FOREST INSECT AND DISEASE SURVEYS IN THE WESTERN SURVEY REGION, 1973

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Frontispiece. Damage caused by a windstorm on July 7, 1973.

Top: windthrown black spruce.

Bottom: wind damage and breakage of jack pine.

SURVEY HIGHLIGHTS

The spruce budworm situation in northwestern Ontario remained bright largely as the result of aerial spraying operations carried out since 1968. Emphasis in 1973 was again placed on providing entomological information in support of spraying operations carried out by the Ontario Ministry of Natural Resources. Spruce budworm conditions in northwestern Ontario are contained in a separate information report (O-X-193) describing the provincial picture. Populations of the forest tent caterpillar increased markedly and the infested area doubled over 1972. Forecasts call for increased infestations in 1974. Infestations of the birch skeletonizer and the large aspen tortrix also increased in size, although numbers are expected to decline in 1974. Black-headed budworm was found through a large section of the Survey Region to which this report applies (see cover).

A fungus disease, *Sirococcus strobilinus* Preuss., recently recognized as the cause of shoot blight of pines was found infecting red pine through much of the host range in the Region. A windstorm in midseason seriously damaged timber stands through an area of approximately 400 square miles. Scattered hail showers accompanying the windstorm caused notable damage to pine and spruce seedlings in the Ontario Ministry of Natural Resources tree nursery in Dryden District. Winter drying caused extensive browning of foliage and needle drop in pine stands in the southern half of the Region. Other noteworthy diseases included a marked increase in the incidence of spruce needle rusts and a continuation of Armillaria root rot in scarified jack pine stands. Scleroderris canker of pines caused considerable mortality in jack pine regeneration in affected areas northwest of Pickle Lake.

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INSECTS

Black-headed Budworm, *Acleris variana* Fern.

Populations remained low although numbers increased in the Region in 1973. Light infestations on black spruce (*Picea mariana* [Mill.] B.S.P.) trees were observed on the shorelines of Bulging Lake in Red Lake District, Churchill Lake in Sioux Lookout District, Smoothrock Lake and Granite Falls in Nipigon District and on the Allanwater River in Thunder Bay District. Increased numbers of larvae were also found during spruce budworm (*Choristoneura fumiferana* [Clem.]) surveys in Quetico Provincial Park and adjacent areas.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

Heavy infestations persisted for the fourth consecutive year in stands of white birch (*Betula papyrifera* Marsh.) and moderate-to-severe damage of the foliage was common at many points throughout the Region (see Appendix, Fig. A1). Damage was particularly severe in stands on islands in lakes and rivers, along shorelines and on high ridges (Fig. 1). In urban areas where ornamental birches were heavily skeletonized foliage browning and premature leaf drop caused concern to property owners and urban area managers. In many instances trees were nearly devoid of foliage by early September.

Large Aspen Tortrix, *Choristoneura conflictana* Wlk.

Although infestations of this insect continued to expand in the northern two thirds of the Region, substantial declines in population levels occurred in the southern part of Thunder Bay District and in the northern part of Atikokan District. Moderate-to-severe defoliation of trembling aspen (*Populus tremuloides* Michx.) was mapped over approximately 25,500 square miles of forest, an increase of 10,000 square miles over 1972 (see Appendix, Fig. A2).

Infestations recurred in the southeastern and eastern parts, respectively, of Sioux Lookout and Ignace districts and through 80% of Thunder Bay and Nipigon districts. Infestations persisted in the northern part of Red Lake District and in the vicinity of the Town of Red Lake. Moderate-to-severe defoliation recurred in the northeastern part of Atikokan District and in numerous pockets in Quetico Provincial Park. A single pocket of defoliation occurred near Lake of the Woods in Fort Frances District.

The number of pupae that gave rise to moths at eight sample points ranged from 21% to 73%, indicating the probable continuation of the outbreaks in 1974. Smaller proportions of pupae gave rise to adults than in 1972 at two of three locations where comparative data are available. Pupal counts are summarized in Table 1.

Figure 1. Aerial view of damage to birch foliage caused by the birch skeletonizer, *Bucculatrix canadensisella* Cham.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The results of damage surveys, population sampling, and egg-mass counts have been included with those of other survey regions in a special information report by G. M. Howse *et al.* (O-X-193). This report provides the reader with a complete description and analysis of developments in the 1973 spruce budworm situation in Ontario and gives infestation forecasts for the Province for 1974.

Jack-pine Tip Beetle, *Conophthorus banksianae* McPherson

Damage by this insect was common on jack pine (*Pinus banksiana* Lamb.) regeneration in several districts. Low populations persisted in Lomond Township, Sioux Lookout District, at Tot Lake, Dryden District and near Wintering Lake in Ignace District. Small localized infestations recurred along Graham Road and south of Highway 17 in Trewartha Township, Thunder Bay District.

Quantitative sampling on the incidence of damage to leading terminals was carried out at three points (Table 2).

Table 1. Summary of large aspen tortrix pupal counts in the Western Survey Region in 1972 and 1973 (Counts were based on the examination of 100 pupae at each location.)

Location	Parasitized (%)		Diseased or dead of unknown cause (%)		Moth emergence (%)	
	1972	1973	1972	1973	1972	1973
Red Lake District						
Junction of Hwy 105 and 125	19	70	3	9	78	21
Ignace District						
Hwy 17 at Raven Lake	13	59	6	13	81	28
Fort Frances District						
Morson Twp	--	45	--	9	--	46
Atikokan District						
Clearwater Lake Rd	--	53	--	11	--	36
Windigoostigwan Lake	--	61	--	4	--	35
Thunder Bay District						
Goldie Twp	--	40	--	6	--	54
Nipigon District						
Armstrong Rd	19	14	5	13	76	73
Booth Twp	--	63	--	14	--	23

Table 2. Summary of damage by the jack-pine tip beetle on regeneration jack pine in the Western Survey Region in 1972 and 1973 (Counts were based on the examination of 100 trees at each location.)

Location	% of trees with leading terminal branches damaged	
	1972	1973
Sioux Lookout District		
Lomond Twp	12	6
Dryden District		
Tot Lake	3	1
Ignace District		
Wintering Lake	-	1

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

Since 1970 population levels of this sawfly on white pine (*Pinus strobus* L.) have declined. However, in 1973 infestations stabilized and only light defoliation was observed in an area of approximately 100,000 acres of forest land near Fort Frances, Bear Pass and the Canoe River. Occasional larvae were observed on red pine (*Pinus resinosa* Ait.) and on jack pine.

Birch Leafminer, *Fenusa pusilla* (Lep.)

No appreciable change in the distribution of this introduced leaf-mining sawfly on white birch has occurred during the past 2 years. In the Atikokan District moderate infestations recurred near French and Nym lakes, along the MacKenzie Lake Road and near Atikokan. In Thunder Bay District heavy infestations were observed at several points along the Boreal Road and moderate-to-heavy infestations were common at many points south of Thunder Bay and in areas adjacent to Northern Light Lake and Shebandowan village.

Blotchminers on Poplar, *Lithocolletis ontario* Free., *L. nipigon* Free.

Heavy infestations of *L. ontario* were again evident on trembling aspen reproduction in the southern half of the Ignace District, near Atikokan in the Atikokan District, at Northern Light and Shebandowan lakes in Thunder Bay District, and along the south shoreline of Lake Nipigon in the Nipigon District. Infestations of lesser intensity were observed at many other points.

L. nipigon, a blotchminer on balsam poplar (*Populus balsamifera* L.) caused severe browning of foliage at the provincial park site near Kakabeka Falls, east of Highway 61 in Blake Township, and near Pigeon River in the Thunder Bay District. Light infestations occurred at numerous other points, the most noteworthy being near Redgut Bay on Rainy Lake. This constitutes a new distribution record for the Fort Frances District.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The area infested by this insect increased from approximately 30 square miles in 1972 to 60 square miles in 1973 (see Appendix, Fig. A3). The largest infestation, 50 square miles in size, occurred between Eagle River and Wabigoon in the Dryden District. New small outbreaks were recorded in the Pakwash-Bruce lakes area, at Ear Falls and near Camping Lake in the Red Lake District, in Echo Township in

the Sioux Lookout District, and at Gullwing Lake, Dryden District. Defoliation in these new areas was moderate to severe, except at Camping Lake where damage was light (Fig. 2). In Thunder Bay District individual larvae or scattered colonies were commonly observed. Dissections of cocoons after moth emergence showed that *Sarcophaga aldrichi* Park. remained relatively low (Table 3). On the basis of egg counts made in areas defoliated in 1973, heavy infestations are again forecast for 1974 (Table 4).

Figure 2. Severe defoliation of aspen by the forest tent caterpillar, *Malacosoma disstria* Hbn.

Table 3. Results of forest tent caterpillar cocoon dissections in two districts in 1972 and 1973 (100 cocoons dissected at each location)

Location	Parasitized (%)		Diseased (%)		Showing adult emergence (%)	
	1972	1973	1972	1973	1972	1973
Red Lake District						
Hwy 105 at Trout Lake River	--	59	--	2	--	39
Ear Falls	--	67	--	3	--	30
Dryden District						
Hwy 17 at Minitaki	78	63	0	6	22	31
Hwy 17 at Eagle River	--	32	--	2	--	66
Hwy 17 at Beaver Creek	--	38	--	6	--	56
Hwy 17 at Dryden	72	49	1	6	27	45

Table 4. Summary of forest tent caterpillar egg-band counts and infestation forecasts in the Western Survey Region (Counts were based on the examination of one to three trees at each location.)

Location	Avg DBH of sample trees (in.)	No. of trees examined	Avg no. of egg bands per tree	Infestation forecast for 1974
Red Lake District				
Hwy 105 at Trout Lake River	5	1	39	heavy
Ear Falls	5	3	15	heavy
Dryden District				
Hwy 17 at Minitaki	5	1	33	heavy
Hwy 17 at Beaver Creek	6	1	28	heavy
Hwy 17 at Wabigoon River	5	1	38	heavy
Fort Frances District				
Crozier Twp	5	3	0	nil
Kingsford Twp	5	3	0	nil

White Pine Weevil, *Pissodes strobi* (Peck)

As in past years populations of this weevil continued to fluctuate but in most instances damage to leading shoots of jack pine, white pine, white spruce (*Picea glauca* [Moench] Voss) and black spruce was lower than in 1972. Moderate infestations (6-20% weeviling) were recorded in six of 13 sample points (Table 5). The most severe damage occurred on Norway spruce (*Picea abies* [L.] Karst.) and red pine at two points along the Marks Lake Road in the Thunder Bay District and near Camp 319, Great Lakes Paper Company, Ignace District.

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Populations of this sawfly have declined for the past 2 years and generally fewer curled tips caused by oviposition were present on larch trees in 1973.

Except for small pockets of medium infestation near Nungesser River and Sambells Lake north of Red Lake in Red Lake District, only scattered colonies were observed and defoliation was negligible.

Surveys to determine any eastward spread in the distribution of *Olesicampe benefactor* Hinz., the introduced larch sawfly parasite, were carried out east of a line running northeast from Huronian and Graham in Thunder Bay District to Pickle Crow in Sioux Lookout District. Although the parasite has spread rapidly from eastern Manitoba to the above areas, no further extension was detected in 1973.

Table 5. Summary of damage by the white pine weevil in the Western Survey Region from 1971 to 1973 (Counts were based on the examination of 100 trees at each location.)

Location	Host	Avg DBH of sample trees (in.)	Trees weeviled (%)		
			1971	1972	1973
Ignace District					
Basket Lake Rd	jP	1	7	17	7
Camp 319 G.L.P. Co.	jP	1	7	11	9
Chartrand Twp	jP	1	-	-	2
Dryden District					
Centrefire Lake	wP	1	7	6	2
Webb Twp	jP	1	2	19	3
Atikokan District					
Williamson Lake	jP	3	16	11	4
French Lake	rP	2	-	-	5
Hwy 11 at Eva Lake	jP	1	-	-	1
Thunder Bay District					
Marks Twp	nS	3	18	18	18
Marks Lake Rd	rP	2	1	7	4
Marks Lake Rd	jP	2	15	21	12
Conmee Twp	wS	3	56	35	8
Trewartha Twp	jP	1	-	-	15
Nipigon District					
Kopka Lake	jP	2	2	6	9

Mountain Ash Sawfly, *Pristiphora geniculata* (Htg.)

This introduced sawfly was first collected in the Region in 1970 in the City of Thunder Bay. Since that time it has spread south to the international border and east into the Geraldton District. In 1973 scattered colonies were observed north to Mile 30 along Highway 800 and west to a point near Northern Light Lake. The latter

represents a westward extension of approximately 50 miles in the known range of the insect. Despite intensive surveys no larvae or defoliation were found elsewhere in the Survey Region.

Table 6. Other forest insects

Insect	Host(s)	Remarks
Adelges strobilobius Kalt.	bS	medium-to-high populations in Fallis Twp, Thunder Bay District and at Smoothrock Lake, Nipigon District; medium populations at Greenmantle Lake, Sioux Lookout District
Alsophila pometaria (Harr.)	wE, Ba mM	shade trees heavily infested at Dryden and Fort Frances
Altica populi Brown	cPo	common on occasional trees in the town of Fort Frances
Barbara mappana Free.	bF	medium populations of this cone insect at Trout Bay, Northern Light Lake
Cecidomyia reeksi Vock.	jP	medium infestations on regeneration near Tache Crossing, Ignace District, and in Adamson Twp, Nipigon District
Chrysomela mainensis mainensis Bech.	Al	heavy near Granite Falls, Nipigon District
Coleophora laricella Hbn.	tL	distribution unchanged with active populations in southeastern corner of Thunder Bay District
Dimorphopteryx melanognathus Roh.	wB	small numbers on shoreline birch at Bernadine Lake, Fort Frances District
Diprion hercyniae (Htg.)	wS	common on beating samples throughout the Survey Region

(continued)

Table 6. Other forest insects (continued)

Insect	Host(s)	Remarks
Dryocoetes affaber Mann.	jP	high populations on occasional decadent trees in Paipoonge Twp, Thunder Bay District
Epinotia solandriana Linn.	wB	leaf rollers common on understory trees near Sioux Narrows, Kenora District and at Valhalla Lake, Red Lake District
Gonioctena americana (Schaef.)	tA	heavy near Portage du Jourdain, Thunder Bay District, medium infestation at Prairie Portage, Atikokan District
Hemichroa crocea (Four.)	Al	single colonies on shoreline trees at Entwine Lake, Fort Frances District
Hylobius warrenii Wood	scP	heavy on planted trees in the Kakabeka Falls-Thunder Bay area
Hyphantria cunea Dru.	w, bO	heavy infestations on islands in Lake of the Woods, Kenora District
Lecanium sp.	mM	heavy on the north shore of Wapesi Bay, Lac Seul, Sioux Lookout District
Lithocolletis kenora Free.	W	medium infestation along the Pickerel River, Atikokan District
Meadorus lateralis Say	wB	high populations on open-growing birch near French Lake, Atikokan District
Nematus populi Marl.	tA	occasional colonies on roadside trees near Bear Pass, Fort Frances District
Neodiprion abietis complex	bF	small numbers of colonies at several locations in Sioux Lookout, Kenora and Fort Frances districts

(continued)

Table 6. Other forest insects (continued)

Insect	Host(s)	Remarks
Neodiprion pratti banksianae Roh.	jP	small numbers of colonies at Sioux Narrows, Kenora District and in Paipoonge and Neebing twp, Thunder Bay District
Neodiprion virginianus complex	jP	heavy infestations on open-grown trees near French Lake and occasional colonies near Nym Lake, Atikokan District
Nycteola cinereana N. & D.	bPo	large numbers of leaf rollers near Bear Pass, Fort Frances District
Ocnerostoma strobivorum Free.	wP	needle miners common along shorelines of Rainy Lake, Fort Frances District
Oligonychus ununguis Jac.	bF, wS, tL, bS, nS	heavy on ornamentals in Vickers Park in the City of Thunder Bay and on reproduction larch in Golding Twp, Thunder Bay District; also found commonly near French Lake, Atikokan District
Pareophora minuta MacG.	bA	moderate-to-heavy defoliation near Lac la Croix Station, Atikokan District
Petrova albicapitana (Busck)	jP	increased numbers noted in Sioux Lookout District; light infestation near Kakabeka Falls, Thunder Bay District
Phenacaspis pinifoliae (Fitch)	jP	heavy on fringe trees near Northern Light Lake, Thunder Bay District
Phyllocolpa mariana (Ross)	bPo	high populations on shoreline trees at Stout Lake, Red Lake District

(continued)

Table 6. Other forest insects (concluded)

Insect	Host(s)	Remarks
Pikonema alaskensis (Roh.)	wS	common on exposed trees at numerous locations in the Survey Region
Pineus similis Gill.	wS	needle galls common on scattered trees near North Branch, Fort Frances District
Pineus strobi (Htg.)	wS	heavy infestation on scattered trees in the Town of Fort Frances
Pleroneura borealis Felt	bF	heavy infestations along hydro line near Eva Lake, Atikokan District, and on occasional trees near Nestor Falls and Emo, Fort Frances District
Profenusa thomsoni Konow	wB	shoreline trees lightly infested at Bernadine Lake, Fort Frances District
Pseudexentera oregonana Wlshm.	tA	light infestation on roadside trees near Rae Lake, Kenora District
Vasates quadripes Shim.	rM	gall mites common on ornamentals in the Town of Fort Frances, and the City of Thunder Bay
Zeiraphera canadensis Mut. & Free.	wS, nS	heavy infestations at several locations in the Thunder Bay and Nipigon districts

TREE DISEASES

Note: In this section of the report, incidence refers to the proportion of trees infected and level of infection refers to the disease severity.

Eastern Dwarf Mistletoe, *Arceuthobium pusillum* Pk.

This parasitic plant is widespread in the Survey Region. Attacks are most frequent in stands growing in low-lying wet areas. In 1973, 21 locations were evaluated and the highest incidence was recorded in Joynt and Conacher townships, Thunder Bay District, where incidence was 22% and 87%, respectively (Table 7). In Joynt Township recent mortality was as high as 5%. Elsewhere incidence was generally under 10% and infection was light.

Table 7. Summary of incidence, mortality and level of infection of eastern dwarf mistletoe on black spruce in 1973 (Counts were based on the examination of 200 trees at each location evaluated.)

Location	Tree height (ft)	Incidence	Recent mortality (%)	Level of infection
Fort Frances District				
Potts Twp	35	moderate	0	moderate
Mine Centre	35	moderate	0	moderate
Thunder Bay District				
Conacher Twp	80	moderate	2	high
Joynt Twp	45	high	5	high
Nipigon District				
Allanwater River	70	moderate	0	light

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

In 1973, these rusts were widespread in the Survey Region at the light infection level. The single exception occurred at Granite Falls in the Nipigon District, where incidence was high and level of infection moderate. Eight stand evaluations are summarized in Table 8.

Table 8. Summary of incidence and level of infection of needle rusts of spruce in the Western Survey Region in 1973 (Counts were based on the examination of 40 trees, four from each of 10 plots at each location.)

Location	Tree height (ft)	Incidence	Level of infection
Sioux Lookout District			
Savant River	45	high	light
Pineimuta River	6	high	light
Connell Twp	4	high	light
Lomond Twp	30	moderate	light
Thunder Bay District			
Hwy 17 at Argon	30	high	light
Graham Lake Rd	30	high	light
Nipigon District			
Granite Falls	70	high	moderate
Allanwater River	70	high	light

Sweetfern Blister Rust, *Cronartium comptoniae* Arth.

Surveys were continued in 1973 to locate new infection centres of this stem rust on jack pine and to determine the range of Sweetfern (*Comptonia peregrina* [L.] Coult.), the principal alternate host. Little change was noted in either infection levels or distribution. Summary estimates at several points and five stand evaluations showed a high level of infection at one point and moderate levels of infection at four others (Table 9). Elsewhere only light infection occurred.

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

This disease was present in varying degrees of intensity within the range limits of white pine. In nine stands evaluated, incidence ranged from 10% at Sioux Narrows, Kenora District, to 90% in Pardee and Blake townships, Thunder Bay District. The level of infection was high at all but one location and recent mortality ranged from 2% to 8% (Table 10).

Table 9. Summary of incidence and level of infection of sweetfern blister rust on jack pine in the Western Survey Region in 1973 (Counts were based on the examination of 40 trees, four from each of 10 plots at each location.)

Location	Tree height (ft)	Incidence	Level of infection
Sioux Lookout District			
Vermilion Add'l Twp	15	moderate	moderate
Fort Frances District			
Bernadine Lake	60	moderate	moderate
Hwy 11 at Mine Centre	60	moderate	high
Turtle Siding Rd	45	moderate	moderate
Atikokan District			
Tanner Lake	50	moderate	moderate

Table 10. Summary of incidence, mortality and level of infection of white pine blister rust on white pine in the Western Survey Region in 1973 (Counts were based on the examination of 40 trees, four from each of 10 plots at each location.)

Location	Tree height (ft)	Incidence (%)	Mortality (%)	Level of infection
Kenora District				
Sioux Narrows	60	10	0	moderate
Fort Frances District				
Nestor Falls	70	27	0	high
Bear Pass	65	30	5	high
Caliper Lake	15	17	0	high
Rainy Lake	70	27	0	high
Thunder Bay District				
Pardee Twp	75	90	7	high
Blake Twp	90	90	0	high
Pickerel Lake on Sibley Peninsula	80	87	3	high
Hwy 587 at Joe Creek	40	22	1	high

Western Gall Rust of Hard Pines, *Endocronartium harknessii* (J.P. Moore) Y. Hiratsuka

Although this gall-forming rust continued to cause varying degrees of damage in jack pine stands at numerous points, little change occurred in infection levels. Infections occurred on trees of all sizes and many branches were killed; however, the most serious damage was to small-diameter trees with stem infections.

Out of 29 points that were examined and evaluated, nine were selected as representative and are summarized in Table 11.

Table 11. Summary of incidence, mortality and level of infection of western gall rust of hard pines on jack pine in the Western Survey Region in 1973 (Counts were based on the examination of 40 trees, four from each of 10 plots at each location.)

Location	Tree height (ft)	Incidence	Mortality (%)	Level of infection
Sioux Lookout District				
Echo Twp	6	high	0	light
Vermilion Add'l Twp	15	high	2	high
Red Lake District				
Long Legged Lake	30	high	0	light
Dryden District				
Buller Twp	4	moderate	0	light
Hwy 105 south of Camp Robinson	15	moderate	0	light
Fort Frances District				
Glenorchy Rd	4	light	0	light
Atikokan District				
Lindsay Lake	15	moderate	0	light
Thunder Bay District				
Herbert Lake	50	high	2	moderate
Ouimet Canyon	50	high	0	light

Scleroderris Canker of Pine, *Gremmeniella abietina* (Lagerb.) Morelet (≡ *Scleroderris lagerbergii* Gremmen)

No new infection centres of this disease were found in 1973. In the Sioux Lookout District, infection centres previously reported in

jack pine regeneration northwest of Pickle Lake continued to expand and cause considerable damage. Heavy mortality occurred and infection centres doubled in size in regeneration jack pine 16 to 20 inches high in the Pineimuta River area. Infection levels remained high in a stand averaging 5 feet in height near Lysander Lake; however, the stand has now developed to the point that infection occurs on the lower third of tree crowns. Current height growth was near normal and a marked decrease in current mortality was noted.

In Dryden District the disease could not be found in growing stock in the Provincial Tree Nursery at Dryden; however, one infected tree was found in a small neighbouring and previously infected red pine plantation. The tree was pruned and the infected branches were destroyed. Along Graham Road and at Graham Airport in the Thunder Bay District where the disease is known to occur, the incidence of infection on regeneration jack pine changed only slightly and recent mortality was at a trace level.

Shoot Blight on Red Pine, *Sirococcus strobilinus* Preuss.

As early as 1970, damage typical of this disease (Fig. 3) was collected in Echo Township, Sioux Lookout District, at French Lake in Atikokan District and near Burchell Lake, Thunder Bay District. However, the pathogenic agent can now be identified with certainty in the laboratory.

Extensive surveys which were carried out to determine relative abundance and distribution showed that the disease was more widespread than originally anticipated (see Appendix, Fig. A4). At present the northern limit of infection in Ontario appears to be near Ear Falls in the Red Lake District. No infected trees were found in red pine stands north of this area. Surveys indicate that the disease is most prevalent where regeneration is growing under or closely adjacent to mature or near mature red pine. This is demonstrated by the fact that moderate or heavy infections were recorded under these conditions in each of the Dryden, Kenora, Fort Frances and Thunder Bay districts (Table 12). Only a trace of infection was recorded in planted stock. A single record of the disease affecting white pine was obtained near Barrel Lake in the Ignace District.

Hail Damage

A hail storm in early July caused extensive damage to tree seedlings in the Ontario Ministry of Natural Resources tree nursery near Dryden. Inspection in late August revealed that the most severe damage occurred to black spruce, white spruce and jack pine (Fig. 4

and 5). Quantitative sampling carried out in pertinent compartments showed that damage ranged from 66% to 90% of the seedlings of which approximately one third showed dead leaders (Table 13).

Table 12. Summary of incidence, mortality and level of infection of shoot blight on red pine and current mortality of host trees in the Western Survey Region in 1973 (Counts were based on the examination of 40 trees, four from each of 10 plots at each location.)

Location	Tree height (ft)	Incidence	Mortality (%)	Level of infection
Sioux Lookout District				
Echo Twp	70	moderate	12	light
Lac Seul	45	moderate	0	light
Kenora District				
Lake of the Woods	40	moderate	0	moderate
Dryden District				
Wabigoon R.	70	moderate	0	light
Blue Lake	6	light	0	moderate
Fort Frances District				
Caliper Lake	1	moderate	0	high
Atikokan District				
French Lake	10	moderate	0	high
Thunder Bay District				
Titmarsh Lake	75	high	5	high
Burchell Lake	50	high	2	high
Windigoostigwan Lake	70	high	2	high

Table 13. Summary of incidence and level of damage caused by hail at the Ontario Ministry of Natural Resources tree nursery in the Western Survey Region in 1973 (Counts were based on the examination of all seedlings within ten 2-foot-square samples at 1-chain intervals in each of three seedling beds.)

Location	Tree species	No. examined	Stems damaged (%) (% with dead leaders in parentheses)	Defoliation (%)
Dryden District				
Dryden Nursery	bS	170	90 (37)	10
	wS	147	82 (20)	2
	jP	268	66 (28)	35

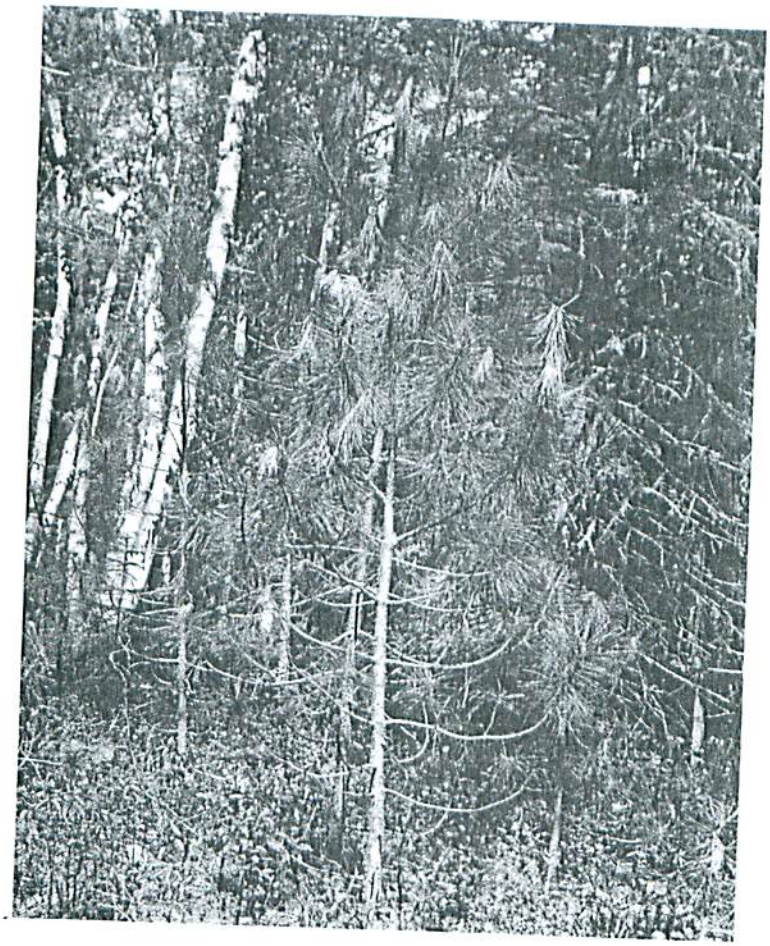
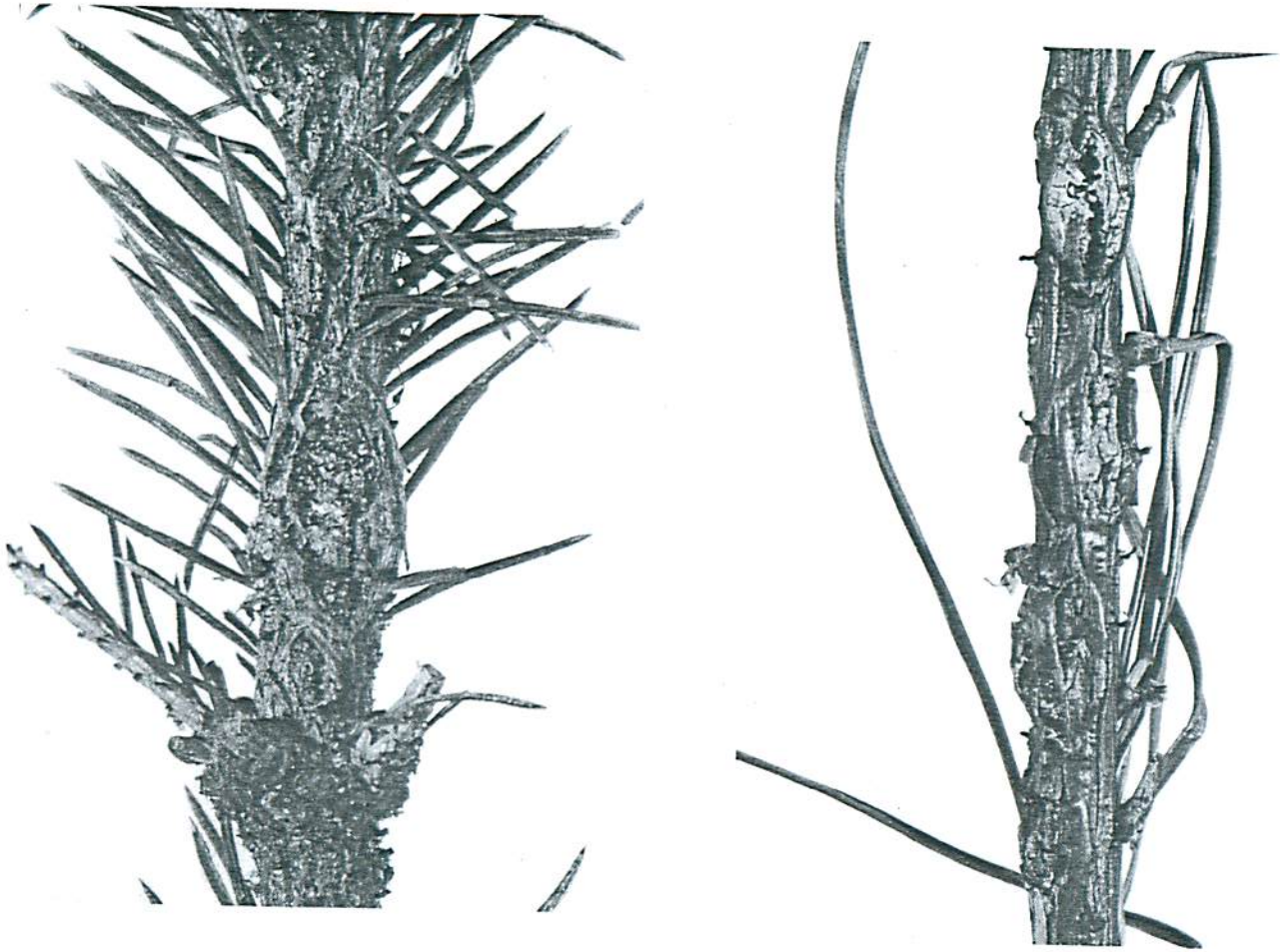


Figure 3. Shoots of red pine damaged by a shoot blight, *Sirococcus strobilinus* Preuss.

Wind Damage

A windstorm of unusual severity on July 7 caused severe blowdown in the Kenora, Dryden, Sioux Lookout, Ignace and Fort Frances districts (see Appendix, Fig. A5). Although many forested areas were severely damaged by this storm (see Frontispiece), the most extensive damage occurred from Lake of the Woods northeastward along a 2-mile front, passing north of Dryberry Lake to Point Bay, then expanding to a width of 14 miles on the western shoreline of Eagle Lake. Damage was also heavy on islands in Eagle Lake, near Dryden in the Dryden District, near Lake of Bays east of Sioux Lookout in the Sioux Lookout District, at two locations near Sturgeon Lake and in Block No. 6 in the extreme eastern part of the Ignace District. The Ontario Ministry of Natural Resources estimated the amount of blowdown at between 800,000 and



Figures 4 and 5. Hail damage to seedlings.
Left: white spruce Right: jack pine

1,000,000 cords of wood over 400 square miles. Smaller areas of damage were noted near Nestor Falls, in Rowe and Morson townships and near Devils Cascade, Fort Frances District, at widely scattered points in the Atikokan District, and at four widely separated points in the Nipigon District and near English River in the Thunder Bay District.

Winter Drying

An unusually cold winter with many hours of sunshine and minimum snowfall was probably instrumental in causing severe browning of jack pine needles in many areas of the Region in 1973. The most notable damage occurred in the Thunder Bay and Atikokan districts from approximately the Moose, Whitefish and Shebandowan lakes area in the Thunder Bay District, along Highway 11 to a point north of Poobah Lake in the Atikokan District, and south from there to the international border. It encompassed an area of approximately 5,000 square miles (see Appendix, Fig. A6). Although needle drop of the old foliage was quite heavy in early spring, new shoot development tended to cover the loss of previous years' needles. However, thin crowns and sparse foliage were still evident over a large area.

Pockets of moderate-to-severe drying of jack pine and white pine foliage were common south of Lac Seul, in Echo and Vermilion Additional townships of the Sioux Lookout District, near White Otter Lake in Atikokan District and Mameigweiss Lake in the Ignace District. Summary estimates and evaluations at nine sample points are presented in Table 14.

Table 14. Summary of incidence and level of damage caused by winter drying on two species of pine in the Western Survey Region in 1973 (Counts were based on the examination of 40 trees, four from each of 10 plots at each location.)

Location	Tree species	Tree height (ft)	Incidence	Level of damage
Sioux Lookout District				
Vermilion Add'l Twp	wP	10	moderate	moderate
Ignace District				
Mameigweiss Lake	jP	50	high	high
Martin Access Rd	jP	3	moderate	moderate
Atikokan District				
Eva Lake	jP	60	high	high
Nym Lake	jP	75	high	high
Poohbah Lake	jP	50	high	high

(continued)

Table 14. Summary of incidence and level of damage caused by winter drying on two species of pine in the Western Survey Region in 1973 (Counts were based on the examination of 40 trees, four from each of 10 plots at each location.) (concluded)

Location	Tree species	Tree height (ft)	Incidence	Level of damage
Thunder Bay District				
Northern Light Lake	jP	40	high	high
Hwy 11 at Kashabowie	jP	10	high	high
Burchell Lake	jP	15	moderate	high

Table 15. Other forest diseases

Organism	Host(s)	Remarks
Arceuthobium americanum Nutt. ex Engelm.	jP	caused 10% current mortality to mature trees along the west shore of South Inlet, Lac Seul, Dryden District
Botrytis cinerea Pers. ex Fr.	wS, nS	found in association with tip damage of seedlings in compartments 3 and 22 in the Thunder Bay Forest Station
Cenangium ferruginosum Fr.	rP	occasional trees infected in French Lake Park, Atikokan District
Coleosporium asterum (Diet.) Syd.	jP, rP	light infection level on small trees north of Sioux Narrows, Kenora District; trace infection levels at several widely separated points in the Thunder Bay and Nipigon districts
Cronartium coleosporioides Arth.	jP	moderate infection north of Burchell Lake, Thunder Bay District
Davisomycella ampla (Davis) Darker	jP	light infection levels at many points throughout the Survey Region

(continued)

Table 15. Other forest diseases (continued)

Organism	Host(s)	Remarks
Diplodia pinea (Desm.) Kickx	rP	collected from dead shoots in conjunction with red pine shoot blight surveys from south of Miles Island, Lake of the Woods, Kenora District and from Arrow Head Island, Northern Light Lake, Thunder Bay District
Fomes igniarius (L. ex Fr.) Kickx	bAs	high infections on this host at Pithers Point Park, Fort Frances District
Isthmiella faullii (Darker) Darker	bF	heavy needle cast, mainly on understory trees, at numerous locations in the Thunder Bay District
Lophodermium juniperi (Grev.) Darker	J	moderate infection at Trout Bay, Northern Light Lake, Thunder Bay District
Lophodermium piceae (Fckl.) Hoehn.	bS	heavy needle cast on ornamentals at Cameron Falls, Nipigon District
Lophodermium pinastri (Schrad. ex Hook.) Chev.	rP, jP	light near Sapawe, Atikokan District, at Miles Island, Lake of the Woods, Kenora District, and on jack pine near Barrel Lake, Ignace District (Light infections in red pine seedling beds in the Thunder Bay Forest Station were treated and controlled.)
Melampsora sp.	W	heavy stem rust on shoreline trees at the north end of Black Sturgeon Lake, Nipigon District
Polyporus tomentosus Fr.	bS	collected from pockets of root rot damaged trees at Hood and Chief Peter lakes, Thunder Bay District

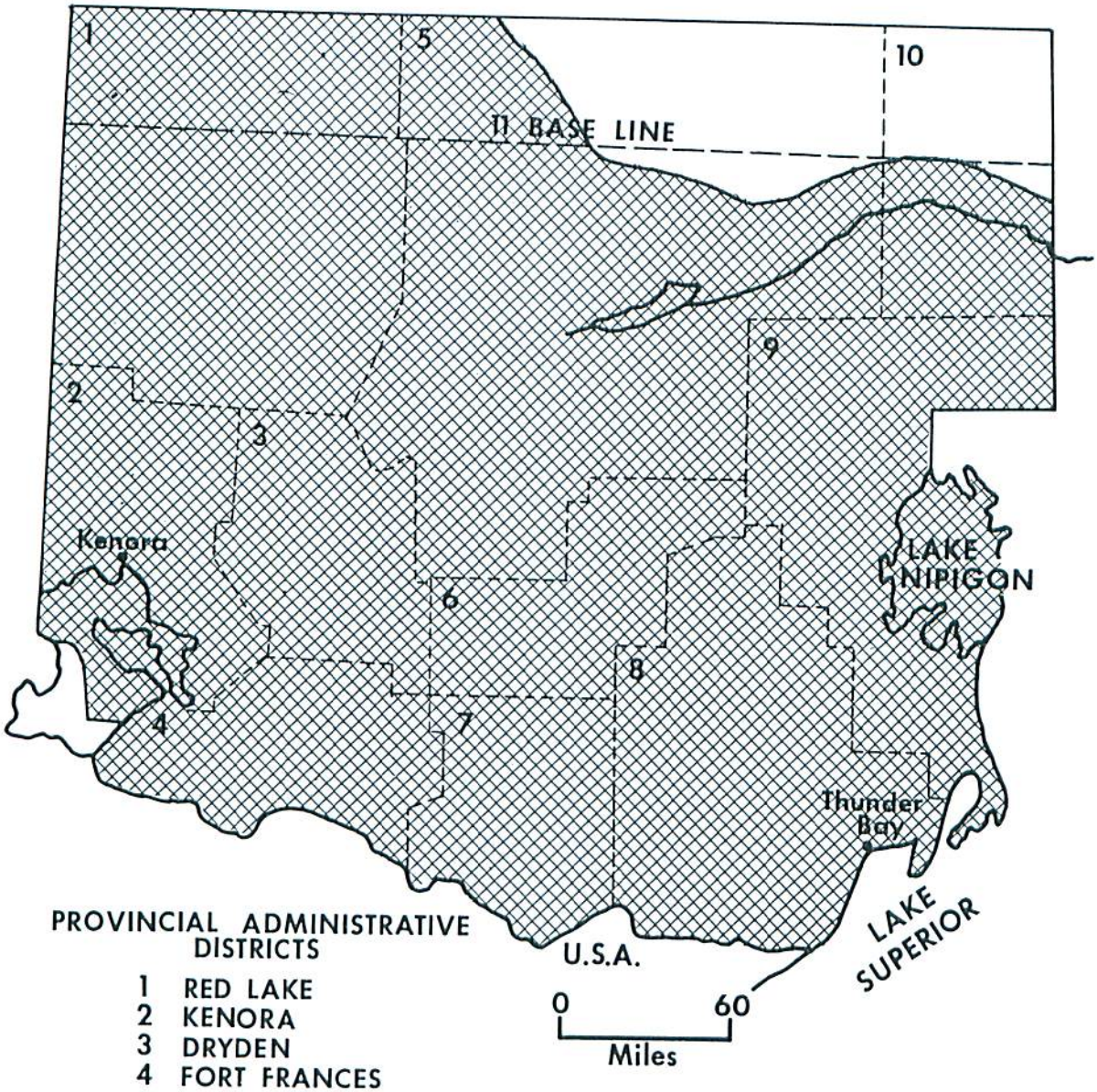
(continued)

Table 15. Other forest diseases (concluded)

Organism	Host(s)	Remarks
Puccinia bolleyana Sacc.	El	heavy on shoreline trees at Greenwater Lake, Thunder Bay District
Puccinia coronata Cda.	buckthorn	heavy rust on understory trees in Soper Twp, Thunder Bay District
Pucciniastrum agrimoniae (Diet.) Tranz.	*Agrimonia eupatoria*	heavy at Greenwater Lake, Thunder Bay District
Pucciniastrum epilobii Otth.	bF	light levels of infection of this needle rust near Sioux Narrows, Kenora District, at Mountain Lake, Thunder Bay District and at Pine Portage, Nipigon District
Septoria musiva Pk.	bPo	high infection levels in the Thunder Bay-Kakabeka Falls area, Thunder Bay District
Valsa pini (Alb. & Schw.) Fr.	rP	one tree dead and occasional branch and stem cankers near Regina Bay, Kenora District
Zythia aurantiaca (Pk.)	Do	stem and branch cankers common in Conners Twp, Thunder Bay District

APPENDIX

WESTERN SURVEY REGION



PROVINCIAL ADMINISTRATIVE DISTRICTS

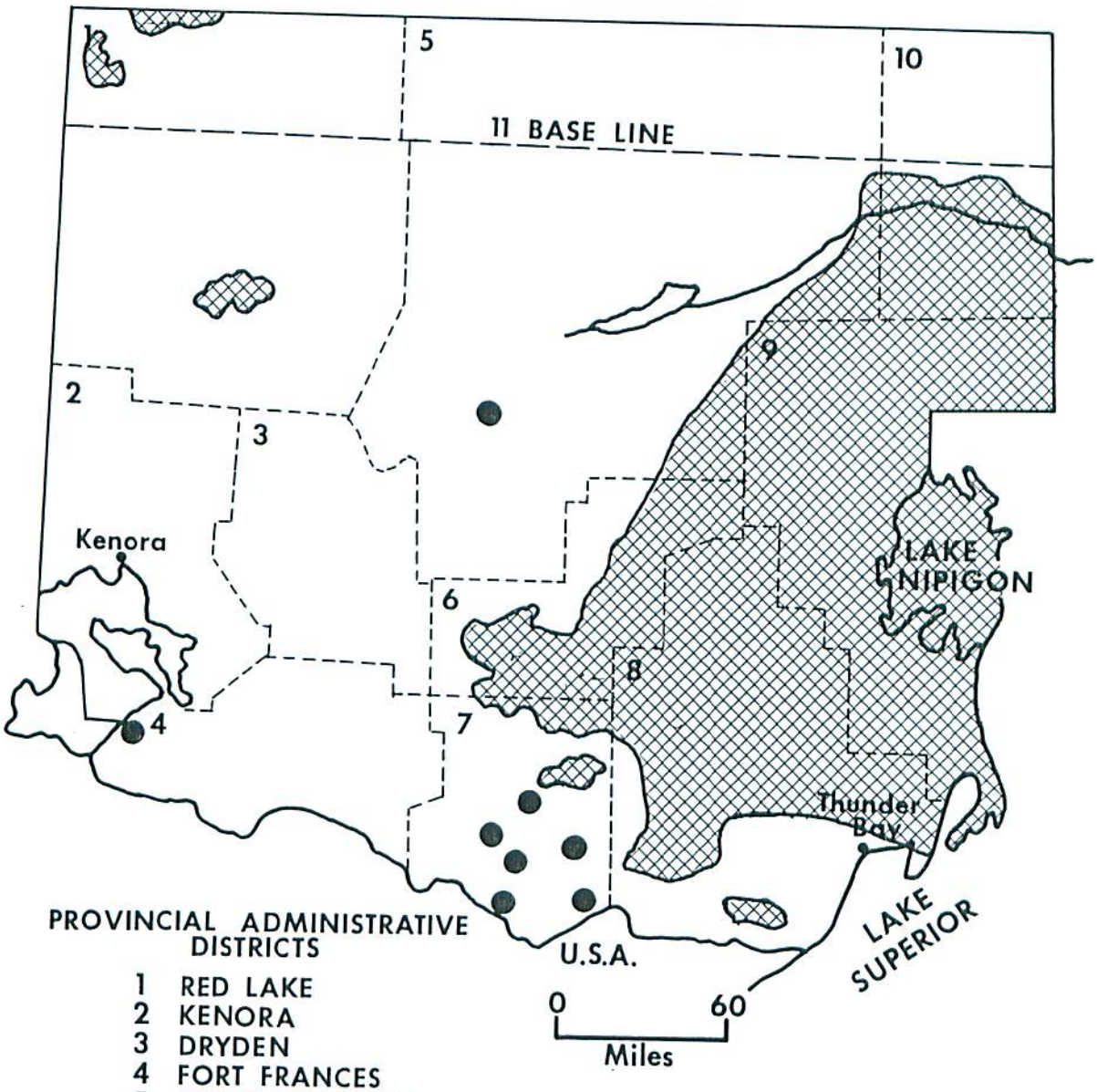
1 RED LAKE
2 KENORA
3 DRYDEN
4 FORT FRANCES
5 SIOUX LOOKOUT
6 IGNACE
7 ATIKOKAN
8 THUNDER BAY
9 NIPIGON
10 GERALDTON

Figure A1. BIRCH SKELETONIZER

Areas within which defoliation occurred in 1973

Moderate-to-severe defoliation . .

WESTERN SURVEY REGION



PROVINCIAL ADMINISTRATIVE DISTRICTS

1 RED LAKE
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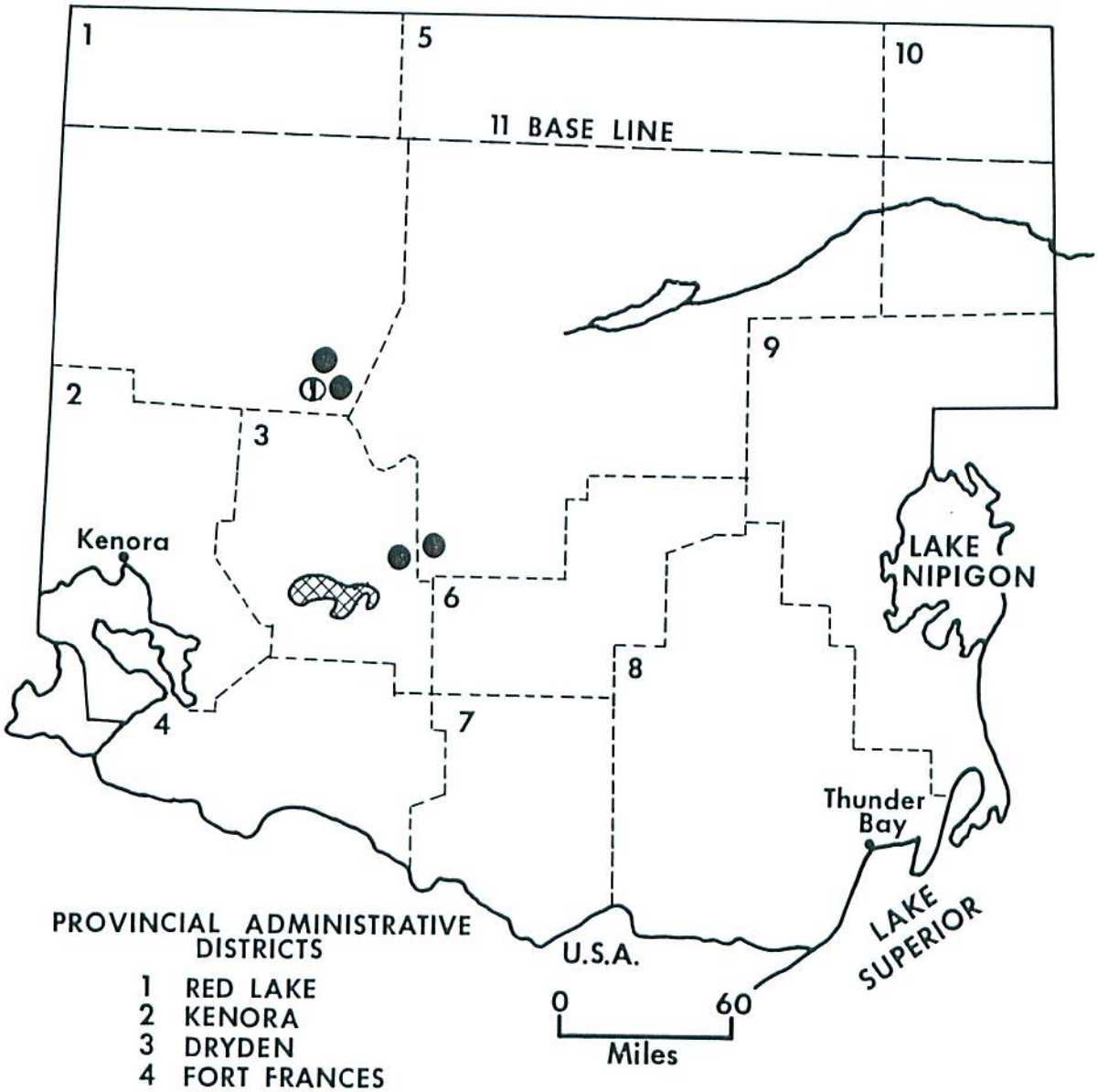
10 GERALDTON

Figure A2. LARGE ASPEN TORTRIX

Areas within which defoliation occurred in 1973

Moderate-to-severe defoliation . . . ▨ or ●

WESTERN SURVEY REGION



PROVINCIAL ADMINISTRATIVE DISTRICTS

1 RED LAKE
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9 NIPIGON
10 GERALDTON

Figure A3. FOREST TENT CATERPILLAR

Areas within which defoliation occurred in 1973

Moderate-to-severe defoliation . . . or

Light defoliation . . . .

WESTERN SURVEY REGION

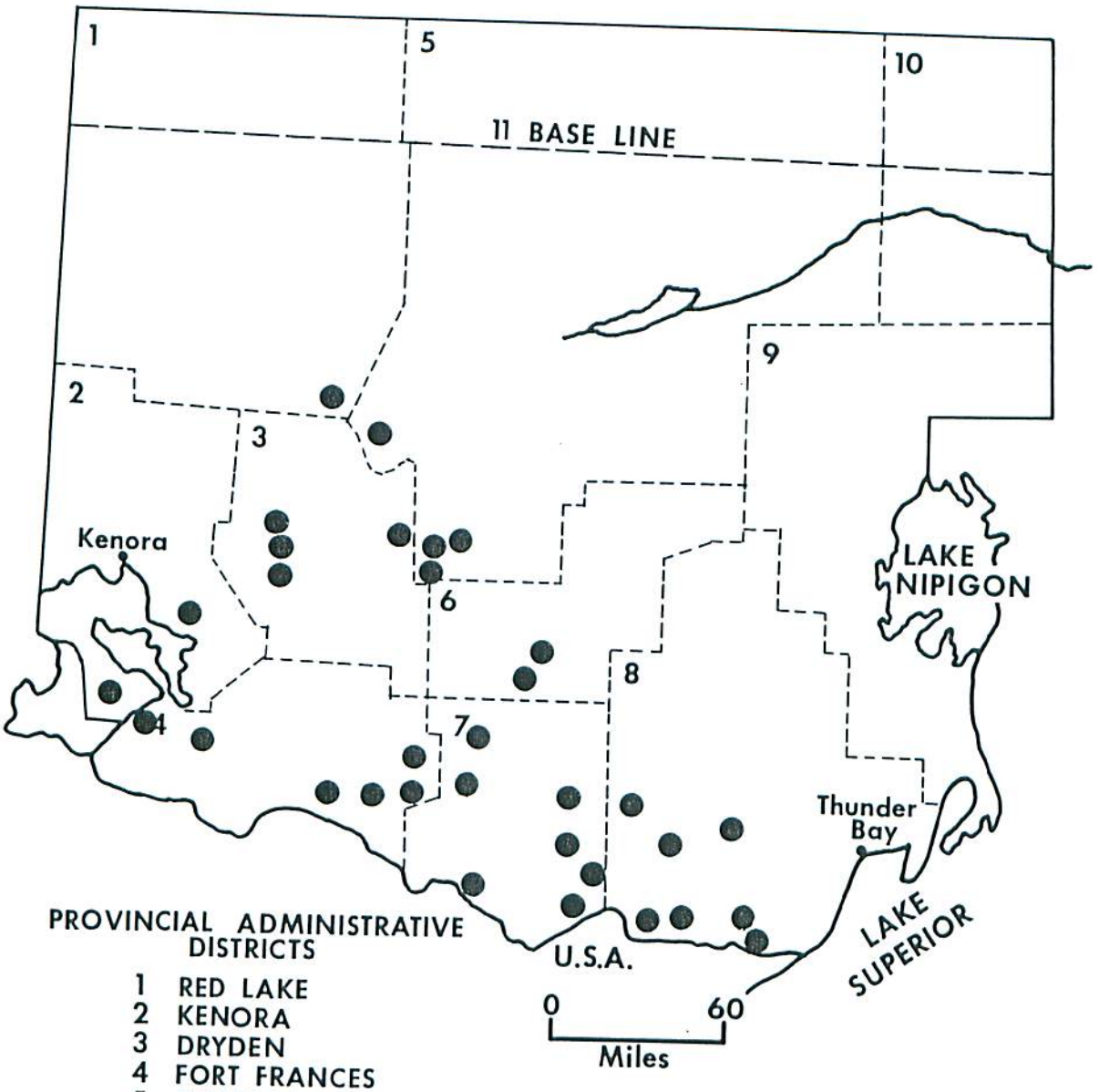
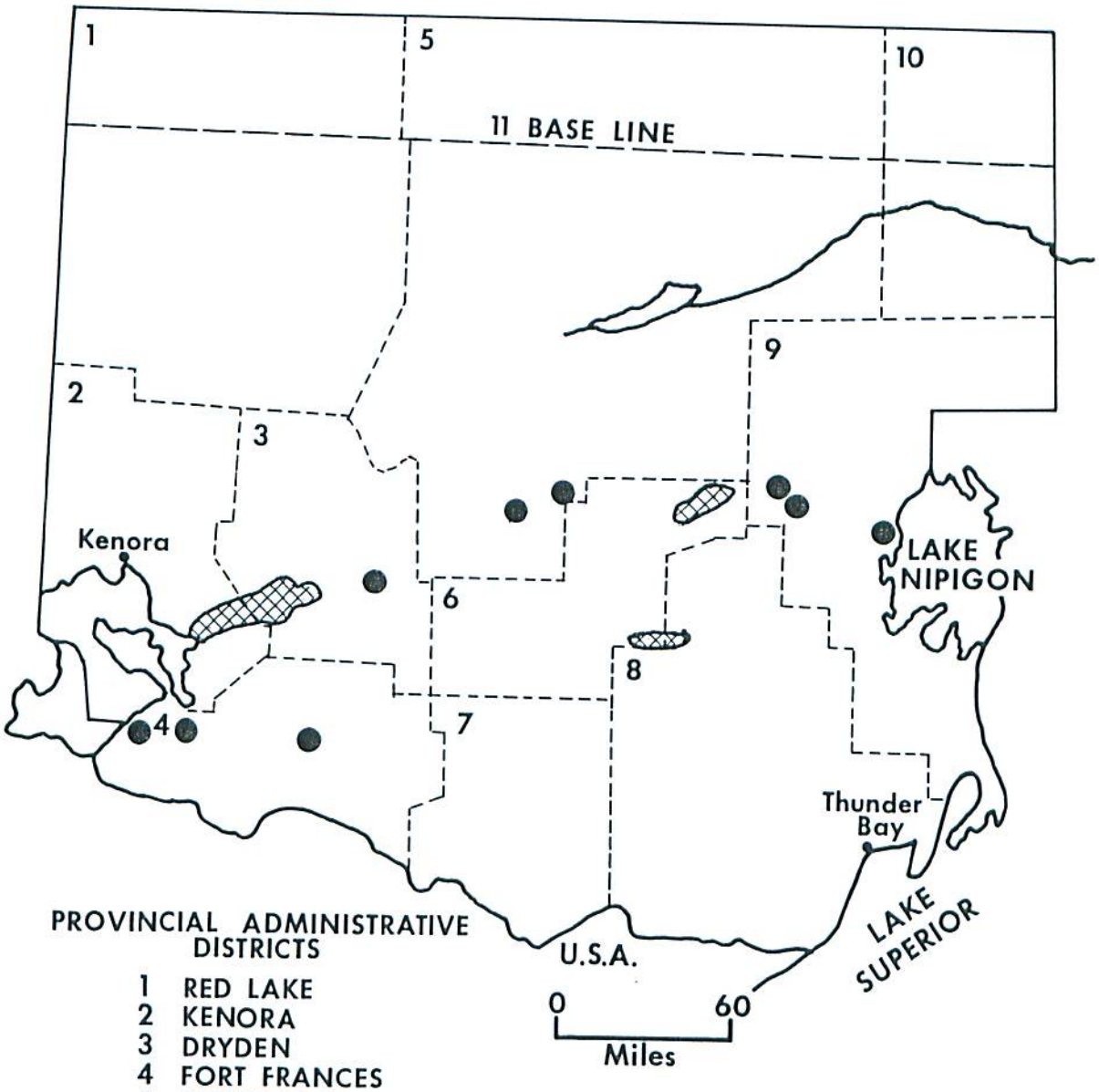


Figure A4. SHOOT BLIGHT OF PINES

Locations of infection centres recorded in 1973

Infection centres . . . . ●

WESTERN SURVEY REGION



PROVINCIAL ADMINISTRATIVE DISTRICTS

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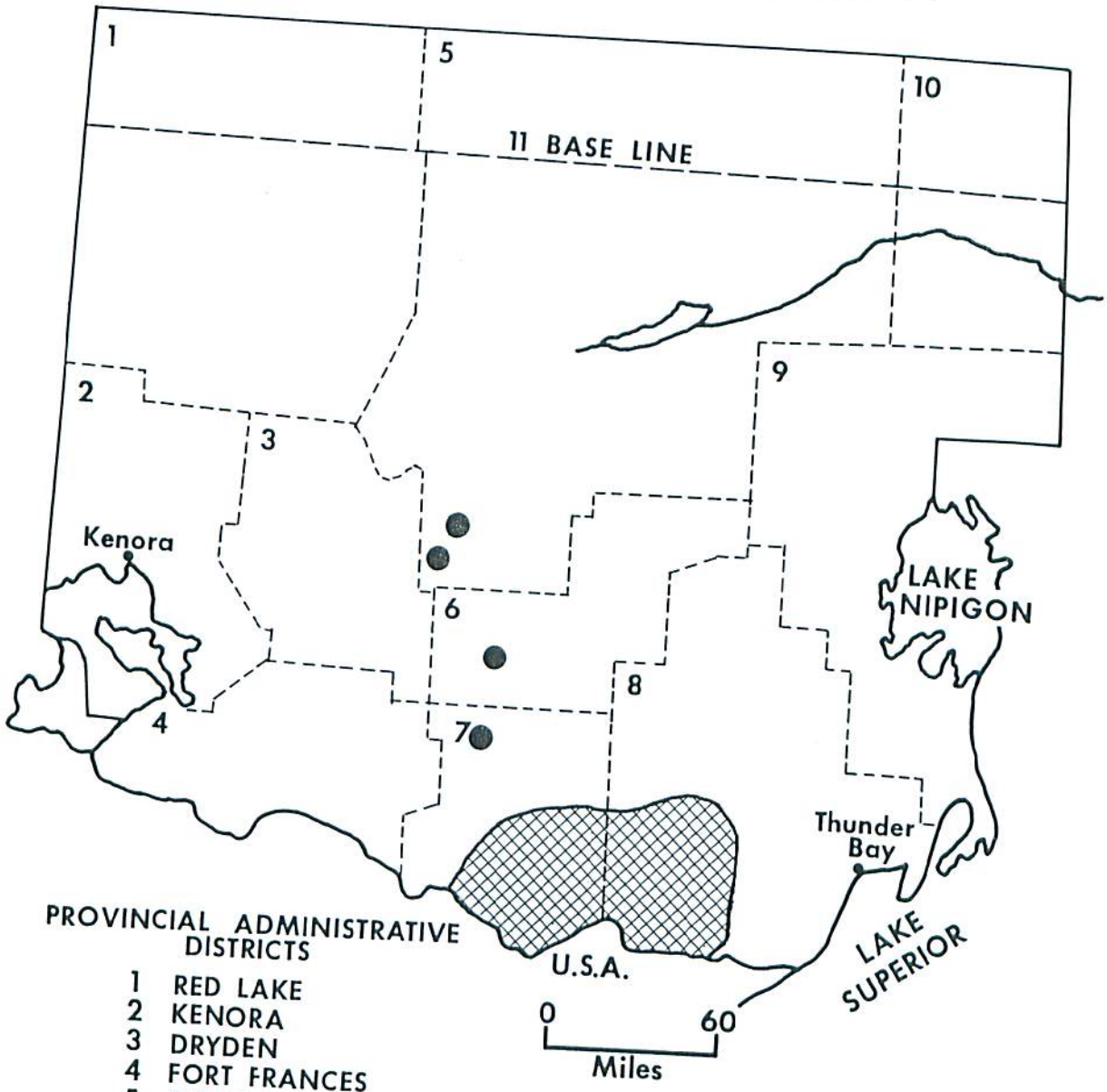
Figure A5. WIND DAMAGE

Areas where wind damage occurred in 1973

Moderate-to-severe damage . . . . . or

WESTERN SURVEY REGION



PROVINCIAL ADMINISTRATIVE DISTRICTS

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Figure A6. WINTER DRYING OF PINES

Areas within which winter drying occurred in 1973

Moderate-to-severe drying . . . . . or