RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE NORTHWEST REGION OF ONTARIO, 1995

Forest Districts: Dryden, Fort Frances, Kenora, Nipigon, Red Lake, Sioux Lookout, and Thunder Bay

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SURVEY HIGHLIGHTS

The purpose of this report is to summarize all forms of insect, disease, and abiotic damage surveyed for in 1995 by the Forest Insect and Disease Survey (FIDS) Unit in the Northwest Region of Ontario. There was one staffing change to report. The FIDS ranger stationed in Fort Frances, Mr. Tim Bouwmeester, resigned from the Canadian Forest Service (CFS) in August and is now working for the British Columbia Ministry of Forests in Penticton.

The most damaging pest found across the region was the eastern spruce budworm. Provincially, the amount of moderate to severe defoliation recorded was less than in previous years. This was also the case in the Northwest Region, where, in 1995, a 21 percent reduction was noted in the area infested. Only in the Dryden and Sioux Lookout districts did budworm populations increase. In comparison to other years, very little new tree mortality resulting from eastern spruce budworm was mapped. Egg-mass densities were also lower in 1995, thereby indicating a general population decline for 1996. However, it is expected that moderate to severe infestations will persist in many parts of the region. After a long absence, the balsam fir sawfly made a return visit. Damage caused by this insect has not been seen in the region since 1988. Another newcomer to the forest in 1995 was the aspen serpentine leafminer. Heavy damage caused by this tiny insect was mapped over large tracts of trembling aspen in the Nipigon District. Population levels of large aspen tortrix, jack pine budworm, eastern pine shoot borer, yellowheaded spruce sawfly, and white pine weevil declined or were categorized as very low.

Armillaria root rot and western gall rust continued to make their presence known in plantations and orchards across the region. The Dooks' needle blight was identified on eastern white pine foliage in the western part of the region. Foliage diseases on hardwoods were common during the latter part of the summer.

A number of different forms of abiotic damage were encountered in 1995. The Acid Rain National Early Warning System (ARNEWS) plots and the eastern spruce budworm and jack pine budworm Northern Ontario Development Agreement (NODA) plots were evaluated. One gypsy moth adult was captured in a pheromone trap at Kakabeka Falls Provincial Park in the Thunder Bay District. The Dryden Forest Tree Nursery was visited again this summer, but very few problems were encountered.

Insects and diseases described in this report are categorized as follows:

Major Insects/Diseases

capable of causing serious injury to, or death of, living trees or shrubs.

Minor Insects/Diseases

capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs.

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pest:

(1) those that are of minor importance and have not been known to cause serious damage to forest trees, and

(2) those that are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage this year.

Cooperation and assistance provided by the Ontario Ministry of Natural Resources (OMNR) and by the forest industry are gratefully acknowledged.

If further information is required about pest conditions in the Northwest Region, please contact one of the report authors or write to: Chief, Forest Insect and Disease Survey Unit, Canadian Forest Service–Sault Ste. Marie, P.O. Box 490, Sault Ste. Marie, Ontario, P6A 5M7.

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FRONTISPIECE

Damage to trembling aspen (*Populus tremuloides* Michx.) leaves caused by the aspen serpentine leafminer (*Phyllocnistis populiella* Cham.).

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INSECTS

Major Insects

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

This pest of trembling aspen (*Populus tremuloides* Michx.) caused moderate to severe defoliation during 1994 to 1 905 ha in the Pays Plat River watershed area in the Nipigon District. The large aspen tortrix reinfested a smaller portion of this area in 1995 (Fig. 1). Approximately 600 hectares of mature trees were severely defoliated in Yesno and Lahontan townships, primarily along both sides of the Pays Plat River south to the Lake Superior shoreline. New pockets of severe defoliation were recorded in the Kama Hills area of the Jack Pine River watershed (300 ha) approximately 35 km west of the village of Pays Plat. Similar damage was also found at the north end of Lake Helen in a 0.5-ha stand of 8-m-tall trees in the Nipigon District.

Eastern Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Provincial Situation

In 1995 population levels of the eastern spruce budworm declined for the third consecutive year. The total area mapped of moderate to severe defoliation of balsam fir *(Abies balsamea* [L.] Mill.), white spruce (*Picea glauca* [Moench] Voss), and black spruce (*P. mariana* [Mill.] B.S.P.) was 3 451 098 ha. Compared with the 4 266 656 ha found in 1994, this represents a 19 percent reduction in damage. The bulk of the defoliation occurred in the Northwest Region. (Fig. 2, Table 1).

Minimal increases in the amount of tree mortality caused by the eastern spruce budworm were observed in northwestern Ontario. A total of 127 088 ha was mapped in 1995. This is an increase of 2 percent compared with a cumulative provincial total of 7 910 424 ha in 1994. Most of the dead balsam fir and white spruce were found in the Northwest Region and in the Wawa and Hearst districts of the Northeast Region.

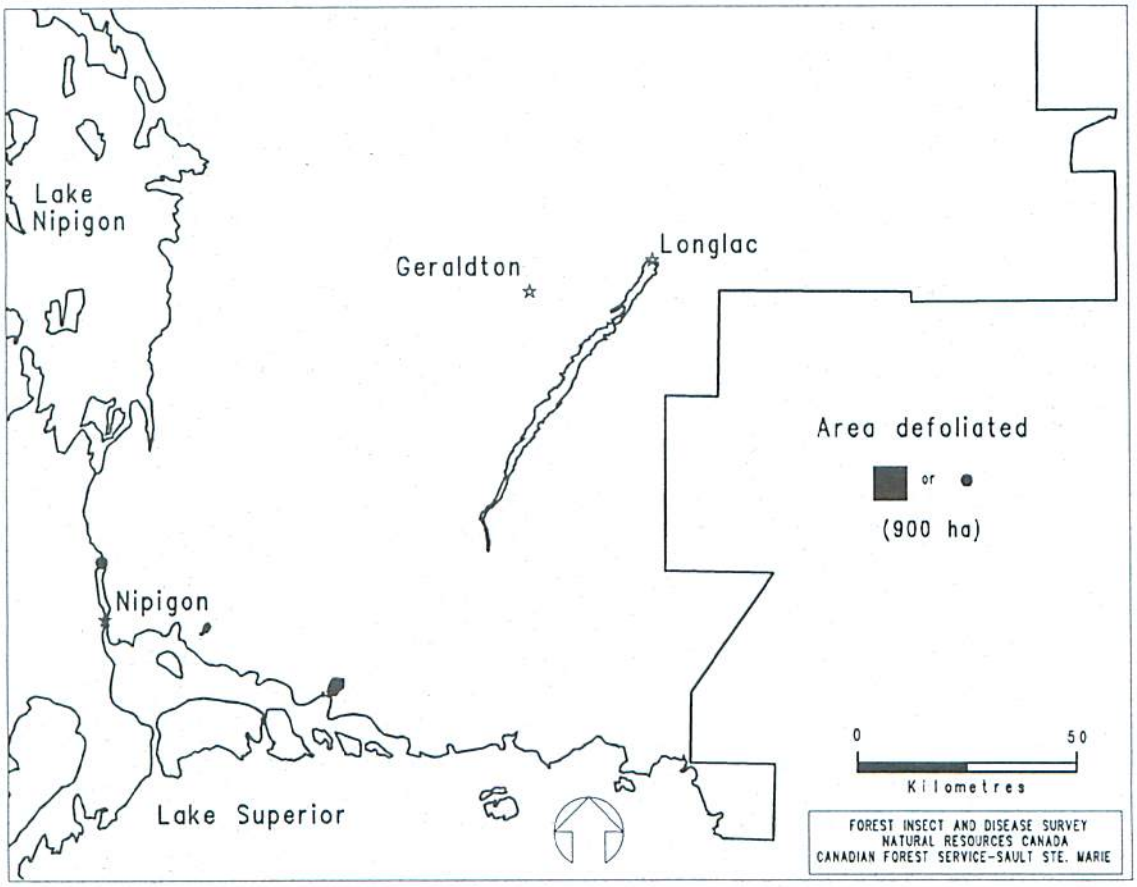

Figure 1. Areas of moderate to severe defoliation caused by the large aspen tortrix (Choristoneura conflictana *[Wlk.]) in the Nipigon District, Northwest Region, in 1995.*

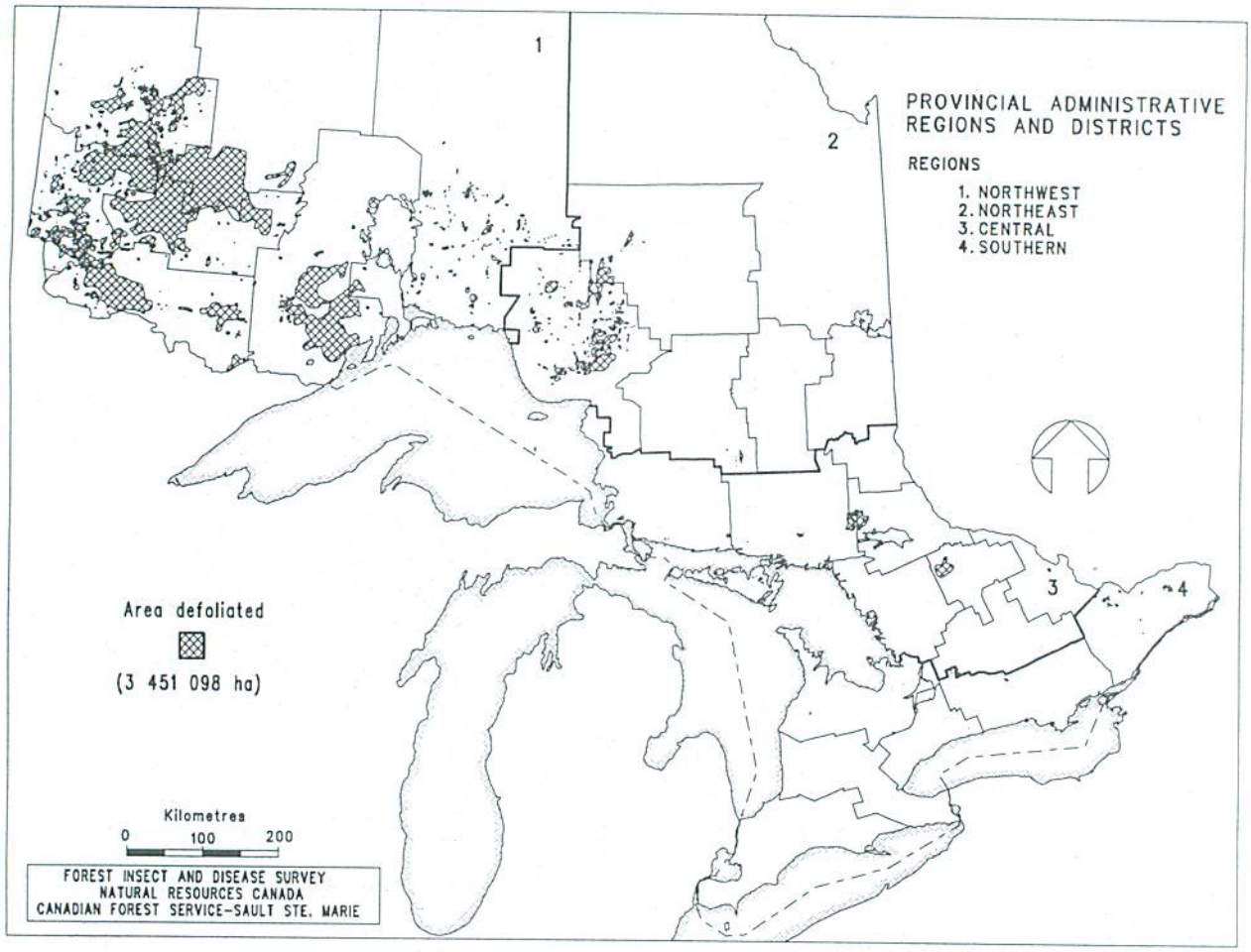

*Figure 2. Areas of moderate to severe defoliation caused by the eastern spruce budworm (*Choristoneura fumiferana *[Clem.]) in 1995.*

Table 1. Total area of moderate to severe defoliation caused by the eastern spruce budworm in Ontario, 1993–1995.

	Area of moderate to severe defoliation (ha)		
Region	1993	1994	1995
Northwest	7 295 736	3 873 424	3 073 489
Northeast	1 650 677	283 590	277 554
Central	44 662	108 955	93 498
Southern	102	687	6 557
Total	8 991 177	4 266 656	3 451 098

Northwest Region

In the Northwest Region in 1995 there was a 21 percent decline in the amount of moderate to severe defoliation caused by the eastern spruce budworm. This decline was slightly offset by some additional damage mapped in the Sioux Lookout and Dryden districts. However, major reductions in the size of the infestations were noted in the Thunder Bay, Nipigon, Red Lake, and Fort Frances districts. Smaller reductions were recorded in the Kenora District (Fig. 3, Table 2). Reductions in defoliation were partially due to the fact that many of the host stands that had a high component of balsam fir also had higher levels of host mortality. Thus, infestations only endured where enough living balsam fir and spruce remained to sustain a significant insect population.

The largest reduction in damaged area was in the Thunder Bay District. Here, the amount of moderate to severe defoliation mapped decreased by 48 percent. These reductions occurred mainly in the eastern and southern parts of the district, including the northeast half of Lake Nipigon, all of the Sibley Peninsula, and an area north of Dog Lake. An irregular-shaped infestation persisted in the central portion of the Thunder Bay District. It started at the Lake Superior shoreline on both sides of the city of Thunder Bay and proceeded north to the Cheeseman and Mooseland lakes area. A significantly smaller infestation remained at the northwest corner of Lake Nipigon.

Reductions in the size of the infestation totaled 260 130 ha compared with 1994 in the Nipigon District in 1995. The most noteworthy decline was located throughout

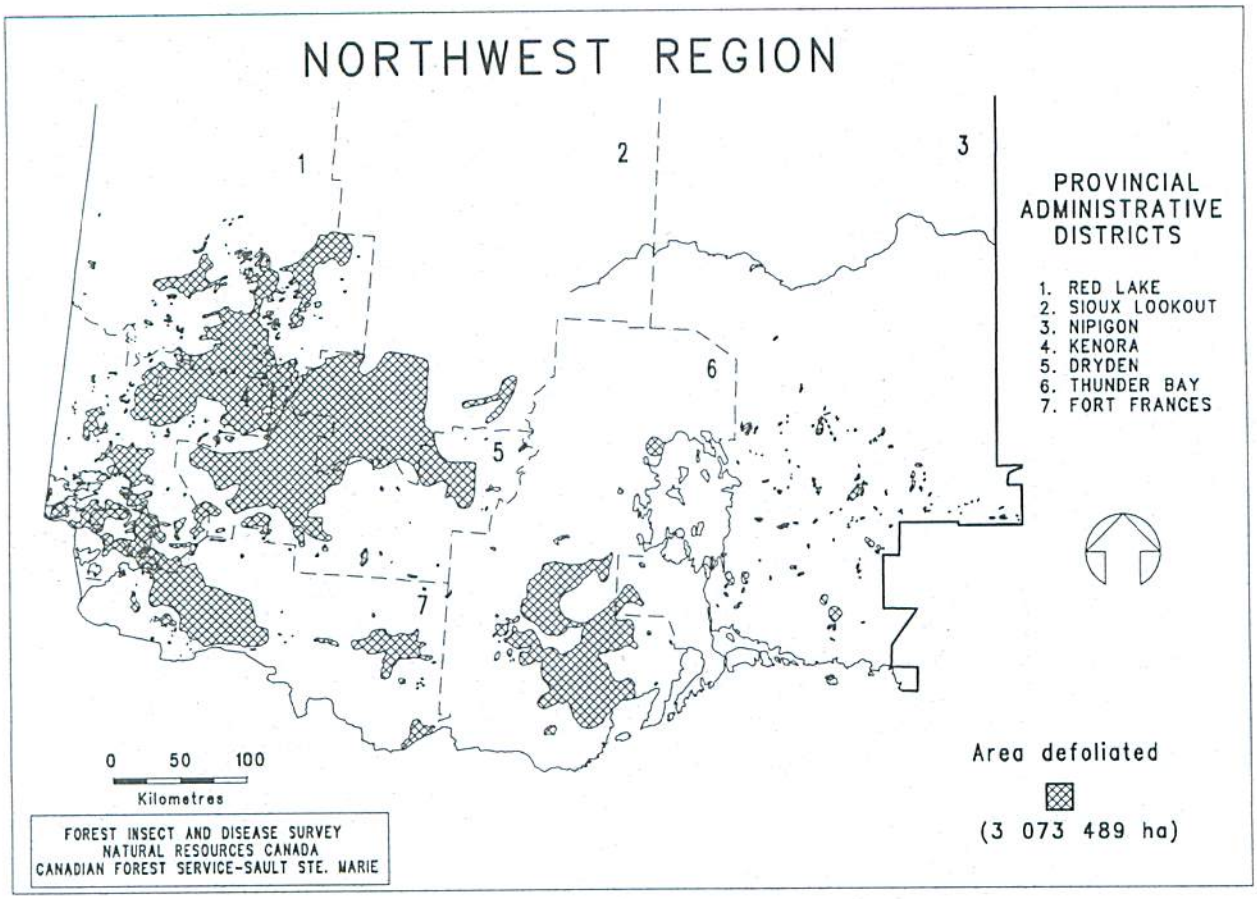

Figure 3. Areas of moderate to severe defoliation caused by the eastern spruce budworm (Choristoneura fumiferana *[Clem.]) in 1995.*

Table 2. Total area of moderate to severe defoliation caused by the eastern spruce budworm in the Northwest Region of Ontario in 1994 and 1995.

	Area of moderate to severe defoliation (ha)		
District	1994	1995	Change (ha)
Dryden	507 450	601 490	+94 040
Fort Frances	506 878	373 401	-133 477
Kenora	571 555	513 141	-58 414
Nipigon	355 699	95 569	-260 130
Red Lake	559 847	392 031	-167 816
Sioux Lookout	367 437	576 055	+208 618
Thunder Bay	1 004 558	521 802	-482 756
Total	3 873 424	3 073 489	-799 935

a large area southwest of Lake Nipigon and west of the Nipigon River. Many of the larger pockets of damage found east of Lake Nipigon in 1994 collapsed in 1995. Reduced populations were also present in the areas around Klotz Lake, the town of Geraldton, Upper Roslyn Lake, and Cairngorm Lake. The remaining infestation consisted of small, isolated pockets of moderate to severe damage scattered across the district. Some of the larger concentrations were located in the area west of Longlac and north of Highway 11 as far as the O'Sullivan Lake area. Larger patches were mapped east and south of Long Lake, and in the Orient Bay area.

In addition to a 30 percent reduction in the size of the infestation in the Red Lake District, damage here was less intense and most of the infestation mapped was moderate. A noteworthy reduction occurred throughout the area southeast of Trout Lake and extending to the Bluffy Lake area. The bulk of the infestation in 1995, located from the Birch Lake area southwest to the Kenora District boundary, included a large pocket lying northwest of Gullrock Lake, and extending along the northwest shore of Lac Seul.

Spruce budworm population levels were low in the Fort Frances District, where moderate to severe damage declined by 133 477 ha in 1995. The majority of the decrease took place in the eastern part of the district, where a large infestation in Quetico Provincial Park collapsed. Moderate to severe defoliation did remain along Highway 11 and in the southeast corner of the district. There was little change in infestation boundaries in the western half of the district. A large infestation was still present east of

the town of Fort Frances. It extended from the central Rainy Lake area northwest to the Nestor Falls area.

Declines were not as striking in the Kenora District. Only a 10 percent reduction in the size of the infestation was recorded in 1995. Very little change occurred in the configuration of the infestation compared with 1994. The largest area affected was bordered by Separation Lake to the west, Dryden District to the south, and Lac Seul and the Red Lake District to the east and north, respectively. Other large pockets of damage were present in the vicinity of the Minaki and Sand lakes, in areas lying east and north of the town of Kenora, and extending northwest from the Nestor Falls area across the Aulneau Peninsula.

In contrast to declines experienced in most districts of the Northwest Region, budworm population levels rebounded in the Sioux Lookout and Dryden districts in 1995. An additional 302 658 ha of moderate to severe defoliation was mapped in these two districts. In the Sioux Lookout District the infestation boundary expanded eastward from the northeast arm of Lac Seul to a north–south line running from Carling Lake to Marchington Lake. Increased amounts of damage were recorded on the western side of Savant Lake. These extended further west to areas adjacent to Kashaweogama Lake. The whole southwest portion of the Sioux Lookout District was infested and has been for years. Reinfestation occurred within a large area north of the town of Dryden. Expansions also occurred in the eastern part of the district from the Lake of Bays area east to the Bell and Shikag lakes areas. The remainder of the infestation in the Dryden District was similar to that of 1994.

There was a marked reduction in the amount of new mortality of balsam fir and white spruce caused by the eastern spruce budworm across the Northwest Region (Fig. 4). A cumulative total area of 7 463 040 ha now exists in 1995. This represents an increase of only 113 552 ha compared with the 2 693 043-ha increase recorded in 1994. Out of the seven districts surveyed only four had additional areas of mortality (Table 3). The majority of the increases were found in the Thunder Bay and Nipigon districts. Here they totaled 106 077 ha. In the Thunder Bay District, new damage was detected in three distinct areas. Large pockets were located along the northwestern shore of Lake Nipigon, from the Hicks Lake area running northwest and northeast of Dog Lake. Increased areas of mortality were also scattered across the central portion of the Nipigon District. Most of the damage was found north of Highway 11, except for areas on the northern and southern

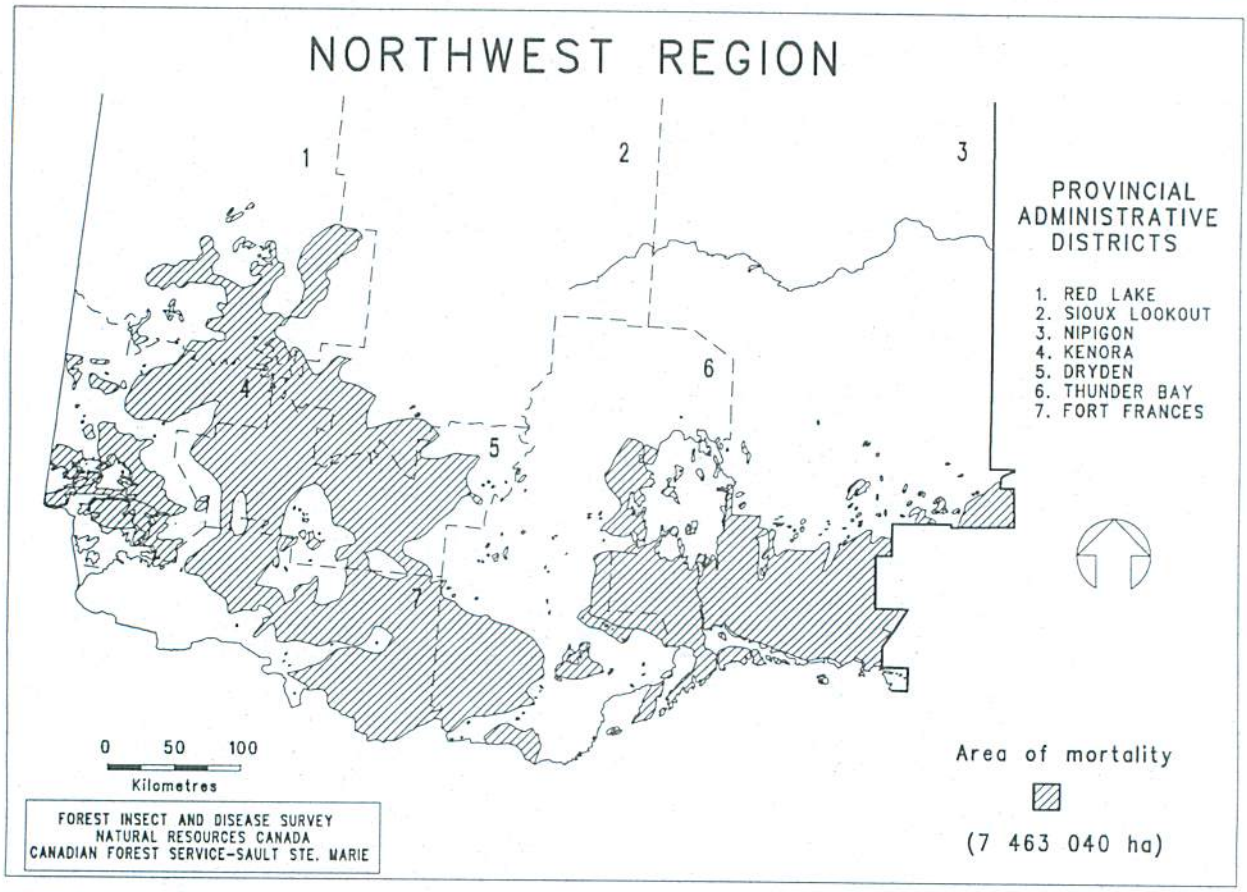

Figure 4. Areas within which cumulative balsam fir mortality was caused by the eastern spruce budworm (Choristoneura fumiferana *[Clem.]) in 1995.*

Table 3. Total area of whole-tree mortality associated with eastern spruce budworm in the Northwest Region of Ontario in 1994 and 1995.

District	Total area of mortality (ha) 1994	1995	Increase (ha)
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	1 704 588	1 750 261	45 673
Red Lake	631 132	631 132	0
Sioux Lookout	440 648	441 512	864
Thunder Bay	1 006 928	1 067 332	60 404
Total	7 349 488	7 463 040	113 552

shores of Pagwachuan Lake. Other noteworthy concentrations were found in Klotz Township, around Burrows Lake, and along the eastern shore of Lake Nipigon. Minor increases in the amount of mortality were recorded in the Dryden and Sioux Lookout districts (Table 3). A total of 82 monitoring plots was examined in the region to give more detailed stand information on the progression of tree mortality (Table 4).

In an effort to forecast population levels for 1996, egg-mass collections were carried out at 165 locations (Appendix 1). Compared with 1994, average egg-mass densities were lower in 1995 in all of the seven districts surveyed. Reductions ranged from a high of 70 percent in the Fort Frances District to a low of 8 percent in the Sioux Lookout District. This indicates an overall decline in spruce budworm populations; however, moderate to severe infestations will likely still persist in many parts of the region.

Jack Pine Budworm, *Choristoneura p. pinus* Free.

The most noteworthy damage caused by the jack pine budworm in 1995 occurred on a small clump of jack pine (*Pinus banksiana* Lamb.) trees west of Hudson in Vermilion Additional Township in the Sioux Lookout District. Defoliation levels ranging from 30 to 75 percent occurred on trees 4 m in height. At the Sunstrum Seed Orchard, 80 percent of the 1.3-m trees averaged three larvae per tree, but defoliation was insignificant.

Trace population levels were observed on trees at the Geraldton Fire Base and at Pagwachuan Lake Flats in the Nipigon District. No defoliation was observed elsewhere in the region.

Egg-mass sampling was conducted in five districts of the region and 88 stands were sampled. Only four areas are forecasted to have light infestations in 1996 (Appendix 2).

Table 4. Summary of tree mortality associated with eastern spruce budworm in the Northwest Region of Ontario. Results are based on ground checks for seven districts for 1994 and 1995.

Location	Host[a]	Tree mortality (%) 1994	1995
Dryden District			
* Bridges Township	bF	49	75
* Coronary Lake	bF	65	67
* Dore Lake	bF	59	64
* Forest Lake	bF	48	55
* Little Indian Lake	bF	96	96
* Mafeking Township	bF	98	98
* North Road	bF	64	64
* Rugby Township	bF	39	65
* Sandy Point Road	bF	24	38
* Satterly Township	bF	55	67
* Southworth Township	bF	67	69
* Temple Township	bF	98	98
Fort Frances District			
* Big Sawbill Lake	bF	62	65
* Claxton Township	bF	18	25
* Lake Hope	bF	6	9
* Menary Township	bF	10	20
* Preacher Lake	bF	63	63
* Watten Township	bF	28	28
Kenora District			
* April Lake	bF	37	39
* Cliff Lake	bF	70	76
* Ewart Township	bF	74	74
* Forgie Township	bF	93	93
* Godson Township	bF	26	35
* Kirkup Township	bF	95	95
* McMeekin Township	bF	93	93
* Melick Township	bF	86	97
* Separation Lake	bF	96	100
* Trail Lake	bF	65	75
* Willindon Township	bF	25	44
Nipigon District			
Adamson Township	bF	54	62
	wS	22	23
* Ashmore Township	bF	11	26
	wS	13	20
* Bikerace Township	bF	–	47
Booth Township	bF	78	85
	wS	100	100
* Burrows Lake North	bF	8	40
	wS	–	11
* Burrows Lake South	bF	–	23
	wS	–	0
Camp 15–Caramat	bF	39	86
	wS	15	20
* Daley Township	bF	24	43
* Errington Township	bF	7	32
Fen Lake	bF	45	96
* Grain Township	bF	–	80
* Grehan Lake	bF	12	50
* Highway 11/625	bF	19	25
* Legault Township	bF	6	19
* Legault North	bF	12	30

(cont'd)

Table 4. Summary of tree mortality associated with eastern spruce budworm in the Northwest Region of Ontario. Results are based on ground checks for seven districts for 1994 and 1995. (concl.)

Location	Host[a]	Tree mortality (%) 1994	1995
Nipigon District (concl.)			
Lyon Township	bF	81	90
McIvor Township	wS	34	44
* Nakina Township	bF	1	1
Nibs Lake	bF	77	86
* Parent Township	bF	–	27
Polly Lake	bF	–	98
	wS	–	25
Purdom Township	bF	46	64
	wS	88	88
* Raynar Township	bF	11	20
* South Beatty Lake	bF	100	100
* Suicide Lake	bF	–	89
* Summers Township	bF	100	100
* Windigokan Lake Road	bF	–	69
Red Lake District			
* Baird Township	bF	18	27
* Detector Lake	bF	57	63
* Goldpine Road	bF	18	21
* Sandy Creek	bF	65	76
* Snake Falls Road	bF	8	24
* Wenasaga Lake	bF	6	933
Sioux Lookout District			
Burma Lake Road	bF	53	59
* Deception Lake	bF	57	63
* Drayton Township	bF	29	33
* Factor Township	bF	18	25
* Foley Lake	bF	7	10
* Lomond Township	bF	42	52
* Moose Lake Road	bF	3	3
* Pape Lake	bF	46	53
* Pickerel Township	bF	60	75
Thunder Bay District			
Cheeseman Lake	bF	–	77
	wS	–	8
Crombie Lake	bF	–	83
Dog River	bF	–	63
Fallscamp Lake Road	bF	–	58
	wS	–	15
* Forbes Township	bF	–	22
Jacques Township	bF	–	88
Kabitotikwia Lake	wS	52	54
* Mountain Lake Road	bF	46	52
Open Bay–Lac des Mille Lacs	bF	60	64
	wS	7	7
Sibley Township	bF	87	92
	wS	71	74
Waweig Lake	bF	61	64
	wS	4	4

[a] bF = balsam fir, wS = white spruce.
* Eastern Spruce Budworm NODA impact plot. The tree count is based on the basal area of the stand. Non-NODA mortality plots contain 100 trees.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Low population levels of this shoot borer continued within the Northwest Region in 1995. Damage levels did not exceed 2 percent over a total of 15 jack pine plantations (Table 5).

Balsam Fir Sawfly, *Neodiprion abietis* complex

Since 1988 the balsam fir sawfly has not been reported in the Northwest Region. During 1995, insect feeding was commonly observed at several locations in the Thunder Bay District. The most noticeable damage extended from the Shebandowan Lake area west towards Huronia Lake, from Inwood Township along Highway 17 west to the English River, and along Highway 588 from Nolalu to the Whitefish and Sandstone lakes area. In each of these locations defoliation levels varied from 5 to 40 percent on all size classes of balsam fir. Similar damage was also noted in parts of Scoble and Devon townships, Thunder Bay District.

Damage levels in the 5 to 40 percent range occurred in the northeast portion of the Fort Frances District. Here, damage was encountered along Highway 11 east of Rainy Lake and in the southern portions of the Manion and Turtle lakes area.

Light defoliation was also found on 2-m trees at several locations in Drayton Township in the Sioux Lookout District. On average, two colonies per tree were present, but this resulted in overall defoliation levels of no greater than 10 percent.

Damage was also present on black spruce in the Thunder Bay District. However, defoliation levels were less than 2 percent.

Jack Pine Sawfly, *Neodiprion pratti banksianae* Roh.

Increased population levels of the jack pine sawfly were observed at various points in the region in 1995. Defoliation levels ranging from 70–100 percent occurred on jack pine trees under 2 m in height along Highway 11 between the Manion Lake Road and Mine Centre in the southeast portion of the Fort Frances District. In the same area larger hosts up to 12 m tall had damage levels that ranged from 5–40 percent.

Scattered roadside trees measuring 4 to 6 m tall sustained up to 50 percent defoliation near the English River along Highway 599 in the Dryden District. Similar damage was also found at a few points in Drayton Township and along Highway 642 in the Sioux Lookout District. Low insect populations were present on young fringe trees along Highways 72, 664, and 519 in the Sioux Lookout District and at several points along Highway 17 in the Dryden District. Only one occurrence of damage was

Table 5. Damage to jack pine caused by the eastern pine shoot borer in the Northwest Region of Ontario in 1995. (Counts are based on an examination of a minimum of 150 trees at each location within the seven districts.)

Location	Area affected (ha)	Estimated number of trees/ha	Average height of trees (m)	Leaders attacked (%) 1994
Dryden District				
Bradshaw Township	25	3 000	1.1	1
Osaquan Progeny Test	4	2 500	1.3	0
Pike Lake Progeny Test	5	2 500	1.2	0
Sunstrum Seed Orchard	5	2 000	1.3	0
Fort Frances District				
Williamson Lake Genetic Test	5	2 500	1.4	0
Nipigon District				
Booth Township	100	2 500	1.8	0
Sioux Lookout District				
Goodie Lake	30	2 500	4.0	0
Highway 642 Block 9	20	4 000	2.5	1
Stanzhikimi Lake Road	10	2 500	2.8	0
Vermilion River Family Test	2	2 500	1.8	2
Vermilion River Seed Orchard	8	2 400	1.0	0
Thunder Bay District				
Fallscamp Lake Family Test	5	2 500	2.7	0
Kakabeka Seed Orchard	15	3 700	3.0	0
Obonga Lake Road	50	3 000	2.2	0
Waweig Lake	5	2 500	2.4	0

found in the eastern part of the region. Foliar damage averaging 20 percent was encountered on several 5-m host at the Geraldton Fire Base in the Nipigon District.

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

Increased numbers of aspen leafblotch miner were evident during 1995, particularly in the Nipigon District. The primary host, trembling aspen, was generally under 10 m tall. The highest levels of damage (90 percent) were observed at the following locations: along Highway 11 east of Highway 625 and extending for approximately 1 km, in Neys Provincial Park, along the Margo Lake and Polly Lake roads, and along Highway 584 from Geraldton to Nakina. In the Dryden District 80 to 100 percent foliar damage was reported in the Pike Lake area, in Revell and Hartman townships, near Vaughan Lake, and in the Williams and Route Bay areas. Similar damage levels were observed in the Goodie Lake area, and in Echo and Lomond townships in the Sioux Lookout District. Elsewhere throughout the region, single trees had defoliation levels ranging from 25 to 100 percent.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.)

During 1995, fewer observations of foliar damage caused by the yellowheaded spruce sawfly were reported in the Northwest Region than were noted in the previous year. Light defoliation levels, approximating 10 percent, occurred on 1- to 4-m roadside white spruce and black spruce along Highway 11 from Kakabeka Falls west to the Shebandowan area in the Thunder Bay District. At many points in the city of Thunder Bay average defoliation levels of 40 percent were found on white spruce and Colorado spruce (*Picea pungens* Engelm.). Occasional trees were totally defoliated. Defoliation levels ranging from 10 to 50 percent were present on ornamental and roadside spruce in and around the towns of Nipigon, Marathon, and Geraldton in the Nipigon District.

Varying levels of damage were also encountered on spruce growing along highway right-of-ways in the Dryden and Sioux Lookout districts in the western part of the region. Defoliation levels ranging from 50 to 80 percent were present on a low number of 1-m trees adjacent to Highways 17 and 72. Some individuals had 100 percent of their foliage consumed. Similar damage was found on ornamentals in the towns of Sioux Lookout and Dryden.

White Pine Weevil, *Pissodes strobi* (Peck)

A total of 28 stands were evaluated for leader damage caused by the white pine weevil (Table 6). Numbers of leaders attacked were generally low, with the exception of two jack pine plantations in the Thunder Bay District. At the 5-ha Fallscamp Lake Family Test, 11 percent of the 2.7-m trees were affected by weevil damage. In addition, 7 percent of the 2.2-m trees at a 50-ha site along the Obonga Lake Road were affected. A removal of tree tops had taken place earlier in the year at some of the spruce seed orchards. This orchard maintenance made the trees much less susceptible to weevil attack.

Table 6. Damage caused by the white pine weevil in the Northwest Region of Ontario in 1995. (Counts are based on an examination of 150 randomly selected trees at each location within the five districts.)

Location	Host[a]	Average height of trees (m)	Estimated number of trees/ha	Estimated area of stand (ha)	Leaders attacked (%)
Dryden District					
Basket Lake	jP	1.1	2 500	5	3
Bradshaw Township	jP	1.1	3 000	25	1
Osaquan Progeny Test	jP	1.3	2 500	4	3
Pike Lake Progeny Test	jP	1.2	2 500	5	1
Revell Township	jP	1.5	2 500	10	1
Smoch Lake Road	jP	3.0	4 500	50	2
Williams Bay	jP	2.0	2 000	10	0
Fort Frances District					
Williamson Lake Genetic Test	jP	1.4	2 500	5	4
Williamson Lake Genetic Test	bS	1.4	2 500	5	0
Nipigon District					
Clay Hill Plantation	jP	1.8	2 000	100	0
Eskwanonwatin Lake	bS	2.6	2 500	80	3
Ledger Township	jP	2.0	1 800	5	4
MacPherson Seed Orchard	wS	8.0	200	1	0
MacPherson Seed Orchard	bS	5.0	200	1	0
Pagwachuan Township	wS	3.0	800	2	0
Sioux Lookout District					
Block 9–Highway 642	jP	2.5	4 000	20	1
Goodie Lake	jP	2.4	2 000	5	1
Moose Lake Road	jP	3.0	2 400	10	0
Stanzhikimi Lake Road	jP	3.6	4 500	5	0
Vermilion River Family Test	jP	1.0	2 500	2	2
Vermilion River Seed Orchard	jP	1.0	2 400	8	3
Thunder Bay District					
Devon Seed Orchard	bS	1.5	625	16	2
Fallscamp Lake Family Test	jP	2.7	2 500	5	11
Hardwick Township	bS	2.0	2 500	10	3
Kakabeka Seed Orchard	jP	3.0	3 700	15	3
Obonga Lake Road	jP	2.2	2 500	50	7
Sandstone Lake	bS	2.0	2 500	6	3
Waweig Lake	jP	2.4	2 500	5	4

[a] bS = black spruce, jP = jack pine, and wS = white spruce.

Minor Insects

Fall Cankerworm, *Alsophila pometaria* (Harr.) and Larger Boxelder Leafroller, *Archips negundana* (Dyar)

The fall cankerworm has fed in various towns throughout the region for the past 8 years. The larger boxelder leafroller has been present in conjunction with the fall cankerworm since 1992, but only in the western part of the region.

Larger boxelder leafroller population levels were higher in 1995 and the fall cankerworm still contributed to the overall defoliation, but generally population levels were low. Defoliation levels ranging from 30 to 100 percent on Manitoba maple (*Acer negundo* L.) were present in the towns of Kenora (Kenora District), Fort Frances (Fort Frances District), Sioux Lookout and Hudson (Sioux Lookout District), and Dryden and Ignace (Dryden District). The fall cankerworm's diet was more varied in the towns of Kenora and Fort Frances. In addition to the Manitoba maple, 5 to 30 percent defoliation was observed on ornamental white elm (*Ulmus americana* L.), bur oak (*Quercus macrocarpa* Michx.), and poplar (*Populus* spp.).

Only the fall cankerworm was present in the city of Thunder Bay (Thunder Bay District) and in the town of Atikokan (Fort Frances District). Average defoliation levels of 60 percent were observed on scattered Manitoba maple, basswood (*Tilia americana* L.), and apple (*Malus* spp.) in Thunder Bay. In Atikokan, defoliation levels did not exceed 20 percent on occasional Manitoba maple.

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

For the fourth consecutive year the jack pine resin midge caused widespread damage to young jack pine on the fringes of stands in the Sioux Lookout and Dryden districts. Branch tip mortality levels ranging from 75 to 100 percent were present along all major highways and secondary roads in the two districts. Medium to high midge populations were present in the Dryden Nursery Breeding Orchard, and pruning of the affected tips was undertaken by OMNR staff.

Spruce Spider Mite, *Oligonychus ununguis* (Jac.)

Very high populations of this tiny pest were observed throughout much of the Sioux Lookout and Dryden districts in 1995. Damage caused by the spruce spider mite affected the second-year foliage of jack pine trees under 3 m tall and heavy feeding resulted in total discoloration of the needles. The high populations were probably due to the very hot, dry weather experienced during most of the months of June and August. Also, there can be up to six generations per season. In the Sioux Lookout District particularly high populations were noted in Echo and Factor townships, in the Stanzhikimi Lake Road area, and along Highway 516 to the Moose Lake road. Foliar discoloration was very prominent in Mafeking Township, on regeneration in the old burn in Tustin Township, and in Bradshaw Township in the Dryden District. Scattered trees along roadways and in plantations sustained high insect populations at many other points in both districts.

Balsam Poplar Leafblotch Miner, *Phyllonorycter nipigon* (Free.)

High populations of balsam poplar leafblotch miner damaged balsam poplar (*Populus balsamifera* L.) throughout the Northwest Region in 1995. Areas containing severe foliar damage (averaging 80 percent) were recorded in Gorham, Oliver, and McIntyre townships in the Thunder Bay District. All sizes of trees were affected. In the Nipigon District similar damage was recorded in McMaster, Cockerham, Adamson, McIvor, Booth, Ledger, Corrigal, Kilkenny, and Kito townships. High levels of damage were also observed on 1-m-tall trees along many roadways in the Dryden, Sioux Lookout, and western Fort Frances districts.

Aspen Serpentine Leafminer, *Phyllocnistis populiella* Cham.

Unusually heavy infestations of this pest of trembling aspen were reported in northwestern Ontario during 1995 (Fig. 5). The largest infestations of the aspen serpentine leafminer occurred in the northeast part of the Nipigon District. Severe mining caused the foliage to take on a silvery appearance over approximately 88 440 ha (Frontispiece). All sizes of host trees, ranging from regeneration (2 m tall) to mature stands (averaging 20 m tall), were affected. Smaller areas of regeneration were also affected along the Little Sturge Lake Road and at Kilometer 46 on the Black Sturgeon Road, both in the western Nipigon District. A 1-ha area along the Escape Creek Road in the Thunder Bay District sustained foliar damage averaging 75 percent. Approximately 300 ha was infested near Badesdawa Lake in the Sioux Lookout District. Here, foliar damage levels of 100 percent were recorded on sapling-sized regeneration; lower population levels were noted on mature trees.

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

Population levels of the northern pitch twig moth declined in 1995. The infestation that had been present in the Kakabeka Seed Orchard in Paipoonge Township, Thunder Bay District, all but collapsed. Only a trace number (1–6) of insects were observed over the 15-ha area of jack pine trees, which averaged 3.3 m in height. The

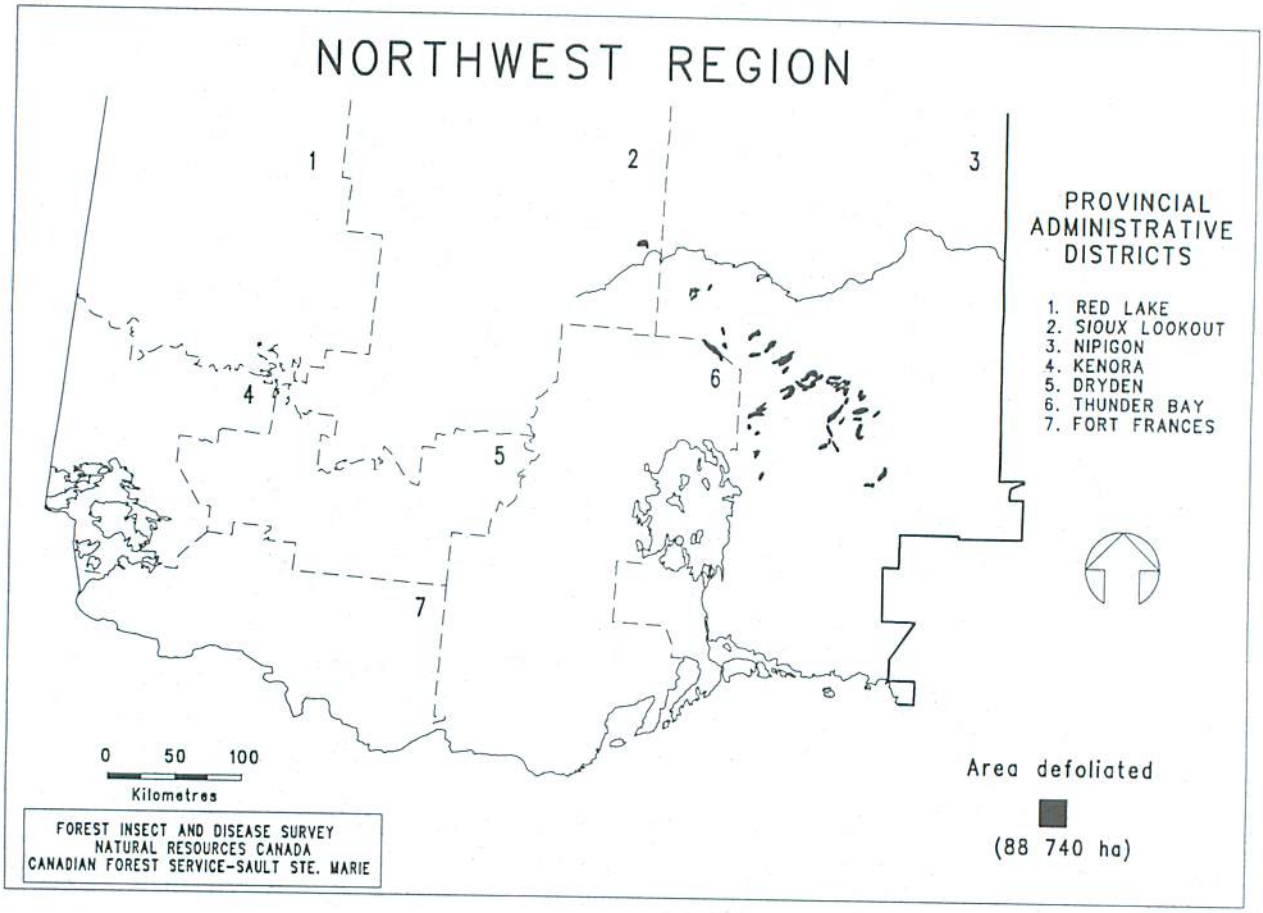

Figure 5. Areas of severe leafmining caused by the aspen serpentine leafminer (Phylocristis populiella Cham.) in 1995.

heaviest damage found was in the Kenora District at the Fifth Creek Seed Orchard. At this 4-ha site 6 percent of the 1.1-m trees were affected. In the Red Lake District trace levels of damage were found at three sites. Three percent of the 1.1-m trees were attacked at the Nungesser Road Progeny Test, and two percent of the trees were affected at the 4-ha Acme Seed Orchard and at the Bug River on Highway 105. Similar damage levels were also found in Jackman Township in the Kenora District, on the Manion Lake Road in the Fort Frances District, and in the Dryden District at the Osaquan Progeny Test and on the Camp 19 Road.

Gray Willow Leaf Beetle, *Tricholochmaea d. decora* (Say) and Willow Leafminer, *Micurapteryx salicifoliella* (Cham.)

The gray willow leaf beetle was commonly observed on stream, roadside, and low-lying willow (*Salix* spp.) bushes throughout much of the Northwest Region. Infestations encompassed an area in the Dryden District from the Dinorwic area west to Docker Township. A few scattered pockets occurred in Tustin Township. This infestation also included much of the region south to the Fort Frances District boundary and north to the Kenora District boundary and Lac Seul. In the Sioux Lookout District, heavy damage was present within an area bounded to the northeast by the Stanzhikimi Lake and Moose Lake roads, and south and west to the Dryden District boundary. A large area containing severe defoliation was also recorded in the Kenora District between Lake of the Woods and the English River. In the Nipigon District, the gray willow leaf beetle and the willow leafminer caused severe foliar browning at numerous locations where host were abundant.

Other Forest Insects

A number of other insects were encountered during the course of regular surveys. Information on these pests is provided in Table 7.

Table 7. Other forest insects.

Insect	Host(s)[a]	Remarks
Aceria fraxinivora (Nal.) Ash gall mite	wA	In the town of Fort Frances 10 percent of the 12-m-tall ornamentals sustained heavy damage.
Aphrophora cribrata (Wlk.) Pine spittlebug	jP	Low population levels were present on 80 percent of 1-m trees over a 10-ha stand near Sunstrum Lake in the Dryden District. Similar populations were present on 5 percent of the 3-m trees in a 5-ha plantation on the Manion Lake Road in the Fort Frances District.
Archips cerasivorana (Fitch) Uglynest caterpillar	cCH, pCH	High population levels were commonly found in the western parts of the Fort Frances District and the southern half of the Kenora District.
Bucculatrix canadensisella Cham. Birch skeletonizer	wB	Light skeletonizing of foliage occurred at scattered locations in Purdom, Booth, and Church townships in the Nipigon District. Damage levels to most trees averaged 10 percent.
Cinara sp. Aphids	wS, jP	High populations of this pest were observed on 2 percent of the 0.9-m white spruce and 4 percent of the 1.1-m jack pine at the Bawlb Lake Seed Orchard and the Nungesser Progeny Test, respectively, in the Red Lake District.
Corythucha elegans Drake Poplar lace bug	W	Foliar damage levels of 90 percent occurred on twenty 3-m trees along Highway 11, approximately 3 km east of the junction with Highway 625, in the Nipigon District.
Dioryctria abietivorella (Grt.) Fir coneworm	bS, jP	This insect was found feeding in numerous western gall rust galls at many sites in the Dryden and Sioux Lookout districts. The additional damage caused to the diseased trees resulted in the death of the tree and/or the branch on which the gall was located. Insects were also present in 18 percent of the cones on 2-m black spruce in Hardwick Township in the Thunder Bay District.
Diprion similis (Htg.) Introduced pine sawfly	ewP	Moderate sawfly population levels were observed for the second consecutive year at Old Fort William, Neebing Township in the Thunder Bay District. Defoliation levels of only 5 percent were seen on 2- to 3-m trees.
Epinotia solandriana (L.) Birch-aspen leafroller	wB	Foliar damage levels of 40 and 28 percent occurred on 6-m trees over a 2-ha area on the Overnight Road in the Red Lake District, and on 50 percent of the ARNEWS plot trees in Wiggins Township in the Nipigon District, respectively. Moderate population levels were recorded in the southeast portion of the Dryden District.
Hemichroa crocea (Geoff.) Striped alder sawfly	Al	High population levels, resulting in 100 percent defoliation, were observed on roadside and understory trees at several locations in Mafeking Township, Williams Bay, and at numerous points along Highways 622 and 502 in the Dryden District.

(cont'd)

Table 7. Other forest insects (concl.).

Insect	Host(s)[a]	Remarks
Hylobius radicis Buch. Pine root collar weevil	jP	Less than 1 percent of the 1.1-m trees were attacked at the Nungesser Progeny Test in the Red Lake District.
Malacosoma californicum pluviale (Dyar) Northern tent caterpillar	wB	At Cedar Narrows in the Fort Frances District 25 percent defoliation was present on 2-m trees over a 2-ha site.
Malacosoma disstria Hbn. Forest tent caterpillar	tA, bO	Trace population levels were observed in the town of Fort Frances in the Fort Frances District.
Monochamus s. scutellatus (Say) Whitespotted sawyer	jP	Heavy feeding by adult beetles was evident in a 120-ha plantation south of Sowden Lake in the Dryden District. Varying levels of branch and twig mortality were observed on 80 percent of the trees, and some trees had as many as 60 percent of their branches damaged. Low levels of feeding ing damage occurred on some main stems, and this could result in whole tree mortality in 1996. Low to moderate levels of feeding were also seen on mature trees along the edges of the cutovers and roadways in the same general area.
Neodiprion n. nanulus Schedl Red pine sawfly	jP, rP	High sawfly population levels occurred on jack pine along Highway 593 in Devon Township in the Thunder Bay District. Defoliation levels ranged from 2 to 50 percent on all sizes of trees. Trace populations were found on red pine in Drayton Township in the Sioux Lookout District.
Nymphalis antiopa (L.) Spiny elm caterpillar	wB, W, tA	Single colonies of this pest were observed at Wildgoose and Polly lakes in the Nipigon District, in Morson Township in the Fort Frances District and at scattered locations in the Dryden and Sioux Lookout districts.
Pristiphora geniculata (Htg.) Mountain-ash sawfly	aMo	This insect was commonly observed throughout the eastern part of the Fort Frances District. In the city of Thunder Bay, in the Thunder Bay District, defoliation on ornamentals varied from 5 to 80 percent. Low population levels were reported in the towns of Sioux Lookout and Dryden in the Sioux Lookout and Dryden districts, respectively.
Rheumaptera hastata (L.) Spearmarked black moth	wB	Low numbers of insects were present on 90 percent of the trees at the Schreiber ARNEWS plot in the Nipigon District.
Scolioneura betuleti Klug Birch leaf edgeminer	wB	Foliar damage levels of 80 percent occurred on ornamentals 6 m in height at Marina Park in the city of Thunder Bay. This represents a new distribution range for Ontario in 1995. The next nearest occurrence was found in 1993 in the city of Sault Ste. Marie, Central Region.

[a] Al = alder, aMo = American mountain-ash, bO = bur oak, bS = black spruce, cCH = choke cherry, ewP = eastern white pine, jP = jack pine, pCH = pin cherry, rP = red pine, tA = trembling aspen, W = willow, wA = white ash, wB = white birch, and wS = white spruce.

TREE DISEASES

Major Diseases

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

Armillaria root rot is an ongoing problem that usually causes low to moderate levels of tree mortality throughout the Northwest Region. In 1995, surveys of 27 young conifer stands revealed that the general level of damage was from 0–2 percent (Table 8). Exceptions to this included a 5 percent current mortality level at the Nungesser Road Progeny Test in the Red Lake District. Also, 3 percent of the jack pine were dead at the Williamson Lake Genetic Test in the Fort Frances District and at the Kakabeka Seed Orchard in the Thunder Bay District. This root disease

Table 8. Summary of damage caused by Armillaria root rot in the Northwest Region of Ontario in 1995. (Counts are based on an examination of 150 randomly selected trees at each location within the six districts.)

Location	Host[a]	Estimated height of trees (m)	Density (trees/ha)	Area affected (ha)	Current mortality (%)
Dryden District					
Basket Lake	jP	1.1	3 500	20	1
Nursery Seed Orchard	jP	2.2	2 000	3	1
Osaquan Township Progeny Test	jP	1.3	2 500	4	2
Pike Lake Progeny Test	jP	1.2	2 500	5	1
Revell Township	jP	1.5	2 500	10	1
Sunstrum Seed Orchard	jP	1.3	2 000	5	1
Williams Bay	jP	2.0	2 000	10	2
Fort Frances District					
Williamson Lake Genetic Test	bS	1.4	2 500	5	0
Williamson Lake Genetic Test	jP	1.4	2 500	5	3
Nipigon District					
Booth Township	jP	1.8	2 500	100	0
Eskwanonwatin Lake	bS	1.4	2 500	100	0
Ledger Township	jP	2.0	1 100	5	0
Limestone Lake Seed Production Area	wS	8.0	800	50	0
MacPherson Seed Production Area	wS	5.0	250	1	0
	bS	5.0	250	1	0
Pagwachuan Lake Seed Production Area	wS	6.0	600	1	0
Red Lake District					
Acme Seed Orchard	jP	0.9	2 000	8	1
Nungesser Road Progeny Test	jP	1.1	2 500	4	5
Sioux Lookout					
Block 9–Highway 642	jP	2.5	4 000	20	0
Goodie Lake	jP	4.0	2 500	30	0
Moose Lake Road	jP	2.5	2 500	5	1
Stanzhikimi Lake Road	jP	2.8	2 500	10	1
Vermilion River Family Test	jP	1.8	2 500	2	1
Thunder Bay District					
Fallscamp Lake Family Test	jP	2.7	2 500	5	1
Hardwick Township	bS	2.0	2 500	10	0
Kakabeka Seed Orchard	jP	3.0	3 700	15	3
Sandstone Lake	bS	2.0	2 500	6	0

[a] bS = black spruce, jP = jack pine, wS = white spruce.

progresses rapidly in young trees and kills them by girdling at the root collar or by destroying major roots. In older trees the disease progresses slowly and may never cause mortality; however, these trees are much more susceptible to blowdown.

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

Western gall rust disease causes conspicuous round swellings that appear on the branches and stems of host trees. Infected trees are considered severely damaged if the main stem or 25 percent of the branches are affected. The most severe infection in 1995 was observed in the Stanzhikimi Lake area of the Sioux Lookout District. Here, 45 percent of the 2.8-m-tall jack pine trees were infected; 10 percent of these were severely affected. At 26 locations evaluated for this disease levels of infected trees ranged from 0 to 45 percent, and severely infected trees ranged from 0 to 15 percent (Table 9). Damage by this disease was compounded by the fact that in numerous situations the fir coneworm, *Dioryctria abietivorella* (Grt.), was also feeding in galls examined in the Sioux Lookout and Dryden districts. Feeding by this insect assured the death of the tree and/or branch on which the gall was located.

Table 9. Damage caused by the western gall rust in jack pine stands in the Northwest Region of Ontario in 1995.

Location	Average height of trees (m)	Number of trees per ha	Area affected (ha)	Trees affected (m)	Trees severely affected (%)
Dryden District					
Bradshaw Township	1.1	3 500	25	10	10
Camp 19 Road	1.1	2 500	10	3	3
Osaquan Township Progeny Test	1.3	2 500	4	3	3
Pike Lake Progeny Test	1.2	2 500	5	1	1
Revell Township	1.5	2 500	10	20	10
Route Bay	6.0	2 000	1	20	5
Satterly Township	3.5	2 500	3	15	1
Sunstrum Seed Orchard	1.3	2 000	4	4	4
Williams Bay	2.0	2 000	10	15	15
Fort Frances District					
Manion Lake Road	2.5	3 000	5	3	1
Kenora District					
Fifth Creek Seed Orchard	1.1	1 500	4	0	0
Jackman Township	3.0	6 000	4	0	0
Red Lake District					
Acme Seed Orchard	1.0	2 000	4	5	3
Coli Lake	4.0	4 000	15	22	9
Highway 105 at Bug River	5.0	2 000	5	5	5
Highway 105 S.E.	5.5	2 800	10	18	7
Nungesser Progeny Test	1.1	2 500	4	5	5
Sioux Lookout District					
Echo Township	3.8	2 500	10	10	3
Goodie Lake	4.0	2 500	30	25	5
Goodie Lake	2.4	2 000	5	10	10
Moose Lake Road	3.9	2 000	15	35	8
Moose Lake Road	2.5	2 500	5	40	10
Stanzhikimi Lake Road	2.8	2 500	10	45	10
Vermilion River Seed Orchard	1.0	2 400	8	15	15
Vermilion River Family Test	1.8	2 500	2	3	3
Thunder Bay District					
Raith Family Test	2.9	2 500	5	17	7

Minor Diseases

Pine Needle Rust, *Coleosporium asterum* (Dietel) Syd. & P. Syd.

Pine needle rusts are caused by the fungi of the genus *Coleosporium*. These fungi attack the needles of two- and three-needled pines, and may cause defoliation and stunt the growth of young trees. They seldom injure older trees.

The highest level of infection occurred at the Clay Hill plantation in Booth Township in the Nipigon District. At this location the incident level of trees affected was 89 percent; foliar damage averaged 66 percent. Other areas evaluated are summarized in Table 10.

Sweet Fern Blister Rust, *Cronartium comptoniae* Arthur

An evaluation conducted at the Kakabeka Seed Orchard in the Thunder Bay District revealed that 36 percent of the jack pine trees were infected by sweet fern blister rust. Tree heights varied from 2 to 4 m over a 15-ha site. No tree mortality was observed.

This disease organism was also recorded at two locations in the Kenora District. The highest level of infection occurred in Work Township, where 5 percent of the 17-m jack pine were affected in a 1-ha site. In Jackman Township 2 percent infection levels occurred on 3-m trees over a 5-ha area. Similar damage was also reported at the Bug River in the Red Lake District.

Table 10. Summary of foliar damage caused by the pine needle rust in the Northwest Region of Ontario in 1995. (Counts are based on an examination of 150 randomly selected jack pine at each location within six districts.)

Location	Average height of trees (m)	Number of trees per ha	Area affected (ha)	Trees affected (%)	Foliar damage (%)
Dryden District					
Osaquan Progeny Test	1.3	2 500	4	0	0
Pike Lake Progeny Test	1.2	2 500	5	0	0
Sunstrum Seed Orchard	1.3	2 500	5	0	0
Fort Frances District					
Cedar Narrows	1.5	2 000	5	5	5
Eltrut Road	1.2	1 500	5	5	15
Manion Lake Road	2.5	3 000	5	2	0
Morson Township	1.3	200	2	1	25
Kenora District					
Fifth Creek Seed Orchard	1.1	1 500	4	0	0
Jackman Township	3.0	6 000	4	0	0
Nipigon District					
Booth Township–Clay Hill	1.7	2 500	100	89	66
Ledger Township	1.8	2 500	5	70	40
Sioux Lookout District					
Goodie Lake	4.0	2 500	30	0	0
Highway 642–Block 9	2.5	4 000	20	0	0
Vermilion River Family Test	1.8	2 500	2	0	0
Vermilion River Seed Orchard	1.0	2 400	8	0	0
Thunder Bay District					
Kakabeka Seed Orchard	3.2	3 700	15	6	2
McIntyre Township	1.7	1 667	4	0	0
Robson Family Test	2.9	2 500	5	0	0
Waweig Lake	2.4	2 500	10	0	0

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

Varying levels of foliar damage caused by tar spot needle cast disease were recorded on jack pine at a number of points across the region (Table 11). The heaviest damage was found in the Dryden and Sioux Lookout districts. Foliar damage levels of 80 percent were present in Mafeking Township and near Route Bay in the Dryden District, albeit on only 10 percent of the trees examined. High numbers of affected trees (50–80 percent) were found at three sites in the Sioux Lookout District, but only 10 percent of the foliage was damaged. In addition to data collected from these stands, heavy infection was also noted on 3- to 12-m fringe trees growing along roadways in the aforementioned two districts. Lower incidence levels were observed in other jack pine stands in the Fort Frances, Kenora, Red Lake, and Thunder Bay districts (*see* Table 11).

Linospora Leaf Blight, *Linospora tetraspora* G.E. Thomps. and Septoria Leaf Spot, *Mycosphaerella populicola* G.E. Thomps.

Damage caused by linospora leaf blight and/or septoria leaf spot was again prevalent throughout the Northwest Region and affected all sizes of balsam poplar. Symptoms for both diseases are very similar and for this report they will be treated as one pest.

High infection levels, averaging 80 percent, were noted on 1- to 2-m roadside trees along the Highway 17 corridor west of Dryden; at various points along Highways 622, 502, and 642; and in the Route Bay area; all in the Dryden District. Similar infection levels were encountered along Highways 72 and 516, and in the Superior Junction area of the Sioux Lookout District. Many sites were similarly infested in the western Fort Frances District, and damage was widespread throughout the entire Thunder Bay District. Foliar damage levels ranged from 10 to 100 percent; however, for most of the affected areas damage

Table 11. Summary of damage caused by tar spot needle cast in jack pine stands in the Northwest Region of Ontario in 1995.

Location	Average height of trees (m)	Number of trees per ha	Area affected (ha)	Trees affected (%)	Foliar damage (%)
Dryden District					
Dryden District					
Mafeking Township	4.0	1 000	5	10	80
Satterly Township	3.5	2 500	3	40	10
Smellie Township	6.0	600	10	20	50
Route Bay	1.0	1 000	20	10	80
Fort Frances District					
Manion Lake Road	2.5	3 000	5	35	25
Kenora District					
Fifth Creek Seed Orchard	1.1	1 500	4	5	5
Jackman Township	3.0	6 000	4	0	0
Red Lake District					
Acme Seed Orchard	1.0	1 200	4	0	0
Coli Lake	4.0	4 000	15	5	10
Highway 105–Bug River	5.0	2 000	5	0	0
Highway 105 S.E.	5.5	2 800	10	13	10
Nungesser Road Progeny Test	1.1	2 500	4	0	0
Sioux Lookout District					
Goodie Lake	4.0	2 500	10	70	10
McAree Township	6.0	2 000	20	80	10
Stanzhikimi Lake Road	5.0	2 500	25	50	10
Thunder Bay District					
McIntyre Township	1.7	3 000	4	8	4

ranged from 50 to 80 percent. High infection levels were also encountered at numerous points in the Nipigon District. One of the more significant areas of damage was found in a 3-ha stand of mature trees along the Catlonite Road near MacKay Lake. At this location 90 percent defoliation was recorded.

Dooks' Needle Blight, *Lophophacidium dooksii* Corlett & Shoemaker

Damage caused by Dooks' needle blight on eastern white pine (*Pinus strobus* L.) was present at various locations in the Northwest Region in 1994. However, it had not been identified as such and was called "Browning of Eastern White Pine".[1] In 1995, the condition was not only identified, but was also more prevalent across the western half of the region. Infection by this foliage disease takes place in the spring on 2nd-year needles, and causes them to turn brown later in the summer. The nature of this disease is such that it will often attack only a single tree within a group and sometimes just a portion of the tree will be affected. At Km 18 on Highway 502 in the Dryden District, 100 percent foliar browning was observed on twelve 20-m-tall trees. In an area lying between the south end of Vickers Lake and Arms Lake, along Highway 502 in the Fort Frances District, numerous mature trees over a 3-ha area had average infection levels of 40 percent. Occasional trees were 100 percent browned. Scattered mature trees were affected in the 50–100 percent range along Highway 71, from the Nestor Falls area north to the junction with Highway 17, in the Kenora District. Damage was once again found at the OMNR Fire Centre/Air Base in the Sioux Lookout District. At this site six trees ranging in size from 8–20 m were 80 percent brown. Some understory regeneration was 100 percent affected. Infection levels ranging from 20–60 percent were observed on a few scattered 4- to 10-m trees in Dewan and MacFie townships and along Highway 599 south of Sandbar Lake Provincial Park in the Dryden District. Similar infection levels were present on a few scattered 10-m trees at Ojibway Provincial Park in the Sioux Lookout District.

Leaf Spot, *Septoria betulae* Pass.

Once again, damage by this late season leaf disease was recorded in the southern Nipigon District (Fig. 6). During 1994, the disease infected over 74 000 ha of white birch (*Betula papyrifera* Marsh.) throughout this area, but a major reduction in the area damaged was observed in 1995. Only 3 700 ha of moderate to severe damage remained in the townships of Wiggins, Yesno, and Lahontan; including Vein Island and the Powder Islands. Host trees averaged 60 percent foliar infection along the Highway 17 corridor in the Nipigon District. Elsewhere, typical damage levels ranged from 40 to 70 percent along major routes, such as Highway 642 in the Dryden District, Highway 502 in the Dryden and Fort Frances districts, Highway 11 in the Nipigon District, and the Vermilion River Road in the Sioux Lookout District.

Shoot Blight, *Venturia macularis* (Fr.:Fr.) E. Müll. & Arx

This shoot blight of trembling aspen infected 60 percent of the 2-m-tall saplings over a 10-ha cutover in the Route Bay area. Similar infection levels were also found in 20-ha cutovers in each of Satterly, Sandford, and Hartman townships in the Dryden District. Near Superior Junction, in the Sioux Lookout District, 60 percent of the saplings had one or two shoots affected over a 15-ha area.

Low incidence levels of the blight were reported in the Red Lake, Kenora, and Fort Frances districts. At the ARNEWS plot at Pistol Lake in the Kenora District, 10 percent of the 2.5-m understory regeneration had shoot mortality levels averaging 5 percent.

Other Forest Diseases

Various other diseases were encountered during the course of regular surveys. Information on these is provided in Table 12.

ABIOTIC DAMAGE

Blowdown

Blowdown resulted from high storm winds that occurred in the fall of 1994 in the Rainy River Crown limits in the Fort Frances District (Fig. 7). Surveys completed by the Rainy River Forest Company determined that 1 058 ha of damage had occurred in the Manitou and Seine River limits. The majority of the blowdown was recorded south of Caliper Lake and extending east to the southern portion of Pipestone Lake. A second area of damage occurred northeast of the Manitou stretch along the north shore of Eyelid Lake. The third area, mapped southeast of Eltrat Lake, extended to the southern portion of Sandbeach Lake.

[1] Constable, D.C.; Biggs, W.D.; Keizer, A.J.; Bolan, P.M. 1995. Results of forest insect and disease surveys in the Northwest Region of Ontario, 1994. Nat. Resour. Can., Canadian Forest Service–Ontario, Sault Ste. Marie, ON. Inf. Rep. 0-X-445. 23 p.

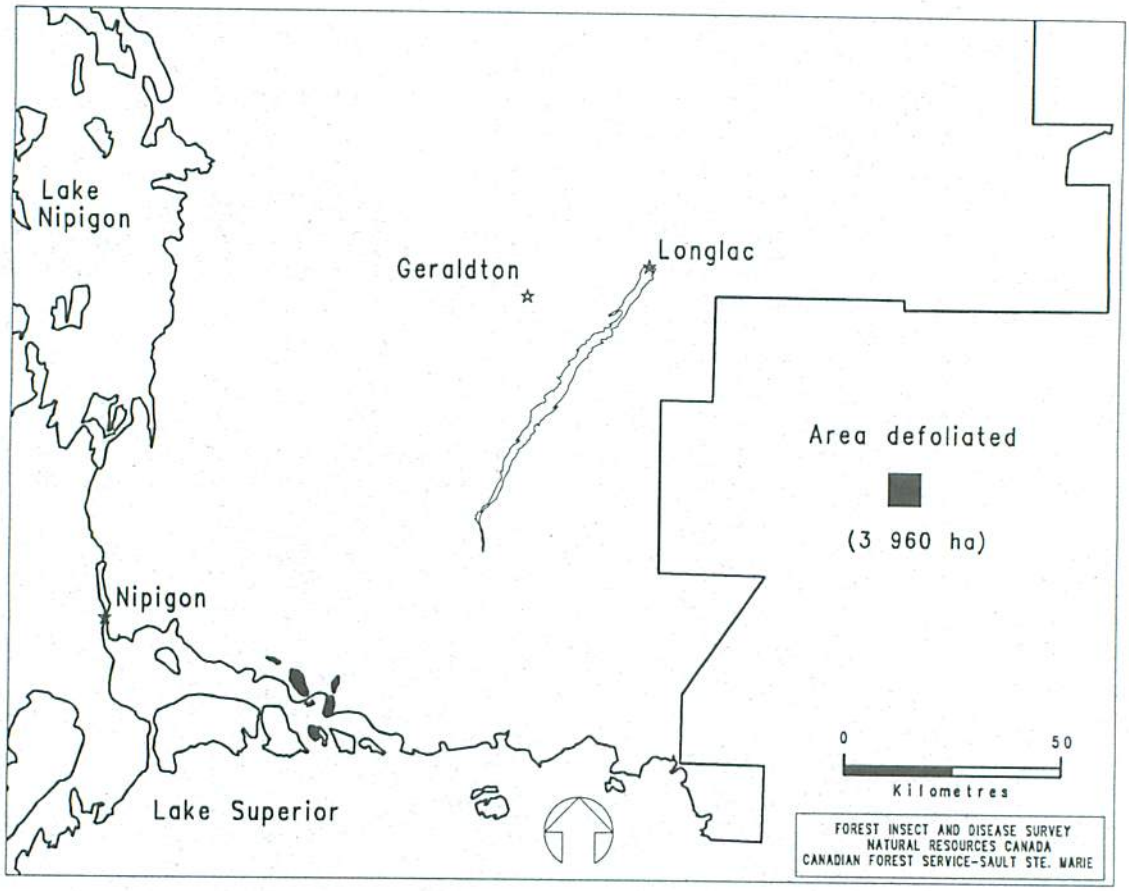

*Figure 6. Areas of moderate to severe defoliation caused by the leaf spot (*Septoria betulae *Pass.) in the Nipigon District, Northwest Region, in 1995.*

Table 12. Other forest diseases.

Disease	Host(s)[a]	Remarks
Apiosporina morbosa (Schwein.:Fr.) Arx Black knot	pCH	Damage caused by this disease was observed at numerous points across the Sioux Lookout and Dryden districts. In some cases whole clusters of shrubs were killed.
Chrysomyxa arctostaphyli Dietel Spruce broom rust	bS	Low levels of brooms were common in older age classes of trees throughout the Dryden and Sioux Lookout districts.
Chrysomyxa ledi (Alb. & Schwein.) de Bary Spruce needle rust	wS	This foliage disease was observed at trace levels across the Northwest Region.
Chrysomyxa ledicola Lagerh. Large-spored spruce needle rust	bS	Heavy rust infections caused 100 percent foliar damage on a small clump of trees at Neys Provincial Park in the Nipigon District.
Ciborinia whetzelii (Seaver) Seaver Ink spot of aspen	tA	Foliar infection levels ranging from 50 to 80 percent were recorded in a 0.8-ha area in Melgund Township in the Dryden District. Average damage levels of 30 percent were found on twelve 8- to 12-m trees along the Burma Lake Road in the Sioux Lookout District. At Jean Lake in the Nipigon District, 20 percent foliar damage occurred on 15-m trees over a 0.5-ha area.

(cont'd)

Table 12. Other forest diseases (concl.).

Disease	Host(s)[a]	Remarks
Cronartium ribicola J.C. Fisch. White pine blister rust	ewP	The heaviest blister rust damage reported was in Lash Township ship in the Fort Frances District, where 14 percent infection levels were encountered on 4.5-m trees over a 5-ha area.
Erwinia amylovora (Burrill) Winslow et al. Fire blight	aMo	This condition was once again prevalent on ornamental plantings at Marina Park in the Thunder Bay District. Foliar damage was approximately 50 percent, with 20 percent branch mortality on 4- to 5-m trees.
Gymnosporangium cornutum Arthur ex Kern Mountain-ash–juniper rust	aMo	Foliar damage levels of 10 percent were observed at scattered points along the Cameron Falls Road in the Nipigon District.
Hendersonia pinicola Whem. Needle cast parasite	jP	Following 2 years of severe foliar damage in the Nakina area of the Nipigon District, this disease was not detected in 1995.
Hypoxylon mammatum (Wahlenb.) P. Karst. Hypoxylon canker	tA	Varying degrees of tree mortality were widespread across the entire region.
Isthmiella faullii (Darker) Darker Needle cast	bF	Near the Milkshake Lake area on Sibley Peninsula in the Thunder Bay District, 20 percent needle infection was present on trees ranging from 3 to 6 m in height.
Ophiostoma ulmi (Buisman) Nannf. Dutch elm disease	wE	A survey in the town of Fort Frances on mature and over-mature trees revealed that 6 percent of the trees were currently infected.
Uncinula adunca (Wallr.:Fr.) Lév. Powdery mildew	bPo, W	Severe leaf infection was found on roadside regeneration adjacent to Highways 642 and 622 in the Dryden District.

[a] aMo = American mountain-ash, bF = balsam fir, bPo = balsam poplar, bS = black spruce, ewP = eastern white pine, jP = jack pine, pCH = pine cherry, tA = trembling aspen, W = willow, wE = white elm, and wS = white spruce.

The majority of the host trees affected were jack pine, poplar, black spruce, and white birch. However, some stands of eastern white pine and eastern white cedar (*Thuja occidentalis* L.) were also damaged. Most of the stands were in the mature to overmature age category.

Drought Damage

Above normal temperatures were recorded throughout the Northwest Region during the months of June and August. In addition, below normal precipitation totals were recorded during various spring and summer months (*see* Climatic Data). This combination of weather factors induced drought-like symptoms in the Nipigon, Sioux Lookout, and Dryden districts. The symptoms, which appeared in mid-August, included premature leaf discoloration and leaf-drop on hardwoods. The hosts most affected were white birch and trembling aspen, and much of the damage was recorded on thin-soiled hilltops and ridges. The eastern Nipigon District contained the largest areas of drought damage (Fig. 8). Approximately 106 455 ha were aerially mapped in five major areas. Three of these areas were mountainous ridges located along the Aquasebon, Pic, and Little Pic river watersheds (76 395 ha). Smaller areas were observed southeast of Long Lake near McKay Lake (18 230 ha), and north of Geraldton near Burrows Lake (11 830 ha). In the Sioux Lookout District white birch regeneration was affected throughout an old burn site off Highway 516 and along the Vermilion River Road. Similar damage was observed in the Dryden District at various points along Highway 502 and in young stands in Tustin Township.

Figure 7. Blowdown damage in a mature trembling aspen (Populus tremuloides *Michx.) stand.*

Frost Damage

Freezing temperatures were recorded at three weather stations in the Northwest Region during the spring of 1995. Temperatures varied between -2.0°C and -2.4°C on June 8 at Geraldton, Thunder Bay, and Fort Frances. In addition, -1.3°C was the temperature on June 7 at the Geraldton station. Near freezing temperatures (0.0° and 0.5°C) were also recorded at the other two stations on 7 and 9 June. Varying degrees of frost damage occurred at numerous locations across the region. White spruce and balsam fir, and to a lesser extent black spruce, were most affected. No damage was detected on any deciduous species. Levels of mortality to new shoots ranged from trace (1 to 6 percent) to 100 percent.

In the Thunder Bay District, severe damage occurred in white spruce plantations planted in 1975 and 1984 in Glen Township. At this site incidence levels were 100 percent, and foliar damage levels averaged 80 percent on trees ranging from 2 to 5 m in height. Additional damage to various age classes of balsam fir stands was present at numerous points in the Thunder Bay District. Shoot damage ranging from 60 to 90 percent was observed along the

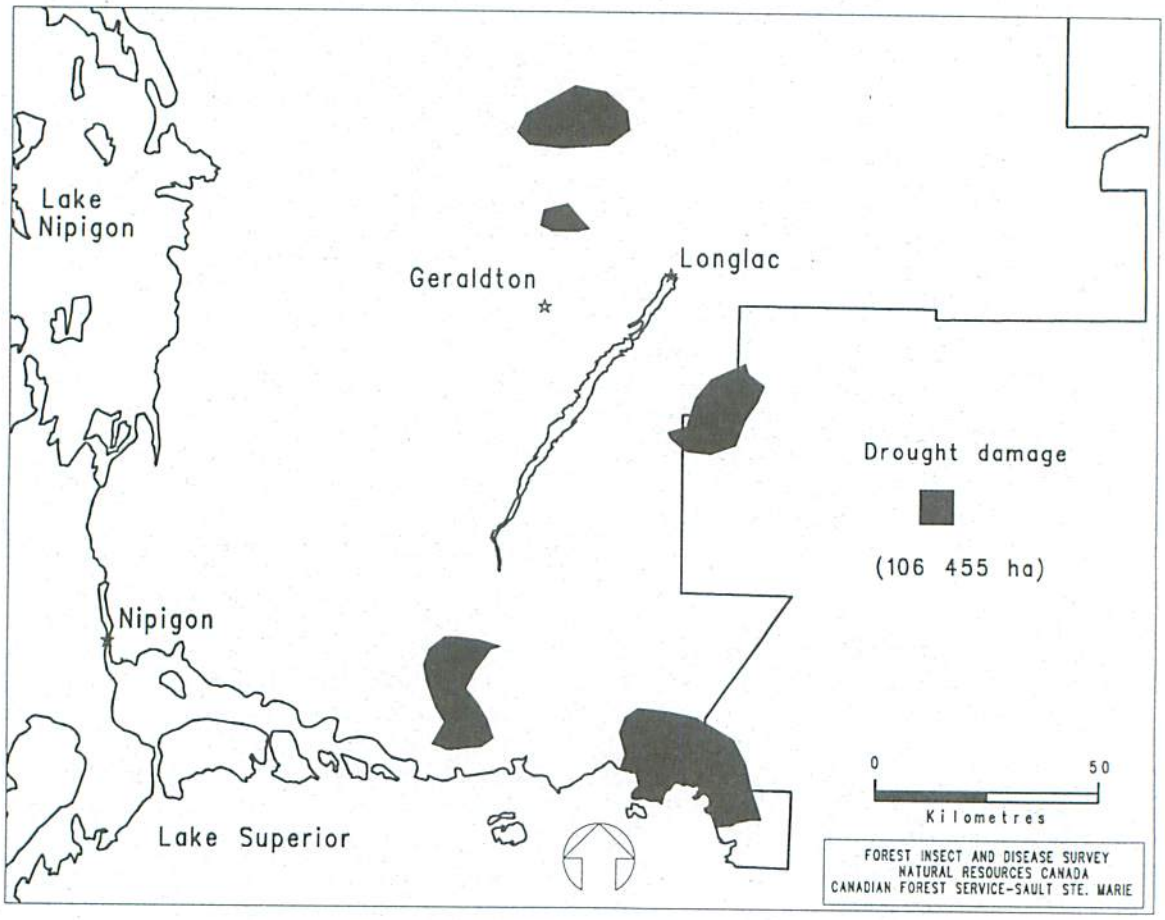

Figure 8. Areas of damage caused by drought in the Nipigon District, Nowthwest Region, in 1995.

Dog Lake Road, at various spots along Highway 11 in Soper Township, and along a 6-km stretch of Highway 811. At numerous sites along Highway 527 single trees and small clumps of balsam fir had damage levels ranging from 5 to 100 percent.

All of the 5-m white spruce were affected in a 50-ha plantation at Limestone Lake in the Nipigon District. Foliar damage levels averaged 45 percent. Elsewhere in the district occasional young trees along roadways and in low lying areas sustained varying amounts of damage.

Late season frost caused damage in the Fort Frances District and the southern portion of the Kenora District. Light damage (5-20 percent) was observed on mature balsam fir in the eastern portion of the Fort Frances District. Evaluations were also carried out in two seed orchards in the Fort Frances District. The heaviest damage occurred at the Morson Seed Orchard, where 60 percent of the 1.8-m white spruce had 5 percent of their new shoots killed. Damage levels averaging 15 percent were present on 5 percent of the 4-m white spruce at the Manion Lake Seed Orchard. Lower levels were recorded on black spruce in the same orchard. In the Kenora District, 5 percent of the shoots were damaged on 3 percent of the black spruce at the Mennesabik Lake and Ulster Lake seed orchards.

High numbers (80 percent) of 0.8-m black spruce had 50 percent shoot damage over a 5-ha area west of Basket Lake in the Dryden District.

Hail Damage

Hail damage was encountered at three areas in the Northwest Region in 1995. The heaviest damage was located approximately 35 km north of Graham along the Petrie Road near McCausland Lake in the Thunder Bay District. This stand was composed of about 800 ha of aerially seeded jack pine ranging in height from 1 to 1.7 m. Damage levels varied greatly, with 5 to 80 percent of the branches damaged on 100 percent of the trees. No current mortality was detected, but some of the more severely damaged trees could die in 1996. A 2-ha pocket of 2- to 6-m balsam fir growing along the south side of Highway 11/17 in MacGregor Township was also affected. Branch mortality levels ranged from 5 to 50 percent.

Hail damage occurred at one location in Clavet Township in the Nipigon District. Forty percent of the balsam fir in the 2-m height class had 60 percent branch damage.

Salt Damage

In 1995, low levels of salt damage occurred on young trees adjacent to major highways at various locations across the Northwest Region. The heaviest damage reported, in Kirkup Township in the Kenora District, was at the intersection of Highways 17 and 71. Here, 60 percent of the roadside 1.5-m red pine (*Pinus resinosa* Ait.) and eastern white pine sustained foliar damage levels ranging from 30 to 70 percent.

Scorch Damage

Intense heat levels caused sudden tissue desiccation and resulted in shrivelled, brown leaf surfaces and/or margins on younger trees and shrubs. The majority of the damage occurred adjacent to roads and amidst exposed rock, where reflective heat levels were greater near the ground. The most commonly affected hosts were white birch, red maple (*Acer rubrum* L.), and speckled alder (*Alnus incana* ssp. *rugosa* [Du Roi] J. Clausen). Some of the heaviest damage was in the eastern part of the Fort Frances District along Highway 11 between Windigoostigwan Lake and Mine Centre. Foliar damage levels on white birch and red maple ranged from 20 to 80 percent on individual trees and small clumps in this area. Varying levels of damage were also observed on white birch adjacent to paved streets in the city of Thunder Bay in the Thunder Bay District. Severe browning of leaf edges on 10-m white birch was also observed in the western part of the region. Small clusters of trees had 100 percent foliar damage in Hartman Township in the Dryden District and south of Kimmewin Lake in the Sioux Lookout District.

Winter Browning

Trace levels of damage due to winter browning were reported over much of the region. However, exceptions to this were found in two districts. Roadside eastern white pine, under 2 m tall, averaged 50 percent foliar browning along Highway 11 from Ledger Township to Kilkenny Township in the Nipigon District. An evaluation of 0.5-m white spruce at the Bawlb Seed Orchard in the Red Lake District revealed 20 percent foliar damage on 2 percent of the trees.

FOREST HEALTH

Acid Rain National Early Warning System (ARNEWS)

A total of 11 ARNEWS plots were evaluated across the Northwest Region so as to monitor the possible effects of airborne pollutants on the forest. Out of this total, six of the plots have been in place for about 10 years. These include the two jack pine plots in each of Mafeking Township in the Dryden District and in Dance Township in the Fort Frances District, and the mixed jack pine–black spruce plot located near Margo Lake in the Nipigon District. Black spruce plots at Fowler Township, Thunder Bay District and near Sandel Lake, Sioux Lookout District, and the white spruce plot in Wiggins Township, Nipigon

District, were part of the original six plots. In 1995 a 5-year assessment was carried out on all of these plots. Tree parameters assessed included the vertical and horizontal characteristics of the crown, the position of each tree in the canopy, the diameter at breast height (DBH), and the tree form. The length of any dead tops and the length of the tree's live crown were calculated from the vertical crown measurements. All saplings that attained tree size (10 cm or greater DBH and taller than 2 m) since the last 5-year assessment were added to the plot system. In addition, a foliar sample and an increment core were taken from all off-plot trees for the purpose of chemical and growth analyses.

The other five ARNEWS biomonitoring plots, established in 1993, involved an inspection of three major tree species. Jack pine was the primary host in the Pine Road plot in the Dryden District. Trembling aspen were examined at the Caribou Falls Road plot, Kenora District and in Hutchinson Township, Fort Frances District. Two white birch stands were surveyed; one near Schreiber in Priske Township, Nipigon District and the other at Ear Falls in the Red Lake District.

Symptoms attributed to airborne pollutants were not observed in any of the plots. However, a range of insect and disease pests were encountered on most of the plots examined. The eastern spruce budworm affected 80 percent of the balsam fir in the Fowler Township plot in the Thunder Bay District. On black spruce, defoliation levels averaged 80 percent, with only trace levels of damage found. At the Sandel Lake black spruce plot in the Sioux Lookout District, 100 percent of the trees were affected. However, defoliation levels never exceeded 10 percent. Three different leafrollers were found on high numbers of white birch in the Wiggins Township plot and in the Schreiber plot, both in the Nipigon District. Foliar damage levels ranged from 40 to 90 percent in these two plots. Eighty percent of the jack pine had 15 percent of their branches affected by western gall rust at the Margo Lake plot, Nipigon District. Much lower levels of infection (11–16 percent) were found at the Pine Road and Mafeking Township plots in the Dryden District. Poplar false tinder fungus (*Phellinus tremulae* [Bondartsev] Bondartsev & Borissov) fruiting was present on 30 percent and 9 percent of the trembling aspen in plots at Caribou Falls Road, Kenora District and in Hutchinson Township, Fort Frances District, respectively. All plots will be checked again in 1996.

SPECIAL SURVEYS

Gypsy Moth, *Lymantria dispar* (L.)

Pheromone trapping for gypsy moth adults began in 1984 and has continued annually throughout the region. During this period trace levels of male moths have been captured at various places. No infestations or larvae have been observed to date.

In 1995 two pheromone traps were deployed at 20 sites across the region. As in previous years, all provincial parks were sampled. So also were two privately operated parks near Upsala and Geraldton in the Thunder Bay and Nipigon districts, respectively. Traps were also set out at Minaki Lodge in the Kenora District and at Leunenburger's Fly-In Service in the Nipigon District. One gypsy moth adult was captured in a trap at Kakabeka Falls Provincial Park in the Thunder Bay District.

Forest Tree Nursery Report

During the 1995 field season there were very few problems encountered at the OMNR Dryden Forest Tree Nursery in the Dryden District. A total of four visits was made throughout the course of the season, but on only one occasion was a damaging organism identified. Gray mold (*Botrytis cinerea* Pers.:Fr.), probably a secondary infection, was cultured from the dead tops of a few black spruce from Greenhouse No. 3. No insect or disease pests that caused any noteworthy impact were collected at the nursery in 1995.

Northern Ontario Development Agreement Northern Forestry Program

This joint venture between the Ontario Ministry of Natural Resources and the Canadian Forest Service continued in 1995. Reassessments of 113 eastern spruce budworm plots and 88 jack pine budworm plots were completed during spring and late-summer visits. Assessments carried out on the condition of the trees included observations of the levels of defoliation and mortality. Also, the quantity of male flowers were recorded for jack pine. Branch samples were taken for the purpose of egg-mass and L_2 counts to forecast 1996 populations (Appendices 1 and 2). Increment cores and soil samples were obtained from all jack pine plots. Each jack pine plot was also classified under the forest ecosystem classification system.[2] Data retrieved from plot evaluations is presently being studied and will be available upon request in the near future.

[2] Sims, R.A.; Towill, W.D.; Baldwin, K.A.; Wickware, G.M. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ont. Min. Nat. Resour., Northwestern Ontario Forest Technology Development Unit, Thunder Bay, ON. 191 p.

Climatic Data

Significant deviations from normal temperature levels can have a profound effect on the development and survival of many biotic pests. Warmer than normal temperatures speed the metamorphosis of many forest insect pests. At times, extreme weather conditions are the result of abiotic forms of damage in the forest, such as blowdown caused by very high winds. Lower than normal temperatures in the spring can result in damage to new conifer shoots and conversely, very hot summer temperatures can cause scorch damage to hardwood leaves. In 1995 a number of abiotic conditions related to climate were reported. These can be found in the "Abiotic Damage" section of this report.

Table 13 summarizes the 1995 weather data provided by the five Environment Canada weather offices in the Northwest Region of Ontario. The "normals" quoted were taken directly from the Canadian Climatic Normals for Ontario from 1951 to 1980. As evidenced, no strong patterns can be seen. However, some hotter than normal temperatures during the summer months were recorded at all of the stations, and some fairly sizeable reductions in monthly rainfall were noted.

Table 13. Climatic data from five weather stations in the Northwest Region of Ontario in 1995.

		Mean temperature (C°)		Deviation from normal	Total precipitation (mm)		Deviation from normal
Location	Month	Normal	Actual	(C°)	Normal	Actual	(mm)
Fort Frances Airport	January	-16.9	-12.9	+4.0	30.6	36.0	+5.4
	February	-13.1	-14.9	-1.8	22.7	22.0	-0.7
	March	-5.7	-3.5	+2.2	31.6	19.0	-12.6
	April	3.8	0.2	-3.6	48.5	37.2	-11.3
	May	11.0	10.4	-0.6	71.2	54.0	-17.2
	June	16.4	19.3	+2.9	101.7	42.8	-59.7
	July	19.2	18.4	-0.8	103.7	124.8	+21.1
	August	17.7	19.0	+1.3	82.6	104.0	+21.4
	September	12.2	11.2	-1.0	83.8	103.5	+19.7
	October	6.6	5.0	-1.6	50.9	71.8	+20.9
	November	-3.2	-9.6	-6.4	36.8	38.5	+1.7
	December	-12.4	-14.6	-2.2	31.8	36.0	+4.2
Geraldton Airport	January	-20.0	-16.3	+3.7	38.2	31.6	-6.6
	February	-17.9	-18.7	-0.8	33.3	53.2	+19.9
	March	-11.0	-7.7	+3.3	38.2	32.4	-5.8
	April	-0.5	-2.2	-1.7	43.3	28.8	-14.5
	May	7.7	8.2	+0.5	63.2	93.4	+30.2
	June	13.5	16.7	+3.2	91.1	83.8	-7.3
	July	16.3	16.2	-0.1	81.6	94.0	+12.4
	August	14.6	17.6	+3.0	66.8	34.6	-32.2
	September	9.3	9.0	-0.3	75.6	141.2	+65.6
	October	3.9	2.6	-1.3	64.6	156.2	+91.6
	November	-5.5	-12.6	-7.1	61.5	51.2	-10.3
	December	-15.4	-16.9	-1.5	38.8	31.4	-7.4
Kenora Airport	January	-18.5	-14.1	+4.4	28.2	41.5	+13.3
	February	-14.4	-15.6	-1.2	23.0	15.6	-7.4
	March	-7.1	-4.1	+3.0	30.1	17.8	-12.3
	April	2.7	0.6	-2.1	41.9	15.2	-26.7
	May	10.5	10.6	+0.1	57.3	96.2	+38.9
	June	16.1	20.5	+4.4	83.4	98.2	+14.8
	July	19.2	19.1	-0.1	91.8	94.6	+2.8
	August	17.6	19.5	+1.9	85.9	111.8	+25.9
	September	11.6	11.9	+0.3	69.2	28.4	-40.8
	October	5.6	4.6	-1.0	40.7	58.2	+17.5
	November	-4.6	-9.8	-5.2	40.4	41.8	+1.4
	December	-14.1	-15.6	-1.5	31.2	33.7	+2.5

(cont'd)

Table 13. Climatic data from five weather stations in the Northwest Region of Ontario in 1995. (concl.)

Location	Month	Mean temperature (C°) Normal	Mean temperature (C°) Actual	Deviation from normal (C°)	Total precipitation (mm) Normal	Total precipitation (mm) Actual	Deviation from normal (mm)
Sioux Lookout Airport	January	-19.4	-15.4	+4.0	36.0	67.9	+31.9
	February	-15.7	-17.0	-1.3	27.6	38.4	+10.8
	March	-8.3	-5.1	+3.2	35.0	18.4	-16.6
	April	1.4	-0.4	-1.8	45.2	21.8	-23.4
	May	9.2	9.6	+0.4	65.8	63.0	-2.8
	June	15.2	19.9	+4.7	91.7	106.4	+14.7
	July	18.3	18.6	+0.3	93.7	99.6	+5.9
	August	16.6	19.3	+2.7	88.3	43.2	-45.1
	September	10.7	10.4	-0.3	81.6	46.4	-35.2
	October	4.7	3.3	-1.4	64.9	73.6	+8.7
	November	-5.3	-9.3	-4.0	49.9	50.8	+0.9
	December	-15.1	-16.4	-1.3	33.7	50.6	+16.9
Thunder Bay Airport	January	-15.4	-11.4	+4.0	40.9	47.6	+6.7
	February	-13.0	-13.2	-0.2	28.3	41.3	+13.0
	March	6.3	-4.5	-10.8	45.0	14.2	-30.8
	April	2.5	0.1	-2.4	50.7	36.1	-14.6
	May	8.8	9.7	+0.9	73.3	87.6	+14.3
	June	14.0	16.2	+2.2	76.6	22.0	-54.6
	July	17.6	17.2	-0.4	75.4	111.3	+35.9
	August	16.4	17.7	+1.3	83.1	77.9	-5.2
	September	11.1	10.5	-0.6	89.1	93.3	+4.2
	October	5.7	5.1	-0.6	54.8	92.6	+37.8
	November	-2.6	-9.3	-6.7	52.9	56.5	+3.6
	December	-11.1	-12.9	-1.8	41.7	39.1	-2.6

Appendix 1. Northwest Region – Eastern Spruce Budworm. (Summary of defoliation estimates and egg-mass counts in 1995 and infestation forecasts for 1996.)

Location	Host[a]	Estimated defoliation in 1995 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1996[b]	Accumulated damage[c]
Dryden District (27 locations)					
*Bridges Township–stand 83	bF	52	197	M–S	5
*Coronary Lake	bF	66	310	S	3
*Docker Township–stand 110	bF	87	235	S	2
	bS	21	145	M–S	1
*Dore Lake–stand 483	bF	48	102	M–S	4
*Emmons Lake	bF	78	212	M–S	3
	wS	65	508	S	1
*Forest Lake–stand 22	bF	19	117	M–S	3
*Isley Township	bF	43	0	N	1
*Langton Township	bF	94	84	M–S	3
*Langton Township	wS	89	635	S	2
*Little Indian Lake	bF	5	0	N	7
*Mafeking Township	bF	62	230	S	7
*McIlraith Township–stand 10	bF	83	293	S	3
	bS	19	279	S	1
*North Road	bF	93	0	N	4
	bS	58	360	S	1
*Rugby Township	bF	28	15	L–M	4
	wS	80	221	S	3
*Sandy Point Road	bF	88	252	S	5
*Satterly Township	bF	94	256	S	4
	bS	20	1004	S	1
*Southworth Township	bF	35	87	M–S	6
*Temple Township	bF	33	134	M–S	7
	wS	65	287	S	6
*Vaughan Lake	bF	78	176	M–S	2
	bS	55	311	S	1
Fort Frances District (11 locations)					
*Big Sawbill Lake	bF	89	70	M–S	3
*Calm Lake	bF	61	169	M–S	6
	bS	7	155	M–S	0
*Claxton Township	bF	58	47	M–S	5
*French Lake	bF	91	152	M–S	8
*Lake Hope	bF	92	155	M–S	2
*Menary Township–stand 84	bF	95	253	S	2
*Perch Lake	bF	59	105	M–S	6
	bS	2	39	L–M	0
*Preacher Lake	bF	52	0	N	2
*Watten Township–stand 158	bF	91	85	M–S	3
Kenora District (18 locations)					
*Aerobus Lake Road	bF	88	72	M–S	6
	wS	76	97	M–S	6
*April Lake	bF	90	270	S	3
*Cliff Lake	bF	60	126	M–S	3
	wS	58	289	S	3
*Ewart Township–stand 28	bF	16	15	L–M	8
*Forgie Township–stand 355	bF	21	0	N	7

(cont'd)

Appendix 1. Northwest Region – Eastern Spruce Budworm. (Summary of defoliation estimates and egg-mass counts in 1994 and infestation forecasts for 1995.) (cont'd)

Location	Host[a]	Estimated defoliation in 1995 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1996[b]	Accumulated damage[c]
Kenora District (18 locations) (concl.)					
*Godson Township–stand 451	bF	84	49	M–S	6
*Haycock Township–stand 384	bF	81	784	S	3
*Kirkup Township–stand 167	wS	63	420	S	8
*McMeekin Township–stand 412	bS	41	24	L–M	6
*Melick Township–stand 205	bF	82	167	M–S	7
	wS	72	327	S	7
*Separation Lake–stand 8	bF	81	40	L–M	5
	wS	79	388	S	5
*Trail Lake–stand 127	bF	74	103	M–S	8
*Tweedsmuir Township	wS	72	144	M–S	7
*Willingdon Township–stand 156	bF	58	30	L–M	6
Nipigon District (47 locations)					
*Ashmore Township	bF	47	26	L–M	2
	wS	84	154	M–S	2
*Bikerace Lake	bF	88	18	L–M	4
*Black Sturgeon Lake–stand 200	bF	3	43	L–M	4
*Booth Township	bF	2	0	N	3
*Burrows Lake–North	bF	67	19	L–M	3
	wS	58	331	S	3
*Burrows Lake–South	bF	68	82	M–S	3
	wS	43	540	S	3
*Caramat Road–Highway 11	bF	46	67	M–S	3
*Catlonite Road–Spider Lake	bF	87	91	M–S	3
	bS	42	38	L–M	3
*Church Township–stand 74	bF	1	55	M	3
*Coldwell Township	wS	4	0	N	0
*Daley Township	bF	14	0	N	3
	bS	22	0	N	3
*Errington Township	bF	63	0	N	2
*Eskanonwatin Lake–stand 276	bF	4	0	N	5
*Grain Township	bF	0	0	N	7
*John Ahl Road	bF	35	0	N	6
	bS	8	35	L–M	6
*John Creek–stand 179	bF	0	0	N	8
*Ledger Township–Polly Lake	bF	10	11	L	6
	bS	9	0	N	6
*Legault Township–Highway 11	bF	78	37	L–M	3
	wS	54	192	M–S	3
*Legault Township–Kinghorn Road	bF	73	22	L–M	3
	wS	49	48	L–M	3
*Nakina Township	bF	36	80	M–S	3
	wS	79	310	S	3
*Nibs Lake	bF	4	40	L–M	4
	wS	6	0	N	4
*Nonwatin River–stand 380	bF	14	53	L–M	5
*Parent Township	bF	31	0	N	1
	wS	49	50	M	1
*Pic Township–Black River	bF	0	15	L–M	1
	bS	0	0	N	1
*Raynar Lake	bF	51	0	N	2
	wS	22	27	L–M	2
*South Beatty Lake	wS	64	35	L–M	7

(cont'd)

Appendix 1. Northwest Region – Eastern Spruce Budworm. (Summary of defoliation estimates and egg-mass counts in 1995 and infestation forecasts for 1996.) (cont'd)

Location	Host[a]	Estimated defoliation in 1995 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1996[b]	Accumulated damage[c]
Nipigon District (47 locations) (concl.)					
*Suicide Lake	bF	22	8	L	4
	wS	44	0	N	4
*Summers Township	bF	6	0	N	8
	wS	19	55	L–M	8
*Twit Lake–stand 197	bF	0	0	N	4
	wS	5	38	L–M	4
*Windigokan Lake	bF	2	11	L	7
Red Lake District (7 locations)					
*Baird Township–stand 162	bF	92	83	M–S	5
*Detector Lake–stand 251	bF	74	59	M–S	8
*Goldpine Road–stand 734	bF	64	110	M–S	4
*Sandy Creek–stand 202	wS	81	390	S	7
*Snake Falls Road–stand 38	bF	94	167	M–S	3
	wS	92	286	S	3
*Wenesaaga Lake–stand 252	bF	76	45	L–M	3
Sioux Lookout District (12 locations)					
*Burma Lake Road	bF	92	126	M–S	4
	bS	68	50	L–M	1
*Deception Lake	bF	85	234	S	3
*Drayton Township–stand 234	bF	17	25	L–M	3
*Factor Township–stand 209	bF	35	168	M–S	2
*Foley Lake–stand 287	bF	80	499	S	3
Goodie Lake Seed Orchard	bS	1	0	N	0
*Lomond Township	bF	94	381	S	3
*Moose Lake Road	bF	78	64	M–S	3
Pacific Lake Family Test	bS	21	187	M–S	1
*Pape Lake	bF	32	52	L–M	3
*Pickerel Township	bF	3	41	L–M	3
Thunder Bay District (43 locations)					
Aldina Township–stand 19	bF	49	96	M–S	2
*Blackwell Township–stand 46	bF	18	124	M–S	6
Burchell Lake–stand 125	bF	1	0	N	-
*Buzzer Lake Road–stand 13	bF	92	464	S	3
	wS	78	344	S	2
*Cheeseman Lake–stand 26	bF	16	24	L–M	6
	wS	25	45	L–M	4
Crayfish Lake	bF	0	0	N	+
*Crombie Lake–stand 196	wS	60	168	M–S	8
*Decourcey Lake–stand 62	bF	30	380	S	2
*Dog Lake–stand 60	bF	11	96	M–S	4
*Fallis Township–stand 281	bF	34	114	M–S	1
*Forbes Township–Flett–stand 256	bF	20	90	M–S	3
*Fowler Township–stand 192	bF	15	97	M–S	2
	bS	1	58	M	0
*Glen Township–stand 56	bF	2	62	M–S	1
*Gorham Township–stand 99	bF	14	203	M–S	4
	wS	51	735	S	3
Greenwater Lake–S.E.	bF	0	0	N	-
–Shelter Island	bF	0	0	N	-
Greenwood Lake	bF	0	0	N	-

(cont'd)

Appendix 1. Northwest Region – Eastern Spruce Budworm. (Summary of defoliation estimates and egg-mass counts in 1995 and infestation forecasts for 1996.) (concl.)

Location	Host[a]	Estimated defoliation in 1995 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1996[b]	Accumulated damage[c]
Thunder Bay District (43 locations) (concl.)					
*Fowler Township	bF	72	121	M–S	2
Hagey Township–Highway 586	bF	4	10	L	+
Haines Township–Postans	bF	1	0	N	+
*Hicks Lake–stand 65	bF	15	51	M–S	1
Hood Lake	bF	0	0	N	-
Hoof Lake	bF	5	0	N	6
*Joeboy Lake–stand 86	bF	2	0	N	6
*Kabitotikwia Lake–stand 216	bF	28	201	M–S	4
*Kenna Lake–stand 127	bF	9	14	L–M	1
*Laverendrye Park–stand 33	bF	3	53	M	8
McGinnis Lake	bF	1	0	N	-
*Michener Township–stand 276	bF	61	204	S	3
*Milkshake Lake–stand 136	bF	11	104	M–S	4
	wS	59	379	S	3
Moss Lake	bF	0	0	N	1
*Mountain Lake Road–stand 205	bF	1	0	N	4
*Open Bay–stand 513	bF	11	35	L–M	6
Plummes Lake	bF	0	0	N	-
*Sandstone Lake–283	bF	11	0	N	2
*Soper Township–stand 186	bF	75	447	L–M	3
*Walkingshaw Lake–stand 393	bF	41	569	M–S	1
*Waweig Lake–stand 265	bF	20	114	M–S	5
*Wolf River Road-km 28–stand 93	bF	10	0	N	4

* SBW NODA IMPACT PLOT.

[a] bF = balsam fir, bS = black spruce, wS = white spruce.

[b] S = severe, M = moderate, L = light, N = nil.

[c] Accumulated Damage: 0 = undamaged; 1 = light damage, <25 percent total defoliation, usually one season of severe defoliation; 2 = moderate damage, 25 to 60 percent total defoliation, two or three seasons of severe defoliation; 3 = severe damage, 60 to 80 percent total defoliation, three to five seasons of severe defoliation, will recover; 4 = moribund or dying, 80 to 100 percent total defoliation, crowns gray in appearance, 50–150 cm top dead or bare; 5 = <25 percent of stand dead; 6 = 25 to 50 percent of stand dead; 7 = 50 to 70 percent of stand dead; 8 = >70 percent of stand dead; 9 = <25 percent of stand dead, no significant (0–25 percent) defoliation for several years; + = 25 to 50 percent of stand dead, no significant defoliation for several years; - = 51 to 70 percent of stand dead, no significant defoliation for several years.

Appendix 2. Northwest Region – Jack Pine Budworm. (Summary of defoliation estimates and egg-mass counts in 1995 and infestation forecasts for 1996 on jack pine. All sampling was done on jack pine budworm NODA plots.)

Location	Estimated defoliation in 1995 (%)	Total number of egg-masses on six 61 cm branch tips	Infestation forecasts for 1996[a]
Dryden District (17 locations)			
Bailey Lake–stand 208	0	0	N
+Basket Lake–stand 519	0	0	N
Bradshaw Township–stand 200	0	0	N
+Bradshaw Township–stand 212	0	0	N
+Centrefire Lake–stand 23	0	0	N
Hodgson Township–stand 370	1	0	N
+Ilsley Township–stand 333	0	0	N
Lac Seul-Williams Bay–stand 89	0	0	N
+ –Route Bay–stand 128	0	0	N
Mafeking Township–stand 66	0	0	N
McNevin Township–stand 364	0	0	N
Mutrie Township–stand 311	0	0	N
Revell River–stand 398	0	0	N
Suzanne Lake–stand 323	0	0	N
Turtle Lake–stand 19	0	0	N
Wabigoon Township–stand 350	0	0	N
–stand 362	0	1	L
Fort Frances District (16 locations)			
+Caliper Lake–stand 167	0	0	N
+Dance Lake–stand 37	0	1	L
Dawn Road–stand 229	0	0	N
Eltrut Lake–stand 183	0	0	N
–stand 249	0	0	N
Fishhawk Road–stand 43	0	0	N
Gallo Lake–stand 131	0	0	N
+Heathcliffe Lake–stand 232	0	0	N
+Hillyer Creek–stand 224	0	0	N
Lake Despair–stand 24	0	0	N
Prince Road–stand 18	0	0	N
Rawlinson Creek–stand 30	0	0	N
Rawlinson Creek–stand 119	0	0	N
Skull Lake–stand 110	0	0	N
Straw Lake–stand 519	0	0	N
Triple Road–stand 134	0	0	N
Kenora District (13 locations)			
April Lake–stand 134	0	0	N
Blindfold Creek–stand 344	1	0	N
Coyle Township–stand 245	0	0	N
Devonshire Township–stand 503	0	0	N
Graphic Lake–stand 209	0	0	N
Gundy Township–stand 319	0	0	N
+John Lake–stand 119	0	0	N
MacNicol Township–stand 108	0	0	N
+Mark Lake–stand 103	0	0	N
Rabbit Lake	0	0	N
Snook Lake	0	0	N
Stokes Lake	0	0	N
Wabigoon Lake–stand 32	0	0	N

(cont'd)

Appendix 2. Northwest Region – Jack Pine Budworm. (Summary of defoliation estimates and egg-mass counts in 1995 and infestation forecasts for 1996 on jack pine. All sampling was done on jack pine budworm NODA plots.) (concl.)

Location	Estimated defoliation in 1995 (%)	Total number of egg-masses on six 61 cm branch tips	Infestation forecasts for 1995[a]
Red Lake District (24 locations)			
+Bateman Township–stand 31	0	0	N
+Bateman Township–stand 31	0	0	N
+ –stand 34	0	0	N
+Coli Lake–stand 224	0	0	N
Conifer Lake	0	0	N
Ear Falls	0	0	N
+Emarton Lake	0	0	N
+Flundra Lake	0	0	N
+Gleave Lake	0	0	N
+Graves Township–stand 514	0	0	N
McDonough Township–stand 401	0	0	N
–stand 402	0	0	N
–stand 403	0	1	L
+McKenzie Bay Road–stand 374	0	0	N
+McKenzie Bay Road–stand 451	0	0	N
North Road–stand 132	0	1	L
Nungesser Road–km 30–stand 27	0	0	N
–km 36–stand 150	0	0	N
–km 75–stand 407	0	0	N
Nungesser River–stand 240	0	0	N
Overnight Road–stand 404	0	0	N
Sidace Lake Road–stand 230	0	0	N
+ –stand 254	0	0	N
Wenesaga Lake	0	0	N
Zimring Road–stand 100	0	0	N
Sioux Lookout District (18 locations)			
+Drayton Township–stand 200	0	0	N
+Elbow Lake Road–stand 251	0	0	N
Goodie Lake–stand 49	0	0	N
Goodie Lake–stand 80	0	0	N
+Goodie Lake–stand 83	0	0	N
+Goodie Lake–stand 108	0	0	N
Goodie Lake–stand 245	0	0	N
+Lomond Township–stand 6	0	0	N
McAree Township–stand 57	0	0	N
McAree Township–stand 65	0	0	N
Moose Lake Road–stand 99	0	0	N
Moose Lake Road–stand 116	0	0	N
–stand 122	0	0	N
Porrett Lake–stand 259	0	0	N
Stanzhikimi Lake Road–stand 26	0	0	N
+ –stand 230	0	0	N
Wrong Road–stand 266	0	0	N
Wyatt Lake Road–stand 195	0	0	N

[a] N = nil, L = light, M = moderate, H = heavy.

+ Immature jack pine stand.