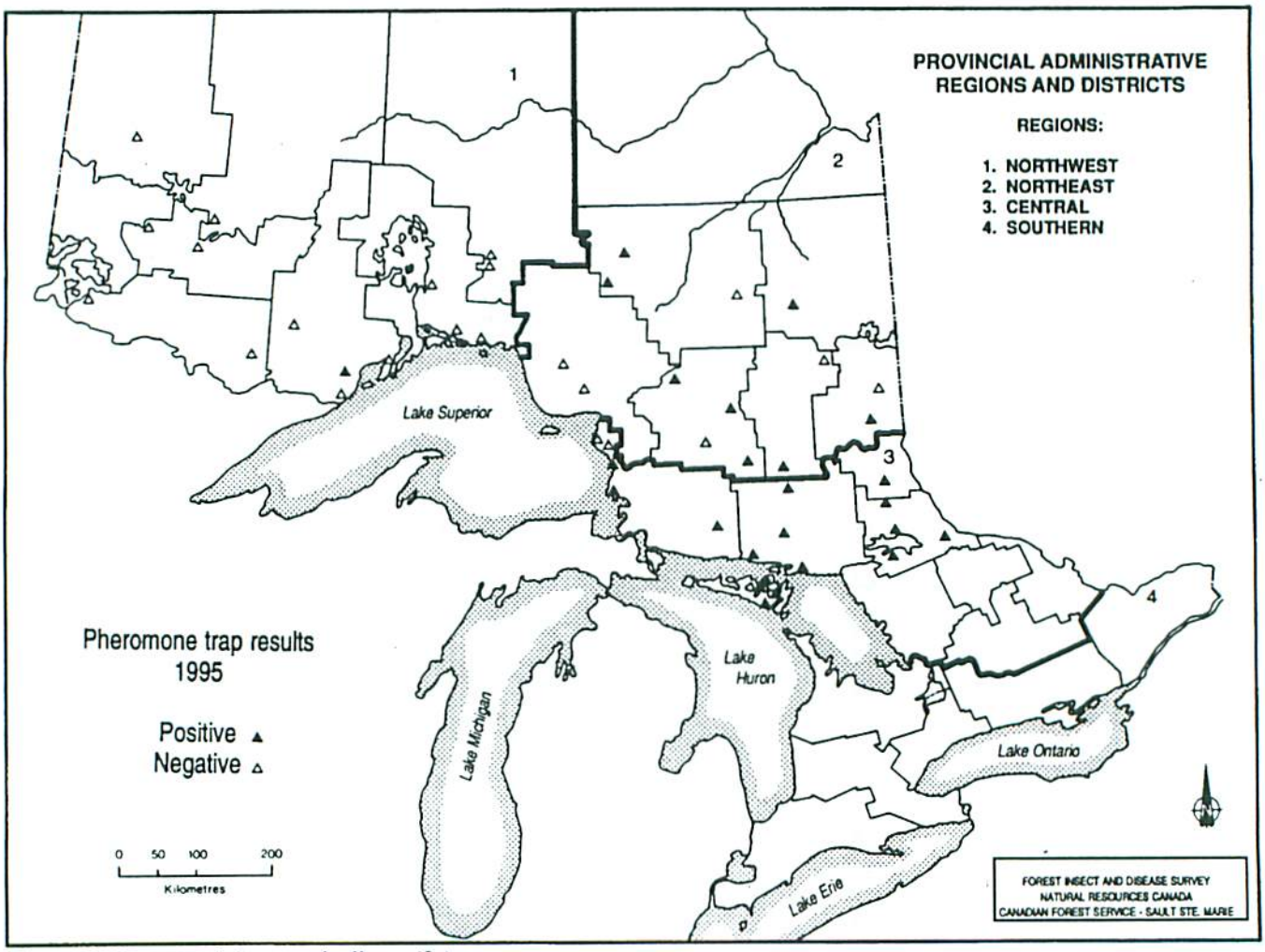

Figure 3. Gypsy moth, Lymantria dispar *(L.).*

surveys conducted in the Kemptville District, but larval populations were heavily diseased. This would indicate that major population increases in that part of the province are unlikely.

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

Further to information presented in the summer *Survey Bulletin*, heavy webworm infestations severely damaged stands of semimature red pine (*Pinus resinosa* Ait.) in Oro Township, Midhurst District and in Hope and Cavan townships, Tweed District. The most severe damage was in a 19-m, 4-ha stand in Oro Township. Here, 100 percent of the trees averaged a 68 percent loss of old foliage and a 36 percent loss of new foliage. In addition, 10.7 percent of the trees are dead. It should be noted that webworm damage was exacerbated by Armillaria root rot (*Armillaria ostoyae* [Romagn.] Herink), which was found on nearly all of the dead trees. In Hope Township, Tweed District, 100 percent of the trees were attacked in a 10-ha, 12.5-m red pine stand. The average old foliage loss was 85 percent and the average new foliage loss was 41 percent. Tree mortality in this stand stood at slightly over 5 percent. No root rot was found here.

Pinkstriped Oakworm, *Anisota virginiensis* (Drury)

The pinkstriped oakworm was present in most stands having a significant red oak (*Quercus rubra* L.) component in the Sault Ste. Marie District. Although early instar populations were high, late season checks showed that resulting defoliation was quite low; usually averaging 15 percent. In some stands the pinkstriped oakworm fed in conjunction with other insects, such as the micro moths *Chionodes fuscomaculella* (Cham.), *Antaeotricha schlaegeri* (Zell.), and *Coleotechnites quercivorella* (Chambers). Damage from this combination of pests often reached 20 percent and gave the trees a very ragged appearance.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

The current birch skeletonizer outbreak declined in 1995 for the third consecutive year. The total area of moderate to severe defoliation was 1 635 128 ha, compared with 2 990 824 ha in 1994 and 7 858 495 ha in 1993. The outbreak is currently comprised of two large infestations in the eastern part of the province (Fig. 4). The more northerly and smaller infestation occupied

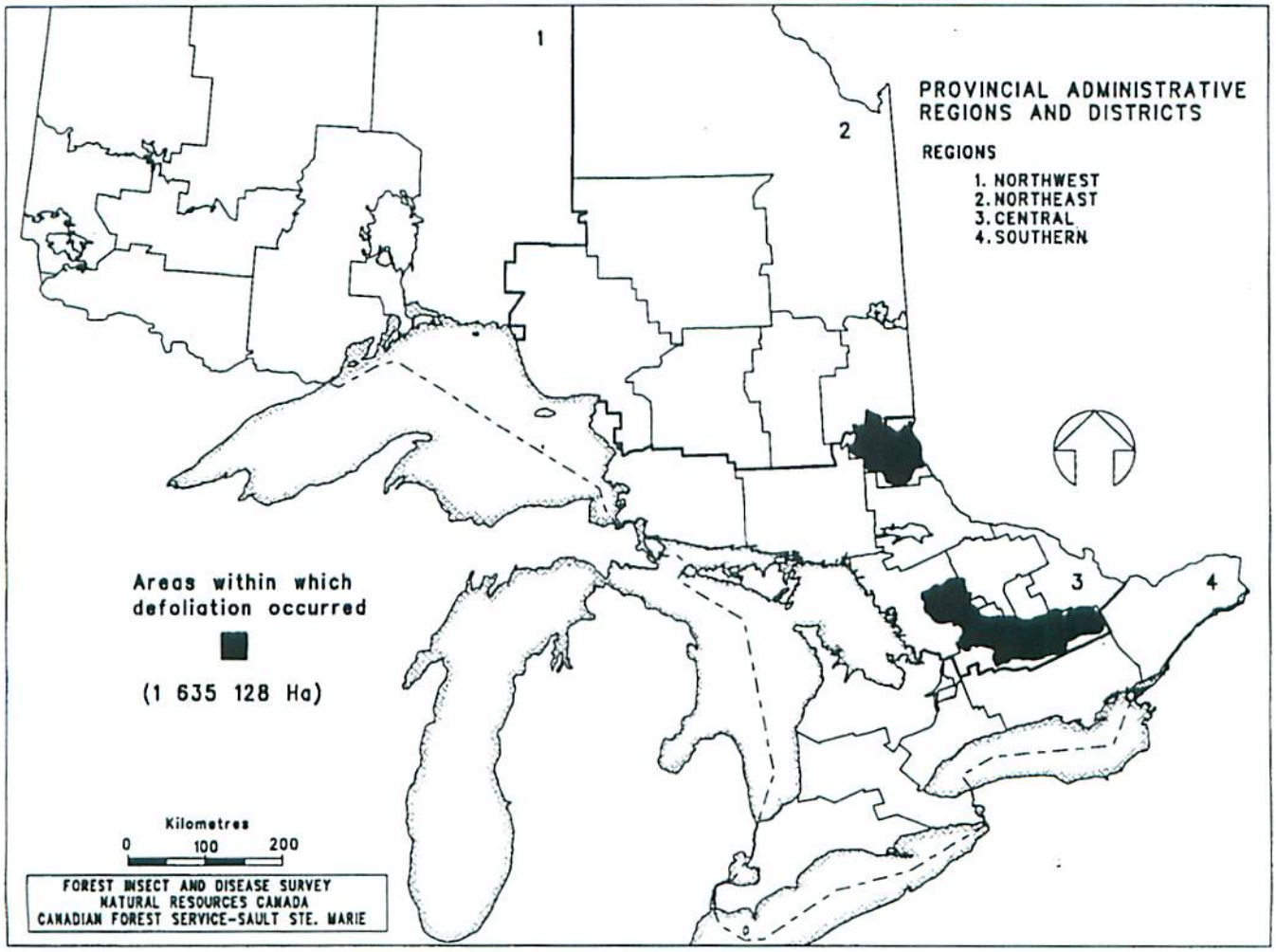

Figure 4. Birch Skeletonizer, Bucculatrix canadensisella *Cham.*

some 467 261 ha in the Temagami District, with a small northerly extension of 59 603 ha in the southern Kirkland Lake District. The second and larger infestation occurred mainly in the southeast Parry Sound District and most of the Bancroft District. There were also small extensions into adjacent areas of the Algonquin Park, Pembroke, and Tweed districts (Table 6). The insect also caused light defoliation of white birch (*Betula papyrifera* Marsh.) in Purdom, Booth, and Church townships, south of Lake Nipigon in the Nipigon District.

Table 6. Gross area of moderate to severe defoliation caused by the birch skeletonizer in 1995.

Region District	Area of moderate to severe defoliation (ha)
Central	
Algonquin Park	16 024
Bancroft	768 795
Parry Sound	295 440
Pembroke	27 996
Temagami	467 261
	1 575 486
Northeast	
Kirkland Lake	59 603
	59 603
Southern	
Tweed	39
	39
Total	**1 635 128**

Pitted Ambrosia Beetle, *Corthylus punctatissimus* (Zimm.)

The pitted ambrosia beetle attacks young hardwood regeneration up to about 12 mm in diameter, and damages the tree by girdling at or near the ground level. The species most commonly damaged in Ontario is sugar maple (*Acer saccharum* Marsh.). In 1995, infestations were observed at several locations in the Midhurst and Maple districts. The most severe damage was in a stand of mature sugar maple in Adjala Township, Midhurst District. This stand had been thinned in the fall of 1994. Here, 20 percent of the young understory regeneration was killed. Mortality of 5 percent was recorded on regeneration in 15-ha and 50-ha semimature sugar maple stands in Oro and Derby townships, respectively, in the Midhurst District. Very low (1 percent) damage was detected in a 50-ha semimature stand in Nassagaweya Township, Maple District.

Introduced Pine Sawfly, *Diprion similis* (Htg.)

Heavy sawfly infestations, which occurred in 1994 along the Georgian Bay coast between Parry Sound and Snug Harbour, collapsed in 1995. Small numbers of first and second generation larvae were found in the area, but there was no discernible defoliation.

The introduced pine sawfly was found at numerous points between Gros Cap on Lake Superior and Algoma Mills on the north channel of Lake Huron in the Sault Ste. Marie District. Defoliation varied widely but averaged about 10 percent. Heavier defoliation (up to 60 percent) occurred on individual white pine (*Pinus strobus* L.) trees in the city of Sault Ste. Marie, in Tarbutt Additional Township, and near the town of Blind River.

Greenstriped Mapleworm, *Dryocampa rubicunda rubicunda* (F.)

High populations of this pest caused moderate to severe defoliation of red maple (*Acer rubrum* L.) within an area of 507 811 ha in adjoining parts of the southern Sudbury and Sault Ste. Marie districts. The most severe damage occurred on red maple in Attlee, Humboldt, Carlyle, and Killarney townships, Sudbury District. Here, defoliation was in the 90–100 percent range. Defoliation of red maple in the southeast Sault Ste. Marie District east of Highway 129 averaged 80 percent. Sugar maple within this area was also attacked but damage was much lighter on this species. A single report of moderate to severe defoliation of sugar maple was received from an area in Sturgeon Township, Sault Ste. Marie District. Unhealthy larvae collected from several locations were found to be infected with the fungus *Entomophaga aulicae*. This may presage a decline in mapleworm populations in 1996.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

There were widespread reports of this pest in the province, but populations were generally lower than in 1994. While high numbers of lateral shoots were destroyed in a few instances, leader damage was for the most part quite low. The most severe damage occurred in a 12-ha, 2.1-m pine stand in Shulman Township, Sault Ste. Marie District. Here leader damage of 18.7 percent was recorded. In Firstbrook Township, Temagami District, two separate jack pine (*Pinus banksiana* Lamb.) seed orchards sustained leader damage of 12.7 percent and 9.3 percent, respectively. A 50-ha stand of young jack pine in Tyrrell Township, Temagami District, had 8.7 percent of the leaders destroyed.

Fall Webworm, *Hyphantria cunea* (Drury)

The highest webworm populations in 1995 were recorded in the western Tweed District. Here, a number of black ash (*Fraxinus nigra* Marsh.) stands varying from 0.5 to 1 ha in size were 100 percent defoliated; some trees were completely encased in webbing. High webworm populations were also reported in the Norland–Bobcaygeon area of the southern Bancroft District, where white elm (*Ulmus americana* L.) and black ash were severely defoliated. The insect was also abundant in the eastern part of the Tweed District and in the Kemptville District. In these locations single trees and small clumps of a variety of hardwood species were attacked. In Point Pelee National Park in the Aylmer District, mature black walnut (*Juglans nigra* L.) trees were severely defoliated. Lesser degrees of damage were evident on a variety of other deciduous trees.

In northern Ontario sporadic fall webworm infestations were reported in the North Bay, Sudbury, Temagami,

Kirkland Lake, and Sault Ste. Marie districts. The most notable damage occurred in Gladman, McLaren, Sisk, and Thistle townships, North Bay District. Here, immature fringe white birch, white ash (*Fraxinus americana* L.), and pin cherry (*Prunus pensylvanica* L.f.) trees sustained defoliation ranging from 10 to 70 percent.

Willow Defoliators, *Isochnus rufipes* (LeC.), *Tricholochmaea decora decora* (Say) and *Tricholochmaea tuberculata* (Say).

This group of insects caused severe defoliation to willow (*Salix* spp.) in several areas of the province in 1995. The most widespread damage occurred in the Wawa, Nipigon, Dryden, Fort Frances, and Sioux Lookout districts, where the gray willow leaf beetle (*Tricholochmaea decora decora*) caused severe foliar damage to willow growing along roadside forest fringes and in other open situations. The willow leaf beetle, *T. tuberculata*, severely defoliated approximately 10 ha of willow growing in abandoned fields on the edge of the city of Sault Ste. Marie, Sault Ste. Marie District. A third defoliator, the willow flea weevil (*I. rufipes*), caused 90 to 100 percent foliar damage to ornamental willows in the towns of Wanapitei, Markstay, Chelmsford, and Dowling, and in the city of Sudbury, Sudbury District. Similar damage was inflicted on ornamental willow in the city of North Bay, North Bay District.

Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Gn.)

A number of scattered pockets of heavy infestation that occurred in the Tweed and Kemptville districts in 1993 and 1994 collapsed in 1995. However, 383 ha of whole-tree mortality of eastern hemlock (*Tsuga canadensis* [L.] Carr.) were recorded at these previously infested sites. Mortality was recorded in scattered pockets in Rear of Leeds and Lansdowne, Front of Leeds and Lansdowne, and Elizabethtown townships, Kemptville District. Hemlock mortality was also recorded in small pockets on the Ernestown–Kingston townships boundary, the Portland–Loughborough townships boundary, and in Haldimand Township, Tweed District. Mortality of eastern white cedar (*Thuja occidentalis* L.) was recorded in two small stands in Clarke Township, Maple District. A total of 585 ha of mostly new infestations was detected as follows: 294 ha of severely defoliated eastern hemlock north of Sharbot Lake in Olden Township, and 136 ha along the Portland–Loughborough townships border in the Tweed District. Two small pockets of moderate to severe defoliation, encompassing 155 ha, were mapped near Temperance Lake in Rear of Yonge and Escott and Front of Yonge and Escott townships, Kemptville District. In the Bancroft District, scattered areas of moderate to severe defoliation, which totaled some 400 ha in 1994, were reduced to approximately 60 ha in 1995. This defoliation was located in eastern hemlock and balsam fir stands on the north shore of Big Gull Lake and on the eastern peninsula of Crotch Lake in Clarendon and Palmerston townships. Approximately 50 ha of balsam fir and eastern hemlock mortality were recorded in the same area.

New areas of heavy infestation were mapped on a number of islands and on the adjacent mainland in Lake Temagami, Temagami District. Defoliation ranged from 90 to 100 percent on balsam fir, black spruce (*Picea mariana* [Mill.] B.S.P.), and eastern white cedar. However, it was quite light on adjacent small white pine trees. The total area affected was 342 ha.

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.)

The widespread, heavy infestations of this pest that affected trembling aspen (*Populus tremuloides* Michx.) stands in northwestern Ontario in 1994 subsided somewhat in 1995. Although populations were generally reduced in the Sioux Lookout and Dryden districts, a few areas of severe (80 to 100 percent) defoliation persisted on young aspen regeneration. These were located in the Pike Lake and Vaughan Lake areas, in Revell and Hartman townships, and in the Williams and Route Bay areas, all in Dryden District. Sporadic, similar damage was evident in the Goodie Lake area and in Echo and Lomond townships, Sioux Lookout District, and at a number of points in the Fort Frances District. High populations, with defoliation in the 90 percent range, were reported along Highway 11 in the Longlac area; at Neys Provincial Park; and in the Margo Lake, Poly Lake, and Burrows Lake areas of the Nipigon District. Similar population levels were noted at one location in Strickland Township, Wawa District.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* Roh.

Further to information presented in the summer *Survey Bulletin*, moderate and occasionally severe defoliation was reported on white spruce ornamentals in a number of small communities, including the towns of Nipigon, White River, Marathon, and Schreiber, along the north shore of Lake Superior. Similar damage was recorded on ornamental white spruce in Hillsport and Geraldton, while light damage was observed on blue spruce (*Picea pungens* Karst.) ornamentals in the city of Thunder Bay.

Sawfly populations were lower than usual in Thunder Bay, Dryden, and Sioux Lookout districts, although severe defoliation was recorded sporadically on small (1 m) black spruce and white spruce along Highways 17 and 72 in the Dryden and Sioux Lookout districts, respectively. Defoliation in the 50 to 80 percent range occurred on ornamentals in the town of Sioux Lookout.

White Pine Weevil, *Pissodes strobi* (Peck)

Populations of this pest were generally lower in 1995 than in 1994. Although the insect was encountered in numerous young conifer stands and plantations, the incidence of attack was usually less than 10 percent. An exception to this trend was at the Bonner Tree

Improvement Centre in Fauquier Township, Hearst District, where 34.7 percent of the 1.7-m trees in a 20-ha black spruce family test sustained leader damage. At the Fallscamp Lake family test site in the Thunder Bay District, leader damage of 11 percent occurred in a 5-ha stand of 2.7-m jack pine.

Red Pine Needle Midge, *Thecodiplosis piniresinosae* Kearby

Infestations of this midge, which were heavy in the eastern part of the Sault Ste. Marie District in 1994, subsided somewhat in 1995. The highest remaining populations were in the Kirkwood Forest in Kirkwood, Haughton, and Bridgland townships. Here, most red pine stands sustained an average of 35 percent new foliage damage. There were some pockets, however, where defoliation was as high as 80 percent. Light (10 to 25 percent) damage was recorded in the adjacent townships of Rose, Plummer, Galbraith, and Aberdeen.

Other Noteworthy Insects

Heavy infestations of the striped alder sawfly (*Hemichroa crocea* [Geoff.]) caused severe defoliation of roadside and understory alder (*Alnus rugosa [Du Roi]* Spreng.) at several locations in the Dryden District.

The oak skeletonizer (*Bucculatrix ainsliella* Murt.) severely defoliated a 2-ha red oak stand in Mulmur Township, Midhurst District.

Widespread, light infestations of the maple trumpet skeletonizer (*Epinotia aceriella* [Clem.]) were recorded in the Tweed, Midhurst, and Maple districts as well as in a few locations in the Parry Sound and Bancroft districts.

Unusually high populations of spruce spider mite (*Oligonychus ununguis* [Jac.]) discolored the foliage of jack pine at a number of locations in the Sioux Lookout and Dryden districts.

Heavy infestations of oystershell scale (*Lepidosaphes ulmi* [L.]), combined with drought conditions, damaged beech (*Fagus grandifolia* Ehrh.) trees at locations in the Kemptville and Tweed districts.

The Swaine jack pine sawfly (*Neodiprion swainei* Midd.) caused defoliation as high as 40 percent on Island 127 in Lake Temagami in Biggs Township, Temagami District.

The balsam poplar leafblotch miner (*Phyllonorycter nipigon* Free.) caused sporadic, severe damage to balsam poplar (*Populus balsamifera* L.) stands in the Dryden, Sioux Lookout, Thunder Bay, and Nipigon districts. Damage was often in the 80 to 100 percent range.

Declining populations of the redhumped oakworm (*Symmerista canicosta* Franc.) in the Mississauga and Gold lakes area of the Bancroft District caused defoliation of red oak and white oak (*Quercus alba* L.) in the 40 to 60 percent range. Low oakworm numbers were reported on red oak on the Serpent River First Nation lands in the Sault Ste. Marie District.

The oak sawfly (*Arge scapularis* [Klug]) caused an average of 80 percent defoliation of shoreline alder at McCreight's Pond in Kirkwood Township and on Archibald Island in the north channel of Lake Huron, Sault Ste. Marie District.

Sporadic infestations of mountain-ash sawfly (*Pristiphora geniculata* [Htg.]) caused defoliation as high as 80 percent on mountain-ash (*Sorbus americana* Marsh.) in urban and forest situations in the Nipigon, Fort Frances, Thunder Bay, Dryden, Sioux Lookout, and Sault Ste. Marie districts.

Larvae of the fir coneworm (*Dioryctria abietivorella* [Grt.]) were found in numerous galls on jack pine. These galls had been caused by the western gall rust (*Endocronartium harnessii* [J.P. Moore] Y. Hirats). Feeding by this insect exacerbated damage caused by the disease organism and resulted in the death of the branches or main stems where the galls were located.

The maple leafcutter (*Paraclemensia acerifoliella* [Fitch]) caused 25 percent defoliation of 24-m sugar maple in a 30-ha woodlot in Haughton Township, Aylmer District. It was also detected in low numbers on sugar maple at Canadian Forces Base Borden in the Midhurst District and in several sugar maple plots in the Bancroft District.

The northern pitch twig moth (*Petrova albicapitana* [Bsk.]) attacked the main stem on 22 percent of the 1.2-m jack pine in Daumont Township, Sault Ste. Marie District. Low numbers were also reported on young jack pine at several locations in the Dryden District.

The birch edgeminer (*Scolioneura betuleti* Klug) caused 80 percent foliar damage to ornamental white birch at Marina Park in the city of Thunder Bay. This was a new distribution record for this introduced species.

Increased populations of the red-headed pine sawfly (*Neodiprion lecontei* [Fitch]) were reported in the Sault Ste. Marie District. The most severe defoliation, averaging 40 percent on 12 percent of the 1-m red pine trees in a 4-ha plantation, was in Bouck Township.

TREE DISEASES

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

European Race

There have been several changes in the status of the European race of this disease since the printing of the summer *Survey Bulletin*. First, a single collection of infected red pine was confirmed in Monck Township, Parry Sound District. While this is the first collection in Monck Township, it does not reflect any significant change in the distribution of the organism. The European race was also collected on eastern white pine regeneration in a previously infected area in McMurrich Township, Parry Sound District. This is the first record in Ontario of the European race of scleroderris canker disease on this tree species.

North American Race

In addition to information presented in the summer *Survey Bulletin*, light infections were recorded on planted red pine at two locations on the

Mine Road in Strathy Township, Temagami District, and at the Aide Creek seed orchard, Kirkland Lake District. A single infection was reported from a 1.9-m jack pine family test site in Evelyn Township, Timmins District. Damage levels in all instances were very low.

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

As stated in the summer *Survey Bulletin*, there were numerous reports of this disease in young stands and plantations. With few exceptions, however, infection levels were very low and damage levels were under 3 percent. In Oro Township, Huronia District, a 4-ha, 19-m red pine plantation, which had been heavily defoliated by the pine false webworm, had 11 percent of the trees dead. All of these were infected with this organism. The disease also killed or severely damaged a pocket of 22, 18-m trees in a 15-ha red pine plantation in Sunnidale Township, Midhurst District. Armillaria root rot was also associated with severe crown dieback and mortality of white ash in a 0.5-ha area in Ridout Township, Bancroft District. While all the white ash trees in the stand were attacked, sugar maple adjacent to and in the same stand was unaffected.

Dook's Needle Blight, *Lophophacidium dooksii* Corlett & Shoemaker

Dook's needle blight was reported last year as browning of eastern white pine because the causal organism had not been identified at that time. The disease causes a browning and later death of the distal portion of the foliage of eastern white pine. Often, one-half to three-quarters of affected needles are killed, but the basal portions remain green. Resistance to the blight appears to be quite variable. Often single or small groups of trees are heavily infected while adjacent trees, sometimes with intermingled branches, show no sign of damage.

In 1995, Dook's needle blight was found most commonly in the Parry Sound, Pembroke, Algonquin Park, and Bancroft districts. Infections were observed sporadically throughout these districts, but the most consistent and severe damage was observed in the Parry Sound–Huntsville–Burks Falls area of the Parry Sound District. Light infections were reported on scattered host north of the North Channel of Lake Huron in the Sault Ste. Marie District and at a number of locations in the Sudbury and North Bay districts. The disease was more prevalent and damage levels were higher in northwestern Ontario. Infections were recorded in a number of areas in the Sioux Lookout, Dryden, and Fort Frances districts. While incidence was also sporadic in these areas, infection levels were often in the 60 to 100 percent range.

Leaf Diseases of Balsam Poplar, *Linospora tetraspora* G.E. Thomps. and *Mycosphaerella populicola* G.E. Thomps.

Linospora leaf blight (*L. tetraspora*) was most prevalent across the Temagami, Kirkland Lake, and Timmins districts. Here, most balsam poplar stands were attacked, often with infection levels near 100 percent. The blight was also found sporadically in the western Wawa District and the eastern Nipigon District, often on single trees. Infection levels in a few areas reached 90 percent. The disease was commonly found in the Sioux Lookout and Dryden districts, where it was most prevalent on young, 1- to 2-m roadside shrubs. Infection levels in a few areas reached 80 percent.

Septoria leaf spot (*M. populicola*) was less common except in the Hearst and Cochrane districts, where heavy infections caused up to 100 percent foliar damage throughout the range of balsam poplar. Moderate and occasionally severe damage was reported on roadside trees in a few areas on Manitoulin Island, Sudbury District. Similar damage occurred on roadside trees at single locations in the Tweed and Midhurst districts. Moderate damage levels were reported from the Thunder Bay and eastern Fort Frances districts. The disease was also found in conjunction with *L. tetraspora* in the Wawa and Nipigon districts.

Leaf Spot of Birch, *Septoria betulae* Pass.

Heavy infections of this disease were present along the north shore of Lake Superior in the Nipigon District. White birch stands within an area of 3 960 ha in Wiggins, Yesno, and Lahontan townships along the coast and on Powder and Vein islands were heavily infected. Foliar damage levels were in the 90 percent range. The disease was also observed in numerous areas of the Sioux Lookout, Dryden, and western Fort Frances districts. The most severe damage occurred on young trees in old burn sites in Tustin Township, Dryden District and northeast of Sioux Lookout and along the Vermilion River Road in the Sioux Lookout District. In these areas incidence ranged from 40 to 60 percent, with foliar damage levels of approximately 75 percent. There were numerous observations of this leaf spot disease in the northern Sudbury and North Bay districts and at one location in Wells Township, Sault Ste. Marie District.

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary and *C. ledicola* (Peck.) Lagerh.

Infections of these diseases declined to unusually low levels in Ontario in 1995. Only trace levels of foliar damage were found in white spruce stands in Lendrum Township, Wawa District. Infections in this area had been heavy for the past 2 years. A small pocket of white spruce and black spruce trees in Neys Provincial Park, Nipigon District, was heavily infected and sustained 100 percent foliar damage. Light infections were observed in black spruce Acid Rain National Early Warning System (ARNEWS) plots in Hopkins Township, Hearst District and in Freele Township, Cochrane District.

ABIOTIC DAMAGE

Blowdown

Further to information presented in the summer *Survey Bulletin*, a severe thunderstorm and high winds on 14 July caused heavy damage in Havelock Township, Bancroft District. Here, an area of some 2 000 ha of mixed conifer and hardwood trees was completely flattened. Elsewhere in the Parry Sound and Bancroft districts numerous small patches of trees, up to about 0.5 ha in size, were heavily damaged. In some cases trees were uprooted and in others they were snapped off, with 5 to 10 m of the bole remaining upright.

Drought

Drought damage was widespread in the province in 1995, but it was probably most prevalent in the Temagami and Kirkland Lake districts, and in a small area in the Timmins District (Fig. 5). Trees within a combined area of 725 195 ha in the three districts were damaged to varying degrees. White birch growing on shallow sites were most severely affected, and sustained mortality ranging from 6 to 8 percent. Large amounts of crown dieback, foliar discoloration, and premature leaf drop were also present. Jack pine and black spruce were affected to a lesser degree in this area. In the Nipigon District, extensive drought damage was mapped north of Lake Superior in the southern Nipigon and Wawa districts. Damage was most conspicuous on high rocky ridges along the drainage systems of the Aguasabon, Pic, and Little Pic rivers, together with a smaller area around the village of Longlac. A total of 106 455 ha of damage was mapped in this part of the province. Smaller, scattered areas of drought damage were mapped along the Vermilion River Road and in Tustin Township in the Sioux Lookout and Dryden districts, respectively.

In southern Ontario a long, narrow band of scattered drought damage was mapped along the Niagara Escarpment between the Meaford Tank Range in St. Vincent Township and the village of Creemore in Nottawasaga Township, Midhurst District. A total of 1 219 ha was affected. Young white ash, trembling aspen, choke cherry (*Prunus virginiana* L.), and sumac (*Rhus typhina* L.) shrubbery were the most severely affected species. There was also widespread drought damage in the townships north of Lake Ontario and the St. Lawrence River in adjoining

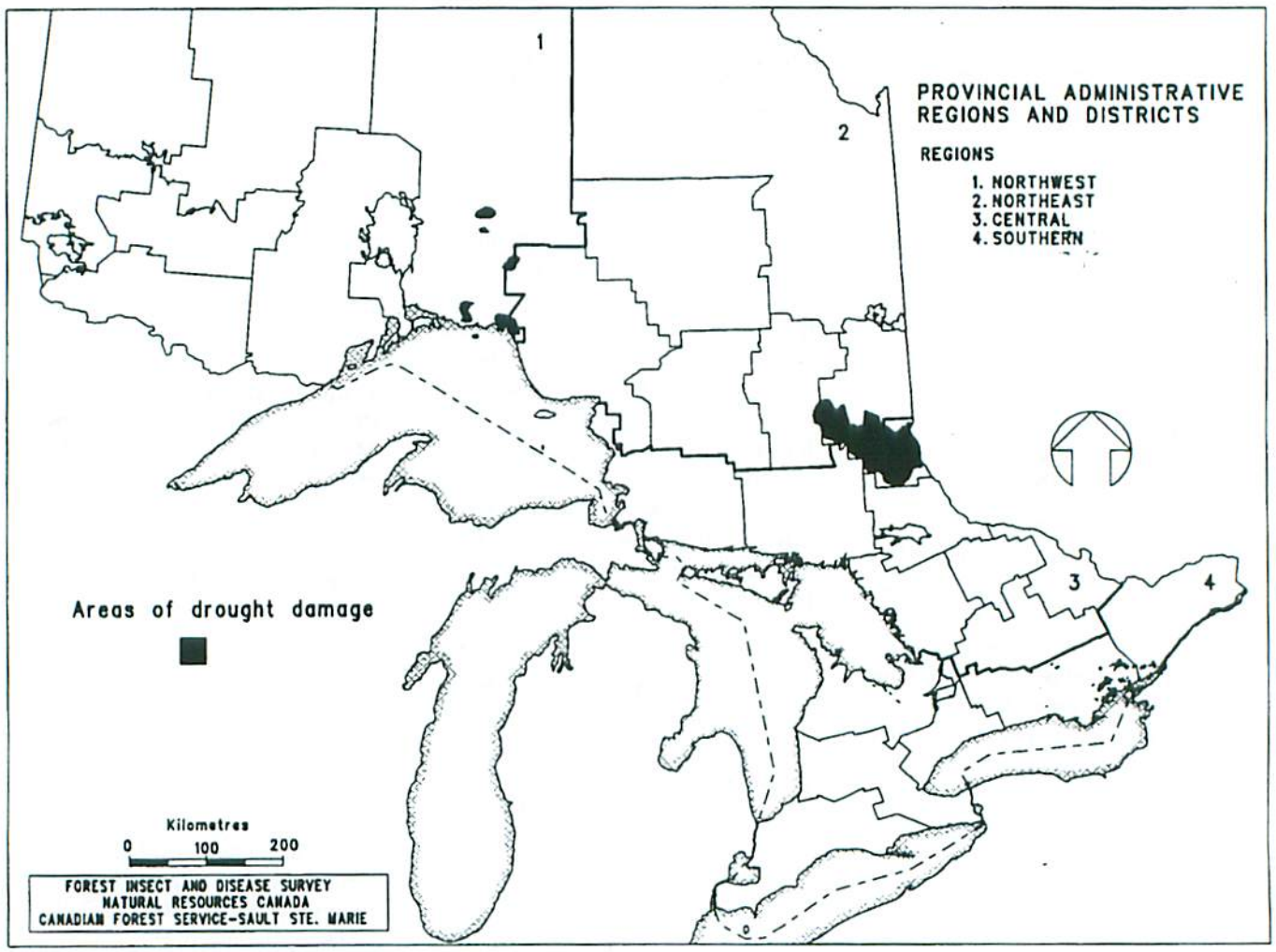

Figure 5. Areas within which drought damage occurred in 1995.

areas of the Tweed and Kemptville districts. The bulk of the damage occurred between the towns of Napanee and Mallorytown as far north as the Opinicon and Rideau lakes area. Most hardwood species were affected, as was white pine at one location north of Kingston. An area of some 20 900 ha was affected in the Tweed District; 4 551 ha were damaged in the Kemptville District. The total area within which drought damage was mapped in Ontario in 1995 was 857 769 ha.

Leaf Scorch

Extensive leaf scorch was evident in the eastern Fort Frances District between Windigoostigwan Lake and the village of Mine Centre. Within this area, single trees and small clumps of white birch sustained foliar damage ranging from 20 to 80 percent. Red maple and alder in the same area were damaged to a lesser degree. Ornamental white birch and basswood (*Tilia americana* L.) plantings in the city of Thunder Bay, Thunder Bay District, sustained leaf scorch damage as high as 80 percent. This damage, sometimes severe, was also reported on white birch in several areas in the Dryden and Sioux Lookout districts. In southern Ontario sporadic, heavy damage was evident on a variety of hardwood species in the Tweed and Kemptville districts.

Hail

A severe hailstorm heavily damaged young jack pine in an aerially seeded, 800-ha area north of Graham in the McCausland Lake area of the Thunder Bay District. The trees, which were seeded in 1990, averaged 1 m in height and sustained branch mortality ranging from 5 to 80 percent. A second small area of hail damage occurred west of Pass Lake in MacGregor Township, Thunder Bay District. Here, about 1 ha of young balsam fir suffered approximately 50 percent branch damage. A similar sized area of balsam fir regeneration north of Highway 11 in Clavet Township, Nipigon District, had 60 percent branch damage on the 2-m trees.

Other Noteworthy Diseases

Dutch elm disease (*Ophiostoma ulmi* [Buisman] Nannf.) severely damaged young white elm regeneration on the east side of Lake Simcoe in Mara Township, Midhurst District. Light damage was also reported along the Veuve River in Hagar Township, Sudbury District.

Downy mildew (*Plasmopara viburni* Peck.) caused 75 percent foliar damage to highbush cranberry (*Viburnum trilolum* L.) seedlings in one compartment at the Orono tree nursery in the Maple District.

Light to moderate shoot damage by the aspen shoot blight (*Venturia macularis* [Fr.:Fr.] E. Müll. & Arx) was reported on trembling aspen regeneration in several areas in the Dryden, Sault Ste. Marie, and Sioux Lookout districts and on hybrid poplar whips at the Orono tree nursery, Maple District.

Tomentosus root rot (*Inonotus tomentosus* [Fr.:Fr.] S. Teng) was associated with numerous pockets of dead and dying white spruce trees in Gaudette Township, Sault Ste. Marie District.

Ground hemlock (*Taxux canadensis* Marsh) on Archibald Island in the north channel of Lake Huron was severely damaged by a snow blight (*Phacidium taxicola* Dearn & House) in Dearn.

Butternut canker (*Sirococcus clavigignenti-juglandacearum* V.M.G. Nair Kostichka & Kuntz) was collected for the first time in the Sault Ste. Marie District at the village of Hilton Beach on St. Joseph Island. It was also found at a few other sporadic locations in southern Ontario.

A leaf spot disease (*Mycosphaerella effigurata* [Schwein] House) caused 40 to 75 percent foliar damage on white ash and black ash trees at several widely separated areas in the Midhurst and Tweed districts.

A needle cast (*Isthmiella crepidiformis* [Darker] Darker) severely defoliated individual white spruce trees in an ARNEWS plot in Wylie Township, Pembroke District.

A leaf spot (*Tubakia dryina* [Sacc.] B. Sutton) caused 40 to 70 percent foliar damage to scattered red oak and white oak trees over an 8-ha area in Cavendish Township, Bancroft District.

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