

THE 1975 SPRUCE BUDWORM SITUATION
IN ONTARIO

PART A: DAMAGE AND FORECASTS

PART B: AERIAL SPRAYING OPERATIONS

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We wish to remind all management and unit foresters, industrial or provincial, that if they require more specific information than is contained in this report about spruce budworm conditions in their districts they should contact the appropriate Forest Research Technician or write to the Head, Forest Insect and Disease Survey Unit, Great Lakes Forest Research Centre.

ABSTRACT

The spruce budworm situation worsened considerably in Ontario in 1975. Part A of this report describes changes in the infestations in 1975 and forecasts, in cartographic and tabular form, the damage liable to occur in 1976. Part B describes aerial spraying operations covering 13,344 ha (33,360 acres) which were conducted against the spruce budworm in Ontario in 1975 as part of a joint strategy developed by the Canadian Forestry Service and the Ontario Ministry of Natural Resources.

RÉSUMÉ

En 1975, les infestations de la Tordeuse des bourgeons de l'épinette a empiré considérablement dans l'Ontario. La partie A de ce rapport décrit les fluctuations des infestations survenues en 1975 et prévoit, en se basant sur des cartes et des tableaux, les dégâts probables en 1976. La partie B décrit les arrosages aériens effectués en 1975 sur un superficié de 13,344 ha (33,360 acres), lors de la réalisation d'un programme conjoint entre le Service canadien des forêts et le Ministère des richesses naturelles de l'Ontario.

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PART A: DAMAGE AND FORECASTS

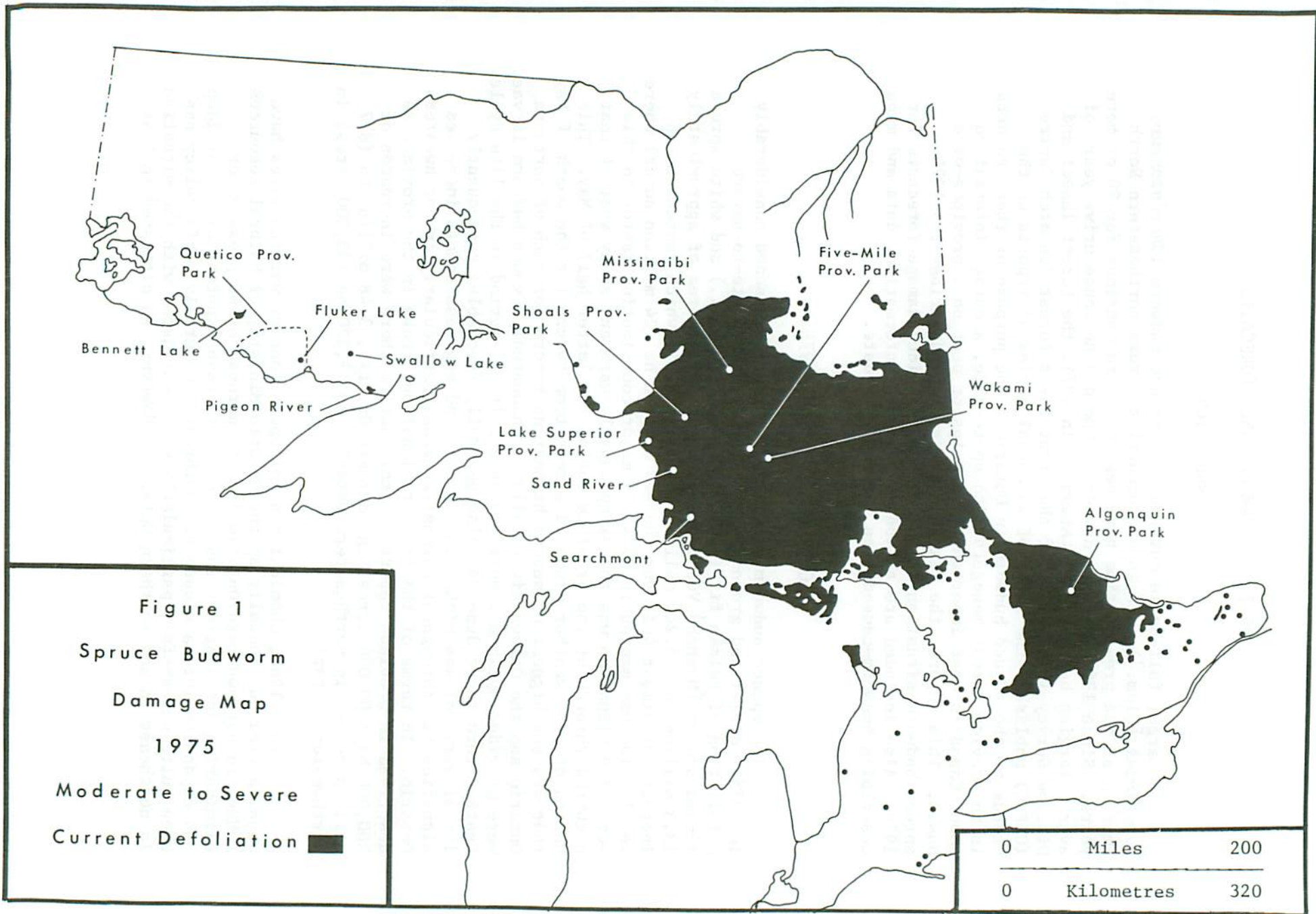
INTRODUCTION

Large, full-scale outbreaks of spruce budworm (*Choristoneura fumiferana* [Clem.]) such as are occurring across northeastern North America at the present time have been known to continue for 20 or more years. Since 1967, Ontario has experienced nine consecutive years of ever enlarging budworm infestations. In 1971, the Forest Insect and Disease Survey (FIDS) unit of the Great Lakes Forest Research Centre (GLFRC) published the first of an annual series of reports on the status of the spruce budworm in Ontario. The purpose of these reports is to provide forest managers with up-to-date, accurate information about Canada's most important forest insect pest on a province-wide basis. This report, the sixth in the series, describes the 1975 spruce budworm situation in Ontario and provides damage forecasts for 1976. Also included are the best available information, data and maps describing budworm-caused tree mortality to date.

OVERALL SITUATION, 1975

The spruce budworm situation in Ontario worsened considerably in 1975. Aerial and ground surveys revealed moderate-to-severe defoliation of balsam fir (*Abies balsamea* [L.] Mill.) and white spruce (*Picea glauca* [Moench] Voss) trees throughout an area of approximately 13.3 million ha (33.245 million acres) (Fig. 1) which represents an increase of almost 40% over the 9.6 million ha (24 million acres) where defoliation was mapped in 1974. A major contributing factor to this worsening situation was the exceptionally warm and sunny weather that occurred throughout the province during the latter half of May. This period of fine weather produced a mean temperature for the month of May that was the highest or second highest on record for much of northern Ontario and the Ottawa River Valley. Undoubtedly, young budworm larvae were provided optimum conditions at a critical period in the life cycle. Weather throughout June was also generally favorable; consequently larval survival was higher than normal and egg-mass counts increased significantly throughout extensive areas, particularly in northwestern Ontario. In terms of the three regional outbreaks in the province as described in previous reports of this series there were increases of 200,000 ha (500,000 acres) in southern Ontario, 3.48 million ha (8.7 million acres) in northeastern Ontario and 13,320 ha (33,000 acres) in northwestern Ontario.

Since 1968, chemical control operations of varying sizes have been carried out annually by the Ontario Ministry of Natural Resources (OMNR) in northwestern Ontario for the purpose of suppressing or eliminating infestations that appeared to have a potential for buildup and expansion into a widespread outbreak. Generally, this policy has been quite successful, particularly when contrasted with the situation in northeastern and southern Ontario. However, as discussed in last



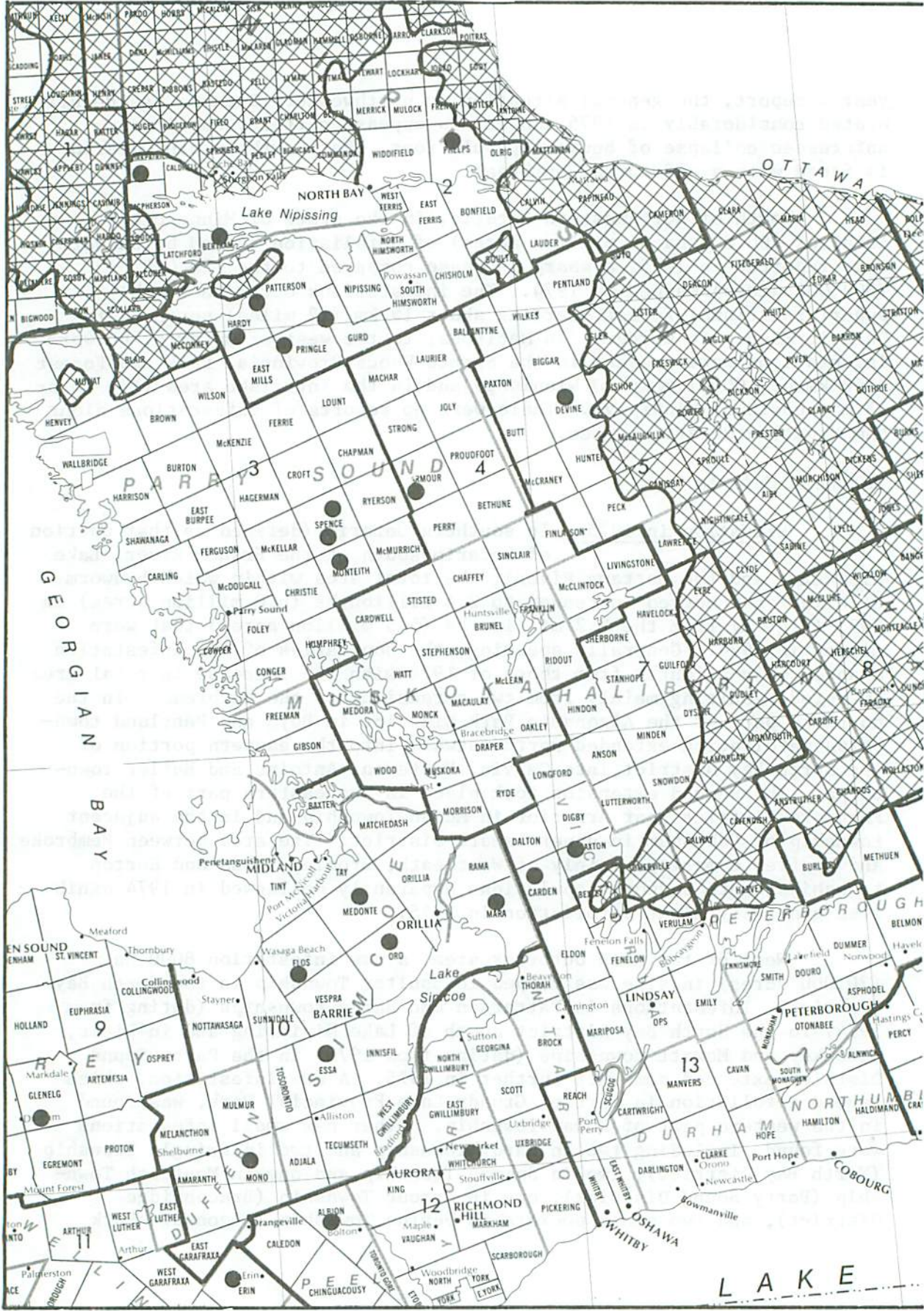
year's report, the general situation in northwestern Ontario has deteriorated considerably in 1975 and it now appears certain, barring an unforeseen collapse of budworm populations, that northwestern Ontario is faced with a widespread outbreak.

South of northwestern Ontario, in the state of Minnesota, a total of 400,000 ha (1 million acres) of defoliation caused by budworm were reported in 1975, a sharp increase compared to the 120,000 ha (300,000 acres) mapped in 1974. The infestations occurred in the Superior National Forest starting about 19 km (12 miles) south of the Ontario-Minnesota border. In Manitoba, to the west of Ontario, budworm infestations were present in the Spruce Woods Provincial Park and Forest (160 km or 100 mi. west of Winnipeg) and in the Interlake area (120 km or 75 mi. north of Winnipeg). There were no reports of infestations along the Manitoba-Ontario border.

Southern Ontario

Situation in 1975: In southern Ontario (defined as that portion of Ontario south of the French River, Lake Nipissing and the Mattawa River), the total area within which budworm defoliation occurred increased to 2.4 million ha (6.0 million acres) in 1975 (Fig. 2) from the 2.2 million ha (5.5 million acres) that were mapped in 1974. Generally speaking, the boundaries of the infestation changed only slightly from those of 1974 with the increase in total area infested resulting mainly from two extensions of the outbreak. In the northern part of the Algonquin Park District in Boyd and Pentland townships defoliation extended northwestward into the eastern portion of the North Bay District into Calvin, Mattawan, Antoine and Butler townships. The second extension took place in the eastern part of the Pembroke District near Arnprior in McNab Township and in the adjacent township of Pakenham in upper Lanark District. The area between Pembroke and Renfrew comprised mainly of Westmeath, Bromley, Ross and Horton townships where budworm populations apparently collapsed in 1974 exhibited generally light defoliation in 1975.

West of the main outbreak area, a new infestation 8000 ha (20,000 acres) in size was mapped in Boulter Township in the North Bay District. Infestations in Patterson and Hardy townships (dating from 1974) in the North Bay District south of Lake Nipissing and in Blair, McConkey and Mowatt townships (dating from 1973) in the Parry Sound District extended somewhat further in 1975. A new infestation, which caused defoliation in part of Grundy Lake Provincial Park, was found in the western part of Mowat Township. Other new small infestations were found, including two in Hardy Township and two in Pringle Township (North Bay District), two in Spence Township and one in Monteith Township (Parry Sound District), one in Armour Township (Bracebridge District), and two small pockets in Devine Township (Algonquin Park



GEORGIAN BAY

OTTAWA

LAKE

NORTH BAY
Lake Nipissing

Lake Simcoe

PETERBOROUGH

NORTHUMBERLAND

OSHAWA

RICHMOND HILL

MARKHAM

SCARBOROUGH

YORK

ETOHRA

HEWITT

EGRENT

WEST LUTHER

WEST GARAFRAXA

ERIN

OSPREY

PROTON

AMARANTH

MONO

ERIN

SUNNIDALE

MULMUR

ADJALA

ALBION

ERIN

ESSEX

TECUMSETH

ALBION

ALBION

ERIN

INNISFIL

WEST GUILDFORD

ALBION

ALBION

ERIN

NORTH GUILDFORD

EAST GUILDFORD

WHITCHURCH

WHITCHURCH

ERIN

SCOTT

REACH

WHITCHURCH

WHITCHURCH

ERIN

BROCK

MARIPOSA

REACH

REACH

ERIN

LINDSAY

EMILY

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PETERBOROUGH

OTONABEE

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ASPHODEL

PERCY

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ERIN

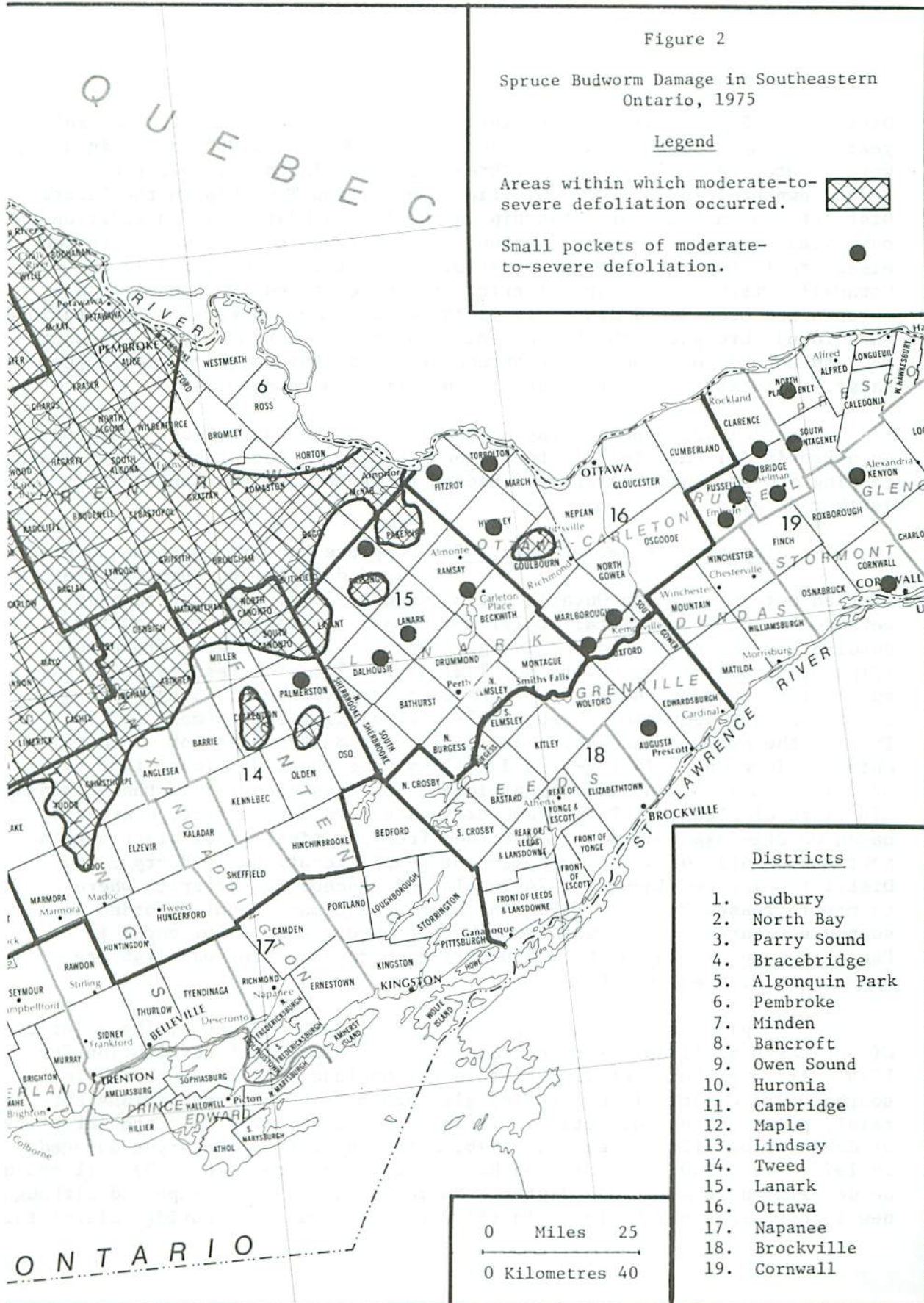
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District). Several areas where infestations have persisted for several years ranging from 2000 ha (5000 acres) to 8000 ha (20,000 acres) in size, were located east of the main outbreak area in Clarendon, Palmerston and Olden townships in the Tweed District, in Darling Township in the Lanark District and in Goulbourn Township in the Ottawa District. In addition, many smaller pockets of defoliation, too numerous to list, were detected elsewhere throughout southern Ontario. Many of these occurred in the Cornwall, Ottawa and Lanark districts in the east and the Minden, Maple, Huronia and Owen Sound districts in the west. Many pockets of infestations were found throughout the Bruce Peninsula, and in south central and southwestern Ontario numerous white spruce or Norway spruce (*Picea abies* [L.] Karst.) plantations or ornamental spruce trees were defoliated.

Aerial and ground spraying operations were carried out in Algonquin Provincial Park in 1975 to protect foliage of host trees in high-value camping and recreational areas. Please refer to Part B of this report for further details.

Infestation Forecasts for 1976: Spruce budworm egg-mass counts and defoliation surveys were carried out in southern Ontario during August, 1975. Foliage samples were collected from a total of 127 locations, egg masses were counted, defoliation was estimated and damage forecasts for 1976 were prepared (Fig. 3; for detailed results see Table 1, p. 7). The results of this survey for southern Ontario show that, on the average, 1975 egg-mass densities have decreased by about 57% over similar counts made in 1974. This is the second consecutive decline in egg-mass counts for southern Ontario since the 1974 egg-mass densities were about 35% lower than those of 1973. In 1975, the most significant decreases occurred in the adjoining districts of Algonquin Park, Pembroke and Bancroft. In fact, decreases based on egg-mass counts were recorded from practically all districts in southern Ontario with the exception of sample locations in Parry Sound District which remained at 1974 levels and Bracebridge District where counts increased by about 65%. The highest egg-mass count recorded in southern Ontario in 1975 was from a white spruce sample collected in Pakenham Township in the Lanark District where the count was 1146 egg masses per 9.29 sq. m (100 sq. ft).

In spite of the continued decline in egg-mass counts, the majority of forecasts still call for moderate or higher levels of defoliation for 1976. It is probably still premature to conclude that the outbreak in southeastern Ontario is collapsing although most of the indications certainly point in that direction. It is likely that, over all, the intensity of defoliation will decrease in 1976, although most of the areas damaged in 1975, i.e., 2.0 - 2.4 million ha (5-6 million acres) (Fig. 3) will again be defoliated to a visible degree. No major expansion is expected although new infestations may be found in the Parry Sound and Bracebridge districts.

Table 1. Southern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Algonquin Park District</u> (28 locations)				
Airy Twp - East Gate ^b	wS	72	240	S
Biggar Twp - Sawbill Lake	bF	11	14	L-M
Bruton Twp	bF	79	192	M-S
Canisbay Twp - Cache Lake	bF	11	46	L-M
- Lake of Two Rivers ^b	wS	16	450	S
- Mew Lake ^c	bF	70	30	L-M
- Pog Lake ^c	bF	1	28	L-M
Clara Twp - Dieux Rivières	bF	94	114	M-S
Clyde Twp	bF	98	65	M
Deacon Twp - North River	bF	99	223	S
Devine Twp - Tim River	bF	7	31	L-M
Dickens Twp	bF	94	407	S
Dickson Twp - Annie Bay	bF	99	193	S
Finlayson Twp				
- Oxtongue River	bF	2	0	0
Freswick Twp - Hogan Lake	bF	99	351	S
- Hogan Lake	eH	86	146	M-S
Guthrie Twp				
- north of Basin Depot	wS	52	147	M-S
Head Twp - Grant Creek	wS	70	142	M-S
Master Twp	bF	17	4	L
Peck Twp - Smoke Lake	bF	2	0	0
Preston Twp				
- Annie Bay Dam	bF	99	82	M
- Tattler Lake	bF	99	372	S
Sabine Twp - McCoy Lake	wS	12	28	L-M
Sproule Twp				
- Fisheries Res. Stn. ^b	bF	29	103	M-S
Stratton Twp				
- Achray (Plot C)	bF	95	33	L-M
- Lone Creek	bF	93	51	M

(cont'd.)

Table 1. Southern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Algonquin Park District</u> (cont'd.)				
(28 locations)				
White Twp				
- Otterpaw Creek	bF	76	219	S
Wilkes Twp - Wilkes Lake	bF	7	0	0
<u>Aylmer District</u>				
(1 location)				
London Twp				
- City of London	ws	41	593	S
<u>Bancroft District</u>				
(5 locations)				
Ashby Twp	bF	98	291	S
Cardiff Twp	bF	9	0	0
Chandos Twp	bF	69	175	M-S
Faraday Twp	bF	33	81	M-S
Wicklow Twp	bF	94	102	M-S
<u>Bracebridge District</u>				
(8 locations)				
Brunel Twp				
- south of Huntsville	bF	8	9	L
Butt Twp	bF	3	7	L
Cardwell Twp	bF	2	8	L
Joly Twp - Paisley Lake	bF	39	25	L-M
Monck Twp - Bardsville	bF	1	6	L
Oakley Twp - Clear Lake	bF	10	74	M-S
Ridout Twp	bF	3	12	L
Sinclair Twp - Bella Lake	bF	1	9	L

(cont'd.)

Table 1. Southern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Cambridge District</u> (2 locations)				
Beverly Twp	wS	19	406	S
Binbrook Twp	wS	7	96	M-S
<u>Chatham District</u> (1 location)				
Sarnia Twp - City of Sarnia	wS	13	320	S
<u>Cornwall District</u> (4 locations)				
Cambridge Twp - 2 miles north of Casselman	wS	53	20	L-M
- Larose Forest, Spruce Rd	wS	37	11	L
Clarence Twp - Larose Forest	wS	58	45	L-M
Kenyon Twp	wS	22	0	0
<u>Huron District</u> (5 locations)				
Essa Twp	wS	25	1043	S
Vespra Twp - Jct. Hwy 26 & 27	wS	12	130	M-S
- Midhurst Nursery windbreaks ^d	wS	8	291	S
- Midhurst Nursery windbreaks ^d	nS	5	137	M-S
- Midhurst Nursery windbreaks ^d	b1S	8	61	M-S

(cont'd.)

Table 1. Southern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Lanark District</u> (4 locations)				
Dalhousie Twp - northeast of Dalhousie Lake	bF	8	45	L-M
Darling Twp - Lot 10, Con VII	bF	6	8	L
Lavant Twp - Robertson Lake	wS	16	28	L-M
Pakenham Twp	wS	70	1146	S
<u>Lindsay District</u> (3 locations)				
Cartwright Twp	wS	20	80	M-S
Smith Twp	bF	0	5	L
Clarke Twp - Orono Nursery	wS	57	148	M-S
<u>Maple District</u> (3 locations)				
Albion Twp	wS	16	448	S
Uxbridge Twp	wS	50	322	S
Vaughan Twp	wS	31	160	M-S
<u>Minden District</u> (9 locations)				
Carden Twp	wS	28	38	L-M
Cavendish Twp - Pencil Lake	bF	38	40	L-M
Dudley Twp - Kennibik Lake	bF	5	8	L
Eyre Twp	bF	3	10	L

(cont'd.)

Table 1. Southern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Minden District (cont'd.)</u> (9 locations)				
Glamorgan Twp				
- Koshlong Lake	bF	15	32	L-M
Guilford Twp	bF	1	8	L
Harvey Twp - Nogies Creek	bF	100	248	S
Minden Twp	bF	25	18	L-M
Somerville Twp	bF	59	85	M-S
<u>Ottawa District</u> (6 locations)				
Fitzroy Twp				
- Lot 6, Con. IV	wS	45	242	S
Goulbourn Twp - Hwy 7	wS	38	701	S
Huntley Twp				
- Lot 16, Con. IV	wS	67	272	S
North Gower Twp	wS	20	157	M-S
Oxford Twp				
- Kemptville Nursery	wS	18	133	M-S
Torbolton Twp				
- Lot 20, Con. I	wS	74	343	S
<u>Owen Sound District</u> (2 locations)				
Glenelg Twp	wS	45	417	S
St. Edmunds Twp	wS	95	930	S
<u>Parry Sound District</u> (11 locations)				
Blair Twp - Blair Camp	wS	31	18	L
- Lost Channel	bF	93	69	M-S

(cont'd.)

Table 1. Southern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Parry Sound District (cont'd.)</u> (11 locations)				
Christie Twp	bF	3	8	L
Croft Twp	bF	6	37	L-M
Lount Twp	wS	68	392	S
McConkey Twp - Hunt Camp	wS	48	17	L-M
McKenzie Twp	bF	13	19	L
McMurrich Twp - Doe Lake	bF	1	10	L
Mowat Twp - Grundy Prov. Pk.	wS	69	91	M-S
- Pakesley	bF	8	13	L
Spence Twp infestation	bF	53	22	L-M
<u>Pembroke District</u> (27 locations)				
Admaston Twp				
- Bonnechere River	wS	24	861	S
- Mount St. Patrick	bF	37	169	M-S
Alice Twp	bF	56	189	M-S
Bromley Twp	wS	61	324	S
Brougham Twp	bF	16	68	M-S
Brudenell Twp	bF	98	63	M-S
Grattan Twp	wS	45	561	S
Griffith Twp	wS	82	340	S
Matawatchan Twp	bF	87	111	M-S
McNab Twp	wS	82	482	S
Petawawa Twp				
- Antler Creek	wS	39	158	M-S
Raglan Twp	wS	97	62	M
Richards Twp - Round Lake	bF	78	277	S
Rolph Twp	wS	73	468	S
Ross Twp - Dist. Boundary	wS	33	314	S
- Garage	wS	43	419	S
Sherwood Twp				
- west of Barry's Bay	wS	69	988	S

(cont'd.)

Table 1. Southern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Pembroke District</u> (cont'd.)				
(27 locations)				
South Algona Twp - Ruby	bF	53	44	L-M
Stafford Twp - Mixburg	wS	69	95	M-S
- N.P.V. Plot 5	wS	50	227	S
- N.P.V. Plot 5	bF	58	337	S
Westmeath Twp				
- east of Westmeath	bF	46	146	M-S
- Quarry	wS	80	973	S
Wilberforce Twp				
- northwest of Douglas	wS	63	276	S
- 1 mile north of Rankin	wS	92	105	M-S
Wylie and Buchanan Twp (Petawawa Forest Exp. Stn.)				
- Deluthier Rd, (Plot G)	wS	63	356	S
- Orange Rd, (check plot)	wS	82	354	S
<u>Simcoe District</u>				
(1 location)				
South Walsingham Twp				
- St. Williams Nursery	wS	42	271	S
<u>Tweed District</u>				
(5 locations)				
Clarendon Twp	wS	28	82	M-S
Denbigh Twp				
- Slate Falls Rd	bF	90	100	M-S
Kaladar Twp	bF	1	0	0
Marmora Twp	bF	9	46	L-M
Tudor Twp	wS	47	192	M-S

(cont'd.)

Table 1. Southern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (concl'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Wingham District</u> (2 locations)				
Colborne Twp - Auburn	wS	100	291	S
Downie Twp	wS	95	413	S

^a S = severe, M = moderate, L = light, 0 = nil

^b Aerially sprayed, fenitrothion, 1975

^c Aerially sprayed, fenitrothion + ground spray, *B.t.*, 1975

^d Ground spray, fenitrothion, 1975

(cont'd.)

Elsewhere throughout southern Ontario, budworm damage should occur at no greater than a trace or light level except for the occasional pocket of moderate or severe infestation. It is probable that white spruce or Norway spruce plantations, windbreaks and ornamentals will again suffer varying levels of defoliation in 1976, particularly in southwestern Ontario.

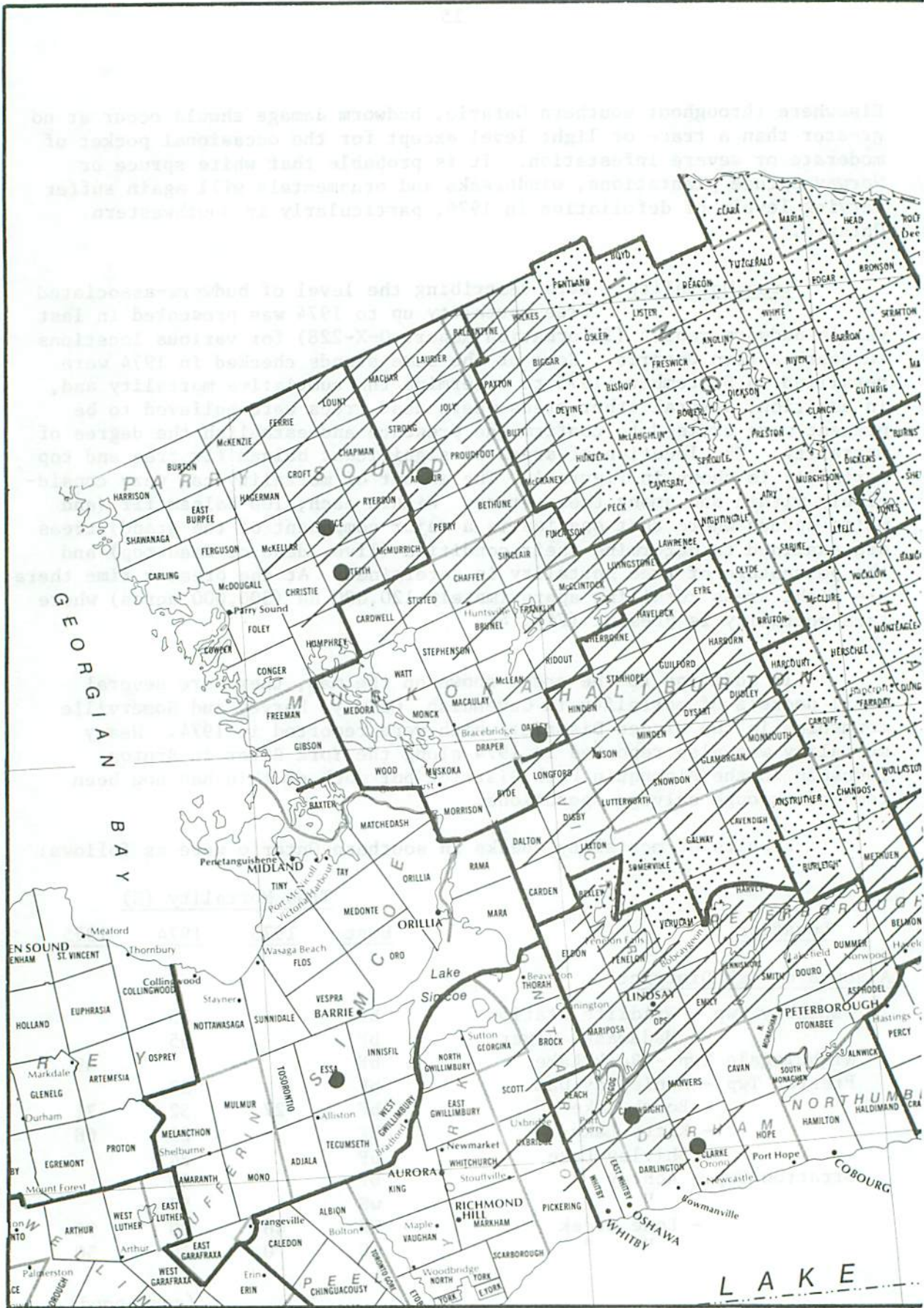
Tree Mortality: Data describing the level of budworm-associated tree mortality up to 1974 was presented in last year's budworm report (Information Report O-X-228) for various locations in southeastern Ontario. Some of the same stands checked in 1974 were retallied in September, 1975 to determine the cumulative mortality and, in addition, several other areas where dead trees were believed to be present were cruised to confirm the presence and establish the degree of mortality. The location of areas of significant balsam fir tree and top mortality is shown in Figure 4. The amount of mortality can vary considerably within and among these areas. Within each, 100 balsam fir (and white spruce where that species is a major component of the stand) trees are examined to determine their condition (live, dead or dead top) and the percentage of tree mortality is determined. At the present time there are eight areas totalling approximately 120,000 ha (300,000 acres) where tree mortality is present (Fig. 4).

In addition to the areas shown on the map, there are several small pockets of mortality in Cavendish, Galway, Harvey and Somerville townships in the Minden District which were reported in 1974. Heavy mortality was also reported in 1974 along the York River in Bruton Township in the Algonquin Park District but much of this has now been removed through salvage operations.

Results of mortality checks in southern Ontario were as follows:

<u>Location</u>	<u>Host</u>	<u>Tree Mortality (%)</u>		
		<u>1973</u>	<u>1974</u>	<u>1975</u>
<u>Algonquin Park District</u>				
Canisbay Twp - Wildlife Station	bF		25	
- Madawaska River	bF		55	
Nightingale Twp - Rock Lake	bF			49
Preston Twp - Annie Bay Dam	bF		38	
- Booth Lake	bF	27	52	71
- Kitty Lake	bF		25	68
- Shirley Lake	bF		24	
Stratton Twp - Achray	bF		50	
"	wS		57	
- Lone Creek	bF	46	80	92
" "	wS	0	16	50

(continued)



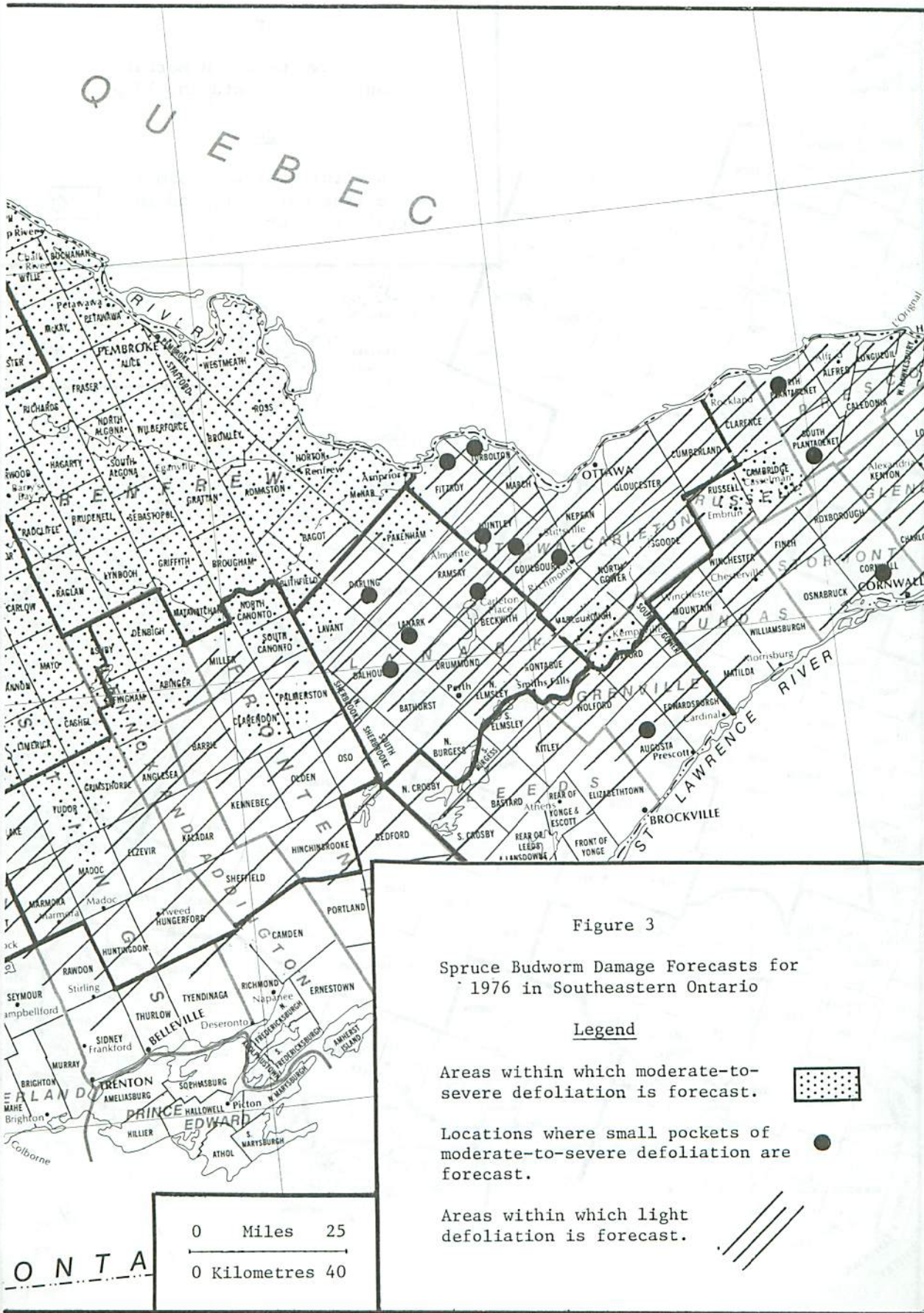





Figure 3

Spruce Budworm Damage Forecasts for 1976 in Southeastern Ontario

Legend

Areas within which moderate-to-severe defoliation is forecast. 

Locations where small pockets of moderate-to-severe defoliation are forecast. 

Areas within which light defoliation is forecast. 

0 Miles 25
0 Kilometres 40

Figure 4

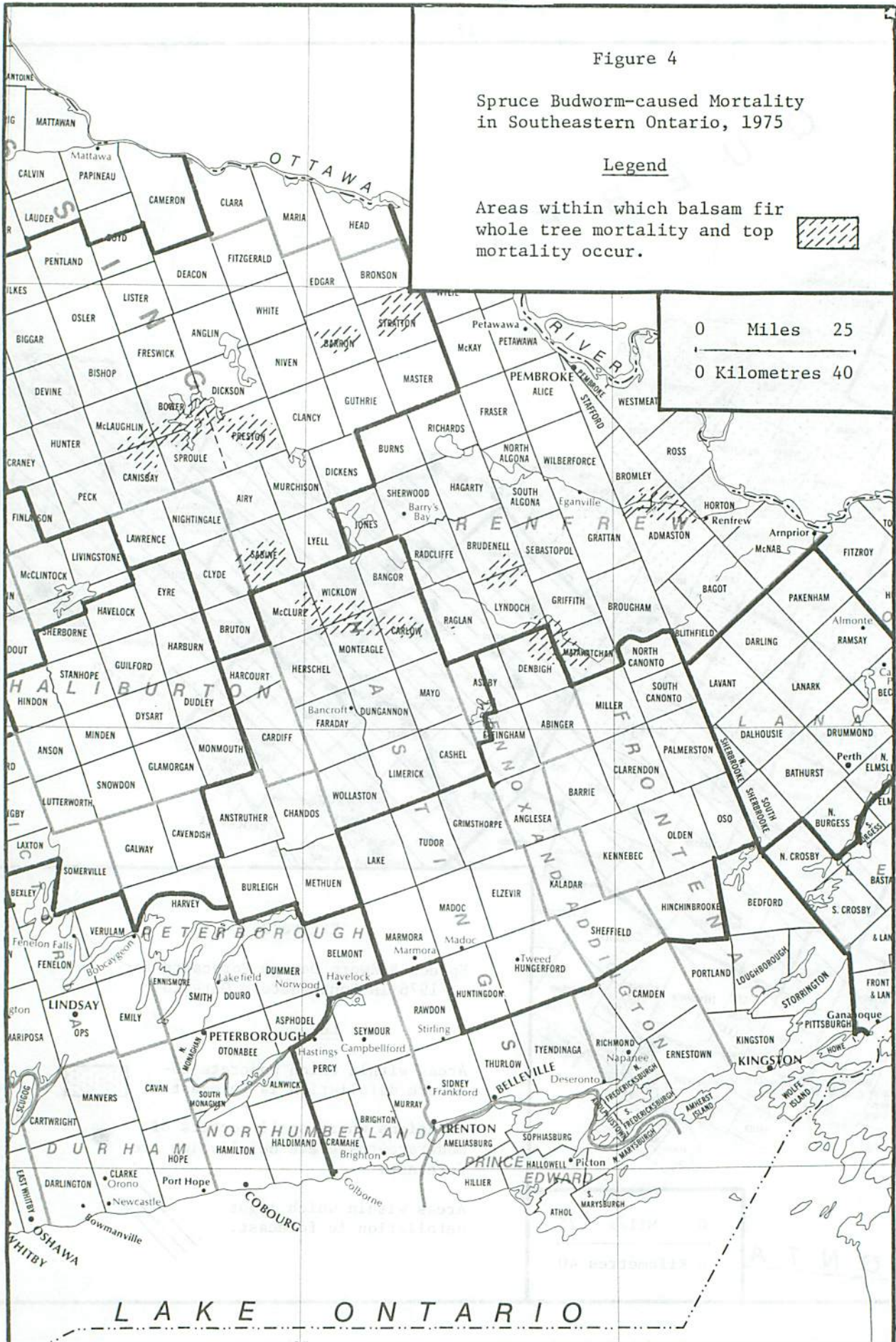
Spruce Budworm-caused Mortality in Southeastern Ontario, 1975

Legend

Areas within which balsam fir whole tree mortality and top mortality occur.



0 Miles 25
0 Kilometres 40

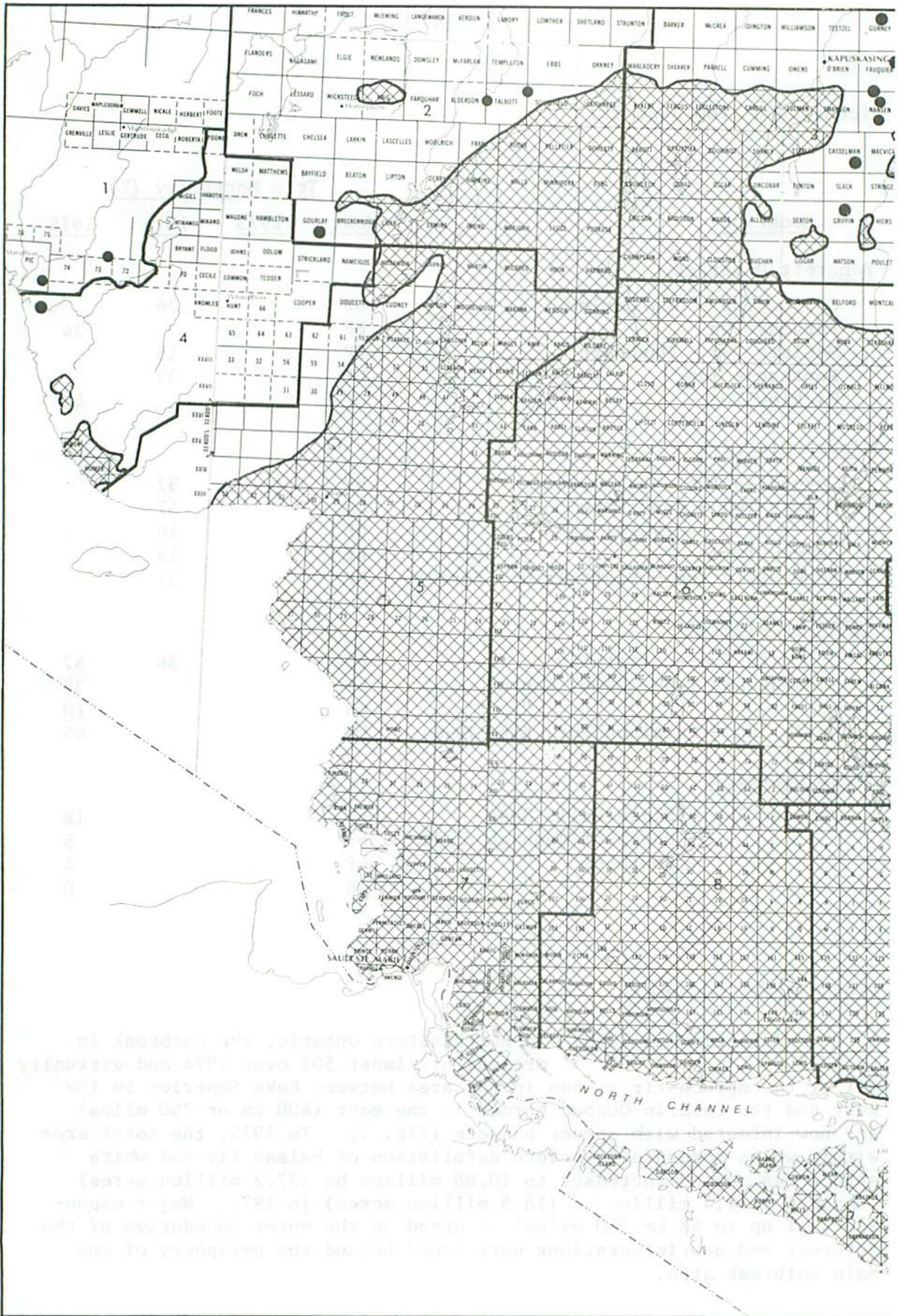


(continued from page 15)

<u>Location</u>	<u>Host</u>	<u>Tree Mortality (%)</u>		
		<u>1973</u>	<u>1974</u>	<u>1975</u>
<u>Bancroft District</u>				
Carlow Twp - New Carlow	bF		36	
Faraday Twp	bF			24
McClure Twp - Maynooth	bF		15	
Monteagle Twp	bF		39	
Wicklow Twp	bF			45
<u>Minden District</u>				
Cavendish Twp - Onion Lake	bF		32	
Galway Twp - Bass Lake	bF		47	
- Crystal Lake	bF		10	
Harvey Twp	bF		15	
Somerville Twp - Victoria Co. Forest	bF		31	
<u>Pembroke District</u>				
Griffith Twp - Strathtay	bF		36	57
Matawatchan Twp - Camel Chute	bF			38
" "	wS			10
Wylie Twp - Petawawa For. Exp. Stn.	bF			65
<u>Tweed District</u>				
Denbigh Twp - Slate Falls Road	bF			18
- North of Denbigh on HW 41	bF			5
- South of " " " "	bF			4
- " " " " " "	wS			0

Northeastern Ontario

Situation in 1975: In northeastern Ontario, the outbreak increased by almost 50% over 1974 and virtually all of the spruce-fir stands in the area between Lake Superior in the west and the Ontario-Quebec border in the east (400 km or 250 miles) are now infested with spruce budworm (Fig. 5). In 1975, the total area within which moderate-to-severe defoliation of balsam fir and white spruce was mapped increased to 10.88 million ha (27.2 million acres) compared to 7.4 million ha (18.5 million acres) in 1974. Major expansions of up to 48 km (30 miles) occurred on the outer boundaries of the outbreak and new infestations were found beyond the periphery of the main outbreak area.



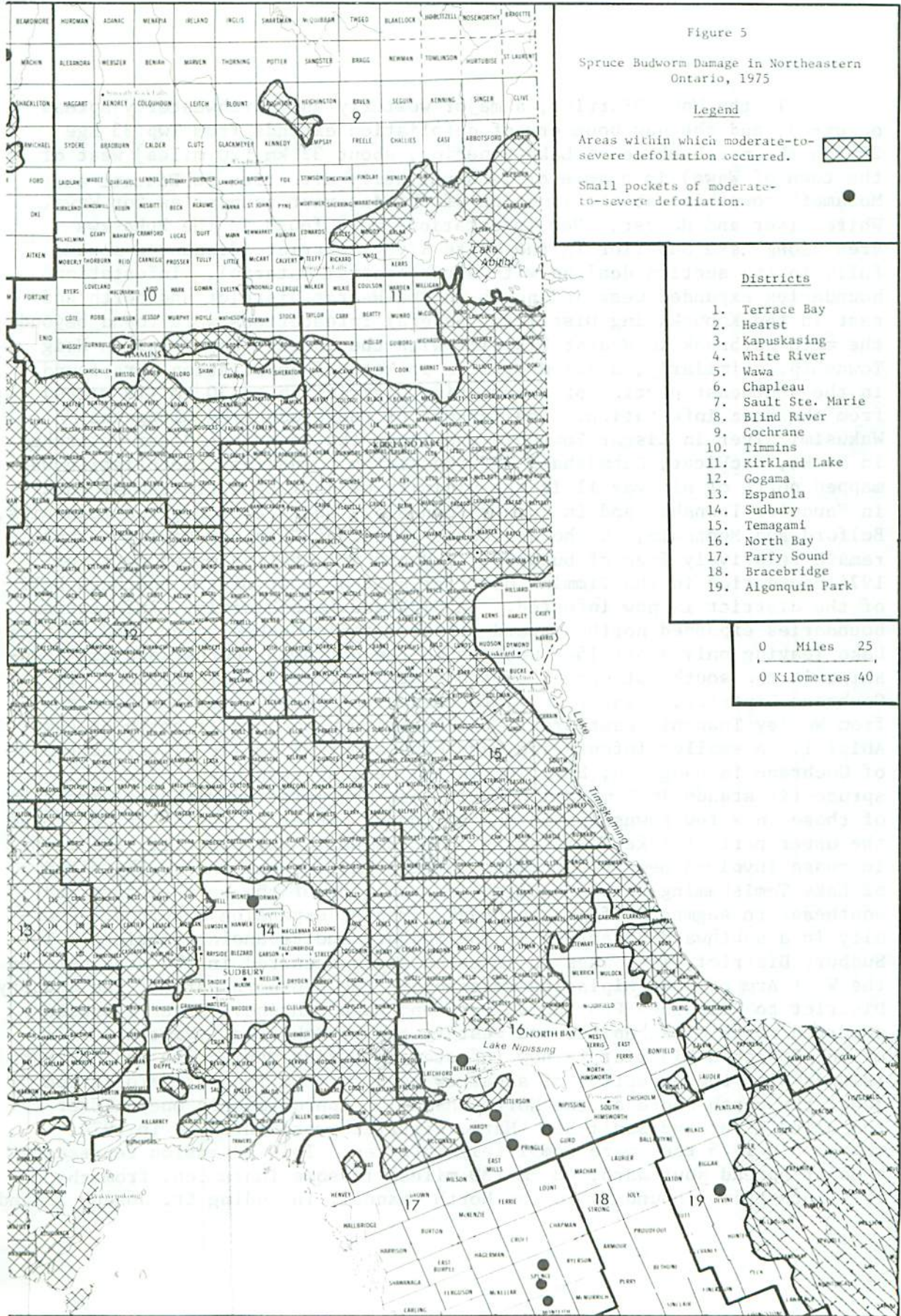



Figure 5

Spruce Budworm Damage in Northeastern Ontario, 1975

Legend

Areas within which moderate-to-severe defoliation occurred. 

Small pockets of moderate-to-severe defoliation. 

Districts

1. Terrace Bay
2. Hearst
3. Kapuskasing
4. White River
5. Wawa
6. Chapleau
7. Sault Ste. Marie
8. Blind River
9. Cochrane
10. Timmins
11. Kirkland Lake
12. Gogama
13. Espanola
14. Sudbury
15. Temagami
16. North Bay
17. Parry Sound
18. Bracebridge
19. Algonquin Park

0 Miles 25
0 Kilometres 40

In the Wawa District, a major westerly and northwesterly spread occurred, and the new boundary of defoliation extends from Twp 33 Rge 23 (on the north shore of Lake Superior, about 32 km [20 miles] west of the town of Wawa) in a more or less northerly direction to Doucett and Mosambik townships at the junction of the district boundaries for Wawa, White River and Hearst. New infestations were found in the Pukaskwa area along Lake Superior in the White River District (discussed more fully in the section dealing with north central Ontario). Infestation boundaries expanded west and north in the Hearst District and north and east in the Kapuskasing District. Several infestations were found beyond the main outbreak in Hearst District with the largest occurring in Haig Township. Similarly, a dozen or more pockets of defoliation were found in the southeast portion of Kapuskasing District up to 30 km (19 miles) from the main infestation. The largest of these occurred along the Wakusimi River in Lisgar Township and along the Groundhog River watershed in Hicks, MacVicar, Carmichael and Shackleton townships. Defoliation was mapped north of Highway 11 in the vicinity of Remi Lake Provincial Park in Fauquier Township and in Gurney Township. There are only two townships, Belford and Montcalm, in the northeast corner of Chapleau District that remain relatively free of budworm. Budworm infestation moved north of 1974 boundaries in the Timmins District so that most of the southern half of the district is now infested. In Kirkland Lake District, infestation boundaries expanded northeastward to the Ontario-Quebec border and Abitibi Lake leaving only about 15 townships in the northwest corner and six townships in the southeast corner of the district free of infestation. In Cochrane District, a large new infestation was found covering the area from Wesley Township eastward to the Ontario-Quebec border north of Lake Abitibi. A smaller infestation was found about 26 km (16 miles) northeast of Cochrane in Loughton, Heighington and Dempsay townships. Virtually all spruce-fir stands in Temagami District are now infested with the exception of those in a few townships in the northeast corner of the district around the upper part of Lake Temiskaming. In the North Bay District, the major increase involved new infestations between Mattawa and the southern end of Lake Temiskaming which resulted in a merging of the northeastern and southeastern segments of the outbreak. Modest expansion occurred, generally in a southward direction in the Sudbury and Espanola districts. In Sudbury District, increases in infested areas occurred in the area between the West Arm of Lake Nipissing west across the southern part of the Sudbury District to Killarney Provincial Park and Lake Panache. Other increases occurred north of Wanapitei and west to the Levack area. Virtually all of the Espanola District is now infested including Manitoulin and Cockburn islands with the exception of a narrow band that is free of defoliation along the north shore of the North Channel. Approximately one-half of the Blind River and Sault Ste. Marie districts were infested in 1974, whereas in 1975 they were completely infested. This expansion represents a major spread southward, 48 km (30 miles) in some instances, from the 1974 infestation boundary to the North Channel, including St. Joseph Island.

Larval populations were exceptionally high in some areas and considerable backfeeding occurred in the vicinity (east and north) of Ranger Lake 64 km (40 miles) north of Thessalon, near the Sault Ste. Marie-Blind River District boundary. Backfeeding was also frequently observed throughout Kirkland Lake and Temagami districts. A very unusual observation from the Temagami District was that sixth-instar larvae were present as early as May 31 and heavy moth flights occurred in the Marten River-Temagami areas on June 21. These events would occur 2-3 weeks later in a normal year.

In northeastern Ontario in 1975, OMNR sprayed 4400 ha (11,000 acres) in Wawa, Chapleau and Sault Ste. Marie districts to minimize damage in high-value forest areas. Please refer to Part B for further details.

Infestation Forecasts for 1976: Egg-mass densities for 259 locations throughout northeastern Ontario in August, 1975 were 40% lower than comparable counts made in 1974 (Table 2, p. 24). However, although the overall trend is downward some districts experienced rather substantial increases. In general, increases occurred in northern districts whereas decreases were the rule in most central and southern districts. Percentage population *increases* were recorded for districts as follows: Cochrane-2700%, Kapuskasing-880%, North Bay-110%, Timmins-75%, and Hearst-50%. Population *decreases* occurred in districts as follows: Blind River-20%, Sudbury-25%, Espanola-41%, Gogama-51%, Chapleau-53%, Kirkland Lake-54%, Wawa-58%, Temagami-59%, and Sault Ste. Marie-63%. Kapuskasing now has the questionable honor of harboring the highest average egg-mass density, 837 egg masses per 9.29 sq. m (100 sq. ft), on a district basis and is closely followed by Timmins, Gogama and Chapleau districts. The highest single egg-mass count in northeastern Ontario, 3556 egg masses per 9.29 sq. m (100 sq. ft), was made on a balsam fir sample from along the Groundhog River in Shanly Township, Kapuskasing District.

It is expected that the outbreak will expand further in 1976 to approximately 14-16 million ha (35-40 million acres) (Fig. 6). Most of this expansion is expected northward from the 1975 northern boundary of the outbreak in Wawa, Hearst, Kapuskasing, Timmins and Cochrane districts. The spread could extend northward to the vicinity of the town of Hearst on Highway 11 and eastward to Lake Abitibi. Further spread is likely to occur between North Bay and Mattawa as well as south of Lake Nipissing in the North Bay District. Any remaining uninfested areas in Temagami, Kirkland Lake, Sudbury, and Espanola districts will probably exhibit defoliation in 1976.

Tree Mortality: Balsam fir trees are dead or dying within a total area of some 1.2 million ha (3 million acres) in northeastern Ontario (Fig. 7). For the past two years, many

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Blind River District</u> (11 locations)				
Bright Twp	bF	80	1177	S
Kirkwood Twp				
- Tree Nursery	wS	72	396	S
Morin Twp	bF	98	418	S
Parkinson Twp	wS	80	971	S
Spragge Twp	bF	57	290	S
Twp 1F	bF	99	165	M-S
Twp 3F	bF	100	210	M-S
Twp 150	bF	100	351	S
Twp 157				
- Mississagi Prov. Pk	bF	92	309	S
Twp 157	bF	99	466	S
Twp 169	bF	92	166	M-S
<u>Chapleau District</u> (45 locations)				
Abney Twp - Spanish Lake	bF	93	151	M-S
Barclay Twp				
- Missinaibi Prov. Pk ^b	bF	92	847	S
- Missinaibi Prov. Pk ^b	wS	93	819	S
Borden Twp	bF	91	570	S
Brutus Twp	bF	93	788	S
Carew Twp	bF	94	80	M-S
Denyes Twp - Denyes Lake	bF	97	1066	S
Fawn Twp	bF	82	155	M-S
Foley Twp	bF	89	169	M-S
Gallagher Twp	bF	99	867	S
Genoa Twp	bF	95	1302	S
Halsey Twp - Nemegos Rd	bF	96	254	S
Hardiman Twp	bF	90	230	S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Chapleau District (cont'd.)</u> (45 locations)				
Hill Twp	bF	98	657	S
Horwood Twp - Horwood Lake	bF	99	673	S
Iris Twp - Mississagi Lake	bF	93	587	S
Ivanhoe Twp				
- Ivanhoe Prov. Pk	bF	88	1132	S
Ivy Twp - Miniwaski Lake	bF	94	107	M-S
Kapuskasing Twp	bF	95	476	S
Keith Twp	bF	86	1359	S
Kirkwall Twp				
- Dunrankin Lake	bF	90	585	S
Leeson Twp	bF	95	556	S
Lincoln Twp - Lincoln Lake	bF	90	1947	S
Lloyd Twp - Makonie Lake	bF	98	412	S
Margaret Twp	bF	97	956	S
Melrose Twp	bF	70	240	M-S
Montcalm Twp - Elf Lake	bF	60	173	S
Ossin Twp - Ossin Lake	bF	98	2587	S
Oswald Twp - Oswald Lake	bF	89	941	S
Penhorwood Twp	bF	95	560	S
Peters Twp				
- Shoals Prov. Pk ^b	bF	99	389	S
Rollo Twp - Rollo Lake	bF	90	256	S
Sadler Twp	bF	98	762	S
Sandy Twp	bF	90	312	S
Shenango Twp	bF	80	124	M-S
Whigham Twp	bF	89	441	S
Twp 8F				
- Prairie Grass Lake	bF	97	838	S
Twp 9D	bF	99	497	S
Twp 10F - Vezina Lake	bF	95	980	S
Twp 11B				
- Wakami Prov. Pk ^b	bF	97	294	S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Chapleau District (cont'd.)</u> (45 locations)				
Twp 11D				
- 5 Mile Prov. Pk ^b	bF	97	309	S
Twp 12G - Sample Lake	bF	99	506	S
Twp 12H - Gale Lake	bF	98	285	S
Twp 23, Rge 16	bF	95	450	S
Twp 32	bF	98	1099	S
<u>Cochrane District</u> (5 locations)				
Adanac Twp - Mile 23	bF	12	227	S
Laughton Twp	bF	19	299	S
Pinard Twp				
- at Abitibi Canyon	bF	1	36	L-M
Steele Twp	bF	68	696	S
Sydere Twp - Mile 8	bF	3	253	S
<u>Espanola District</u> (39 locations)				
Baldwin Twp	bF	13	58	M-S
Bidwell Twp	bF	43	81	M-S
Burpee Twp	bF	90	506	S
Campbell Twp	bF	2	28	L-M
Cockburn Island	bF	38	44	L-M
Comox Twp - Comox Lake	bF	97	579	S
Craig Twp				
- Bluewater Lake	bF	100	381	S
Dawson Twp	bF	94	475	S
Gilbert Twp				
- Sinaminda Rd	bF	100	112	M-S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Espanola District (cont'd.)</u> (39 locations)				
Gough Twp	bF	41	32	L-M
Manitoulin Island				
- Plot F, 1974 virus	wS	31	711	S
- Plot G, 1974 virus	wS	65	535	S
- Plot G, 1974 virus	bF	81	304	S
- Plot H, 1974 virus	wS	38	388	S
- Plot 1 ^c	wS	58	1012	S
- Plot 1 ^c	bF	83	516	S
- Plot 4 ^c	wS	62	226	S
- Plot 4 ^c	bF	58	111	M-S
- Plot 6, check	wS	55	410	S
- Plot 6, check	bF	43	139	M-S
- Plot 6, Dean Bay ^d	wS	94	1404	S
- Plot 6, Dean Bay ^d	bF	98	905	S
- Plot 7, Poplar ^d	wS	63	226	S
- Plot 7, Poplar ^d	bF	80	1102	S
- Plot 7, check, Providence Bay	wS	77	898	S
- Plot 7, check, Providence Bay	bF	70	493	S
- Plot 9, check, Poplar	wS	76	548	S
- Plot 9, check, Poplar	bF	77	147	M-S
Salter Twp				
- N.P.V. Plot 3	wS	78	657	S
- N.P.V. Plot 3	bF	91	392	S
- South check plot	wS	88	443	S
- South check plot	bF	95	448	S
Tehkummah Twp				
Twp 119	bF	100	663	S
Twp 125	bF	87	88	M-S
Twp A - west branch road	bF	99	347	S
Twp B	bF	99	282	S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Espanola District (cont'd.)</u> (39 locations)				
Twp J - Russian Lake	bF	89	114	M-S
Twp M - Plaunt Rd	bF	89	129	M-S
<u>Gogama District</u> (14 locations)				
Beulah Twp - Meteor Lake	bF	90	514	S
Edinburgh Twp	bF	95	368	S
Garvey Twp	bF	93	523	S
Hazen Twp	bF	98	2001	S
Inverness Twp - Donnegana Lake	bF	98	510	S
MacMurchy Twp	bF	97	647	S
Marquette Twp	bF	97	490	S
Middleboro Twp	bF	96	1264	S
Miramichi Twp	bF	97	1058	S
Scotia Twp	bF	99	157	M-S
Shelley Twp - Onaping Lake	bF	98	164	M-S
St. Louis Twp	bF	98	525	S
Stull Twp	bF	99	594	S
Togo Twp	bF	85	321	M-S
<u>Hearst District</u> (8 locations)				
Caithness Twp - Big Pike Lake	bF	3	20	L-M
Derry Twp - Bullmoose Lake	bF	8	6	L
Farquhar Twp	bF	9	32	L
Gourlay Twp - Gourlay Lake	bF	3	16	L
Lowther Twp	bF	9	92	M-S
McMillan Twp	bF	0	24	L-M

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Hearst District (cont'd.)</u> (8 locations)				
Minipuka Twp - Goat Lake	bF	70	1068	S
Wicksteed Twp - 1.2 miles south of Hornepayne	bF	0	14	L
<u>Kapuskasing District</u> (15 locations)				
Bourinot Twp - Mile 33	bF	74	1334	S
Buchan Twp - Mile 6	bF	94	541	S
Cromlech Twp - Brunswick Lake	bF	57	309	S
Fauquier Twp - Remi Lake Prov. Pk	bF	13	310	S
Fenton Twp - Mile 23 Chain of Lakes Rd	bF	12	372	S
Fergus Twp	bF	71	664	S
Griffin Twp - Griffin Lake	bF	6	227	S
Harmon Twp - Mile 82	bF	3	0	0
Lisgar Twp - Chain of Lakes Rd	bF	87	999	S
McCrea Twp	bF	7	153	M-S
Opasatika Twp - Opasatika Lake	bF	53	845	S
- Rufus Lake	bF	65	524	S
Seaton Twp	bF	93	368	S
Shanly Twp - Camp 15, Groundhog River	bF	96	3556	S
Stringer Twp - Groundhog River	bF	29	833	S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Kirkland Lake District</u> (20 locations)				
Alma Twp	bF	100	202	M-S
Ben Nevis Twp	bF	40	117	M-S
Blain Twp	bF	100	1177	S
Burt Twp				
- M.N.R. Swastika Tree Nursery ^e	wS	37	967	S
Corkill Twp	bF	100	425	S
Dack Twp	bF	100	156	M-S
Eby Twp	bF	100	142	M-S
Hearst Twp	bF	100	499	S
James Twp	bF	100	101	M-S
Katrine Twp	bF	10	15	L-M
Lamplugh Twp	bF	100	697	S
Marriott Twp	bF	60	376	S
Milner Twp	bF	100	75	M-S
Montrose Twp	bF	100	1131	S
Mulligan Twp	bF	95	110	M-S
Pacaud Twp	bF	95	328	S
Rattray Twp	bF	95	286	S
Truax Twp	bF	100	194	S
Tyrell Twp	bF	100	58	L-M
Yarrow Twp	bF	100	183	M-S
<u>North Bay District</u> (14 locations)				
Calvin Twp	bF	53	78	M-S
Clement Twp	bF	67	560	S
Commanda Twp	bF	14	0	0
Crerar Twp	bF	62	427	S
East Mills Twp	bF	13	28	L-M
Jocho Twp	bF	66	176	M-S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>North Bay District (cont'd.)</u> (14 locations)				
Mattawan Twp				
- Hwy 533, 10 miles north of Mattawa	bF	20	87	M-S
Notman Twp	bF	59	1130	S
Osborne Twp	bF	60	840	S
Papineau Twp	bF	51	185	M-S
Patterson Twp				
- Restoule Prov. Pk	bF	7	26	L-M
Phelps Twp	bF	27	43	L-M
South Himsworth Twp	bF	18	5	L
Thistle Twp	bF	73	871	S
<u>Sault Ste. Marie District</u> (17 locations)				
Aberdeen Additional Twp	bF	25	8	L
Fenwick Twp	bF	82	247	S
Fisher Twp	bF	86	388	S
Gaudette Twp				
- Abitibi Plantation Tree Seed Orchard ^b	wS	82	222	S
- Abitibi Plantation ^b	wS	98	152	M-S
- Whitman Dam Rd, Pheromone spray, 1975	wS	96	276	S
Herrick Twp				
- Pancake Prov. Pk	bF	96	306	S
Haviland Twp	bF	91	202	S
Palmer Twp	bF	60	20	L-M
Shields Twp	bF	93	231	S
Tarbutt Additional Twp	bF	98	197	M-S
Whitman Twp	bF	82	281	S
Twp. 3H - Mile 20	bF	100	515	S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Sault Ste. Marie District (cont'd.)</u> (17 locations)				
Twp 5H - Tujak Lake	bF	100	439	S
Twp 7H	bF	100	73	M-S
Twp 23, Rge 13 - Hanes Lake	bF	100	384	S
Twp 25, Rge 14 - Wart Lake	bF	100	440	S
<u>Sudbury District</u> (20 locations)				
Antrim Twp - Halfway Lake	bF	99	140	M-S
Beaumont Twp - Helen Lake	bF	91	600	S
Botha Twp	bF	98	384	S
Creelman Twp	bF	91	604	S
Davis Twp	bF	53	267	M-S
Delamere Twp	wS	80	969	S
DeMorest Twp	bF	98	469	S
Dunnett Twp	bF	19	142	M-S
Fairbank Twp	bF	99	426	S
Hawley Twp	bF	80	252	S
Hess Twp	bF	76	177	M-S
Howey Twp	bF	100	786	S
Hyman Twp	bF	25	110	M-S
Indian Reserve #6 - LaVase Lake	wS	78	646	S
Killarney Twp - Killarney Prov. Pk	bF	6	44	L-M
Muldrew Twp	bF	98	215	M-S
Selkirk Twp - Solace Lake	bF	94	137	M-S
Tyrone Twp - Michaud Lake	bF	88	685	S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Sudbury District (cont'd.)</u> (20 locations)				
Waldie Twp	bF	80	219	M-S
Twp 107	bF	89	--	--
<u>Temagami District</u> (14 locations)				
Askin Twp	bF	100	254	S
Aston Twp	bF	100	325	S
Barr Twp	bF	98	639	S
Belfast Twp	bF	100	596	S
Dane Twp	bF	100	1201	S
Flett Twp	bF	98	660	S
Gamble Twp	bF	100	820	S
Gillies Limit Twp	bF	100	511	S
Parker Twp	bF	82	303	S
Rorke Twp	bF	100	435	S
Shelburne Twp	bF	100	458	S
South Lorrain Twp	bF	100	409	S
Strathy Twp	bF	100	327	S
Torrington Twp	bF	100	983	S
<u>Timmins District</u> (9 locations)				
Bartlett Twp				
- Texmont Rd	bF	94	848	S
English Twp - English Lake	bF	100	1942	S
Evelyn Twp	bF	12	282	S
Hassard Twp	bF	100	811	S
Langmuir Twp	bF	6	76	M-S
McKeown Twp	bF	100	751	S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976a
<u>Timmins District (cont'd.)</u> (9 locations)				
Pharand Twp	bF	100	576	S
Robb Twp	bF	50	299	S
Sewell Twp - Lapierre Rd	bF	100	436	S
<u>Wawa District</u> (28 locations)				
Abigo Twp - Apisabigo Lake	bF	100	1159	S
Challener Twp	bF	39	262	S
Home Twp	bF	99	231	S
Pearkes Twp	bF	63	158	M-S
Simpson Twp - Oba Lake	bF	32	26	L-M
Twp 25, Rge 18 - Tikamaganda Lake	bF	100	729	S
Twp 25, Rge 23	bF	100	550	S
Twp 26, Rge 25 - Manitowik Lake	bF	98	552	S
Twp 27, Rge 23	bF	100	257	S
Twp 28, Rge 18	bF	100	147	M-S
Twp 28, Rge 19 - Sand River #3 ^f	bF	3	123	M-S
Twp 28, Rge 20 - Sand River #4 ^f	bF	13	215	M-S
Twp 28, Rge 24 - Hawk Junction	bF	99	325	S
Twp 28, Rge 27	bF	95	365	S
Twp 29, Rge 16 - Agawa Prov. Pk #1	bF	91	80	M-S
- Agawa Prov. Pk #2	bF	93	254	S
Twp 29, Rge 17 - Sand River #1 ^f	bF	27	201	M-S
Twp 29, Rge 19 - Sand River #2 ^f	bF	12	129	M-S

(cont'd.)

Table 2. Northeastern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (concl'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Wawa District (cont'd.)</u> (28 locations)				
Twp. 29, Rge 20				
- Mijin Rd at Mijin Lake ^b	bF	32	52	L-M
Twp 30, Rge 18 - Camp 101	bF	98	202	M-S
Twp 30, Rge 20				
- Junior Ranger Camp ^g	bF	32	441	S
Twp 30, Rge 24				
- Black Trout Lake	bF	90	266	S
Twp 30, Rge 26	bF	18	119	M-S
Twp 31, Rge 21				
- Old Woman Bay Prov. Pk	bF	97	446	S
Twp 31, Rge 21				
- Old Woman Bay Prov. Pk	bF	93	103	M-S
Twp 32, Rge 26	bF	3	22	L-M
Twp 43 - Ogasiwi River	bF	99	159	M-S
Twp 46 - Renabie Rd	bF	99	232	S

^a S = severe, M = moderate, L = light, 0 = nil

^b Aerially sprayed, fenitrothion, 1975

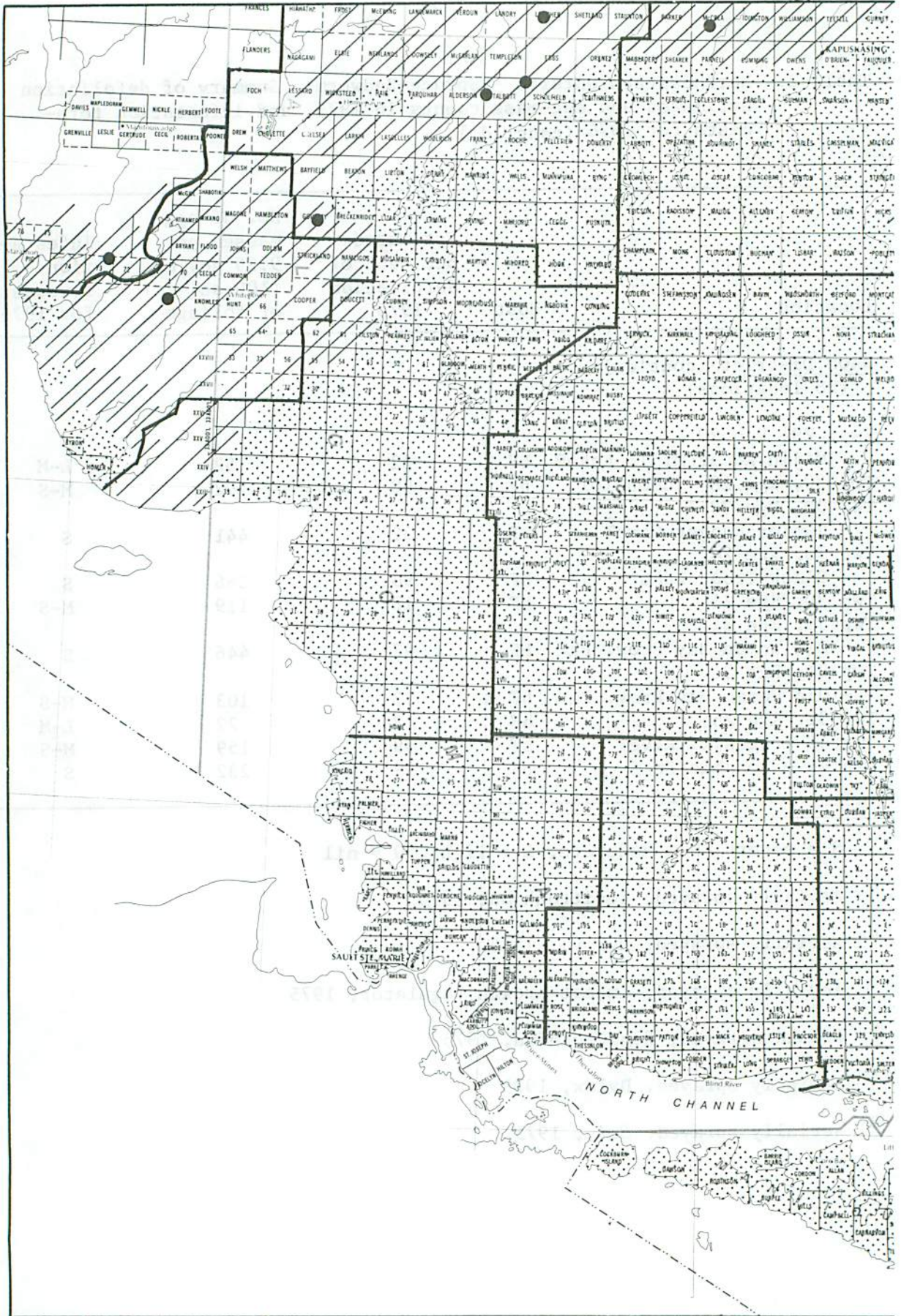
^c Aerially sprayed, N.P.V., 1975

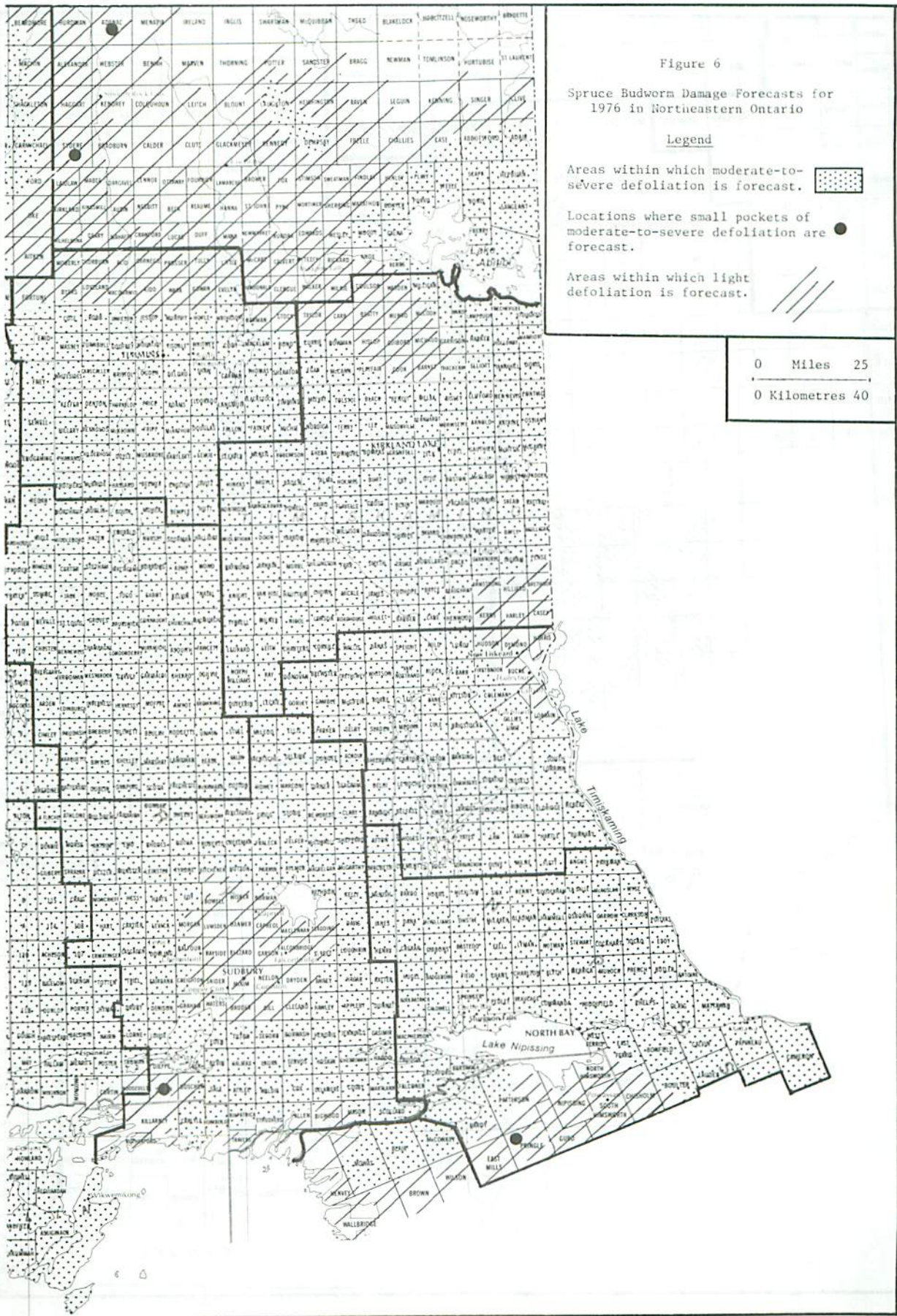
^d Aerially sprayed, insect growth regulator, 1975

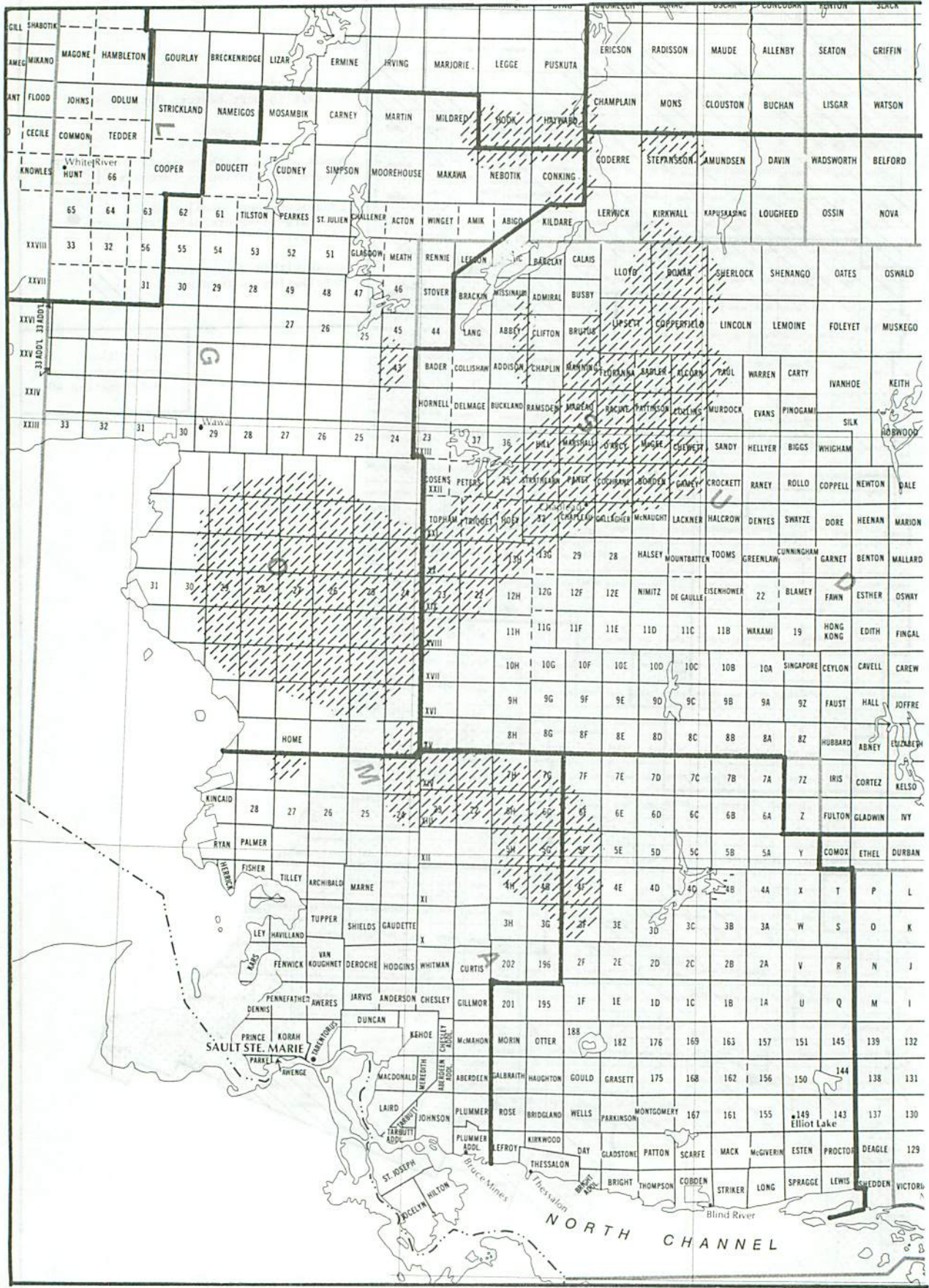
^e Ground sprayed, fenitrothion, 1975

^f Aerially sprayed, Dylox, 1975

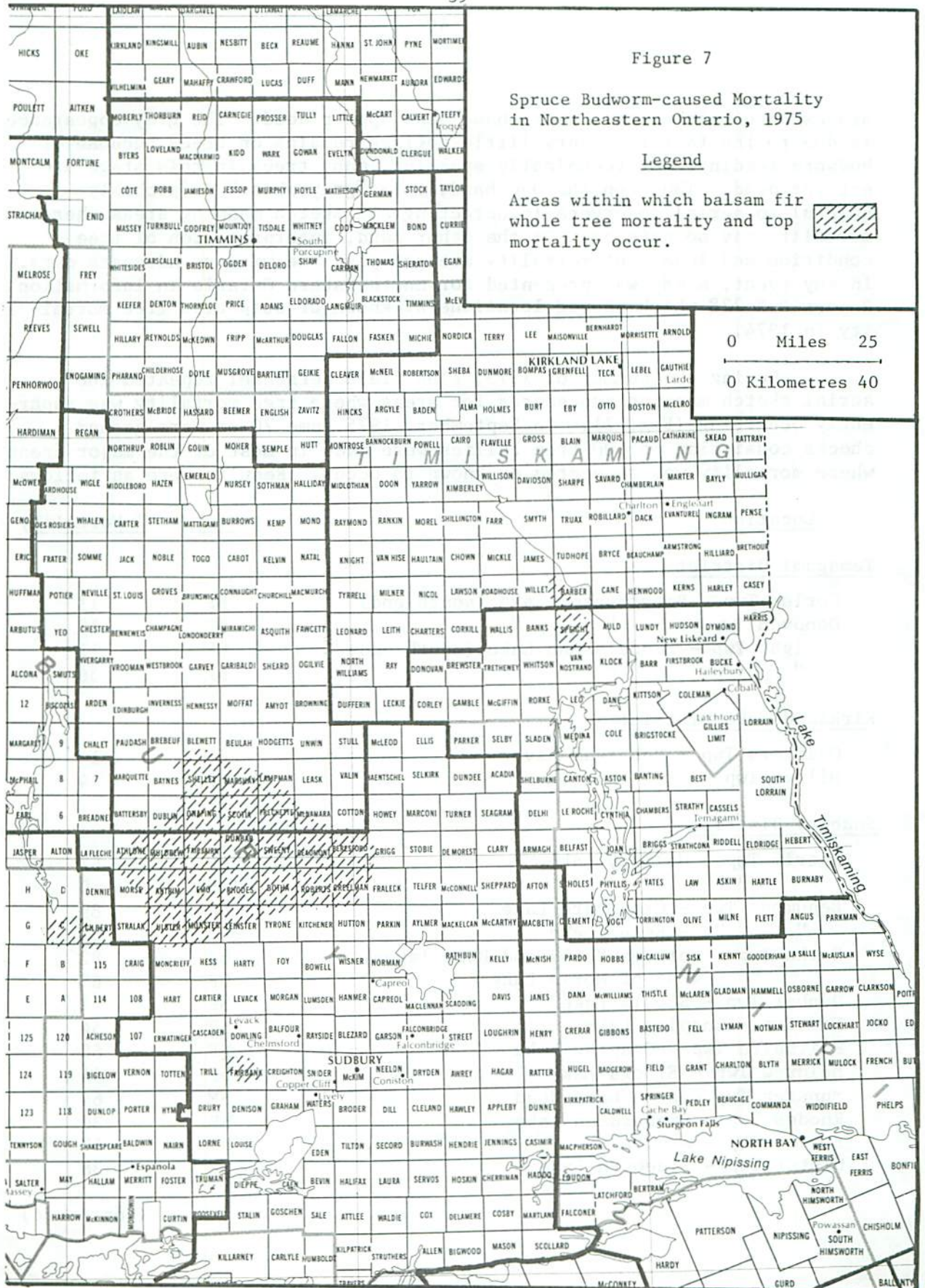
^g Aerially sprayed, *B.t.*, 1975







NORTH CHANNEL



stands have reached the "grey phase" and appear dead. The grey appearance is due to the fact that very little foliage remains on trees because of budworm feeding, yet technically speaking, many trees in this stage are not yet dead. Thus, on the one hand, this "grey phase" is probably helpful to aerial observers in detecting and sketch mapping areas where mortality may be present. On the other hand, interpretation of tree condition and levels of mortality are not possible without adequate data. In any event, a map was presented for northeastern Ontario in Information Report O-X-228 which showed locations of known or suspected tree mortality in 1974.

During the summer of 1975, FIDS field personnel repeated the aerial sketch mapping procedures for areas where tree mortality was apparently occurring (Fig. 7). In September, 1975 some 70 or more ground checks consisting of 100 tree tallies were made in most of the major areas where mortality was suspected or known to occur. Results were as follows:

<u>Location</u>	<u>Host</u>	<u>% Mortality</u>
<u>Temagami District</u>		
Corley Twp - Smoothwater Lake (south end)	bF	11
Donovan Twp - " "	bF	15
Speight Twp - Mendelssohn Lake (south end)	bF	17
" " " "	bF	36
<u>Kirkland Lake District</u>		
Charters Twp - Montreal River	bF	14
Milner Twp	bF	4
<u>Sudbury District</u>		
Antrim Twp - Halfway Lake	bF	62
" " " "	wS	0
Beaumont Twp - Graveyard Lake	bF	89
" " - Helen Lake	bF	81
Botha Twp - between Botha and Rome lakes	bF	82
" " - west of Morin Lake	bF	65
Dunbar Twp - Scotia Lake	bF	93
Emo Twp - Onaping Lake	bF	54
Fairbairn Twp - Onaping Lake	bF	68
Muldrew Twp - Elboga Lake	bF	54
Munster Twp - Rome Lake Road	bF	64
Rhodes Twp - Richardson Lake	bF	30
Sweeny Twp - Aytte	bF	67
Ulster Twp - Sideburn Lake	bF	38

(continued)

<u>Location</u>	<u>Host</u>	<u>% Mortality</u>
<u>Gogama District</u>		
Marshay Twp - Ladyfair Lake	bF	39
Onaping Twp - Onaping Lake, East Bay	bF	77
<u>Blind River District</u>		
McNie Twp - Aubinadong Road, River Road Jct.	bF	4
Twp 3E - 1.6 km (1 mi.) S of Ranger Lake turn on HW 129	bF	3
Twp 2F - 1.6 km (1 mi.) S of Seymour L. turn on HW 129	bF	1
Twp 3F - approx. 6.4 km (4 mi.) on Ranger L. Rd. from HW 129	bF	16
Twp 4F - 4.8 km (3 mi.) N of Ranger L. cutoff on Aubinadong Rd.	bF	26
Twp 4F - 1.6 km (1 mi.) S of Ranger L. Rd. and Aubinadong Rd. Jct.	bF	15
Twp 4F - 1.1 km (.7 mi.) W of Jct. of Ranger L. Rd. and Aubinadong Rd.	bF	2
<u>Sault Ste. Marie District</u>		
Twp 5H (Pine Twp) - E of Tujack L.	bF	7
" " " - km 30.9 (mi. 19.3) Aubinadong Rd. - Ragged L. Rd.	bF	9
Twp 6H (Hoffman Twp) - Gong L. Rd. 1.6 km (1 mi.) N of Welcome L. cutoff	bF	6
Twp 7H (Butcher Twp) - Goulais Lake	bF	22
Twp 22 Rge 14 (Bracci Twp) - North Chubb Lake	bF	13
Twp 23 Rge 14 (Wlasy Twp) - Dyson Lake	bF	29
Twp 28 Rge 14 - 1.6 km (1 mi.) N.E. Huff Lake	bF	44
<u>Wawa District</u>		
Twp 24 Rge 17 - Hoppy Lake	bF	71
Twp 24 Rge 24 - HW 651, .8 km (.5 mi.) N of Little Jackpine R.	bF	31
Twp 25 Rge 15 - Grey Owl Lake	bF	30
Twp 25 Rge 19 - McEwen Lake	bF	47
Twp 26 Rge 19 - Black Spruce Lake	bF	91
Twp 26 Rge 23, Twp 25 Rge 23 - Boundary on HW 101	bF	63
Twp 27 Rge 16 - Little Agawa Lake	bF	48
Twp 28 Rge 22 - Anjigami Road	bF	53
Twp 29 Rge 16 - Agawa	bF	8
Twp 30 Rge 17 - Coldwater River	bF	31
Twp 30 Rge 20 - Mijin Rd., Peller Lake	bF	40
Twp 45 - Poon Lake	bF	27
Michipicoten Twp - High Falls Road	bF	16

(continued)

<u>Location</u>	<u>Host</u>	<u>% Mortality</u>
<u>Chapleau District</u>		
Borden Twp - 19.8 km (12.4 mi.) E on HW 101 from HW 129 Jct.	bF	55
" " - HW 101, Westover Lake	bF	19
Chewett Twp - HW 101	bF	10
" " - Cedric Lake Road	bF	0
Cochrane Twp - km 1.4 (mi. 9) Kanipakow Road	bF	28
" " - on HW 101, 11.8 km (7.5 mi.)	bF	52
Cosens Twp - HW 101, 4.8 km (3 mi.) W of Prairie Bee River	bF	2
Foley Twp - HW 101	bF	0
Halsey Twp - Nemeegos Road	bF	42
Hill Twp	bF	8
Hoey Twp - HW 101, Lawson Lake	bF	55
Marshall Twp	bF	23
Pattison Twp - 3.5 km (2.2 mi.) S of Martel's Camp	bF	9
Sadler Twp - 3.2 km (2 mi.) N of Martel's Camp	bF	21
Twp 11D - HW 129, 4.2 km (2.6 mi.) S of 5-mile L. Prov. Park	bF	10
Twp 11D - HW 129, 1 km (.6 mi.) S of 5-mile L. Prov. Park	bF	22
Twp 11G - Sheppard and Morse Road	bF	8
Twp 12E - HW 129, Watershed Sign	bF	56
Twp 12H - Gale Lake	bF	64
Twp 13H - 3.8 km (2.4 mi.) W of Island Lake	bF	32
" "	wS	2
Twp 22 Rge 18 - Island Lake Lumber Road	bF	25
Twp 32 - HW 101, .4 km (.25 mi.) E of Esher- Healy Road	bF	27
Twp 35 - HW 101, .3 km (.2 mi.) E of Peters Twp- Twp 35 Boundary	bF	21
Twp 36 - Esher-Healy Rd., N of Prim Lake	bF	14

Inspection of the data confirms that mortality levels are extremely variable, ranging from 1% to 93%. Some trends are apparent; for example, the highest levels of mortality are present in the 200,000 ha (500,000 acres) of mortality in the Onaping Lake region in Sudbury-Gogama districts. This is not surprising in that mortality was first reported from this area in 1972. Generally light mortality exists in the Temagami and Kirkland Lake districts which have not been under attack as long as other districts. Mortality is present over a large area in Wawa and Chapleau districts (0.68 million ha, or 1.7 million acres), but mortality levels vary considerably. Generally speaking, white spruce has not started to die in northeastern

Ontario but many trees and stands are in very poor condition. In any event, the amount and extent of mortality in both balsam fir and white spruce can be expected to increase over the next few years.

North Central Ontario

Situation in 1975: For purposes of this report, north central Ontario will be regarded as that part of Ontario that includes the districts of White River, Terrace Bay, Geraldton and Nipigon. From 1967 to 1974, budworm outbreaks had neither developed nor flourished in these districts; consequently, information concerning budworm in this area was included as part of the writeup for northwestern Ontario in the previous reports of this series. However, the picture has changed sufficiently to warrant a brief, but separate section dealing with the budworm situation in north central Ontario.

In 1975, several new infestations were found in the Pukaskwa area in the White River District (Fig. 5). The largest of these, approximately 24,000 ha (60,000 acres) in size, was located between the East Pukaskwa River and the Cascade River along the Lake Superior coast and included most of Byron and Homer townships. Other smaller pockets of defoliation were found scattered throughout the White River District and the adjoining part of the Terrace Bay District. Light infestations occurred commonly elsewhere in the southern portion of the White River and Terrace Bay districts. Budworm populations became scarcer and more scattered to the north and west through Terrace Bay, Geraldton and Nipigon districts. The origin of the infestations in White River District is not known for certain, but they are the result of either population buildup in susceptible stands owing to favorable weather in recent years or moth dispersal from an outbreak area such as Wawa District.

Infestation Forecasts for 1976: Owing largely to the inaccessibility of the Pukaskwa area, intensive surveys were not possible, but a few egg-mass counts (Table 3, p. 49) obtained by helicopter indicate that areas defoliated in 1975 will likely be defoliated in 1976. Furthermore, although data are lacking present infestations in the Pukaskwa area will likely expand in size and increase in terms of population density. Population increases and related defoliation are likely to be common elsewhere in the southern part of the White River and Terrace Bay districts. Egg-mass counts taken in the same locations in 1974 and 1975 indicate that populations have increased about four times throughout Nipigon, Terrace Bay and Geraldton districts. Thus, if conditions are suitable for budworm survival in 1976, the stage seems set for an outbreak to develop in the North Central Region.

Northwestern Ontario

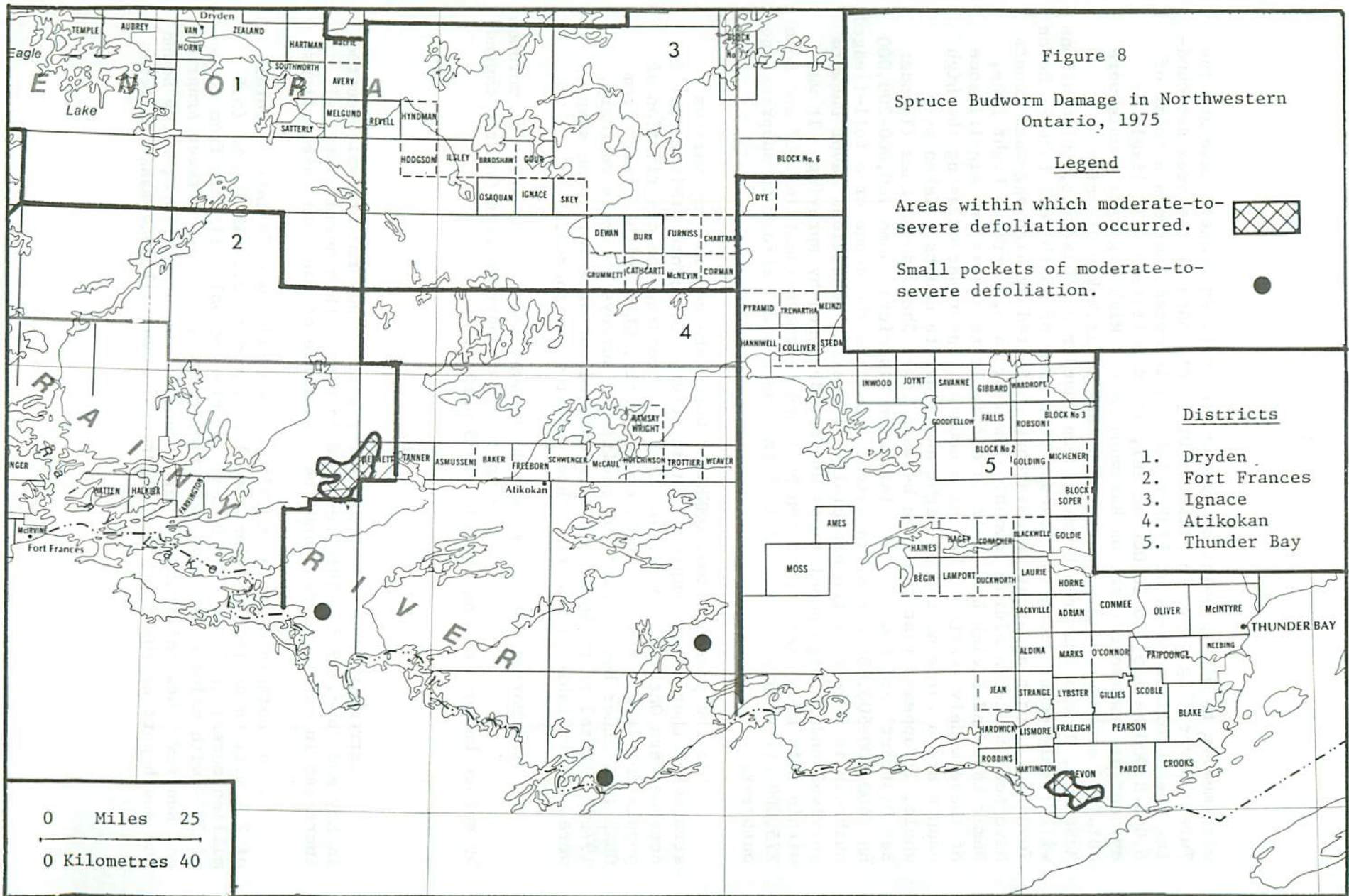
Situation in 1975: The formerly bright picture in northwestern Ontario took a decided turn for the worse in 1975. Throughout June, 1975 Survey Field Technicians observed that budworm were common across northwestern Ontario (Thunder Bay, Atikokan, Fort Frances, Ignace, Dryden, Kenora and the southern part of Sioux Look-out districts). Generally budworm numbers were low but widespread, and occasionally high numbers were found. For example, permanent sampling stations showed that larval populations in 1975 increased by a factor of four over those of 1974.

Moderate-to-severe defoliation in 1975 totalled 18,000 ha (45,000 acres), an increase of 13,320 ha (33,300 acres) over the 4680 ha (11,700 acres) mapped in 1974 (Fig. 8). The largest area of defoliation occurred at Bennett Lake in the Fort Frances District where 8,000 ha (20,000 acres) were sprayed in June, 1975. For details concerning the spraying operation, refer to Part B. This was the only significant infestation known to exist in northwestern Ontario. In July, aerial observers mapped 10,800 ha (27,000 acres) of defoliation which included virtually all of the treated area. However, defoliation was not unexpected even within those areas that were sprayed, since defoliation was evident when sprays were applied. In addition to that at Bennett Lake, several other infestations (as indicated by feeding damage) were found. Defoliation totalling 200 ha (500 acres) at Little Eva Lake and another pocket of 400 ha (1000 acres) at Fluker Lake southeast of Kawa Bay on Kawnipi Lake and a few small, scattered pockets at Prairie Portage on Basswood Lake were mapped in the Atikokan District. A new infestation of 6,600 ha (16,500 acres) was found in very rugged terrain just north of the Pigeon River in the Thunder Bay District. Moderate-to-severe defoliation was discovered on balsam fir trees in a stand near Swallow Lake in the Thunder Bay District.

Aerial spraying operations carried out in northwestern Ontario in 1975 are described in Part B of this report.

Infestation Forecasts for 1976: The egg-mass survey carried out in August, 1975 confirmed that an upward ground swell of budworm populations had occurred across northwestern Ontario, particularly in Thunder Bay, Atikokan and Fort Frances districts (Table 3). A total of 202 locations were sampled in 1975 of which 172 were common to both 1974 and 1975. Based on those locations sampled in both years, egg-mass densities in 1975 were double those of 1974 and the incidence of positive counts increased from 37% to 52%. On an individual district basis, egg-mass densities increased by 750% in Thunder Bay and 60% in both Atikokan and Fort Frances districts.

At Bennett Lake in the Fort Frances District, egg-mass counts indicate that approximately 50,000 ha (125,000 acres) are now infested



with medium to high populations in an area between Bennett Lake and the Turtle River (Fig. 9). In Atikokan District, much of the area surrounding the defoliated area at Fluker Lake is infested, perhaps a total of 6,000-8,000 ha (15,000-20,000 acres), and defoliation will likely be evident at Prairie Portage on Basswood Lake. High egg-mass counts were obtained at other widely scattered points in Atikokan District at McKenzie, Oriana and French lakes. In Thunder Bay District, infestations will likely occur along the Pigeon River east of South Fowl Lake in Devon Township. Other apparent infestations indicated by high egg-mass counts have been found in Aldina Township, Swallow Lake, Northern Light Lake, Bemar Lake and Sleigh Lake. It is difficult to assess the significance of these widely scattered but high counts. Interspersed among the high counts are a large number of light and moderate counts. Taken as a whole, it appears that the area between Lower Shebandowan Lake (Thunder Bay District) and Kawnipi Lake (Atikokan District), some 160,000-200,000 ha (400,000-500,000 acres) in extent, could be the scene of a full-fledged outbreak in a year or two especially if weather conditions favor budworm survival and if high populations are not dampened by spraying. It was within this area that population buildups became evident in 1967 and some 275,000 acres were treated in 1968 in a successful effort to suppress the outbreak.

At the present time, OMNR and GLFRC are considering various strategies that can be employed in an attempt to counter this threat in northwestern Ontario. More information concerning the distribution of population levels was required; consequently, GLFRC with support from OMNR in Thunder Bay carried out additional surveys in early February, 1976. A total of 60 locations were sampled but data for these samples were not available at the time this report was prepared.

Tree Mortality: There are no (known) significant areas or volumes of tree mortality in northwestern Ontario caused by spruce budworm during the 1968-1975 period.

SUMMARY

Extremely favorable weather for spruce budworm survival occurred in May and June, 1975. This resulted in higher than normal survival, increases in outbreak areas and the appearance of many new infestations.

In southern Ontario in 1975, spruce budworm defoliated a total of 2.4 million ha (6.0 million acres) compared to 2.2 million ha (5.5 million acres) in 1974. The boundaries changed only slightly from those of 1974 with major extensions occurring near Mattawa and between Arnprior and Renfrew. New infestations were found in the Bracebridge, Parry Sound and south part of the North Bay districts. Over all, egg-mass densities

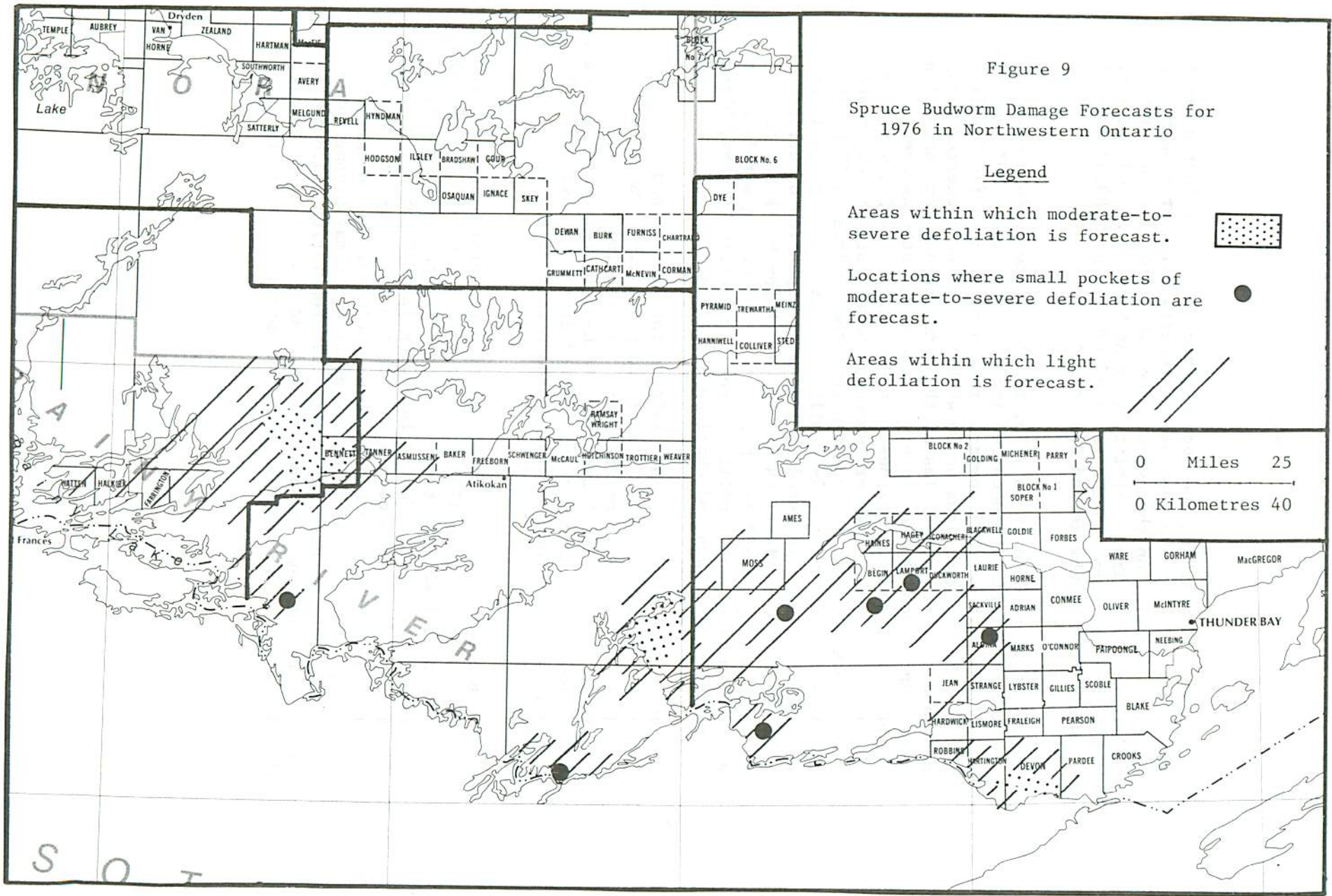





Figure 9

Spruce Budworm Damage Forecasts for 1976 in Northwestern Ontario

Legend

Areas within which moderate-to-severe defoliation is forecast. 

Locations where small pockets of moderate-to-severe defoliation are forecast. 

Areas within which light defoliation is forecast. 

0 Miles 25
0 Kilometres 40

have decreased by 57%, marking the second consecutive year that a decline has occurred. In spite of the decrease, forecasts call for moderate or higher levels of defoliation throughout some 2.0-2.4 million ha (5-6 million acres) in 1976. Tree mortality varying between 4% and 92% (mainly balsam fir) is present throughout a total of 120,000 ha (300,000 acres) in the Algonquin Park, Pembroke and Bancroft districts.

In northeastern Ontario in 1975, the total area within which moderate-to-severe defoliation occurred increased by almost 50% to 10.88 million ha (27.2 million acres) compared to 7.4 million ha (18.5 million acres) in 1974. Major expansions up to 48 km (30 miles) occurred along the northern and southern boundaries of the outbreak and many new infestations were found beyond the periphery of the main outbreak area. Egg-mass densities throughout northeastern Ontario were 40% lower than comparable counts in 1974. However, some northern districts experienced substantial increases and it is expected that the outbreak will cover approximately 14-16 million ha (35-40 million acres) in 1976. All areas defoliated in 1975 will be infested in 1976 with expansion occurring primarily in the northern districts and the North Bay-Mattawa area. Balsam fir mortality up to 93% is reported to be occurring within a total area of some 1.2 million ha (3 million acres) in Sudbury, Gogama, Blind River, Sault Ste. Marie, Wawa and Chapleau districts.

In north central Ontario, new infestations were found in the Pukaskwa area in the White River District and populations increased throughout the region. The areas that were infested in 1975 will be infested again in 1976 and the boundaries of the infestations will likely be extended. Population increases and related defoliation will probably occur in many locations throughout the southern part of the White River and Terrace Bay districts.

In northwestern Ontario, the total area of defoliation amounted to 18,000 ha (45,000 acres) in 1975 compared to 4,680 ha (11,700 acres) in 1974. The Bennett Lake infestation in the Fort Frances District, in spite of aerial spraying, expanded to 10,800 ha (27,000 acres), based on defoliation surveys. Egg-mass counts show that a total area of 50,000 ha (125,000 acres) will be infested in 1976. Defoliation and egg-mass counts indicate that as many as 10 or 12 infestations may become evident in 1976 in Atikokan and Thunder Bay districts. Population buildups have occurred in the area between Shebandowan Lake and Kawnipi Lake, an area which coincides with the outbreak in 1967 and spraying operations in 1968.

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Atikokan District</u>				
(85 locations)				
Agnes Lake	bF	5	0	0
Airport Road	bF	1	0	0
Allan Lake - west side	bF	1	10	L
Argo Lake - west side	bF	1	0	0
Basswood Lake - Bayley Bay	bF	8	25	L-M
- Canadian Point	bF	4	8	L
- North Bay	bF	27	35	L-M
- Prairie Portage	bF	26	120	M-S
- Ranger Bay	bF	7	6	L
Beaverhouse Lake	bF	6	16	L-M
Brent Lake - north central	bF	5	0	0
Buckingham Lake	bF	1	0	0
Cache Bay	bF	13	8	L
Cache Lake	bF	9	9	L
Cairn Lake	bF	0	0	0
Calm Lake	bF	1	5	L
Camel Lake	bF	1	8	L
Captain Tom Lake	bF	2	23	L-M
Carp Lake	bF	7	40	L-M
Crooked Lake - east end	bF	5	9	L
- Gardner Bay	bF	5	0	0
- northeast of Sunday Bay	bF	1	0	0
Darky Lake	bF	3	11	L
David Lake	bF	0	0	0
Delahey Lake	bF	2	13	L-M
Duff Lake	bF	3	9	L
Emerald Lake	bF	2	0	0
Eye Lake	bF	1	7	L
Factor Lake	bF	3	28	L-M
Ferguson Lake	bF	2	0	0

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Atikokan District (cont'd.)</u> (85 locations)				
Fluker Lake				
- #1 Wawiag River	bF	7	41	L-M
- #2 Wawiag River	bF	6	28	L-M
- #3 Devine Creek	bF	39	175	M-S
- #4 west of Fluker Lake	wS	84	282	S
- #5 Mack Lake	bF	2	14	L
- #6 west of Munro Lake	bF	3	43	L-M
- #7 southwest of #6	bF	7	89	M-S
French Lake	wS	2	0	0
French Lake	bF	3	54	L-M
Gehl Lake	bF	2	0	0
Greer Lake	bF	2	24	L-M
Hydro Line - Hwy 11	bF	10	0	0
Joyce Lake	bF	1	0	0
Kawa Bay - #116	bF	19	27	L-M
Lac La Croix - Campbells	bF	19	13	L-M
- I.R. 25 D (central)	bF	8	0	0
- I.R. 25 D (east)	bF	2	0	0
- Martin Bay (central)	bF	2	0	0
- Martin Bay (west)	bF	1	0	0
Lilac Lake	bF	5	0	0
Little Eva Lake	bF	6	0	0
Louisa Lake - north end	bF	26	10	L
- south end	bF	39	19	L-M
Maligne River				
- west of Tanner Lake	bF	1	0	0
McAree Lake - Lookout	bF	11	0	0
McCaulay Lake Rd	bF	0	0	0
McEwan Lake	bF	2	0	0
McIntyre Lake	bF	2	0	0
McKenzie Lake - Tower	bF	27	85	M-S
Melema Lake	bF	2	23	L-M

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Atikokan District (cont'd.)</u> (85 locations)				
Mercutio Lake	bF	2	0	0
Minn Lake	bF	2	14	L
Olifaunt Lake	bF	2	0	0
Oriana Lake	bF	7	71	M-S
Orion Lake	bF	0	0	0
Pipestone Creek	bF	2	0	0
Poacher Lake	bF	2	38	L-M
Poohbah Lake	bF	2	0	0
Price Lake	bF	1	10	L
Quetico Lake	bF	0	0	0
Robinson Lake	bF	3	0	0
Snow Lake	bF	5	0	0
Airport Rd	bF	0	0	0
Sturgeon Lake				
- northeast end	bF	2	0	0
- west end	bF	12	9	L
Sunday Lake	bF	23	12	L
Tanner Lake				
- Poohbah Creek	bF	2	0	0
Thompson Lake	bF	1	0	0
Trail Lake	bF	11	7	L
Tuck Lake	bF	3	0	0
Whalen Lake	bF	1	0	0
Wicksteed Lake	bF	2	0	0
William Lake - east end	bF	2	0	0
- west end	bF	2	0	0
Wolseley Lake				
- north central	bF	2	0	0
<u>Fort Frances District</u> (38 locations)				
Bear Pass	bF	8	36	L-M

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Fort Frances District (cont'd.)</u> (38 locations)				
Bennett Creek				
- east of Glenorchy ^b	bF	28	18	L
Bennett Lake - west end ^b	bF	15	96	M-S
Beynon Lake	bF	12	22	L-M
Crilly River	bF	95	684	S
Duff Lake	bF	3	9	L
Hepburn Lake	bF	2	0	0
Hwy 11 - Farrington Twp	bF	0	4	L
- south of Olive	bF	1	26	L-M
- south of Turtle	bF	5	0	0
- Seine River	bF	5	72	M-S
- Mine Centre	bF	1	6	L
Hillyer Creek - #10 ^b	bF	97	273	S
Law Lake				
- (2 miles east of)	bF	5	8	L
Little Turtle River				
- #9 ^b	bF	99	371	S
- #11 ^b	bF	98	156	M-S
- #12 ^b	bF	91	348	S
- #15 (1 mi. north of)	bF	22	12	L
Manion Lake				
- southeast corner	bF	9	26	L-M
Manion Lake Rd				
- at Hwy 11	bF	20	104	M-S
- Hillyer Creek ^b	bF	35	104	M-S
- Little Turtle River ^b	bF	8	25	L-M
- Mile 6.5	bF	2	55	M
- Mile 9 ^b	bF	4	97	M-S
- Mile 11 ^b	bF	1	54	L-M
- Mile 13	bF	4	83	M-S
Mather Twp	bF	1	0	0
McPherson Lake	bF	15	78	M-S
Melin Lake	bF	4	20	L-M

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Fort Frances District (cont'd.)</u> (38 locations)				
Moosetrack Lake				
- west side	bF	30	500	S
Pipestone River	bF	2	0	0
Potts Twp	bF	4	0	0
Shoal Lake	bF	2	26	L-M
Sturgeon Falls Indian Res.				
- west side	bF	3	93	M-S
- southeast boundary	bF	39	136	M-S
Tessup Creek	bF	10	16	L
Tessup Lake				
- (2 miles south of)	bF	32	69	M
Turtle River - #16				
- (2.5 miles southeast of)	bF	16	18	L-M
<u>Geraldton District</u> (6 locations)				
Caramat - (1.8 miles south)	bF	2	0	0
Caramat Road - Mile 15	bF	5	0	0
Catlonite Rd				
- Mile 72.3	bF	1	11	L
Croll Twp	bF	2	7	L
Pagwa River - Mile 2.5	wS	22	0	0
Wintering Lake	bF	3	9	L
<u>Ignace District</u> (4 locations)				
Bending Lake	bF	3	0	0
Campus Lake	bF	3	0	0
Kathleen Lake	bF	3	0	0
Scotch Lake	bF	1	0	0

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>Nipigon District</u> (9 locations)				
Black Sturgeon Lake	bF	4	9	L
Jackpine River - Mile 9	bF	7	9	L
Ledger Twp - gas line	bF	8	10	L
Legault Twp	bF	3	0	0
Macdiarmid	bF	5	0	0
Parks Twp - Mile 30.7 Domtar Rd	bF	4	0	0
Poshkokagan River	bF	1	0	0
Purdon Twp - Cameron Falls	wS	23	12	L
Summers Twp	bF	1	0	0
<u>Terrace Bay District</u> (9 locations)				
Amwri Station	bF	5	0	0
Catlonite Lake	bF	3	0	0
Gertrude Twp	bF	4	9	L
Jct. of Industrial and Camp 15 (old Camp 5) Rd	bF	5	0	0
Manitouwadge Road - Mile 1.5	bF	38	124	M-S
Marathon - 1/2 mile north of Hwy 17	bF	9	0	0
Stevens C.N.R. - Monitoring and pheromone plots	bF	7	8	L
Twp 82 - Jackfish Lake	bF	5	0	0
Twp 85 - Rainbow Falls Prov. Pk	bF	3	9	L

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Thunder Bay District</u> (75 locations)				
Aldina Twp	bF	10	167	M-S
Armistice Creek - 2 miles east of Sunday Lake	bF	6	24	L-M
Athelstane Lake	bF	3	34	L-M
Batwing Lake	bF	11	8	L
Batwing & Mark lakes Rd Jct.	bF	4	9	L
Bedivere Lake	bF	6	0	0
Bemar Lake	bF	38	82	M-S
Blackwell Twp	bF	8	0	0
Burchell Lake	bF	2	0	0
Clovenhoof Lake	bF	9	0	0
Crayfish Lake	bF	5	0	0
Cushing Lake	bF	1	0	0
Devil's Elbow	bF	7	7	L
Drift Lake Rd	bF	1	0	0
Fountain Lake	bF	0	0	0
Granite River - (south of)	bF	5	0	0
Greenwater Lake - east side	bF	8	0	0
- Shelter Island	bF	3	0	0
Greenwood Lake	bF	18	48	L-M
Gunflint Lake - west end	bF	10	14	L-M
- central	bF	9	7	L
Hagey Twp - Hwy 586	bF	15	33	L-M
Haines Twp - Postans	bF	6	0	0
Heaven Lake Rd	bF	55	42	L-M
Hoof Lake	bF	9	37	M
Huronian Lake	bF	3	0	0
Hwy 11 - west of Burchell Lake Rd	bF	7	7	L

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Thunder Bay District (cont'd.)</u> (75 locations)				
Hwy 800				
- Kabitotikwia River	bF	8	0	0
Icarus Lake	bF	5	0	0
Kashabowie Lake	bF	8	0	0
Kekekuab Lake	bF	34	57	M
Lac des Mille Lacs				
- Baril Bay	bF	2	0	0
- Bolton Bay	bF	13	26	L-M
- Pine Point	bF	1	0	0
- Poplar Point	bF	3	0	0
- Portage Bay	bF	4	0	0
Marks Lake	bF	6	9	L-M
McGinnis Lake	bF	4	0	0
McMaster Twp	bF	3	0	0
Moss Lake	bF	2	11	L-M
Mountain Lake	bF	3	0	0
Mountain Lake	wS	3	15	L
Nelson Lake	bF	12	31	L-M
Northern Light Lake				
- Curran Bay	bF	3	0	0
- Gravel Pit	bF	3	0	0
- South Island	bF	1	0	0
- Trout Bay Rd (Pupal sample point)	bF	8	102	M-S
Pearson Twp	bF	2	0	0
Pigeon River				
- #1 Hwy 61 at Larsen Rd	bF	3	0	0
- #2	bF	4	10	L
- #3 Arrow River at Devon Rd	bF	12	12	L

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (cont'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg- masses per 9.29 sq. m (100 sq. ft) of foliage	Infesta- tion forecasts for 1976 ^a
<u>Thunder Bay District (cont'd.)</u> (75 locations)				
<u>Pigeon River (cont'd.)</u>				
- #4	bF	2	16	L
- #5	bF	5	42	L-M
- #6	bF	5	114	M-S
- #7	bF	1	7	L
- #8	bF	1	14	L
- #9	bF	0	13	L
- #10	bF	2	5	L
- #47	bF	0	0	0
Plummes Lake	bF	2	0	0
Powell Lake	bF	10	15	L-M
Prelate Lake	bF	1	0	0
Ross Lake	bF	24	0	0
Sandstone Lake	bF	3	8	L
Shebandowan Lake				
- Sawmill Bay	bF	8	36	L-M
Sibley Peninsula				
- Joe Lake	bF	5	0	0
Sleigh Lake	bF	5	52	M-S
South Fowl Lake	bF	1	13	L-M
Squeers Lake	bF	3	30	L-M
Swallow Lake	bF	25	286	S
Thunder Bay Tree Nursery	wS	1	12	L
Tilley Lake	bF	4	0	0
Titmarsh Lake	bF	5	0	0
Upsala - Inwood Prov. Pk	bF	2	0	0
Whitefish Lake	bF	1	18	L-M

(cont'd.)

Table 3. Northwestern Ontario - Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1975, and infestation forecasts for 1976 (concl'd.)

Location	Host	Estimated per cent of defoliation 1975	No. of egg-masses per 9.29 sq. m (100 sq. ft) of foliage	Infestation forecasts for 1976 ^a
<u>White River District</u> (11 locations)				
Cooper Twp	wS	16	8	L
Hydro Rd - Mile 2	bF	11	9	L
Hydro Rd - Mile 14.5	bF	53	37	L-M
Obatanga Prov. Pk	bF	5	28	L-M
Pukaskwa National Pk				
- Cascade River	bF	20	153	M-S
- Oiseau Bay (7 miles east of)	bF	8	0	0
- Otter Cove Radio Tower	bF	52	433	S
- Tip Top Mountain (2 miles southwest of)	bF	23	83	M
Regan - (8.8 miles south of)	bF	37	92	M-S
Twp 66	bF	16	13	L
Twp 70 - Access Rd	bF	10	25	L-M

^a S = severe, M = moderate, L = light, 0 = nil

^b Aerially sprayed, Dylox, 1975

PART B: AERIAL SPRAYING OPERATIONS

INTRODUCTION

Aerial spraying operations covering some 13,344 ha (33,360 acres) were conducted against spruce budworm in Ontario by the Ministry of Natural Resources in 1975. The Great Lakes Forest Research Centre provided the biological information necessary for the planning, execution, timing and assessment of these operations. Province-wide surveys for spruce budworm defoliation and egg-mass counts were carried out by GLFRC with support from OMNR in the form of aircraft and casual help in order to determine the current overall situation and to provide forecasts for 1976.

The spray contractor was General Airspray Ltd., St. Thomas, Ontario. Two Stearman and one Agcat, equipped with Micronair dispersal units, were employed. Fenitrothion (Sumithion 10E, Niagara Chemicals) mixed with appropriate amounts of water was used in single 2398-ha (5995-acre) or double 786-ha (1965-acre) applications at rates of 56-112 g in 0.67 liters of spray mixture per 0.4 ha (2-4 oz in 24 fluid oz per acre) of spray mixture to approximately 3184 ha (7960 acres). Dylox U.L.V. (Chemagro Ltd.) was used in undiluted form at an application rate of 336 g in 0.67 liters per 0.4 ha (12 oz in 24 fluid oz per acre) on approximately 10,120 ha (25,300 acres). Eight thousand ha (20,000 acres) were treated once and 2120 ha (5300 acres) received two applications.

An outstanding feature of the 1975 season that affected most of Ontario was the exceptionally warm and sunny weather that occurred from mid to late May. For many locations, this was the warmest May on record and undoubtedly provided budworm with an excellent start at a very critical period in the insect's life cycle. Consequently, it was difficult to achieve optimum timing for spray applications in some cases because of the abnormally early and rapid development of budworm.

The following description of the operations and results is taken from a report by Howse et al. (1975).

Southern Ontario

1975 Operations: A total of 852 ha (2130 acres) were sprayed in Algonquin Provincial Park in 1975. The purpose of spraying was to protect foliage on host trees in high value areas along Highway 60. Most of the major camping or recreational areas were sprayed. In addition, the provincial tree nursery at Midhurst was sprayed with fenitrothion from a mistblower.

In Algonquin Park, fenitrothion was applied from an aircraft and *Bacillus thuringiensis* (*B.t.*) (Thuricide 16B) was sprayed from the ground using a mistblower. The treatments and acreages were as follows:

1. Fenitrothion - one application, 56 g/0.4 ha (2 oz/acre) - 256 ha (640 acres)
2. Fenitrothion - two applications, 56 + 56 g/0.4 ha (2 + 2 oz/acre) - 556 ha (1390 acres)
3. Fenitrothion - two applications, 56 + 56 g/0.4 ha (2 + 2 oz/acre) + two mistblower applications of *B.t.* - 40 ha (100 acres)
4. *B.t.* - two mistblower applications - 20 ha (50 acres).

As outlined in last year's report, the basic approach was to spray one application of fenitrothion at 56 g/0.4 ha (2 oz/acre). Some areas, such as campgrounds, where a "guaranteed" high level of protection was required, received a second application of fenitrothion at 56 g/0.4 ha (2 oz/acre) and a mistblower application of *B.t.* Some areas received mistblower applications of *B.t.* only. Thuricide 16B applied from the mistblower was diluted 7:1 with water.

Budworm emergence occurred about May 10-12, 1975. Spraying was carried out from May 28 to 30 with an Agcat.

Results: All treatments provided satisfactory results although a single aerial application of fenitrothion was the poorest of the four (Table 4). Excellent results were achieved with mistblower applications of fenitrothion at Midhurst (Table 5).

Proposed Aerial Spraying Operations for 1976: Spraying operations for 1976 will likely be similar in extent to those carried out in 1975.

Northeastern Ontario

1975 Operations: A total of 4452 ha (11,130 acres) were sprayed in northeastern Ontario in 1975. The locations, areas and treatments are listed on the page following.

<u>District</u>	<u>Park</u>	<u>Location</u>	<u>Hectares</u>	<u>Acres</u>	<u>Treatment</u>	
Wawa	Lake Superior	Mijin Lake Rd.	466	1165	Fenit. - 1 appl. 112 g (4 oz)	
		Mijin Lake	656	1640	" - 1 appl. 112 g (4 oz)	
	Rabbit Blanket	20	50	" - 1 appl. 112 g (4 oz)		
	Red Rock River	40	100	Dylox - 1 appl. 336 g (12 oz)		
	Sand River	2080	5200	" - 2 appl. 336 + 336 g (12 + 12 oz)		
			<u>3262</u>	<u>8155</u>		
Chapleau	Missinaibi		92	230	Fenit. - 1 appl. 112 g (4 oz)	
			52	120	" - 2 appl. 112 + 70 g (4 + 2.5 oz)	
	Shoals		456	1140	Fenit. - 1 appl. 112 g (4 oz)	
			50	125	" - 2 appl. 112 + 70 g (4 + 2.5 oz)	
	5 Mile		160	400	Fenit. - 1 appl. 112 g (4 oz)	
			56	140	" - 2 appl. 112 + 70 g (4 + 2.5 oz)	
	Wakami		60	150	" - 1 appl. 112 g (4 oz)	
			32	80	" - 2 appl. 112 + 70 g (4 + 2.5 oz)	
				<u>958</u>	<u>2395</u>	
	Sault Ste. Marie		Searchmont (Abitibi Plantation)	232	580	Fenit. - 1 appl. 112 g (4 oz)

The primary purpose of this spraying in the provincial parks and the white spruce plantation near Searchmont in the Sault Ste. Marie District was to minimize the intensity of damage caused by budworm within selected areas that have recreational, aesthetic or timber values. In addition, provincial nurseries at Chapleau and Swastika were sprayed with aircraft and ground equipment.

Budworm emergence occurred about May 10-12. Spraying was carried out from June 3 to June 8 in the Chapleau District using an Agcat and from June 4 to June 10 in Lake Superior Provincial Park and June 14 in Sault Ste. Marie District using two Stearman aircraft.

Table 4. Population reduction and foliage protection attributable to spraying on balsam fir and white spruce in Algonquin Provincial Park, 1975. Budworm development (instar) at time of spraying was L4. Data from 16 plots (12 spray, 4 check).

	Prespray larvae/46 cm (18 in.) branch tip		Surviving pupae/46 cm (18 in.) branch tip		% Population reduction due to treatment		% 1975 Defoliation		
	bF	wS	bF	wS	bF	wS	bF	wS	
<u>Fenitrothion 1 applic. of 56 g (2 oz) - L4 - 256 ha (640 acres)</u>									
spray	29.9	45.9	1.1	3.2	78	64	53	33	
check	34.5	46.5	6.0	8.9	--	--	99	92	
<u>Fenitrothion 2 applic. of 56 g (2 oz) each - L4 - 556 ha (1390 acres)</u>									
spray	24.5	40.0	.6	3.9	90	49	26	24	
check	22.9	46.5	5.2	8.9	--	--	95	92	
<u>Fenitrothion 2 applic. of 56 g (2 oz) each + 1 mistblower applic. of <i>B. thuringiensis</i> - L4 - 40 ha (100 acres)</u>									
spray	27.2	39.8	.7	2.9	89	66	20	43	
check	28.0	32.5	6.7	6.9	--	--	94	89	
<u><i>B. thuringiensis</i> 2 mistblower applic. - L4 - 20 ha (50 acres)</u>									
spray	17.8	25.0	.8	.5	87	78	24	17	
check	21.4	30.4	7.4	2.8	--	--	89	98	

Table 5. Results of mistblower application of fenitrothion on white spruce, Norway spruce and blue spruce (*Picea pungens* Engelm.) windbreak trees at Midhurst Nursery, Huronia District, 1975. Budworm development at time of spraying was L3. No check plots.

Species	Prespray larvae/46 cm (18 in.) branch tip	Surviving pupae/46 cm (18 in.) branch tip	% 1975 Defoliation
White spruce	49.7	.2	10
Norway spruce	14.9	.3	4
Blue spruce	8.3	.3	0

Results: Assessments were carried out for the single application of Dylox (336 g/0.4 ha - 12 oz/acre) in Lake Superior Provincial Park and for the fenitrothion applications in Lake Superior Provincial Park, Chapleau and Sault Ste. Marie districts. The results which were, generally speaking, quite variable are listed in Tables 6, 7, 8 and 9. Dylox caused heavy larval mortality but foliage protection was not satisfactory (Table 6). Fenitrothion was responsible for high larval mortality and good foliage protection along the Mijin Lake Road in Lake Superior Provincial Park (Table 7), whereas little if any benefit could be discerned for the spraying in Chapleau District (Table 8). Considerably higher densities in Chapleau and late timing could be responsible for the difference in results. The generally poor results in the white spruce plantation near Searchmont (Table 8) are probably due to the lateness of the spray (no foliage protection) and the very wet weather that occurred after the spray application. The Sand River corridor that was virtually completely defoliated despite spraying in 1974 received a double application of Dylox in 1975 and data and aerial observations indicate that excellent foliage protection was achieved (Table 10).

Proposed Aerial Spraying Operations for 1976: It is likely that an operational spraying program similar to that of 1975 will take place in 1976.

B.t. Trials, 1975 - Lake Superior Provincial Park: In 1975, the Ontario Ministry of Natural Resources tested three B.t. products against spruce

Table 6. Population reduction and foliage protection attributable to a single application of Dylox at 336 g/0.4 ha (12 oz/acre) on balsam fir and white spruce in Lake Superior Provincial Park, 1975. Budworm development (instar) at time of spraying was L4-L5.

	Prespray larvae/46 cm (18 in.) branch tip	Surviving pupae/46 cm (18 in.) branch tip	% Population reduction due to treatment	% 1975 Defoliation
<u>Balsam fir - 1 application of 336 g/0.4 ha (12 oz/acre)</u>				
Spray	47.1	.06	99	89
Check	50.6	7.72	--	98
<u>White spruce - 1 application of 336 g/0.4 ha (12 oz/acre)</u>				
Spray	134.6	1.08	95	74
Check	69.5	12.36	--	92

Table 7. Population reduction and foliage protection attributable to a single application of fenitrothion at 112 g/0.4 ha (4 oz/acre) on balsam fir and white spruce in Lake Superior Provincial Park, 1975. Budworm development (instar) at time of spraying was L4-L5.

Plot	Prespray larvae/46 cm (18 in.) branch tip		Surviving pupae/46 cm (18 in.) branch tip		% Population reduction due to treatment		% 1975 Defoliation	
	bF	wS	bF	wS	bF	wS	bF	wS
	Mijin Road #1	34.9	42.5	2.10	7.70	75	31	66
Check	28.6	35.3	6.88	9.28	--	--	98	92
Mijin Road #2	56.3	80.9	0	.60	100	96	12	9
Check	50.6	69.5	7.72	12.36	--	--	98	92
Mijin Road #3	32.3	70.8	3.30	5.40	58	57	39	58
Check	28.6	69.5	6.88	12.36	--	--	98	92
Mijin Road #4	29.7	58.9	1.40	9.90	80	19	39	51
" " #5	23.5	55.2	.20	2.00	96	82	12	34
Mijin Lake	27.0	50.4	.10	1.50	98	86	22	28
Check	28.6	52.4	6.88	10.82	--	--	98	92
Mijin Road #6	41.2	37.0	1.00	3.10	87	68	20	28
Check	39.6	35.3	7.30	9.28	--	--	98	92
Rabbit Blanket	43.3	71.0	6.50	7.80	18	38	80	59
Check	39.6	69.5	7.30	12.36	--	--	98	92

Table 8. Population densities and defoliation estimates for four provincial parks in the Chapleau District sprayed with two applications of fenitrothion 112 + 70 g/0.4 ha (4 + 2.5 oz/acre) and one check plot. Budworm development (instar) at time of spraying was L4-L5.

Location	L2 per branch ^a		Estimated L3-L4 per 46 cm (18 in.) branch tip		Surviving pupae per 46 cm (18 in.) branch tip		% 1975 Defoliation	
	bF	wS	bF	wS	bF	wS	bF	wS
	Shoals	485	311	125	105	4.6	1.8	99
Missinaibi	224	180	65	70	.7	1.0	99	98
5 Mile	199	146	60	64	1.9	.5	100	99
Wakami	231	197	65	76	.4	1.1	99	99
Check	314	336	85	120	.3	.7	99	100

^a L2 per branch was determined by collecting foliage in April and forcing overwintering larvae under controlled conditions.

Table 9. Population reduction and foliage protection attributable to a single application of fenitrothion at 112 g/0.4 ha (4 oz/acre) on a white spruce plantation near Searchmont, Sault Ste. Marie District, 1975. Budworm development (instar) at time of spraying was L5-L6.

Plot	Prespray larvae/46 cm (18 in.) branch tip	Surviving pupae/46 cm (18 in.) branch tip	% Population reduction due to treatment	% 1975 Defoliation
1	12.2	.9	52	100
2	12.2	1.8	3	99
3	5.8	.6	32	99
4	14.6	.6	73	99
5	7.8	2.0	0	99
6	3.4	1.0	0	99
7	13.8	2.2	0	99
8	8.6	1.0	23	96
9	11.0	0	100	100
10	9.6	.6	60	99
11	9.8	.4	73	99
Check	10.5	1.6	--	98
12	19.2	2.0	13	98
13	18.2	3.4	0	99
14	16.0	.8	58	99
15	16.2	.6	68	99
16	19.2	2.2	4	98
Check	10.5	1.6	--	98
17	26.0	1.0	64	98
Check	25.7	2.8	--	94
Overall	13.1	1.2	30	99
Check	19.6	2.3	--	97

Table 10. Egg-mass counts and defoliation estimates for Sand River, Lake Superior Provincial Park

Location	Host	1973		1974 (sprayed June, 1974)		1975 (sprayed June, 1975)	
		% Defol.	No. of egg masses per 9.29 sq. m (100 sq. ft)	% Defol.	No. of egg masses per 9.29 sq. m (100 sq. ft)	% Defol.	No. of egg masses per 9.29 sq. m (100 sq. ft)
Sand River							
#1 - Twp 29, Rge 17	bF	75	357	99	229	27	201
#2 - Twp 29, Rge 19	bF	98	288	97	101	12	129
#3 - Twp 28, Rge 19	bF	95	1252	99	363	3	123
#4 - Twp 28, Rge 20	bF	100	1414	99	450	13	215
	\bar{X}	92.0	828	98.5	285	13.75	167

budworm in Lake Superior Provincial Park. Sandoz, Inc. supplied the *B.t.* and other materials used in the spray mixtures. The Great Lakes Forest Research Centre evaluated the effectiveness of the *B.t.* sprays and the Ontario Ministry of Natural Resources provided the spray aircraft and support for entomological evaluation work.

The *B.t.* products and additives that were tested are as follows:

1. Thuricide 16B + water at 80% and 20% each, respectively.
2. San 239 I 24 WDC formulated + water at 70% and 30% each, respectively.
3. San 239 I 32 WDC unformulated + Dowanol TPM at 80% and 20% each, respectively + 224 g (8 oz) of Chevron Sticker.

The original intention was to try to apply all three products at a dosage level of about 7 BIU per 0.4 ha (1 acre); consequently, the higher concentrate materials 24 WDC and 32 WDC could be applied at appropriately lower emission rates. These were, theoretically, 2.1 liters/0.4 ha (0.55 U.S. gallons/acre) for 16B, 1.5 liters/0.4 ha (0.39 gpa) for 24 WDC and 1 liter/0.4 ha (0.26 gpa) for 32 WDC.

A Stearman spray plane (General Airspray) equipped with Micronairs was used for all applications. The 16B was applied the evening of June 4, 24 WDC the evening of June 7 and 32 WDC the evening of June 8. Budworm development was primarily fourth instar on June 4 and progressed to about equal proportions of fourths and fifths by June 8. All spray applications were made under satisfactory weather conditions although a steady rain fell all day on June 5 which may have affected the results of the 16B application. Spray deposit was good for all three treatments and droplet counts exceeded 100 per cm² in many cases.

The area sprayed, the calculated application rate and the calculated dosage of *B.t.* per acre are listed for each treatment as follows:

1. 16B - 80 ha (200 acres) at an application rate of 2.36 liters/0.4 ha (0.625 U.S. gallons per acre) and a dosage of 7.6 BIU per 0.4 ha (1 acre).
2. 24 WDC - 90 ha (225 acres) at an application rate of 2.15 liters/0.4 ha (0.57 U.S. gallons per acre) and a dosage of 9.6 BIU per 0.4 ha (1 acre).
3. 32 WDC - 90 ha (225 acres) at an application rate of 1.24 liters/0.4 ha (0.33 U.S. gallons per acre) and a dosage of 8.5 BIU per 0.4 ha (1 acre).

Results: Results of population reduction (corrected for natural mortality), pupal survival and foliage protection studies carried out by GLFRC are summarized in Table 11. The larval mortality estimates are based on surviving pupal densities obtained 32 days after treatment. Other data suggest that significant effects due to the treatments were evident as early as 7 days after the sprays were applied. As shown by the data, larval mortality was generally good but foliage protection was not too satisfactory. Rain may have decreased the effects of 16B although there appears to be a conflict between larval mortality and foliage protection. Treatment 24 WDC is only marginally better than the other two treatments in terms of larval mortality and foliage protection. Much of the mortality for all treatments was due to the failure of pupae as evidenced by the pupal emergence data, particularly for balsam fir.

Northwestern Ontario

1975 Operations: In 1975, 8,000 ha (20,000 acres) at Bennett Lake in the Fort Frances District were sprayed with a single application of Dylox by an Agcat working from a newly constructed bush airstrip on the Manion Lake Road, 6 miles north of the main infestation. The purpose of this operation was the same as in previous years, i.e., to prevent the spread of budworm into susceptible forests, particularly to the east. In addition, this was the only significant infestation known to exist in northwestern Ontario and appeared to be quite discrete and well-defined. The spray aircraft was delayed in getting to Bennett Lake; consequently, sprays were applied to fifth- and sixth-instar larvae. This was not regarded as serious, however, since the purpose of the operation was to kill as many insects as possible, not to prevent defoliation. Spraying started on June 12 and was completed on June 17.

Two areas were sprayed at Bennett Lake. One block of 7600 ha (19,000 acres) extended from the west end of Bennett Lake westward to the Manion Lake Road. The second block sprayed consisted of 400 ha (1000 acres) straddling the Manion Lake Road about 4.8 km (3 miles) north of the main infestation.

Results: In early July, aerial observers mapped 10,800 ha (27,000 acres) of defoliation which included virtually all of the treated area. Larval mortality due to the Dylox treatment was calculated to be at least 60% (probably higher) and post-spray pupal populations on balsam fir were reduced to slightly less than 1.0 per 46 cm (18 in.) tip. Defoliation within the sprayed areas was not unexpected owing to the lateness of the operation but the fairly considerable area showing defoliation outside of the sprayed areas was surprising.

Egg-mass counts for 10 locations within the sprayed area showed a lower average density in 1975 than in 1974. The change from 1974 to

Table 11. Population reduction, pupal survival and foliage protection attributable to three *B.t.* formulations on balsam fir and white spruce in three plots in Lake Superior Provincial Park, 1975. Budworm development (instar) at time of spraying was L4-L5.

	Prespray larvae/ 46 cm (18 in.) branch tip		Surviving pupae/ 46 cm (18 in.) branch tip		% Population reduction due to treatment		% Successful pupal emergence ^a		Defoliation	
	bF	wS	bF	wS	bF	wS	bF	wS	bF	wS
<u>Thuricide 16B</u> - one applic. at a rate of 2.36 liters/0.4 ha (0.625 gal. U.S. per acre) and a dosage of 7.6 BIU per 0.4 ha (acre)										
Spray - Mijin Road	35.9	45.0	3.84	11.56	42	0	61	74	65	70
Check	39.6	48.4	7.30	9.10	--	--	76	89	98	94
Spray - South Road	57.4	113.0	1.83	8.40	79	58	59	81	97	94
Check	50.6	69.5	7.72	12.36	--	--	79	90	98	92
<u>SAN 239 I 24 WDC</u> - one applic. at a rate of 2.15 liters/0.4 ha (0.57 gal. U.S. per acre) and a dosage of 9.6 BIU per 0.4 ha (acre)										
Spray - Gargantua-B	39.8	32.1	.40	1.72	94	80	22	61	68	83
Check	39.6	35.3	7.30	9.28	--	--	76	90	98	92
Spray - Gargantua-D	15.0	61.2	.33	1.92	95	82	40	94	81	79
Check	16.8	69.5	7.52	12.36	--	--	86	90	81	92
<u>SAN 239 I 32 WDC</u> - one applic. at a rate of 1.24 liters/0.4 ha (0.33 gal. U.S. per acre) and a dosage of 8.5 BIU per 0.4 ha (acre)										
Spray - Gargantua-A	58.1	134.5	.60	4.60	93	81	47	73	89	92
Check	50.6	69.5	7.72	12.36	--	--	79	90	98	92
Spray - Gargantua-C	17.5	34.6	.68	3.40	91	63	35	93	90	90
Check	16.8	35.3	7.52	9.28	--	--	86	90	81	92

^a % Successful pupal emergence = $\frac{\text{emerged budworm}}{\text{budworm alive on sample date}} \times 100$

1975 was from 194 to 154 egg masses per 9.29 sq. m (100 sq. ft) of foliage, a decrease of 20%. Average defoliation for these 10 locations increased from 29% in 1974 to 48% in 1975.

Egg-mass counts for 24 locations very near the area sprayed in 1975 (but outside of the spray boundaries) showed some surprising changes. The average egg-mass density for these 24 locations was seven per 9.29 sq. m (100 sq. ft) in 1974 and 86 per 9.29 sq. m (100 sq. ft) in 1975. Thus, densities outside of the sprayed areas increased by a factor of 12. In 1974, 15 of the 24 locations gave negative counts compared to only three negatives in 1975. Defoliation increased from trace to 14%.

These data suggest that even if the spraying had been virtually completely effective, there would still be high populations throughout the large area represented by the 24 sample locations. In other words, although some of the population increases in the adjacent, unsprayed areas may be due to spillover and spread from the sprayed area, it seems more likely to be the result of high larval survival in the adjacent unsprayed areas. Thus, although the spraying was relatively effective in terms of suppressing populations in those areas that were sprayed, we are now faced with substantial numbers of budworm throughout an area of approximately 50,000 ha (125,000 acres).

Proposed Aerial Spraying Operations for 1976: In addition to the situation at Bennett Lake, several other infestations as indicated by defoliation and/or high egg-mass counts were found in northwestern Ontario. Defoliation totalling 200 ha (500 acres) at Little Eva Lake and another pocket of 400 ha (1000 acres) at Fluker Lake, southeast of Kawa Bay on Kawnipi Lake were mapped in the Atikokan District. A new infestation of 6,600 ha (16,500 acres) was found along the Pigeon River south of Thunder Bay. Other apparent infestations indicated by high egg-mass counts have been found in the Thunder Bay District in Aldina Township, Swallow Lake, Northern Light Lake, Bemar Lake and Sleigh Lake in the Atikokan District at Oriana Lake, McKenzie Lake and Bayley Bay on Basswood Lake. Measurements of overwintering budworm populations were being made at specific locations and consideration was given to the 1976 aerial spraying program in 1976 at time of writing.

SUMMARY

Aerial spraying operations covering 13,344 ha (33,360 acres) were conducted against the spruce budworm in Ontario by the Ministry of Natural Resources in 1975. In northwestern Ontario 8000 ha (20,000 acres) were sprayed near Bennett Lake in the Fort Frances District, 4452 ha (11,131 acres) in northeastern Ontario and 852 ha (2130 acres) in Algonquin Provincial Park in southern Ontario. Dylox was applied to a total of 8000 ha

(20,000 acres) at a rate of 336 g/0.4 ha (12 oz per acre) and 2120 ha (5300 acres) received 672 g/0.4 ha (24 oz per acre). Fenitrothion was used on 3184 ha (7960 acres) at dosages of 56-182 g/0.4 ha (2-6.5 oz per acre). Two Stearman aircraft and an Agcat equipped with Micronairs were used to apply the sprays. Generally, this year's results were good in terms of larval mortality but the degree of foliage protection varied.

REFERENCE

- Howse, G.M., W.L. Sippell and K.B. Turner. 1975. Spruce budworm in Ontario, 1975 - Aerial spraying operations, outbreak status and forecasts, plans for next year. Report to the Canadian Forest Pest Control Forum, Ottawa, November 13-14, 1975. 15 p. (mimeogr.).