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Midwestern Forest Region, 1968
Status of Insects in the Port Arthur
District

Hall, K.C.

Information Report O-X-98
(Forest Research Laboratory, Ontario Region)



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FOREWORD

The Forest Insect and Disease Survey maintains a continuing interest in improving existing sampling methods and in developing new techniques for rating forest pests and appraising damage. In 1968, a new approach for evaluating incidence and levels of infection of a number of tree diseases was explored. This involved determining degrees of damage in random and non-random plots in relation to the basal area of infected stands, the ultimate objective being to provide information on the impact of the organisms on forest stands in Ontario. Studies during the winter to test the accuracy of the new sampling system will be useful for planning field work in 1969. Improvement of insect survey methods in 1968 was largely directed toward jack-pine budworm sampling with emphasis on egg population studies. To this end, the distribution of egg masses on individual branches and at various crown levels of sample trees was investigated as a basis for determining the nature and size of samples required to assess population levels. The value of these new approaches in disease and insect sampling will be proven with use in forthcoming field seasons.

Marked changes in insect and disease conditions were recorded in large areas of the Province in 1968. A sharp increase in population levels of the spruce budworm and jack-pine budworm occurred in many parts of Ontario. The largest areas of infestation of the spruce budworm were located in the Burchell Lake area in the Port Arthur District, in parts of the Chapleau, Kapuskasing and Swastika districts and in southeastern Ontario. Localized infestations were centered in Parkinson Township in the Sault Ste. Marie District and in Fairbanks Township west of Sudbury. Egg surveys in most of the above areas except Burchell Lake, indicated that infestations will increase in extent in 1969.

The chemical control operation undertaken by the Ontario Department of Lands and Forests against the spruce budworm in the Burchell Lake area dominated insect surveys in western Ontario during several periods from May until September. Technicians were involved in intensive sampling to delineate the area to be treated, to time the spray applications and to assess spruce budworm numbers before and after the control operation.

Infestations of the jack-pine budworm abated somewhat in the Kenora and Fort Frances districts but several years of severe defoliation, particularly on rocky sites, caused considerable crown damage. In parts of the Sault Ste. Marie and Pembroke districts very severe defoliation of both jack pine and red pine was reported. Other insects occurring in particularly high numbers in 1968 included the saddled prominent, larch casebearer and several species of cedar leaf miners.

Devastation of elm by Dutch elm disease continued in southern Ontario and numerous new centers of infection were found throughout a large part of the range of elm in central Ontario. A vector of Dutch elm disease, the smaller European elm bark beetle extended its range eastward along the north shore of Lake Ontario and St. Lawrence River. Hypoxylon canker of poplar proved to be a serious problem in many parts of Ontario. Evaluations revealed particularly high levels of infection in aspen stands in the Sault Ste. Marie and Sudbury districts. Scleroderris canker of pine again caused considerable

mortality in young red pine and jack pine plantations in parts of central and northeastern Ontario. Fomes root rot usually associated with thinning operations, caused varying amounts of mortality in red pine plantations in southern Ontario. Four new centers of infection of this disease were found in Larose forest in the Kemptville District in 1968. Details on the above and other noteworthy insect and disease problems are contained in the report that follows.

J. E. MacDonald

MIDWESTERN FOREST REGION

1968

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INTRODUCTION

Midwestern Forest Region

This report deals with the status of forest insects and tree diseases in the Midwestern Region in 1968. Tree diseases are dealt with regionally and forest insects on a district basis. The work in the White River District was carried out jointly by C. Davis and K. Hall but was somewhat curtailed as Mr. Davis was new to the Geraldton District and because of the heavy work load connected with spruce budworm sampling, in the Port Arthur District.

A survey highlight in 1968 was the aerial spraying project undertaken against the spruce budworm in the Shebandowan Division. Larch sawfly infestations were comparable to 1967 except in Geraldton District where defoliation increased in most stands. Infestations of two species of birch leaf miners, Fenusa pusilla and Profenusa thomsoni persisted in Geraldton and White River districts respectively, however, quantitative sampling showed that populations were lower than in 1967. White pine weevil population levels fluctuated considerably throughout the region. The large aspen tortrix, Choristoneura conflictana, occurred in infestation proportions in Port Arthur District for the first time since 1958.

The level of infection of Scleroderris canker of pine, Scleroderris lagerbergii, increased in the eastern part of Geraldton District. Stem and gall rusts of jack pine occurred commonly in the region, generally at light infection levels except along the Dog River road where a high level of incidence persisted on trees in a wide range of diameter classes. A decline in incidence and levels of infection of needle and cone rusts was evident in all districts. Deterioration of birch was more pronounced than in 1967 at numerous locations in the region.

The assistance and cooperation extended by Department of Lands and Forests and Woods operating personnel is gratefully acknowledged.

K. C. Hall

Eastern Dwarf Mistletoe, Arceuthobium pusillum Peck

This organism is widespread in the region, and is found most frequently on hosts growing in low-lying moist areas. The highest level of infection was recorded in small pockets of black spruce east of Klotz Lake and in Township 89 and Cottham in Geraldton District where 30 and 40 per cent incidence respectively occurred. In Port Arthur District a moderate level of infection was recorded in a 600-acre stand of pole-size hosts in Joynt Township. Elsewhere in the region trace levels of infection were observed in scattered pockets of black spruce.

Yellow Witches' Broom, Chrysomyxa arctostaphyli Lagh.

Witches' brooms caused by this rust occurred commonly at trace levels throughout the region in 1968. The only exception noted was in Geraldton District where a moderate infection was recorded in a 20-acre stand of white and black spruce in Pic Township. A number of small diameter trees were heavily infected and supported as many as eight brooms. Light mortality occurred in the area. Elsewhere in the region trace levels of infection were observed at scattered locations.

Needle Rust of Spruce, Chrysomyxa ledi de Bary and C. ledicola Lagh.

The level of infection of these rusts declined sharply in the region in 1968. In 1967 light infection occurred commonly with scattered pockets of moderate and heavy infection in Geraldton and Port Arthur districts. In 1968, moderate levels of infection were recorded in a 50-acre white spruce plantation in Conacher Township, Port Arthur District, and in 5 acres of small diameter black spruce in Township 84, Geraldton District. Elsewhere in the region trace levels of infection were observed.

Cone Rust of Spruce, Chrysomyxa pirolata Wint.

In 1967 this rust occurred in varying degrees of severity ranging from trace levels of infection in the west to high levels of infection in the eastern part of the region. The prevalence of the rust in 1967 was due in part to the heavy cone crop. In contrast, a sharp decline was noted in 1968 due possibly to the scarcity of cones. Although extensive sampling of black and white spruce trees was carried out in 1968 no infected cones were found.

Ink Spot of Aspen, Ciborina whetzellii (Seaver) Seaver

This foliage disease was found commonly at varying levels of infection on trees of all diameter classes throughout the region. Moderate and severe levels of infection were confined, however, to occasional small diameter open-grown hosts. The most noteworthy areas of infection occurred in a 600-acre stand of 10- to 35-foot aspen at Limestone Lake in the Geraldton District and in several semi-mature stands along the south portion of the Armstrong road area in Port Arthur District. In both areas light infection was recorded.

White pine Blister Rust, Cronartium ribicola J.C. Fischer

The most severe damage caused by the white pine blister rust in the region in 1968 occurred in Geraldton District. A 300-acre white pine plantation in Sandra Township where approximately 25 acres were rated heavily infected. Light and moderate infection levels were present throughout the remainder of the plantation. Severe stem cankering has resulted in light mortality. In the Port Arthur District the disease was found at trace levels throughout the range of white pine, however, somewhat higher levels of infection occurred in the Pigeon River area.

Hypoxyylon Canker of Poplar, Hypoxyylon mammatum (Wahl.) Miller

This disease of aspen was widespread in the region in 1968 on all diameter classes of trees. The highest level of infection was recorded in Township 91 in the Geraldton District where aspen in a 30-square mile area showed 25.6 per cent incidence of cankers and 10.3 per cent mortality (Table 1). Moderate levels of infection with incidence ranging from 7.7 to 40 per cent occurred in Lindsley and Exton townships and around Terrior Lake in Geraldton District and in Conmee Township in Port Arthur District. Trace and light infection levels were found in numerous stands in White River District.

TABLE 1

Summary of Canker Incidence and Tree Mortality of Trembling Aspen
Caused by Hypoxyylon Canker in the Midwestern Region in 1968

Location	Basal area		Area affected	Per cent incidence	Level of infection	Per cent mortality (past yr. only)
	Diseased	Total				
<u>Geraldton District</u>						
Twp. 91	13	100	30 sq. mi.	25.6	Heavy	10.3
Ashmore Twp.	12	100	30 acres	5	Light	0
Lindsley Twp.	15	126	300 ac.	7.7	Moderate	5
Exton Twp.	10	120	250 ac.	10	Moderate	5
Terrior Lake	20	120	1000 ac.	20	Moderate	10
<u>Port Arthur District</u>						
Conmee Twp.	18	71	600 ac.	40	Moderate	2.5
<u>White River District</u>						
Knowles Twp.	8	85	100 ac.	10	Trace	2.5
Cecile Twp.	18	70	50 ac.	17	Light	2.5
Hunt Twp.	12	76	50 ac.	7.5	Trace	0

Stem and Branch Rust of Pine, Peridermium sp.

This disease was widespread in the region in 1968. In the Port Arthur District a 600-acre stand along the Dog River road was heavily infected with numerous galls occurring on all diameter classes of jack pine. At Huronian Lake a moderate level of infection was recorded in a 50-acre stand. In the Geraldton District moderate infections were observed in a 300-acre stand in Exton Township and a 500-acre stand in Fulford Township. Throughout the remainder of the region most stands contained at least trace levels of infection. Although the disease is capable of causing mortality none was observed in the region in 1968.

Needle Rust, Pucciniastrum epilobii Otth.

Two areas of moderate infection caused by this needle rust were observed in the region in 1968. The largest infection center occurred in Matthews Township, White River District, where 90 per cent incidence was recorded in a 100-acre stand. The second area of approximately 10 acres was located on the east side of Lac Des Mille Lac in Port Arthur District. In the Geraldton District light infection was observed on balsam fir in one large area along the Statesman road. Elsewhere in the region the disease could be found in most stands generally at trace levels of infection.

Scleroderris Canker of Pine, Scleroderris lagerbergii (Lager.) Gremmen

No important change in the distribution of this destructive organism was observed in the region in 1968 (Table 2). The level of infection in most diseased areas increased only slightly whereas the mortality rate declined. In the Geraldton District incidence ranged from 5 to 50 per cent in jack pine and red pine plantations (Table 2). In a 50-acre jack pine plantation in the Stevens area 50 per cent of the trees were infected and 32 per cent were killed in the past year. Fifty per cent incidence was recorded in an 8-acre jack pine plantation in the Kowkash area and 10 per cent mortality occurred in the past year. A new infection was noted near Wawa in the White River District where incidence of 10 per cent was recorded in 15 acres of natural jack pine. No new distribution points or change in the status of the disease was observed in the Port Arthur District.

TABLE 2

Summary of Canker Incidence and Tree Mortality
Caused by *Scleroderris lagerbergii* in the Midwestern Region in 1968

Location	Tree sp.	Av. height	Acres affected	Per cent incidence	Level of infection	Per cent mortality (past yr. only)
<u>Geraldton District</u>						
Stevens	jP	6	50	50	Heavy	32
Pic Twp.	jP	15	200	5	Light	2
Schreiber	jP	7	15	10	Trace	1
Sandra Twp.	jP	10	800	10	Trace	0
Sandra Twp.	jP	10	800	10	Moderate	3
Sandra Twp.	rP	9	1500	10	Trace	0
Sandra Twp.	rP	9	500	10	Moderate	5
Kowkash Twp.	jP	8	200	10	Trace	0
Kowkash Twp.	jP	8	10	50	Heavy	10
Arrowland	jP	11	20	5	Light	0
Goldfield rd.	jP	10	15	5	Light	1
<u>White River District</u>						
Wawa	jP	15	5	10	Trace	0

Birch Decline

This condition was widespread in the region in 1968. Levels of damage ranged from light to severe and occurred on trees over a wide range of diameter classes. The condition was most pronounced in cottage areas along the north shore of Lake Superior in Geraldton and Port Arthur districts where sites have been thinned. In forested areas varying degrees of damage were observed throughout the Geraldton District and the Wolf and Disraeli Lake areas and along the Graham road in Port Arthur District. In the White River District light to severe crown deterioration occurred commonly on both white and yellow birch in the area extending from the southern boundary of the district to Wawa.

Frost Damage

Late spring frosts caused light to moderate damage to balsam fir trees along the south portion of the Armstrong road area in 1968. Shoot damage was severe on small diameter balsam fir reproduction in cutover areas in Cocheram Township. Damage to new shoots ranged from 25 to 40 per cent. Larger host trees were affected to a lesser degree. Light damage to balsam fir and spruce occurred commonly throughout the Geraldton District. No damage was observed in the White River District.

Winter Drying of Conifers

A relatively light snowfall in the winter of 1967-68 resulted in considerable winter drying throughout the northern part of the Geraldton District. The most noticeable damage occurred in a 300-acre plantation of white pine in Sandra Township in which all trees showed some browning due to winter drying. Ornamental white pine trees at MacLeod Park in Ashmore Township were severely discolored. In forested areas, ground hemlock showed some browning. Winter drying was not observed in Port Arthur or White River districts.

TABLE 3

Other Noteworthy Diseases in the Midwestern Region in 1968

Organism	Host(s)	Remarks
<i>Alternaria tenuis</i> Auct.	tA	Small number stem cankers, Fulford Twp., Geraldton District
<i>Atopospora betulina</i> (Fr.) Petr.	wB	High level of infection on several hosts in Twp 70, White River District. Light infection on small hosts in Walters Twp, Geraldton District
<i>Aureobasidium pullulans</i> (d By) Arnaud	jP	Found affecting one small tree, Booth Twp, Geraldton District
<i>Candida</i> sp.	pCh	Light infection common on shoreline hosts, Michipicoten Is., White River District
<i>Cenangium populneum</i> (Pers.) Rehm	tA	Heavy fruiting on stem of one tree Knowles Twp., White River District
<i>Chrysomyxa</i> sp.	wS	Trace infection, Ashmore Twp., Geraldton District
<i>Cronartium comptoniae</i> Arth.	jP	Occasional branch galls on scattered trees in O'Connor Twp, plantation, Port Arthur District and in Fulford Twp., Geraldton District
<i>Elytroderma deformans</i> (Weir) Darker	jP	Trace level on one tree, Paipoonge Twp., Port Arthur District
<i>Gymnosporangium cornutum</i> Arth ex Kern	Mo	Trace to light infection common throughout the region

TABLE 3 (continued)

Organism	Host(s)	Remarks
<i>Hypodermella</i> sp.	bF	Trace level, Squeers Lake, Port Arthur District
<i>Isthmiella</i> (<i>Bifusella</i>) <i>crepidiformis</i> (Darker) Darker	bS	Moderate level of infection on lower branches of scattered trees, Twp. 32, Range 28, White River District
<i>Lirula mirabilis</i> (Darker) Darker	bF	Light to moderate infection, Greenwood Lake, Port Arthur District
<i>Lophodermium</i> sp.	bF	Trace infection lower branches, Ledger Twp., Geraldton District
<i>Lophodermium piniastri</i> (Schrad ex Hook.) Chev.	rP	Trace infection on open-grown trees Sandra Twp., Geraldton District
<i>Mamiania coryli</i> (Batsch ex Fr.) Ces den	Ha	Light infection common, McGinnis Lake, Port Arthur District
<i>Melampsora epitae</i> Thuem.	W	Trace infection throughout Geraldton District and on scattered trees Hagey Twp., Port Arthur District
<i>Melampsorella caryophyllacearum</i> Schroet.	bF	Brooms observed commonly throughout Geraldton District and along Armstrong and Sibley Penn. roads, Port Arthur District
<i>Nyssopsora clavellosa</i> (Berk) Arth.	Aralia	Moderate level of infection Hood Lake, Port Arthur District
<i>Panus rudis</i> Fr.	bS	Trace level in cutover, control burned area on Spruce River road, Port Arthur District
<i>Pollaccia elegans</i> Serv.	bPo	Trace level of infection throughout region
<i>Pollaccia radiosa</i> (Lib.) Bald & Gif	tA	Found commonly throughout the region principally on small diameter regeneration
<i>Polyporus adustus</i> Willd. ex Fr.	bS	Trace infection in cutover area Spruce River road, Port Arthur District

TABLE 3 (concluded)

Organism	Host(s)	Remarks
<i>Polyporus schweinitzii</i> Fr.	bS	Found commonly on dead roots Batwing Lake and on dead root of living trees Kabigon road, Port Arthur District
<i>Polyporus tomentosus</i> Fr.	bS	One collection in cutover, burned and planted area Spruce River road Port Arthur District
<i>Poria obliqua</i> (Pers ex Fr.) Karst.	wB	Trace infection on several trees in partial cutover area Twp. 90 Geraldton District
<i>Rhytisma punctatum</i> (Pers.) Fr.	MoM	Trace to light infection common throughout region
<i>Rhytisma salicinum</i> (Pers.) Fr.	W	Trace infection widespread in Geraldton District
<i>Sarcotrochila balsamae</i> (Davis) Korf	bF	Found on dead needles, Hanover Lake, Geraldton District
<i>Scoleconectria cucurbitula</i> (Tode ex Fr.) Booth	rP,wP,jP	Trace infections observed in several plantations in Geraldton and Port Arthur districts
<i>Valsa pini</i> (Alb. & Schw.) Fr.	jP	Common in plantations, Twp. 76 and Lukinto Lake, Geraldton District

STATUS OF INSECTS IN THE PORT ARTHUR DISTRICT

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K. G. Hall

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

A new infestation of this insect occurred in Conmee Township in 1968. Medium populations were found in a 10-acre stand of 4- to 5-inch trembling aspen with defoliation ranging from 40 to 70 per cent. The last reported occurrence of the insect in infestation proportions was in 1957 and 1958 in the Pigeon River area.

Spruce Budworm, Choristoneura fumiferana (Clem.), in Northwestern Ontario

The last widespread outbreak of the spruce budworm in northwestern Ontario terminated in 1963. No heavy infestations were detected in this area until 1967 when defoliation of the current foliage on white spruce and fir ranged from 48 to 97 per cent. This infestation developed suddenly in an area of 70 square miles in the Burchell, Moss, McGinnis and Upper Shebandowan lakes area, some 50 miles west of the Lakehead. A fall egg survey in 1967 revealed that light to severe defoliation could be expected in an area of 200,000 acres in 1968 (Map 1).

A much larger area of spruce fir forest type which extends mainly to the north and east of Burchell Lake was endangered by the infestation, having escaped the two previous outbreaks namely the Nipigon outbreak of the 1940's to the east and the Sioux Lookout-Fort Frances outbreak to the west. The threat this new infestation posed was brought to the attention of the Ontario Department of Lands and Forests during 1967. It was suggested by the Forest Research Laboratory, Canada Department of Fisheries & Forestry, Sault Ste. Marie that two alternatives lay open to the Province for direct action against this infestation; (a) the mounting of a spraying operation in 1968 with the objective of suppressing populations sufficiently to "knock out" the relatively small infestation before it had a chance to spread; or (b) using aerial spraying to protect valuable forest stands in imminent danger of suffering heavy losses from further budworm feeding. It was pointed out that if alternative (a) failed to work, the second course of action remained open. The provincial department, after evaluating the forest resources endangered, decided to undertake an aerial spraying operation with the objective of eliminating the infestation by the aerial application of chemical insecticide in the spring of 1968.

Operational control of the project was exercised by the Ontario Department of Lands and Forests. The Forest Research Laboratory, specifically the Insect and Disease Survey, provided technical guidance in the timing of the sprays, and undertook all insect population determinations necessary to define the infestation area and assess the effectiveness of the operation. This report, which draws heavily on a report by G. M. Howse to the Interdepartmental Committee on Forest Spraying, outlines the main features relating to the progress of the project and results obtained.

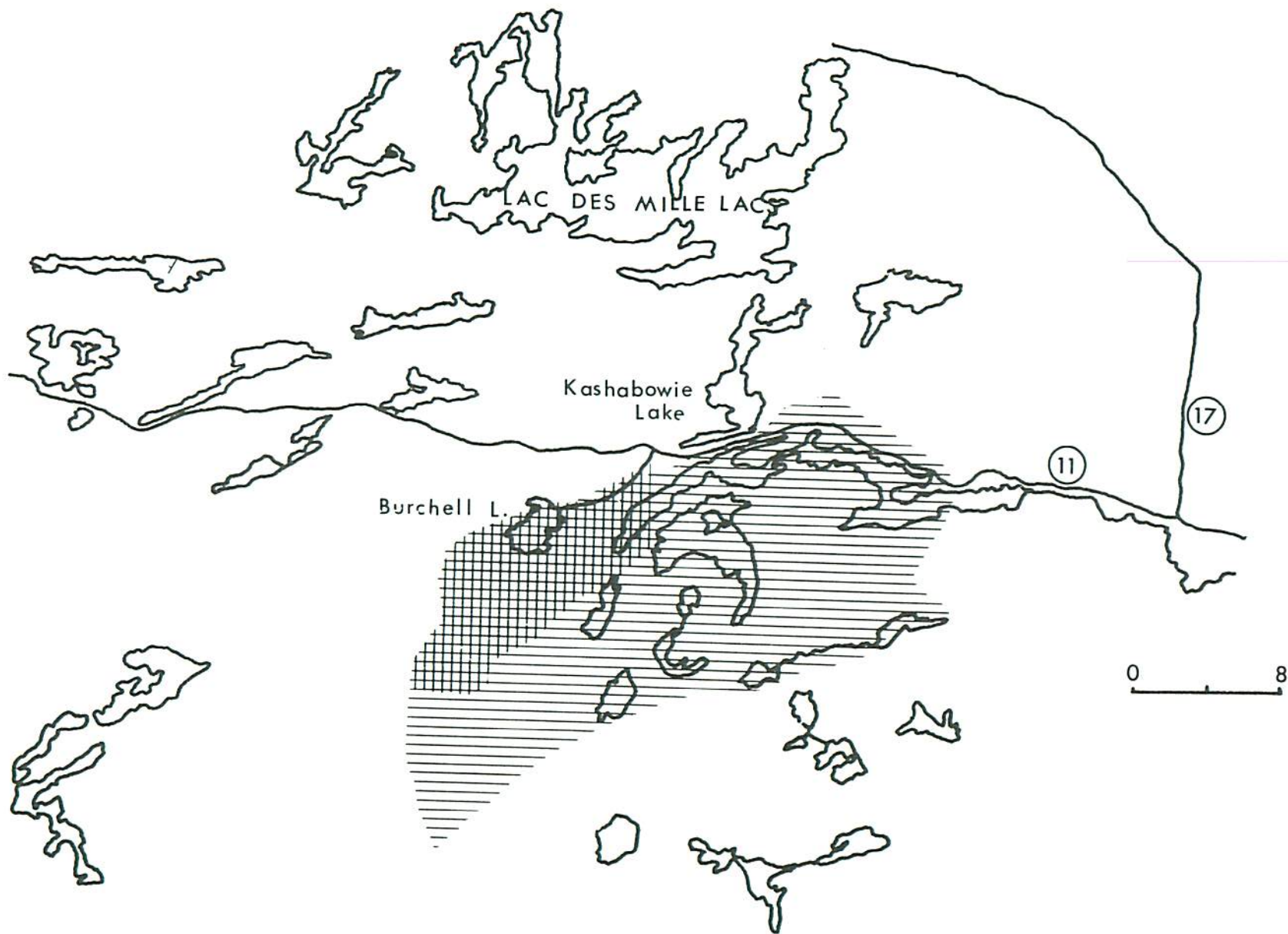
Larval emergence from foliage which was collected in April, 1968 around Burchell Lake and then incubated in the Sault Ste. Marie Laboratory, indicated no excessive winter mortality. On May 1 field work began for the timing of the spray operation and for the establishing of spray boundaries. Larval counts were made at 170 locations over a 2-week period by Survey personnel supported by special crews at Shebandowan. These made possible the delineation of an area in which appreciable populations were known.

The operational plan called for the application of two organophosphate insecticides, Sumithion, at the rate of 6 ounces per acre when the larvae were in 3rd or 4th instars, and Phosphamidon to be applied as a second spray at the rate of 4 ounces per acre at the peak of 5th instar. Spraying commenced on June 5, but owing to continuously poor flying conditions, operations were then forced to shut down until June 12 when spraying resumed. All spraying was completed by June 20. The areas sprayed are shown in Map 2.

The objective of this operation made direct assessment impossible because all check areas were treated on the final day of spraying. However, pupal surveys which were carried out both within and outside the spray area indicated very low populations except for a few areas east of Burchell Lake. Also, an aerial survey to detect defoliation in sprayed and adjoining areas was flown in early July. Four pockets of light to moderate defoliation totalling 1350 acres and one of moderate to heavy defoliation totalling 1300 acres were mapped in the sprayed zone, Map 3. The total of 2650 acres is a relatively small area compared with the 40,000 acres of heavy defoliation in 1967, or compared with the forecast of much more extensive defoliation for 1968 based on egg surveys in the fall of 1967. Also estimates of defoliation showed that defoliation in 1968 was much less severe than in 1967. Outside the spray area two pockets of light to moderate defoliation were detected, one on the west side of Kashabowie Lake, the other along the open Bay Road north of Lac des Mille Lacs.

Finally, egg surveys were conducted in August and early September 1968 throughout the spray area and adjoining areas in northwestern Ontario. Samples were taken from 140 locations, 22 of which coincided with 1967 collection locations. Results from these 22 locations - mostly located within the spray area - show a dramatic reduction in egg populations from 1967 to 1968 (Table 4). The 1968 egg sampling indicated that high overwintering populations were confined to some 35,000 acres, located at the heart of the 1967 infestation area to the east of Burchell Lake (Table 5).

Infested Areas - 1967

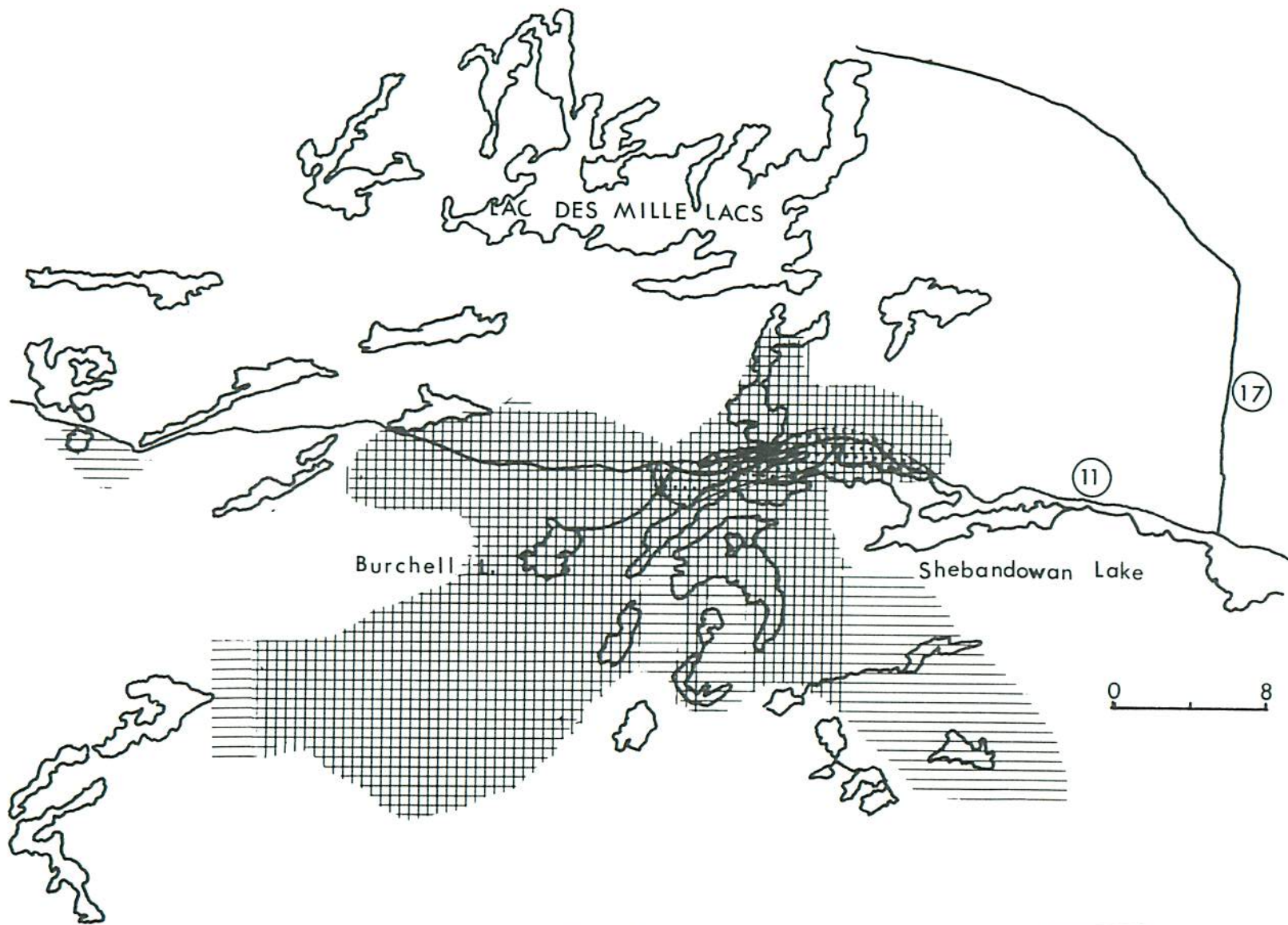


Area of severe defoliation, caused by
1966 generation - detected July, 1967

Area infested - 1967 fall egg survey



AREA
SPRAYED



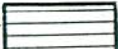


- Sumithion - one application ----- 
- Sumithion - first application
- Phosphamidon - second application ----- 
- Sumithion - two applications ----- 

TABLE 4

Comparison of 1967 and 1968 Egg Cluster Counts
for Burchell Lake Region

Location	Egg clusters per 100 sq. feet of foliage	Egg clusters per 100 sq. feet of foliage
	1967	1968
Burchell Lake	826	97
McGinnis Lake	725	18
Upper Shebandowan L.	293	34
Squeers Lake	136	58
Moss Lake	195	28
Hoof Lake	38	18
Greenwater L.	39	6
Huronian L.	0	14
Haines Twp.	25	3
HW 11 - 5 mi.	60	14
Shelter Island	41	8
Athelstane L. Rd.	0	3
Drift Lake Rd.	0	0
Hagey Twp.	8	0
Hood L.	11	15
Kekekaub L.	7	26
Plummes L.	3	0
Greenwood L.	4	3
Titmarsh L.	0	7
Bolton Bay	0	0
Crayfish L.	3	0
Blackwell Twp.	0	3

TABLE 5

Summary of Egg Mass Counts Within the Spruce Budworm Spray Zone
Indicating the Area Where Infestations are Forecast for 1969

Location	No. of egg masses per 100 sq. feet of foliage	Infestation forecast for 1969
Moss Lake	28	Light to Medium
Upper Shebandowan Lake, dam	28	" " "
Ross Lake	29	" " "
Upper Shebandowan Lake, west side	34	" " "
Upper Shebandowan Lake, north of dam	42	" " "
Upper Shebandowan Lake, south tip	44	" " "
Squeers Lake	58	Medium
Fountain Lake	66	"
Burchell Lake, south east shore	83	"
Burchell Lake	125	Medium to heavy
Burchell Lake	137	" " "
3 mi. west of Grouse Lake	202	Heavy
3 mi. southeast of Burchell Lake	222	"
Upper Shebandowan Lake, south tip	302	"

In the Fort Frances District, pre-spray sampling revealed a substantial larval population at French Lake and light populations at the west end of McKenzie Lake. Both these areas were treated with one application of Sumithion (Map 2). Egg mass counts carried out at 22 locations extending from Cache Bay in the south to Byers Lake in the north indicated that low populations will occur again in 1969. The one exception was in the French Lake area where moderate to severe defoliation is forecast.

Outside of the treated area in Port Arthur District, the numbers of eggs remained generally very low with light populations confined to Bedivere, Tilley, Kashabowie, Howse, Kekekaub and Ross lakes and at Baril Bay (Table 6). Egg-counts made in northwestern Ontario other than in the Port Arthur and Fort Frances districts were low and no infestations were found.

In summary, the exact proportions of the striking reduction attributed to the spraying operation and to other factors such as unfavourable weather are not known owing to the unusual objective of the project. Survey results do reveal a dramatically improved spruce budworm situation in the susceptible spruce-fir forests west of the Lakehead.

TABLE 6

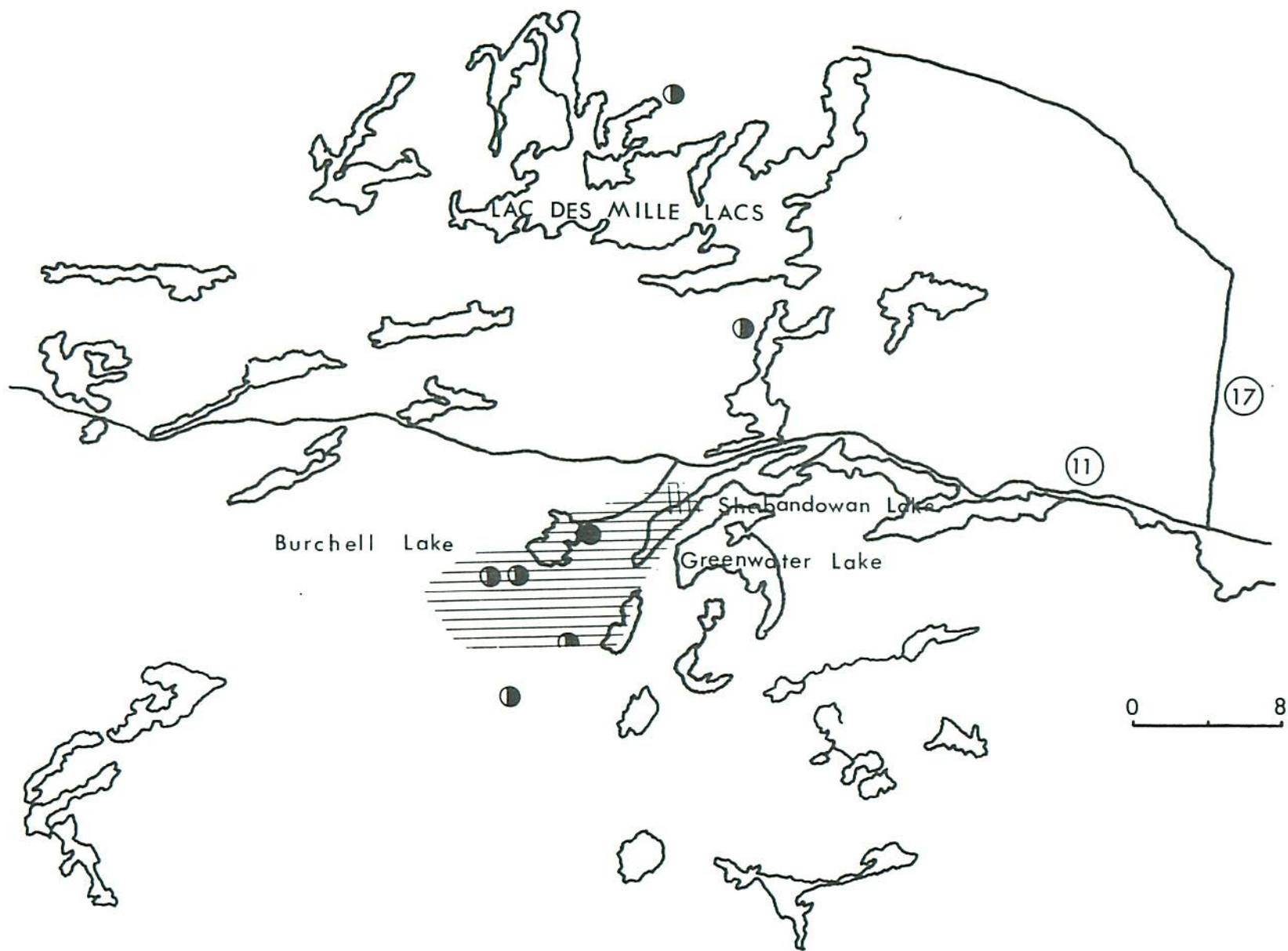
Summary of Egg Mass Counts in the Port Arthur District
in 1968 and Infestation Forecasts for 1969

Location	No. of egg masses per 100 sq. feet of foliage	Infestation Forecast for 1969
Sackville Township	0	Nil to light
Hwy 11 (mid Hagey Twp.)	0	" " "
Greenwater Lake, west	0	" " "
Shelter Bay	0	" " "
Whitefish Lake	0	" " "
Boreal road	0	" " "
Heart Lake	0	" " "
Clovenhoof Lake	0	" " "
3 mi. west of Burchell Lake	0	" " "
Crayfish Lake	0	" " "
Drift Lake	0	" " "
N. of Drift Lake	0	" " "
Huronian	0	" " "
Poland	0	" " "
Lac Des Mille Lac Lodge	0	" " "
Lac Des Mille Lac Indian Reserve	0	" " "
Lac Des Mille Lac Pine Point	0	" " "
Lac Des Mille Lac east side	0	" " "
Lac Des Mille Lac Portage Bay	0	" " "
Lac Des Mille Lac Bolton Bay	0	" " "
North of Clay Lake	0	" " "
Plummes Lake	0	" " "
Nelson Lake	0	" " "
Flower Lake	0	" " "
Marks Lake	0	" " "
Marks Lake road	0	" " "
Blackwell Township	0	" " "
Aldina Township	0	" " "
Aldina Township	2	" " "
Batwing Lake	2	" " "
Lower Shebandowan Lake south shore	2	" " "
Lac Des Mille Lac, Upsala Twp.	2	" " "
Postans	3	" " "
Swallow Lake	3	" " "
Greenwood Lake	3	" " "
Moss mine	3	" " "
Little Athelstane Lake	3	" " "
East of Savanne Lake	3	" " "
Mabella	3	" " "
Middle Shebandowan Lake, narrows	3	" " "
3 mi. south Moss mine	3	" " "

TABLE 6 (concluded)

Location	No. of egg masses per 100 sq. ft. of foliage	Infestation Forecast for 1969
Marks Lake road	4	Nil to light
Lower Shebandowan Lake south shore	4	" " "
Ames Township (Hwy 11)	4	" " "
Lac Des Mille Lac, Joynt Township	4	" " "
Lac Des Mille Lac, Inwood road	4	" " "
Lac Des Mille Lac, Blind Bay	4	" " "
North of Quetico	5	" " "
4 mi east of P.A. - F.F. border	5	" " "
Lac Des Mille Lac, Cushing Lake	5	" " "
Lac Des Mille Lac, Dam	5	" " "
Shafton Lake	6	" " "
Greenwater Lake east	6	" " "
Bemer Lake	6	" " "
Savanne Lake	6	" " "
Kashabowie	6	" " "
Lac Des Mille Lac, Open Bay	6	" " "
East of Postans	7	" " "
Lily Lake	7	" " "
Titmarsh Lake	7	" " "
Whitefish Lake east	8	" " "
Shelter Island	8	" " "
Middle Shebandowan Lake, south shore	8	" " "
Lower Shebandowan Lake, south shore	8	" " "
Sandstone Lake	8	" " "
Boreal road	9	" " "
Burchell Lake road, mi 4	10	" " "
Lower Shebandowan Lake, south shore	10	" " "
Goldie Township	12	" " "
Golding Township	12	" " "
4 mi west of Burchell Lake, Hwy 11	14	" " "
East of Huronian, Hwy 11	14	" " "
Hood Lake	15	" " "
Chief Peter Lake	15	" " "
Powell Lake	16	" " "
Middle Shebandowan Lake, south shore	17	" " "
Hoof Lake	18	Light
McGinnis Lake	18	"
Lac Des Mille Lac, Baril Bay	19	"
Tilley Lake	20	"
Bedivere Lake	22	"
Kashabowie Lake	23	"
Howse Lake	23	"
Kekekaub Lake	26	Light to medium

PREDICTED DEFOLIATION IN 1969
AND
1968 DEFOLIATION



Defoliation in 1968 ----- light - moderate ●
moderate - heavy ●
Predicted moderate to heavy defoliation in 1969 ≡≡≡

Jack Pine Budworm, Choristoneura pinus pinus Free.

No infestations of this destructive insect were found in the district in 1968. Small numbers were collected at scattered locations along the Graham road and north of Lake Shebandowan. Quantitative sampling of egg populations at eight locations in the English River area and along the Graham road gave negative results except at Graham where very small numbers were found. Intensive sampling was carried out in the western part of the district, but no extension of the large heavy infestation in the Western Region was observed.

Larch Casebearer, Coleophora laricella (Hbn.)

Population levels remained low at all sample points in the district in 1968. Minor population increases were recorded at all quantitative sampling points except in MacGregor Township where a substantial decrease occurred (Table 7).

TABLE 7

Summary of Counts of the Larch Casebearer in the Port Arthur District in 1968

Note: Counts are based on the examination of four 18-inch branch tips from each of four trees at each location.

Location	Host	Av. d.b.h. of sample trees in inches	Av. no. larvae per 18" branch tip		
			1966	1967	1968
MacGregor Twp.	El	8	6.2	8.4	2.0
O'Connor Twp.	tL	7	.1	.1	.5
Crookes Twp.	El	7	1.2	.2	.3
Sibley Peninsula	tL	8	.2	.0	1.0
Paipoonge Twp.	tL	8	---	---	.1

Blotch Miner on Balsam Poplar, Lithocolletis sp.

Heavy infestations of this miner on balsam poplar persisted at all sample points in Division 24. Substantial increases in the percentage of leaves infested occurred in Comtee and Oliver townships. The only decrease was noted in Neebing Township where 66 per cent mining was recorded compared with 84 per cent in 1967. Only minor fluctuations in numbers of mines per leaf occurred at sample locations except in Scoble and Oliver townships (Table 8).

TABLE 8

Summary of Leaf Mining by Lithocolletis sp. in the Port Arthur District from 1966 to 1968

Location (township)	Per cent of leaves mined			Av. no. mines per leaf		
	1966	1967	1968	1966	1967	1968
Marks	96	90	96	1.9	1.6	1.8
O'Connor	85	99	98	2.3	6.7	6.2
Neebing	50	84	66	.6	1.5	1.7
Scoble	100	100	99	4.4	8.1	3.8
Conmee	63	68	81	.9	1.0	2.1
Paipoonge	68	98	95	1.2	3.6	3.9
Oliver	100	63	98	3.9	.9	3.5

Red Pine Sawfly, Neodiprion nanulus nanulus Schedl.

Population levels of this sawfly increased at numerous locations in Division 24. The heaviest defoliation, ranging from 20 to 70 per cent, occurred in small diameter understory jack pine trees in Paipoonge and Neebing townships. Defoliation of larger understory trees was light. Elsewhere in the district population levels were low.

White Pine Weevil, Pissodes strobi Peck

Population levels of the white pine weevil fluctuated considerably in the district in 1968. The most noteworthy increase was recorded in a white pine plantation in Paipoonge Township where 14 per cent of the trees were weeviled compared with 4 per cent in 1967. In contrast, a decrease in the number of weeviled trees occurred on an adjacent Scots pine plantation. In Marks Township a six per cent increase in the number of infested trees was recorded in a Norway spruce shelterbelt (Table 9). In forested areas population levels remained low.

TABLE 9

Summary of Damage by the White Pine Weevil in Port Arthur District in 1968

Location	Host	Av. d.b.h. in inches	Per cent trees weeviled		
			1966	1967	1968
<u>Paipoonge Township</u>					
Thunder Bay Nursery	jP	4.5	4	5	5
Boy Scout Tree Farm	wP	3.0	7	4	14
Boy Scout Tree Farm	ScP	4.5	3	12	10
Boy Scout Tree Farm	ScP	3.5	9	22	14
<u>Marks Township</u>	nS	3	-	19	25

Larch Sawfly, Pristiphora erichsonii (Htg.)

No important change in the status of the larch sawfly was observed in the district in 1968. Heavy defoliation, in excess of 40 per cent, occurred in most larch stands in Soper and McIntyre townships. Along Highway 17 West, medium infestations occurred in Upsala and Inwood townships. Light infestations were noted along Highway 17, 11 and the Spruce River and Armstrong roads.

TABLE 10

Summary of Miscellaneous Insects Collected in Port Arthur District in 1968

Insect	Host(s)	Remarks
<i>Acleris variana</i> Fern	bF	Low numbers along Lac Des Mille Lac rd., Inwood Twp.
<i>Adelges lariciatus</i> Patch	wS	Small numbers on open-grown hosts in Paipoonge Twp. and at Black Sturgeon Lake. Two other species of gall insects found in association at latter location
<i>Adelges strobilobius</i> Kalt.	wS	Recovered in small numbers at Black Sturgeon Lake
<i>Altica corni</i> Woods	Dogwood	Moderate populations in upper crown of hosts at Birch Beach, MacGregor Township. Defoliation 30 per cent
<i>Calligrapha multipunctata</i> <i>bigbyana</i> Kby.	W	Light populations Kashabowie River, defoliation 15 per cent
<i>Cecidomyia reeksi</i> Vock.	jP	Light populations on scattered open-grown hosts, Thunder Bay Nursery
<i>Compsolechis niveopulvella</i> Cham.	tA	Medium infestation in several stands in Upsala Township
<i>Dioryctria reniculella</i> Grt.	wS	Small numbers on open-grown hosts on Sibley Peninsula
<i>Dryocoetes affaber</i> Mann.	bS	Moderate populations recovered in trap logs, Armstrong road
<i>Fenusa pusilla</i> Lep.	wB	Light infestation on open hosts, Stanley, Paipoonge Twp.

TABLE 10 (concluded)

Insect	Host(s)	Remarks
Gelechiidae	W	Numerous hosts lightly infested east of Raith
Gonioctena americana Schaeef.	tA	Common on Sibley Peninsula, av. defoliation 10 per cent
Gonioctena notmani (Schaeef.)	W	Small numbers collected in Golding Twp.
Nematus ventralis Say	W	Av. 1 colony per tree on open planted hosts, Fallis Twp.
Neodiprion abietis complex	bF	Light populations Lac Des Mille Lac, Bedivere lakes and Shelter Bay road. Reduction in latter area in 1968
Neodiprion pratti banksianae Roh.	jP	Colonies more numerous on all diameter size trees, Paipoonge Twp.
Neodiprion virginianus complex	jP	Occasional colonies, Kashabowie River
Phyllocolpa sp.	W, bPo	High populations in O'Connor Twp. Moderate populations found in Paipoonge Twp.
Pineus similis Gill	wS	Small numbers of galls caused by this species north end Black Sturgeon Lake
Pikonema alaskensis Roh.	wS	Heavy infestation persisted in plantation in McTavish Township. Light mortality present
Pissodes approximatus Hopk.	rP	Occurred commonly in roots of dead hosts, McTavish Twp.
Pityophthorus sp.	rP	Moderate numbers recovered in stem of dead hosts, McTavish Twp.
Zeiraphera canadensis Mut. & Free.	wS	Small numbers recovered on mat samples Sibley Peninsula