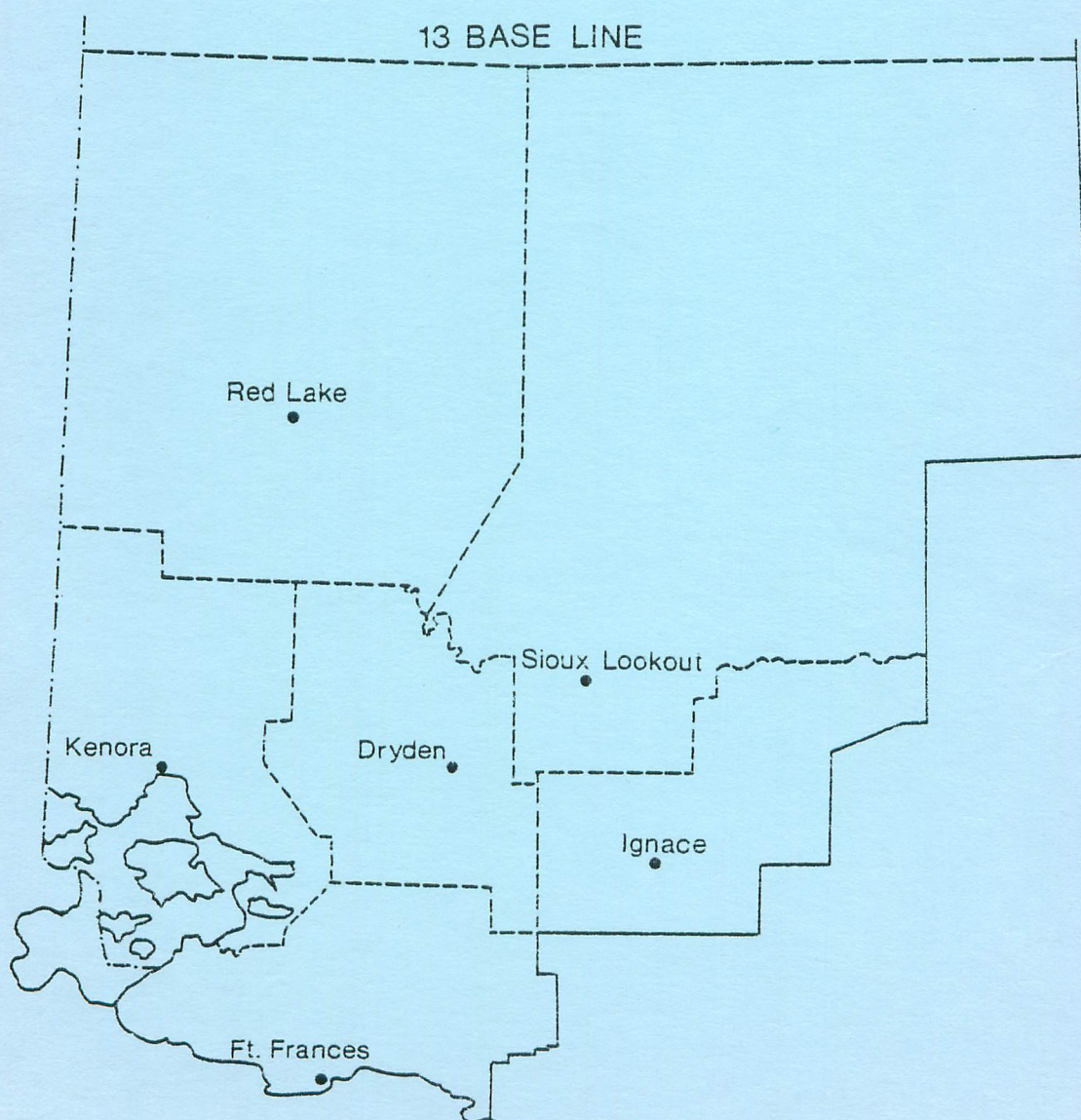


# Results of forest insect and disease surveys in the NORTH WESTERN REGION of Ontario, 1978



CARRIED OUT BY THE GREAT LAKES FOREST  
RESEARCH CENTRE IN CO-OPERATION WITH  
THE ONTARIO MINISTRY OF NATURAL RESOURCES

## SURVEY HIGHLIGHTS

The most important forest insect and tree disease conditions in the Northwestern Region in 1978 are described herein. The spruce budworm infestation persisted and the area infested increased by more than 100% over 1977. The forest tent caterpillar and aspen leaf-roller infestations more than doubled in size; however, the overall area infested is expected to decrease considerably in 1979. Populations of the yellowheaded spruce sawfly increased for the third consecutive year in the southern portion of the Region, and high populations of adult sawyer beetles caused noticeable damage to fringe trees of jack pine stands for the second consecutive year in the Sioux Lookout District and at one point in the Red Lake District. Populations of the larch sawfly were observed over a larger area than in the previous year.

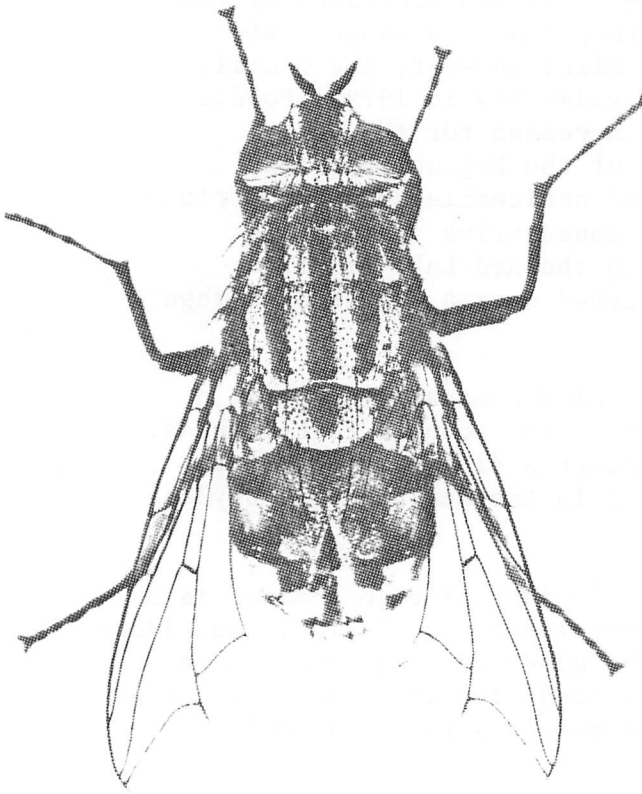
Surveys for Dutch elm disease revealed a marked increase in numbers of infected trees in the vicinity of the town of Fort Frances. An increase in the distribution of Scleroderris disease of pine was recorded when infection centres were found in the Red Lake and Dryden districts.

A hailstorm caused serious damage to jack pine in a mixed jack pine-black spruce stand in the northern portion of the Region. Considerable tree mortality can be expected in the affected stand over the next two or three years. Special surveys were conducted in randomly selected spruce plantations to determine the incidence of spruce chlorosis.

M. J. Thomson

R. J. Sajan





*Sarcophaga aldrichi* Park.



Nuclear polyhedrosis virus

Frontispiece. Two important natural control agents of the forest tent caterpillar, *Malacosoma disstria* Hbn.

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## INSECTS

### Boxelder Leafroller, *Archips negundana* Dyar

Populations of this leafroller continued to increase throughout the southern portion of the Region. The highest level of damage was recorded within an area surrounding the town of Fort Frances in the Fort Frances District. As much as 50% of the foliage on the larger, open-grown ornamental Manitoba maples (*Acer negundo* L.) was damaged. Elsewhere trace levels of defoliation were recorded, extending as far north as the town of Kenora.

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

The results of damage surveys, population sampling, and egg-mass counts have been included with those of other regions in a special report by G.M. Howse et al. (Report O-X-300). This report provides a complete description and analysis of developments in the spruce budworm situation in Ontario in 1978 and gives infestation forecasts for the province for 1979.

### Greenstriped Mapleworm, *Dryocampa rubicunda rubicunda* Fabr.

There was a marked increase in population levels of this defoliator in 1978 over the low level of the past several years. A small area of infestation occurred in the Windy Point and adjacent island area of Commissioners Bay on Rainy Lake in the Fort Frances District. Defoliation ranged as high as 100% on red maple (*Acer rubrum* L.) shade trees and many inquiries were received from concerned cottage owners.

Trace levels of defoliation occurred on roadside regeneration along Highway 11, south of Patton Lake in the Fort Frances District.

### Aspen Leafblotch Miner, *Lithocolletis ontario* Free.

Heavy infestations of this leafblotch miner persisted on trembling aspen (*Populus tremuloides* Michx.) regeneration at scattered locations in the Ignace District and along the southern portion of the Fort Frances District, for the third consecutive year. In the Borups Corners area of the Dryden District, similar damage was recorded for the second consecutive year. Elsewhere in the Region low levels of damage were observed and sampled at various points (Fig. 1).

Two major factors, larval competition and parasitism, play an important part in the natural control of this leafblotch miner. Samples taken from within heavily infested areas in the Ignace and Fort Frances districts revealed that considerable parasitism occurred, thereby indicating a possible decrease in population levels over the next year or two.

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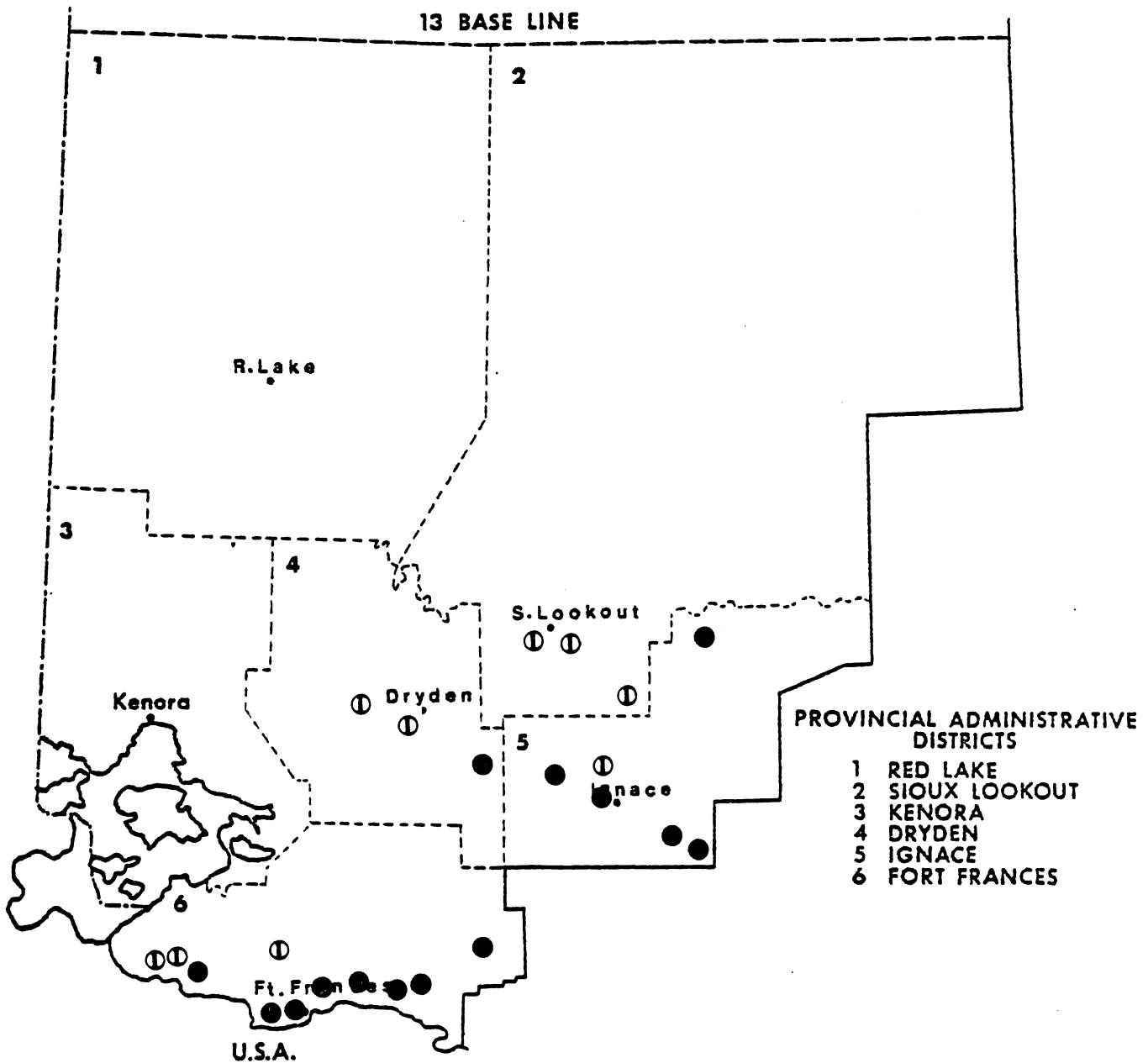


Fig. 1. ASPEN LEAFBLOTCH MINER

Locations where browning of trembling aspen foliage occurred in 1978.

Moderate-to-heavy . . . . . ●

Light . . . . . ①

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The area infested by the forest tent caterpillar more than doubled in size over that recorded in 1977. Aerial mapping revealed moderate-to-severe defoliation of aspen stands within approximately 145 000 km<sup>2</sup> (56,000 mi.<sup>2</sup>) of forest land in the part of the Region lying south of the 13th baseline compared with 59 570 km<sup>2</sup> (23,000 mi.<sup>2</sup>) in 1977. Each of the six districts in the Region were affected. Small pockets of new moderate-to-heavy infestation were found and mapped in the southeastern portion of the Fort Frances District, approximately 48 km (30 mi.) south of the perimeter of the main body of infestation (Fig. 2). Mapping of the caterpillar population extending north from the 13th baseline (not included in map) revealed moderate-to-severe defoliation of aspens within approximately 15 540 km<sup>2</sup> (6,000 mi.<sup>2</sup>) of forest land in this area.

The infestation extended from the town of Pinewood in the southwestern part of the Fort Frances District north of the Canada-United States border through Lake of the Woods, then east of the Ontario-Manitoba boundary, northward to the eastern end of Island Lake on the Ontario-Manitoba boundary, approximately 136 km (85 mi.) north of the 13th baseline. From this point the infestation boundary ran easterly to Seeber Lake, southeasterly to the Severn River, approximately 48 km (30 mi.) northeast of Sandy Lake, thence in a southerly direction past Upper Windigo, Deplanche and Pickle lakes, through the east end of Lake St. Joseph and Sturgeon Lake, to the Ignace area and Campus Lake on the Ignace-Atikokan district boundary. The southern boundary of the infestation extended from near Mount Lake on the Fort Frances-Atikokan district boundary northwesterly to Upper Manitou Lake, westerly to the east shore of Lake of the Woods and then southward to the Canada-United States border at Pinewood.

Larval populations were extremely high in many aspen stands in the defoliated area as in the previous year. Heavy larval migration was observed along highways within the area bounded by Sioux Narrows, Kenora, Ear Falls, Sioux Lookout and Ignace in Kenora, Red Lake, Sioux Lookout and Ignace districts. However, aerial observation in the western parts of Kenora and Red Lake districts revealed a marked decrease, since 1977, in the amount of defoliation in the area bounded by Unfreville, Red, and Musclow lakes. Defoliation of aspen stands averaged about 50% on ridges and hillsides, but in many instances defoliation could not be discerned in river valleys or low-lying stands in the area. This condition, along with the age of the infestation, is indicative of a declining caterpillar population. Further declines can be expected in the area in 1979. Small numbers of dead late-instar larvae, collected near Onaway Lake north of Dryden in Dryden District, proved to be infected with a nuclear polyhedrosis virus, a disease generally associated with infestations that are on

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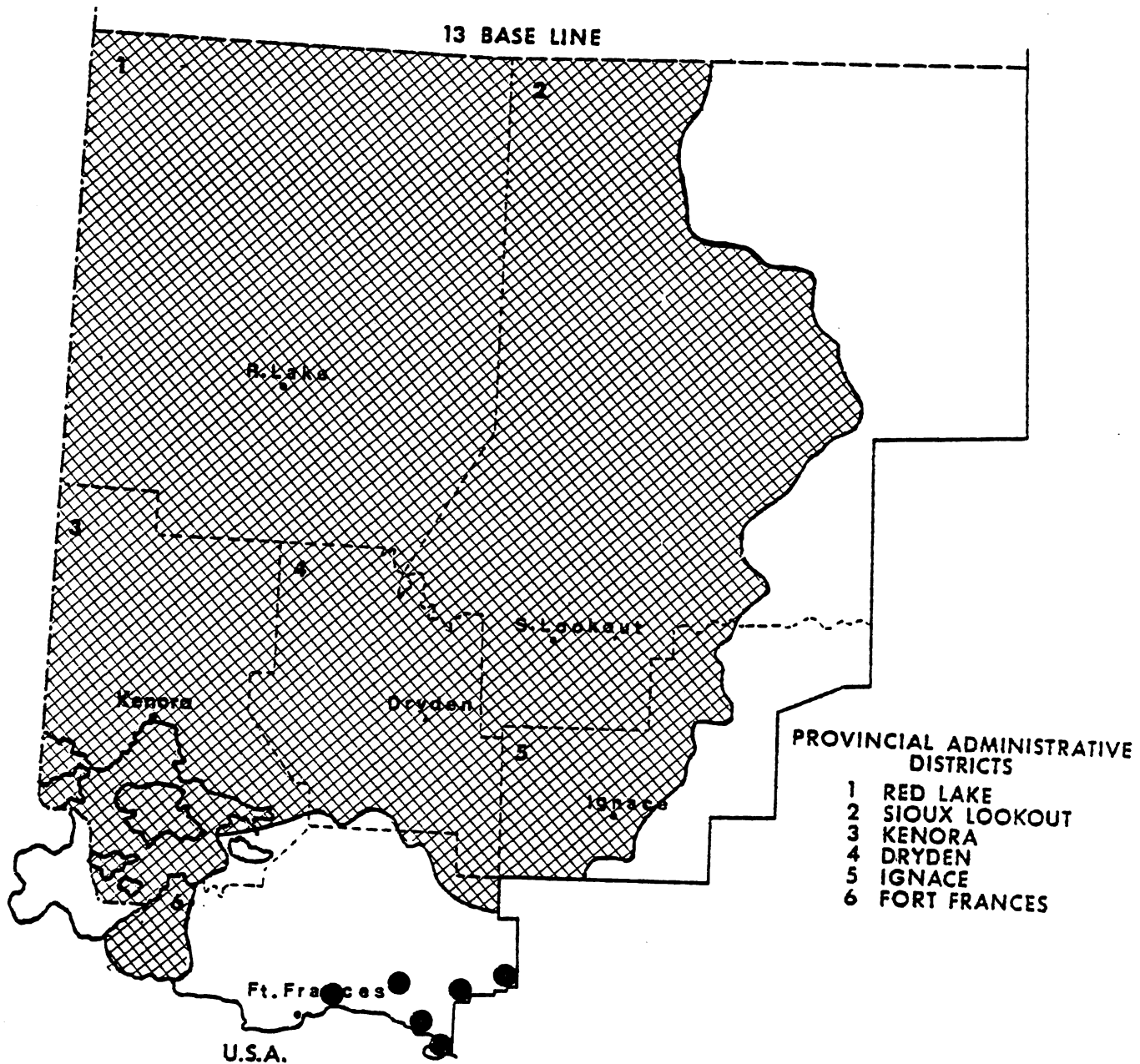



Fig. 2. FOREST TENT CATERPILLAR

Areas where defoliation of aspen occurred in 1978.

Moderate-to-severe . .  or ●



the decline, and a parasite, *Sarcophaga aldrichi* Park., was present in a number of locations (see Frontispiece). Cocoon dissections at eight scattered points revealed a decrease of 52% over the previous year in the incidence of moth emergence, making three consecutive years of declining moth populations. Emergence averaged 19% and ranged from a low of 0% in the Pakwash-Bruce lakes area in the Red Lake District where an infestation has persisted for six consecutive years to a high of 34% in a two-year-old infestation in the Hudson area in the Sioux Lookout District (Table 1). Parasitism was responsible for 79% of the moth emergence failure and 2% failed from disease infections or unknown causes.

Counts were made of the number of overwintering egg bands on trembling aspen within and along the southern and eastern portion of the area currently infested (Table 2). The results of these counts indicate that infestations will decrease in the older part of the infestation in the northwestern part of Kenora District and in the western half of the Red Lake District. However, an eastward and southeastward extension in the area of infestation can be expected in parts of the Sioux Lookout, Ignace and Fort Frances districts (Fig. 3).

Sawyer Beetles, *Monochamus* sp.

Damage caused by high populations of adult sawyer beetle feeding in jack pine (*Pinus banksiana* Lamb.) stands recurred for the second consecutive year in the Northwestern Region.

Severe branch and twig mortality were observed on fringes of stands in strip-cut areas near Sandybeach and Goodie lakes in the Sioux Lookout District and along the fringe of an immature stand on the edge of a clear-cut area about 5 km (3 mi.) southeast of Two Island Lake in the Red Lake District. Damage was generally confined to a depth of 20 m (65 ft) along fringes of affected stands. Tree mortality was evident by mid-August.

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

This sawfly continued to cause considerable damage to young, open-grown spruce (*Picea* spp.) in the southern portion of the Region, especially in the Fort Frances District (Fig. 4).

In conjunction with a special spruce chlorosis survey conducted throughout the Region, sawfly damage was evaluated in eight randomly selected planted areas. Damage ranged from 100% defoliation of both current and old foliage on windbreaks along Highway 71, near Finland in Potts Township, Fort Frances District, to 0% defoliation in the plantations examined in the northern portion of the Region (Table 3).

Table 1. Results of forest tent caterpillar cocoon dissections in 1977 and 1978 in the Northwestern Region (100 cocoons dissected at each location).

Location	Parasitized (%)		Diseased or unknown (%)		Adult emergence (%)	
	1977	1978	1977	1978	1977	1978
Red Lake District						
Red Lake	58	93	7	0	35	7
Bruce Lake	72	92	8	8	20	0
Sioux Lookout District						
Hudson	58	66	2	0	40	34
Kenora District						
Hwy 17 west of Kenora	45	75	4	1	51	24
Hwy 17 at Longbow Corners	-	66	-	5	-	29
Birch Lake	-	74	-	0	-	26
Dryden District						
Prichard Lake	-	81	-	0	-	16
Hwy 17 at Eagle R.	40	84	9	0	51	16

#### White Pine Weevil, *Pissodes strobi* (Peck)

A decrease in the incidence of weevil attacks on jack pine was recorded in the Region in 1978. The average number of leaders destroyed at eight sites evaluated was 2.7% compared to 4.5% in 1977 (Table 4). The highest incidence of damage occurred in Webb Township, Dryden District, where 8% of the leaders of regeneration jack pine in a cutover area were weeviled.

Table 2. Summary of forest tent caterpillar egg-band counts and infestation forecasts for 1979 in the Northwestern Region (counts based on examination of one to three trembling aspen trees at each location).

Location	Avg DBH of sample trees (cm) <sup>a</sup>	No. of trees examined	Avg no. of egg bands per tree	Infestation forecast for 1979
Red Lake District				
Red Lake	12	3	2	light
Sioux Lookout District				
Sioux Lookout	12	1	105	severe
Echo Twp	14	1	96	severe
Kenora District				
Sherwood Lake Rd.	13	3	15	moderate
Tweedsmuir Twp	13	1	29	severe
Hwy 17 at Longbow Corner	11	3	10	moderate
Dryden District				
Aubrey Twp	10	1	52	severe
Ignace District				
Smirch Lake	15	1	199	severe
Suzanne Lake	12	1	51	severe
Savant Lake	12	3	2	light
Fort Frances District				
Mine Centre	18	1	41	severe
Lake of the Woods Prov. Pk	13	1	50	severe

<sup>a</sup> 1 cm = 0.39 in.

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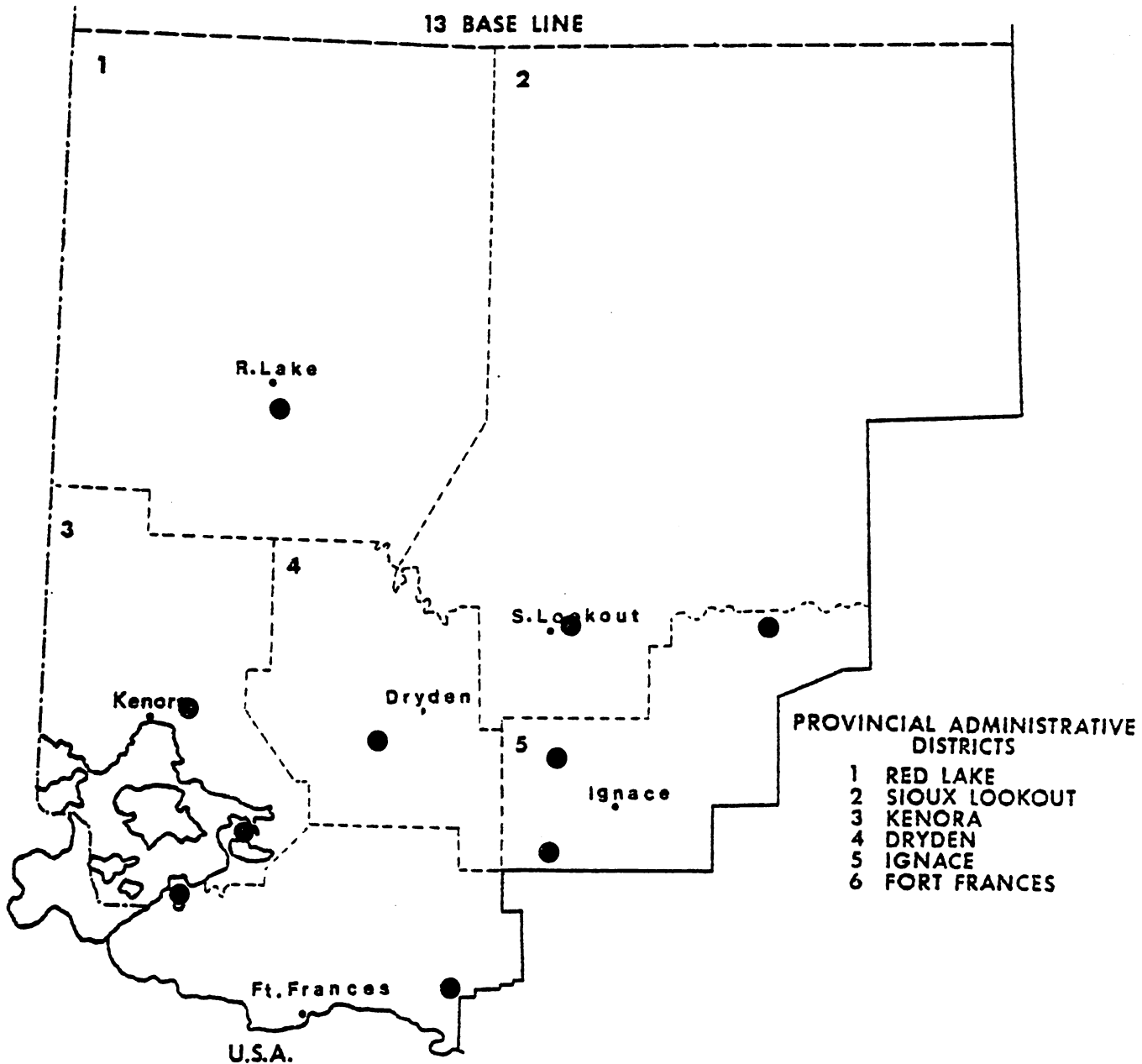


Fig. 3. FOREST TENT CATERPILLAR

Location of egg-band counts in each district in 1978 . . . . . ●

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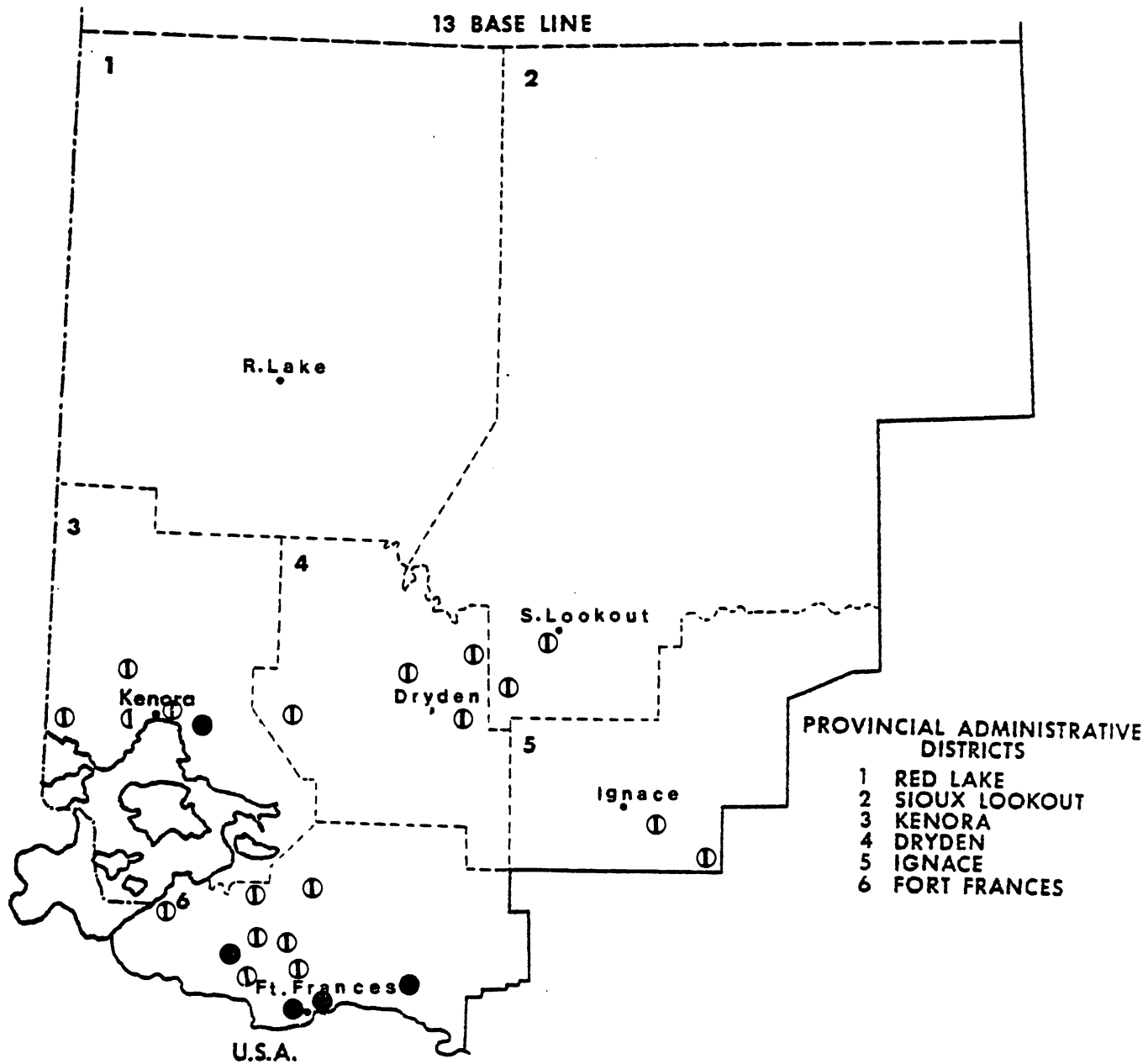


Fig. 4. YELLOWHEADED SPRUCE SAWFLY

Locations where defoliation of spruce occurred in 1978.

Moderate-to-severe . . . . . ●

Light . . . . . ①



Table 3. Summary of damage caused by the yellowheaded spruce sawfly in eight randomly selected planted areas in the Northwestern Region.

Location	Tree sp.	Tree ht (m) <sup>a</sup>	No. of trees examined	% of trees affected	Damage level
Sioux Lookout District					
Echo Twp	bS	3.0	150	0	nil
McAree Twp	bS	3.0	150	0	nil
Kenora District					
Ena Lake Rd	bS	1.9	150	0	nil
Dryden District					
Webb Twp	wS	0.4	150	9	trace
Ignace District					
Paguchi Lake Area	bS	2.0	150	0	nil
Fort Frances District					
Potts Twp	wS	1.9	127	100	severe
McCrosson Twp	wS	2.1	150	18	trace
Kingsford Twp	wS	2.0	150	6	trace

<sup>a</sup> 1 m = 3.28 ft

#### Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Although little change occurred in the generally low population level of this sawfly as reported in 1977, a marked increase in distribution was recorded in the Region in 1978.

Larval colonies were observed on fringes of stands, on open-grown and roadside regeneration larch (*Larix laricina* [Du Roi] K. Koch) at scattered points from Mutrie Township in the Dryden District to Ignace in the Ignace District, and along Highway 599 from the vicinity of Ignace to the Otoskwin River 55 km (34 mi.) northeast of Pickle Lake. No colonies were found in this area during a 1977 survey. Damage was light through the surveyed area except in Mutrie Township east of Vermillion Bay and in Morley Township east of Pinewood where very small pockets of moderate-to-severe defoliation were recorded (Fig. 5).

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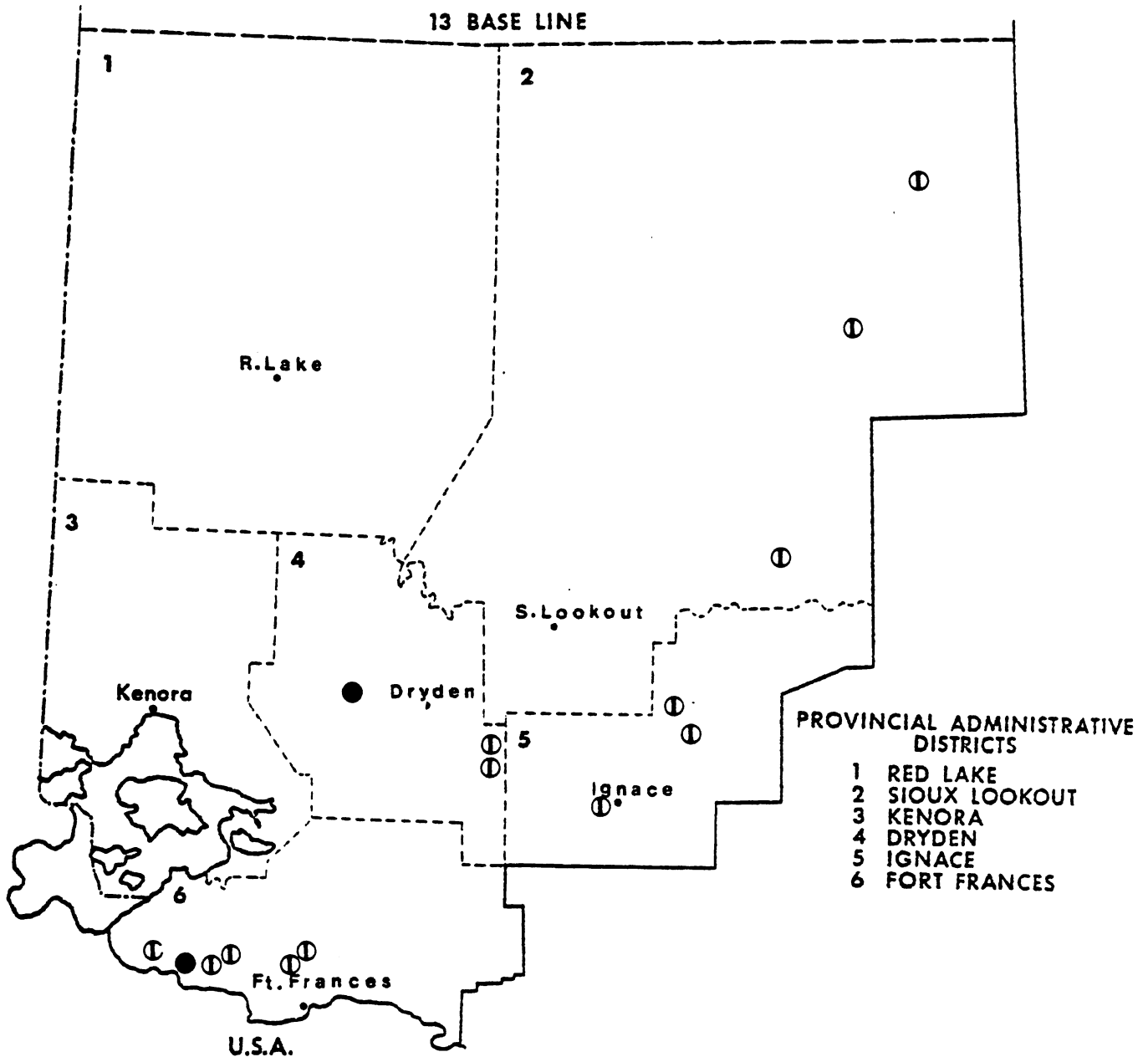


Fig. 5. LARCH SAWFLY

Areas where defoliation of larch occurred in 1978

Moderate-to-severe . . . . . ●  
Light . . . . . ①

Table 4. Summary of damage by the white pine weevil in the Northwestern Region in 1977 and 1978 (counts based on the examination of 100+ randomly selected jack pine trees (3-5 cm<sup>a</sup> DBH) at each location).

Location	Trees weeviled (%)	
	1977	1978
Sioux Lookout District		
Drayton Twp	2	0
Dryden District		
Buller Twp	4	2
Webb Twp	-	8
Drope Twp	-	1
Ignace District		
Hwp 599 at Crystal R.	4	2
Martin Siding	4	3
Paguchi Lake	5	1
Fort Frances District		
Bowes Camp Rd	6	5

<sup>a</sup> 1 cm = 0.39 in.

Oak Leafroller, *Pseudexentera cressoniana* Clem.

Bur oak (*Quercus macrocarpa* Michx.) growing along the Rainy River in the Fort Frances District and scattered across the islands in the southern portion of Lake of the Woods and Nestor Falls area of the Kenora District were partially defoliated by this leafroller for the third consecutive year. The heaviest damage was detected in Woodyatt Township in the Fort Frances District where defoliation was as high as 75% on fringe trees along Highway 602 at the La Vallée River.

Elsewhere, defoliation ranged from 10 to 30% with the higher levels occurring on the more open-grown fringe trees.

Aspen Leafroller, *Pseudexentera oregonana* Wlshm.

There was a marked increase in the area of moderate-to-severe defoliation caused by this leafroller for the second consecutive year in the Fort Frances District. Approximately 3 600 km<sup>2</sup> (1,390 mi.<sup>2</sup>) were heavily defoliated, extending from the Bear Pass area westerly along the Ontario-Minnesota border to Worthington Township and north-westerly from Bear Pass to the Menary and Dewart townships area (Fig. 6).

Adjacent to the eastern edge of the area described above and extending northerly to Eltrut Lake and easterly to the Atikokan District boundary, light defoliation recurred, with small pockets of heavy defoliation, similar to that of 1977.

Small pockets of light defoliation were also detected in the area between the main body of infestation and Highway 17, through the southern part of Kenora District and the southwestern part of the Dryden District.

Table 5. Other forest insects.

Insect	Host(s)	Remarks
<i>Acantholyda erythrocephala</i> (Linn.) Pine false webworm	rP	one colony detected on regeneration at Stevens Bay, Kenora District; first record for northwestern Ontario
<i>Cecidomyia verrucicola</i> O.S. Basswood gall midge	Ba	very common on ornamentals throughout the town of Fort Frances
<i>Conophthorus banksianae</i> McPh. Jack pine tip beetle	jP	trace levels of damage detected along Hwy 642 south of Kirk Lake, Sioux Lookout District, and in Buller Twp along Hwy 105, Dryden District
<i>Diprion similis</i> (Htg.) Introduced pine sawfly	scP	light damage to open-grown pine in the McInnis Creek area of Atwood Twp, Fort Frances District; northwestern extension of known range

(continued)

Table 5. Other forest insects (concluded).

Insect	Host(s)	Remarks
<i>Eucosma gloriola</i> Heinr. Eastern pineshoot borer	jP	population levels remain very low throughout the Region
<i>Fenusa pusilla</i> (Lep.) Birch leafminer	wB	low numbers commonly detected in the English River area, Ignace District, and in the Windy Point area and town of Fort Frances
<i>Hyphantria cunea</i> (Dru.) Fall webworm	wE, W, wB	populations remain low; few scattered colonies observed in Dryden and Fort Frances districts
<i>Malacosoma californicum pluviale</i> Dyar Western tent caterpillar	pCh	scattered colonies along the Marchington Rd, northeast of Deception Bay, Sioux Lookout District
<i>Neodiprion maurus</i> Roh. Redheaded pine sawfly	jP	two colonies collected on fringe trees along Hwy 599 at Fault Creek, Sioux Lookout District
<i>Neodiprion nanulus nanulus</i> Schedl Red pine sawfly	rP	low numbers collected along the Echo Twp access road, Sioux Lookout District
<i>Neodiprion virginianus</i> complex Redheaded jack pine sawfly	jP	low numbers collected in the McInnis Creek, Bear Pass and Crow Rock areas in Fort Frances District
<i>Tetralopha expandens</i> Wlk. Oak webworm	bO	high populations recorded at roadside park, Nestor Falls, Kenora District



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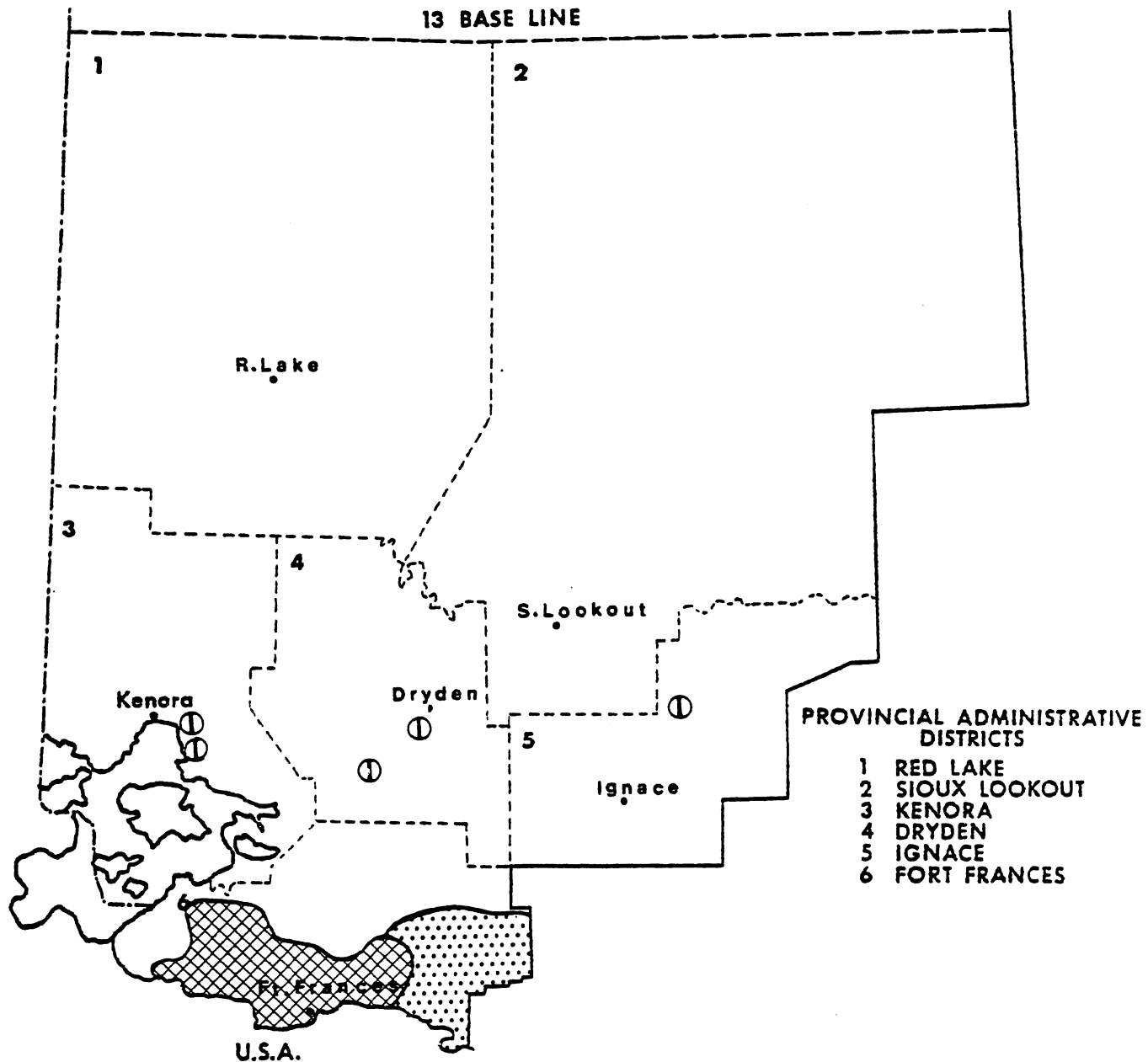


Fig. 6. ASPEN LEAFROLLER

Areas where defoliation of aspen occurred in 1978.

Moderate-to-severe . . . . .

Light . . . . . ① or



## DISEASES

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

Surveys for this elm disease indicated that there was a marked increase during 1978 in the level of incidence. The disease was first detected in the Region in 1977 and then at only one site within the town of Fort Frances. In 1978 the disease had spread to seven locations. Three of these new sites are within the town of Fort Frances proper; two diseased trees were detected approximately 8 km (5 mi.) west of the town line, along Highway 11 right-of-way, and two others were located approximately 11 km (7 mi.) southeast of the town along the Rainy River.

This rapid spread is very likely due to the presence of high populations of the native elm bark beetle (*Hylurgopinus rufipes* Eichh.), one of the main vectors of the disease. Beetle populations are being harbored by numerous deteriorating elms (*Ulmus* spp.) scattered throughout the area and may well increase in numbers as more trees are damaged and killed by the disease.

Needle Rusts of Spruce, *Chrysomyxa ledi* (Alb. and Schw.) d By., and *C. ledicola* Lagh.

Surveys for these foliar diseases of spruce revealed little change in damage levels over the previous year. Infected foliage was easily found in many spruce stands throughout the northern two-thirds of the Region; however, damage was negligible at all but three sample locations.

Moderate damage to current foliage was observed on fringe and scattered black spruce (*Picea mariana* [Mill.] B.S.P.) in a cutover area near Cliff Lake in the Dryden District and in a plantation near Dixie Lake in the Red Lake District. Light damage occurred in a mixed black spruce and jack pine plantation near Paguchi Lake in the Ignace District. Evaluations were conducted in the latter two areas to determine the incidence of infection and degree of damage. In the Dixie Lake plantation 22% of the trees were infected and foliage damage averaged more than 25%. At Paguchi Lake 21% of the trees were infected; however, damage was generally light and averaged less than 25%.

Scleroderris Disease of Pine, *Gremmeniella abietina* (Lagerb.) Morelet

An increase in the known distribution of this disease was recorded in jack pine and red pine (*Pinus resinosa* Ait.) in the Northwestern Region in 1978. New infection centres were found in regeneration jack pine near Wavell Lake 100 km (60 mi.) northeast of Red Lake in the Red Lake District and in a four-year-old red pine plantation along Highway 594, 12 km (7 mi.) west of Dryden in Dryden District (Fig. 7).

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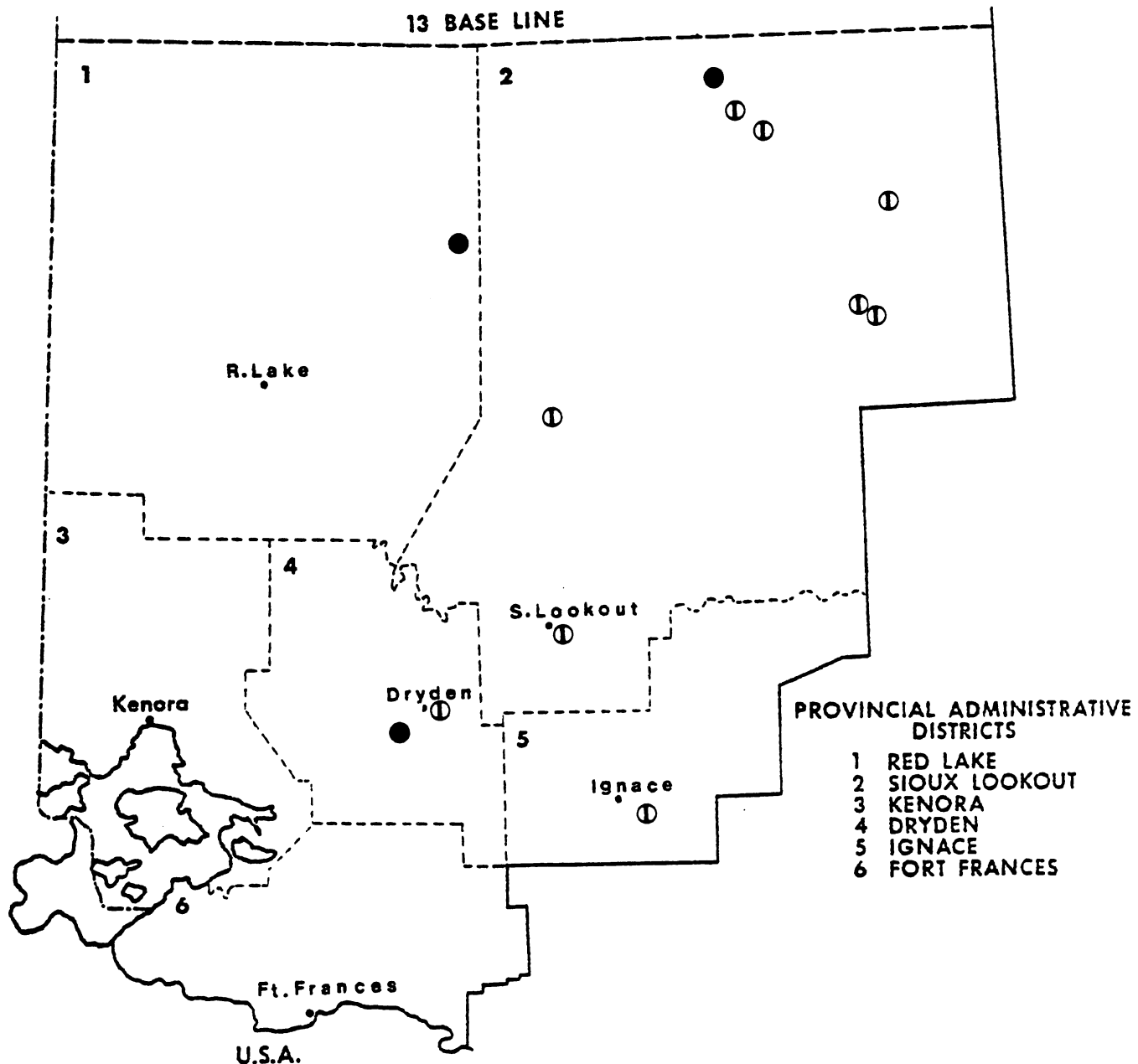


Fig. 7. SCLERODERRIS DISEASE OF PINE

Areas where infection centres have been recorded over the past nine years.

1970-1977 . . . . . ①

1978 . . . . . ●

The Wavell Lake infection centre is isolated from the closest previously reported infection centre at the Pipestone River and Polzen Lake in the Sioux Lookout District by about 160 km (99 mi.) and 80 km (50 mi.), respectively. An aerial survey of the area revealed several pockets of damage in low-lying sites scattered through approximately 2 600 ha<sup>2</sup> (6,425 ac.<sup>2</sup>) of jack pine 1.5 m (5 ft) to 2.5 m (8 ft) in height. A ground check at one point revealed that little tree mortality has occurred to date, indicating that this infection is likely of recent origin. Only a trace of infection and no tree mortality was found in the Dryden District infection centre.

Needle Cast of Pine, *Lophodermium pinastri* (Schrad. ex Hook.) Chev.

Surveys carried out annually have shown little evidence of this disease affecting pine species in the Region over the past several years. However, in 1978 damaged trees were found in a red pine plantation at Stevens Bay in the Kenora District and in two red pine plantations near the southern boundary of Aubrey Township in the Dryden District. Evaluations were carried out in each to determine the incidence of infection, amount of foliage damage and percent current mortality (Table 6).

Table 6. Summary of damage caused by needle cast of pine in three red pine plantations in the Northwestern Region in 1978 (counts based on the examination of 100+ randomly selected trees at each location).

Location	Tree ht (m) <sup>a</sup>	Trees diseased (%)	Foliar damage (%)	Current mortality (%)
Kenora District				
Stevens Bay	1.0	27	<5	2
Dryden District				
South Boundary, Aubrey Twp	0.5	26	15	2
South Boundary, Aubrey Twp	0.5	22	10	0

<sup>a</sup> 1 m = 3.28 ft

### Shoot Blight of Red Pine, *Sirococcus strobilinus* Preuss

In 1974 surveys conducted in red pine stands revealed that this shoot blight was commonly found throughout the range of red pine in the Region; the heaviest damage occurred in Langton Township, Dryden District, where 64% of the 100 randomly selected trees were severely affected. However, during the past few years the disease has been on the decline and this year was detected at only trace damage levels.

Surveys conducted in 1978 showed this disease at trace levels of damage in natural red pine stands at Rushing River Provincial Park, Kenora District, in Aubrey Township, Dryden District, and on Beaverhead Island, Lower Manitou Lake, Fort Frances District.

### Leaf and Twig Blight of Aspen, *Venturia macularis* (Fr.) Müller & Arx (= *Pollaccia radiosa* [Lib.] Bald. & Cif.)

Surveys to determine the incidence and damage levels of this leaf and twig blight in regeneration trembling aspen showed little change over 1977. Foliage disease evaluations showed a 5% increase in the incidence of diseased trees and a 5% decrease in terminal shoot mortality over the previous year.

In stands evaluated in 1978, the incidence of infection averaged 76% (range 51-100%) and terminal shoot mortality averaged 46% (range 20-100%) (Table 7). Elsewhere, at numerous points in the Region, the disease was detected on regeneration aspen growing in cutover areas and along roadsides.

Repeated terminal shoot mortality causes extensive damage to affected trees, such as deformed and crooked stems and a marked reduction in tree height.

### Snow Mold

Damage caused by a snow mold fungus, probably *Lophophacidium hyperboreum* Lagerb., was negligible for the second consecutive year in Dryden Forest Station. An inspect survey carried out in the latter part of May revealed that damage was confined to a small number of transplanted spruce averaging 0.3 m (10 in.) in height used to fill a gap in a windbreak where seriously affected trees had been removed in a sanitation program carried out in the summer of 1976.



Table 7. Summary of damage caused by leaf and twig blight of aspen in six regeneration trembling aspen stands in the Northwestern Region in 1978 (counts based on the examination of 100+ randomly selected trees at each location).

Location	Tree ht (m) <sup>a</sup>	Trees diseased (%)	Terminal shoot mortality (%)
Red Lake District			
Chukuni R. east of Hwy 105	2.0	87	26
Sioux Lookout District			
McAree Twp	2.7	79	20
Stranger Lake	1.5	62	29
Dryden District			
Melgund Twp	2.5	100	91
Ignace District			
Isley Twp	2.0	80	59
Fort Frances District			
Claxton Twp	3.4	51	51

<sup>a</sup> 1 m = 3.28 ft

#### Spruce Chlorosis

Last year, tree disease surveys in northern Ontario revealed the occurrence of chlorotic spruce in two 10-year-old spruce plantations in the Nipigon area of the North Central Region. Resulting concern stimulated a special survey to determine if similar damage was occurring in spruce plantations elsewhere.

Plantations were randomly selected for examination in Sioux Lookout, Kenora, Dryden, Ignace and Fort Frances districts in the Northwestern Region. Over all, seven plantations were evaluated and symptoms of chlorosis were found and recorded at two points in the Sioux Lookout District and at one point in Ignace and Fort Frances districts (Table 8). Damage was light in each of the affected plantations and the incidence of affected trees ranged from 2% to 21%.

Table 8. Summary of damage and incidence of chlorotic spruce in seven spruce plantations in the Northwestern Region in 1978 (counts based on the examination of 150 trees in 10 randomly selected sample plots in each plantation).

Location	Tree sp.	Tree ht (m) <sup>a</sup>	Trees affected (%)	Foliage damage
Sioux Lookout				
Echo Twp	bS	3.0	2	light
McAree Twp	bS	3.0	11	light
Kenora District				
Ena Lake Rd	bS	1.9	0	0
Dryden District				
Webb Twp	wS	0.4	0	0
Ignace District				
Paguchi Lake	bS	2.0	21	light
Fort Frances District				
McCroscon Twp	wS	2.1	7	light
Kingsford Twp	wS	2.0	0	0

<sup>a</sup> 1 m = 3.28 ft

The highest incidence of affected trees occurred in a mixed black spruce and jack pine plantation growing on a hot, dry, sandy site near Paguchi Lake in Ignace District.

Plantations in Echo and MacAree townships in Sioux Lookout District, where 2% and 11% of the trees were affected, had been released from an overstory stand in 1977 and 1978, respectively. It was evident that affected trees had been growing in either partial or full shade in most instances, prior to the release operation. Damage to the affected plantation in the McCroscon Township, Fort Frances District, was generally confined to trees in hollows or low-lying sites where excessive rainfall through the spring and summer of 1978 raised water tables to above-ground level.

### Frost Damage

Below-freezing temperatures during the nights of June 7, 8 and 9 caused widespread damage to the current shoots of numerous tree species, especially the spruces and balsam fir. Affected stands suffering varying degrees of foliar damage were observed at many points in the Region, south from the Red and Pickle lakes area. Current shoot mortality was generally confined to open-growing trees and parts of trees exposed in openings or on fringes of stands; however, the most severe damage was observed on small trees in planted areas.

Damage evaluations were conducted in areas planted to spruce at six points in the Region. The results of the evaluations showed that in the areas examined, the overall percentage of trees affected averaged 94 (range 68-100%). The percentage of terminal shoots killed and overall percent shoot mortality were recorded (the latter as plus or minus 25%) (Table 9).

Traces of damage were observed on small open-growing red pine and on regenerating aspen at scattered points in the area affected.

Table 9. Summary of damage caused by frost affecting spruce in the Northwestern Region in 1978 (counts based on examination of 100+ randomly selected trees at each location).

Location	Tree species	Trees affected (%)	Terminal shoot mortality (%)	Current foliage damage level	
				No. of trees	
				Over 25%	Under 25%
Red Lake District					
Dixie Lake Rd	bS	97	23	97	0
Sioux Lookout District					
Drayton Twp	bS, wS	68	4	31	37
Kenora District					
Ena Lake Rd	bS	100	19	100	0
Dryden District					
Webb Twp	wS	100	100	100	0
Fort Frances District					
McCrosson Twp	wS	100	37	100	0
Kingsford Twp	wS	100	100	100	0

## Hail Damage

Aerial surveys in the Red Lake District revealed serious damage and some tree mortality of jack pine through approximately 2 900 ha<sup>2</sup> (7,166 ac.<sup>2</sup>) of a 35- to 40-year-old mixed stand of jack pine and black spruce near Madden Lake, 120 km (75 mi.) northeast of Red Lake. A ground survey showed that damage was caused by a hailstorm in the latter part of 1977. Serious injury to the branches and stems of trees exposed to the west was noted. In some instances patches of bark 4 cm (1.6 in.) in diameter were scarfed from tree stems. Because of the severity of the damage, considerable tree mortality is likely to occur over the next 2-3 years.

In early August 1978, a hailstorm occurred in the Badesdawa Lake area northeast of Pickle Lake in the Sioux Lookout District. Hailstones as large as golf balls were observed. An aerial survey through the area in late August did not detect any deterioration of stands at that time; however, deterioration of jack pines in the affected area can be expected early in the 1979 growing season.

Table 10. Other forest diseases.

Organism	Host(s)	Remarks
<i>Armillaria mellea</i> (Vahl. ex Fr.) Kummer Shoestring root rot	rP	trace damage in regeneration at Gundy Lake, Kenora District
<i>Ciborinia whetzelii</i> (Seaver) Seaver Ink spot of aspen	tA	heavy foliar damage occurred in Melgund Twp, Dryden District; light damage in the Kirk Lake area of the Sioux Lookout District
<i>Cylindrosporium salicinum</i> (Pk.) Dearn. Leaf blight of willow	W	collected for the first time in northwestern Ontario at Windy Point, Fort Frances District
<i>Hypoxyylon mammatum</i> (Wahl.) Miller Hypoxyylon canker	tA	no apparent change in status of this disease, common and easily found throughout the Region
<i>Verticilium</i> sp. Verticilium wilt	wE	trace level along Hwy 602, west of the town of Fort Frances, Fort Frances District

(continued)

Table 10. Other forest diseases (concluded).

Organism	Host(s)	Remarks
Winter browning	eC	light damage to windbreaks along Hwy 11 in Morley Twp, and along Hwy 71, Potts Twp, Fort Frances District
Red pine shoot mortality	rP	damage to current growth caused by an unknown pathogen was detected in Echo Twp, Sioux Lookout District