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Status of Insects in the Pembroke
District

Trieselmann, R.A.

Information Report O-X-91
(Forest Research Laboratory, Ontario Region)



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Ontario, 1968

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FOREWORD

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

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

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

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

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

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

J. E. MacDonald

STATUS OF INSECTS IN THE PEMBROKE DISTRICT

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Larch Casebearer	<u>Coleophora laricella</u> C 34
Birch Leaf Miner	<u>Fenusia pusilla</u> C 34
Saddled Prominent and a complex of Hardwood Defoliators	<u>Heterocampa guttivitta</u> <u>Heterocampa biundata</u> <u>Besma endropiaria</u> <u>Anisota rubicunda</u> and others C 35
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R. A. Trieselmann

Black-headed Budworm, Acleris variana Fern.

Small to medium numbers of larvae were collected in beating samples at many points in the district, usually in association with spruce budworm larvae and other shoot insects. Small pockets of light infestation occurred in balsam fir and white spruce stands in Bronson, McKay, Westmeath, and Wylie townships (Table 7).

TABLE 7

Summary of Black-headed Budworm Larval Counts
in the Pembroke District in 1968

Location (township)	Host	Av. d.b.h. of sample trees in inches	Total no. of larvae in 15 beating trays
Bronson	wS	4	25
McKay	wS	6	20
Westmeath	bF	8	22
Wylie	wS	5	11

Spruce Budworm, Choristoneura fumiferana (Clem.)

The area in which balsam fir and white spruce stands were infested by the spruce budworm increased considerably in 1968 to include the eastern half and the southwest corner of the district. Heavy infestations were confined to woodlots in the agricultural area south and east of Pembroke. Two pockets of medium infestation occurred in Wylie and Barron townships. Elsewhere in the district small numbers of larvae were collected wherever beating samples were taken from balsam fir and white spruce (see map).

Mass rearings of 1200 larvae from 10 locations revealed that the incidence of parasitism was approximately six per cent. Predation by Coccinellids (mainly Anatis quindecimpunctata Oliv.), ambush bugs, and carpenter ants was commonly observed in the field.

A defoliation and egg mass survey was carried out in November. Foliage collections were made at six locations in the infested area. Forecasts for 1969, based on egg mass counts, are shown in Table 8.

TABLE 8

Summary of Spruce Budworm Defoliation Survey and Egg Mass Counts
in the Pembroke District in 1968

Location (township)	Host	Per cent defoliation of current year's growth	Egg mass total	Cumulative no. of egg masses per 100 sq. ft. of foliage	Forecast for 1969
Bromley	wS	83	115	1200	Heavy
Bromley	bF	83	94	776	Heavy
Ross	wS	80	50	745	Heavy
Ross	bF	71	105	1006	Heavy
Westmeath	wS	51	76	677	Medium-heavy
Westmeath	bF	38	31	221	Light-medium

Jack-pine Budworm, Choristoneura pinus pinus Free.

An increase in population levels of this insect occurred for the second consecutive year. Well-defined areas of heavy infestation were delineated: in the Petawawa-Deep River area, near Lake Traverse in parts of Barron, Edgar, Niven and White townships, and near Round Lake in Burns and Richards townships. Light defoliation was observed in most jack pine stands elsewhere in the district.

In the Petawawa-Deep River infestation, larvae were active well in advance of shoot elongation, resulting in considerable backfeeding on old foliage and complete defoliation of many trees in all size classes. Understory white pine and red pine were also heavily infested, probably as a result of larval dispersal from overstory jack pine trees. At several locations, many buds as well as most of the current and past years' foliage were destroyed and some tree mortality may be expected in these areas.

Defoliation in the Lake Traverse and Round Lake infestations was generally moderate to heavy, but complete destruction of the current year's foliage occurred at many points. Occasional dominant pole-sized red pine trees in jack pine stands were heavily defoliated.

Pupal and late instar larval collections were taken at ten locations while pupation was in progress, and submitted to the Forest Research Laboratory in Sault Ste. Marie to obtain data on parasitism. All specimens on sixteen 18" branch tips were taken, including late instar larvae, pupae, and empty pupal cases from which adults had emerged. The 1458 insects submitted yielded 171 hymenopterous and 63 dipterous parasites. Parasitism ranged from 0 to 28 per cent and averaged 15 per cent (Table 9).

Foliage samples, consisting of one 24-inch branch tip from the mid-crown of each of six trees, were taken at 22 locations and examined for the presence of egg masses and the degree of current defoliation. The following criteria were used as a basis for forecasting the severity of infestations: 1 to 2 egg masses = light infestation; 3 to 8 egg masses = medium infestation; 9 or more egg masses = heavy infestation. The egg mass counts indicate that medium and heavy infestations will continue in 1969 (Table 10).

TABLE 9

Summary of Jack-pine Budworm Parasite Rearings
from the Pembroke District in 1968

Township	Location	No. of budworm larvae reared	Parasites reared hym.	Per cent dip.	Per cent parasitism
Buchanan	AECL main gate	100	12	2	14
	Landry's Crossing	201	9	9	9
Burns	Basin Depot Road	54	13	2	28
Edgar	Edgar Creek	124	19	7	21
	Pole Peeler	261	34	22	21
Guthrie	Basin Depot Road	11	0	0	0
Petawawa	Duke Plains	100	11	0	11
	Rifle Range	180	18	23	23
Richards	Bonnechere Center	64	8	1	14
White	Horse Stable	363	39	5	12

TABLE 10

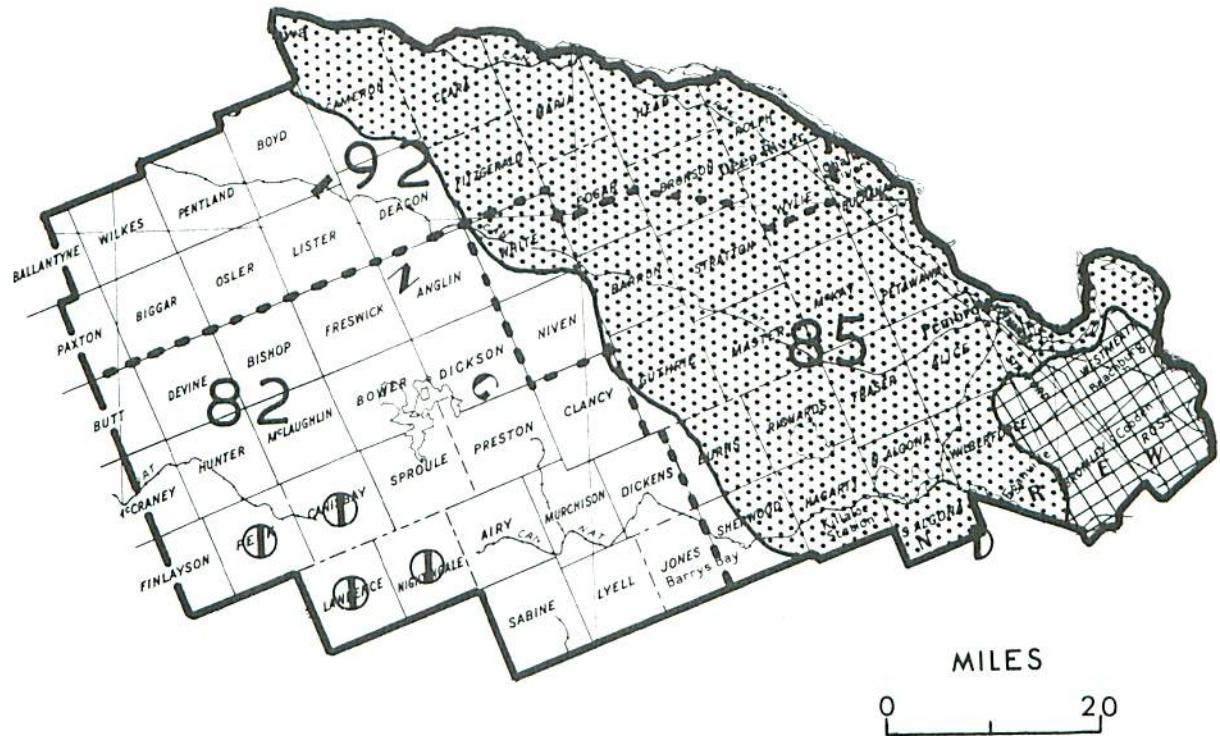
Summary of Jack-pine Budworm Defoliation Survey and Egg Mass Counts
in the Pembroke District in 1968

Note: Based on the examination of six 24" branch tips at each location.

Township (location)	Av. height in feet	Av. d.b.h. in inches	Basal area	Per cent defoliation	No. of egg masses	Defoliation forecast for 1969
Buchanan						
Sturgeon Lake Plains	55	7.5	110	29	8	Medium *
Sturgeon Lake Plains	45	7.5	90	61	4	Medium
Sturgeon Lake Plains	5	nil	nil	1	0	Nil
Deluthier Road	30	5.5	40	68	6	Heavy
Landry's Crossing	25	5.5	30	50	13	Heavy
Landry's Crossing	25	5.5	30	95	5	Medium
Orange Road	50	6.5	70	97	3	Medium
AECL Main Gate	45	5.0	30	62	15	Heavy
Petawawa						
N. of Stewart Crossing	17	2.0	30	77	5	Medium
Stewart Crossing	65	8.5	110	16	7	Medium
Lutheran Church	45	6.0	33	93	3	Medium
Rolph						
Ski Hill Road	38	6.0	80	65	4	Medium
Golf Course Road	62	9.0	90	58	3	Medium
Stratton						
Survey Lake Road	55	10.0	80	15	3	Medium
Montgomery Gate	25	4.0	30	8	1	Light
Edgar						
Pole Peeler	40	7.0	70	96	11	Heavy
S/E end of infestation	35	6.0	30	9	2	Light
White						
N/W of Lake Traverse	60	8.5	60	7	2	Light
S. of traffic light	50	9.0	100	77	9	Heavy
Horse Stable	60	9.0	70	64	8	Medium
Pembroke Lbr. Co.	22	3.0	40	84	5	Medium

* Earlier forecasts indicated six or more egg clusters would result in severe defoliation.

PEMBROKE DISTRICT



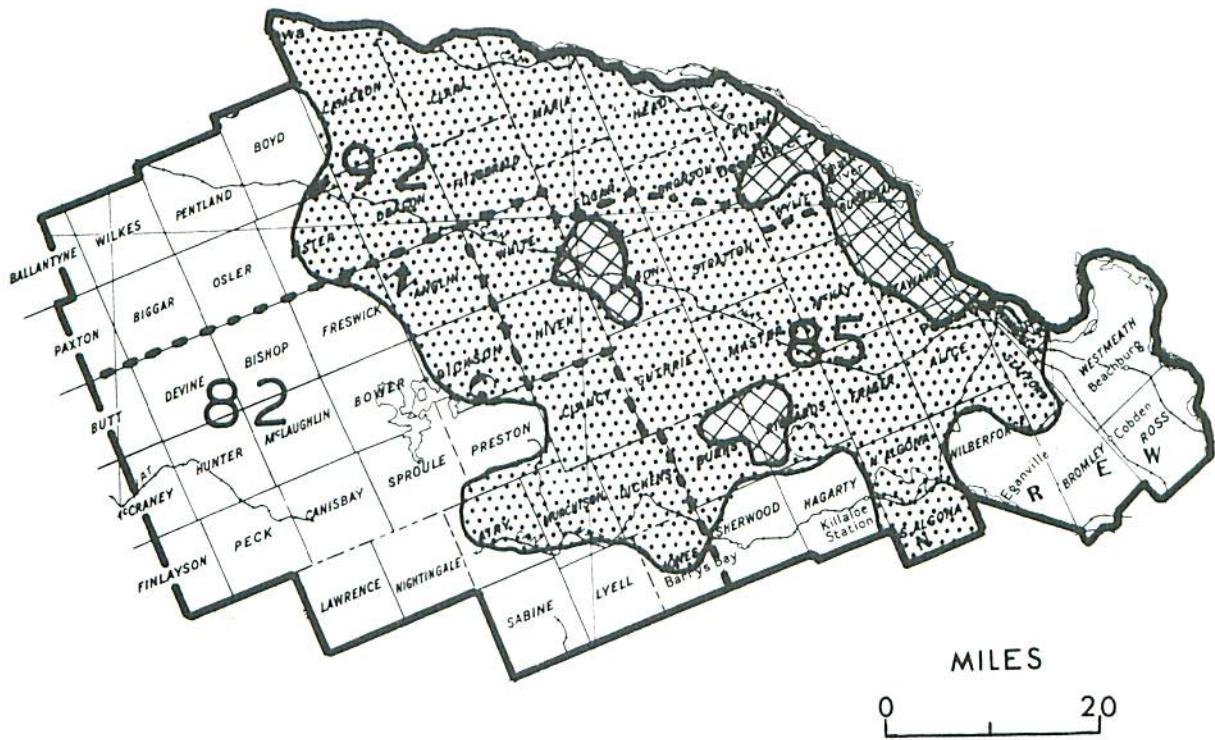
SPRUCE BUDWORM

Area and locations where infestations
were observed in 1968

Legend

- Light infestation ----- and
- Heavy infestation -----

PEMBROKE DISTRICT



JACK-PINE BUDWORM

Areas where infestations were observed in 1968

Legend

- Light infestation ----- [Dotted Box]
- Heavy infestation ----- [Cross-hatched Box]

Larch Casebearer, Coleophora laricella Hbn.

Although population levels declined in 1968, small numbers of larvae were observed at many points in the district. An ornamental planting of European larch in the Town of Deep River was heavily infested. The routine use of insecticides against black flies and mosquitoes controlled this infestation.

TABLE 11

Summary of Larch Casebearer Counts in the Pembroke District from 1966 to 1968

Note: Based on the examination of four 18-inch branch tips from each of four trees at each point.

Location (township)	Av. d.b.h. of sample trees in inches	Av. no. of larvae per 18-inch branch tip		
		1966	1967	1968
Airy	3	2.90	2.10	0.44
Bromley	5	1.00	1.20	0.69
Buchanan	5	2.30	2.00	0.12
N. Algona	4	1.00	0.90	0.00
Westmeath	4	0.60	1.10	0.00

Birch Leaf Miner, Fenusia pusilla (Lep.)

Although population levels were somewhat lower than in 1967 this leaf-mining sawfly was observed at many points in the district. The ornamental varieties of exotic species were more heavily infested than the native trees. Individual trees suffered top mortality as a result of several consecutive years of heavy infestation.

TABLE 12

Summary of Damage by the Birch Leaf Miner in the Pembroke District from 1966 to 1968

Note: Based on the examination of a random sample of 100 leaves at each location.

Location (township)	Host	Av. d.b.h. of sample trees in inches	Per cent of leaves mined		
			1966	1967	1968
Buchanan	wB	1	47	69	21
Hagarty	wB	1	29	59	11
S. Algona	wB	1	32	48	14
Sproule	wB	3	32	37	27
Westmeath	wB	3	38	46	24

Saddled Prominent, Heterocampa guttivitta Wlk.

Hardwood stands in the western part of the Algonquin Park were infested by the saddled prominent and a complex of defoliators. Defoliation was variable but was most pronounced on high ground and on the upper parts of slopes, where sugar maple and yellow birch predominated. There were numerous large areas of severe defoliation (see map).

Of a number of larval and pupal collections taken, 55 per cent of the insects were the saddled prominent. Other common species were Heterocampa biundata Wlk., Anisota rubicunda Fabr., Besma endropiaria G. and R., and some loopers not yet identified to genus and species (Table 14). Four pupal samples taken from the soil in late August are summarized in Table 13.

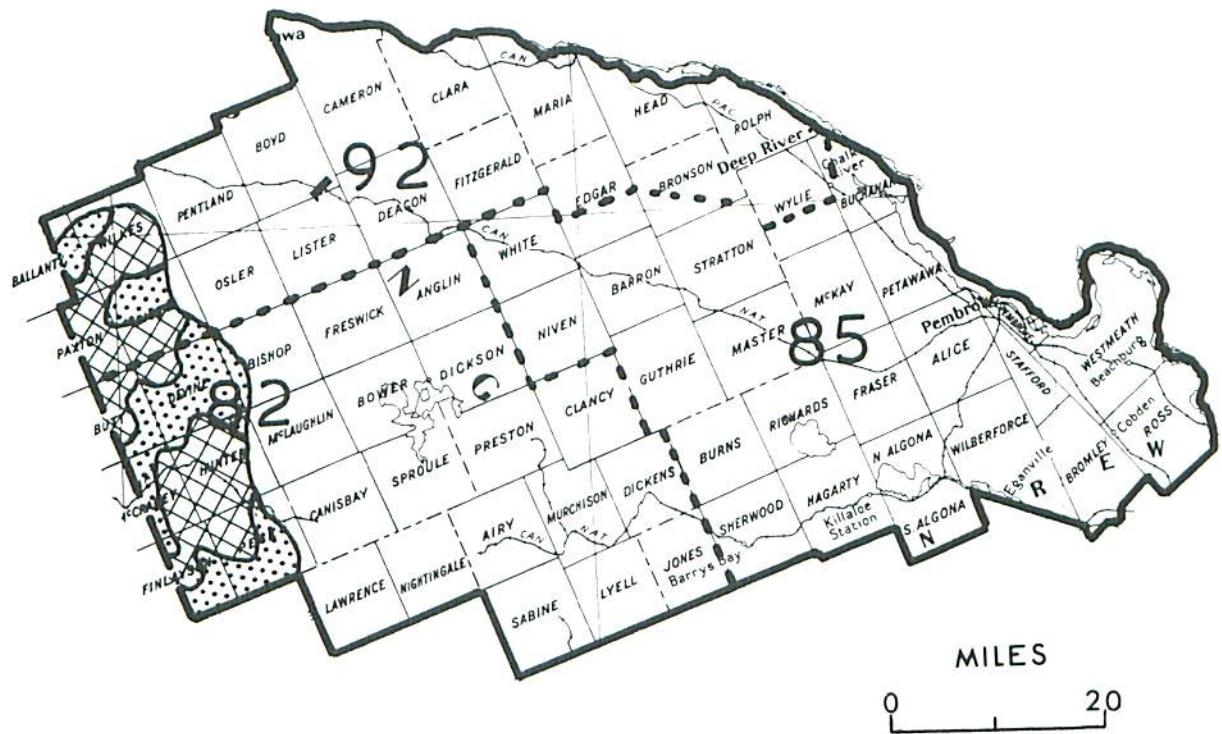
TABLE 13

Summary of Pupal Samples Taken from the Soil
in the Algonquin Park Infestation in 1968

Note: Samples taken from soil to a depth of approximately 6 inches in 1-square-foot sections.

Location (township)	Sample unit in sq. ft.	No. of misc. geometriidae per sq. ft.	No. of Heterocampa guttivitta per sq. ft.	Total no. of pupae per sq. ft.
Butt	10	0	10.9	10.9
Hunter	10	0.7	8.8	9.5
Hunter	20	0.7	2.0	2.7
Devine	20	0.4	1.5	1.9

PEMBROKE DISTRICT



SADDLED PROMINENT

and a complex of hardwood defoliators

Legend

- Light infestation ----- [stippled box]
- Heavy infestation ----- [cross-hatched box]

TABLE 14

Summary of Insects Collected in the Algonquin Park Infestation
in 1968, in Order of Incidence

Note: This table represents the total number of insects collected in the infestation.

Insect	No. of larvae	Per cent of total +
Heterocampa guttivitta	349	55
Lithocolletis aceriella	67	11
Geometridae (undetermined spp.)	45	7
Lithocolletis lucidicostella	27	4
Besma endropiaria	25	4
Anisota rubicunda	22	4
Heterocampa biundata	20	3
Hyperetis amicaria	19	3
Plagodis alcoolaria	17	3
Gracillaria sp.	7	1
Ectropis crepuscularia	6	1
Epinotia aceriella	5	1
Antherea polyphemus	4	1
Melanolophia sp.	4	1
Nadata gibbosa	3	trace
Abbottana clemataria	2	trace
Paraclemensia acerifoliella	2	trace
Acronicta sp.	1	trace
Papilio glaucus	1	trace
Total	626	

+ Percentages are calculated to the nearest per cent,
incidence below 0.5 per cent is designated "trace".

Balsam Fir Sawfly, Neodiprion abietis complex

A further increase in population levels of this sawfly occurred in 1968. Numerous clumps of balsam fir of all size classes were infested throughout a large part of the district (see map). Defoliation of the upper crowns, usually of pole-sized balsam fir, was light to moderate. Regeneration and saplings generally harboured only small numbers of larvae, and individual white spruce trees were lightly infested at scattered locations.

Red-headed Pine Sawfly, Neodiprion lecontei (Fitch)

Population levels declined considerably in 1968 and only small numbers of colonies were observed. Highest population levels were encountered in a red pine plantation in Airy Township, where 42 colonies were counted on 100, 18-foot trees (Table 15).

TABLE 15

Summary of Red-headed Pine Sawfly Colony Counts on 100 Red Pine Trees at each Location in the Pembroke District from 1966 to 1968

Location (township)	Av. height of trees in feet	Av. no. of colonies per tree		
		1966	1967	1968
Airy	23	-	-	0.42
Alice	5	1.50	0.10	0.00
Bronson	11	1.20	0.90	0.09
Maria	8	1.20	1.20	0.04
S. Algona	5	0.20	0.00	0.00
Wilberforce	8	1.10	1.30	0.03

Red-pine Sawfly, Neodiprion nanulus nanulus Schedl

High population levels persisted in Ross Township where a stand of semi-mature red pine and a young plantation were heavily infested. Individual mature and semi-mature red pine trees were heavily infested in Alice, Fraser, and Wilberforce townships. Elsewhere in the district, population levels declined. No defoliation was observed in plantations that had been infested in Hagarty, Petawawa, and Sherwood townships in recent years (Table 16).

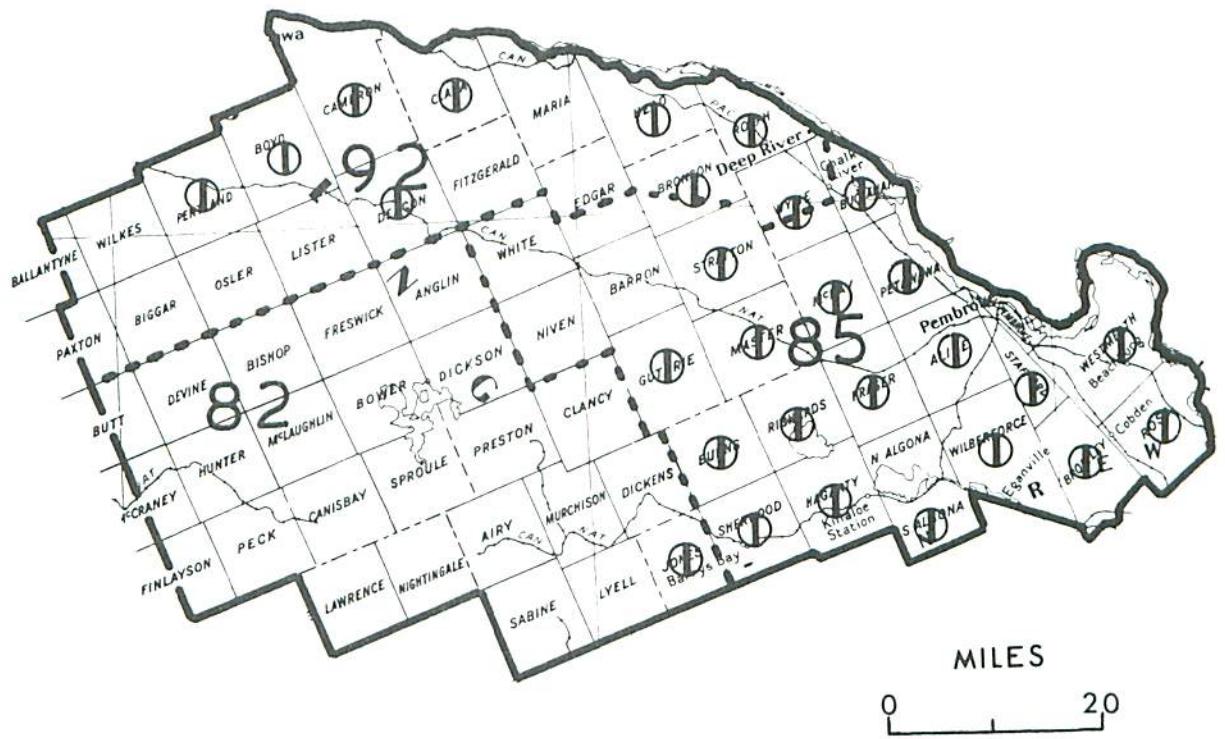
TABLE 16

Summary of Red-pine Sawfly Colony Counts in the Pembroke District from 1966 to 1968

Note: Based on the examination of 100 trees at each location.

Location (township)	Host	Av. d.b.h. of sample trees in inches	Av. no. of colonies per tree		
			1966	1967	1968
Fraser	jP	3	1.80	6.10	0.27
Ross	rP	15	12.10	50+	50+
Westmeath	rP	4	18.90	37.50	0.36
Westmeath	jP	3	1.40	6.90	0.21
Richards	jP	5	-	-	0.39
N. Algona	jP	2	-	1.10	0.24

PEMBROKE DISTRICT



BALSAM FIR SAWFLY

Locations where defoliation occurred
in 1968

Legend

Light defoliation ----- ①

Jack-pine Sawfly, Neodiprion pratti paradoxicus Ross

Most of the light to medium infestations of this sawfly reported in 1967 virtually collapsed in 1968. This decline may have occurred partly as a result of extremely heavy defoliation of the host trees by the jack-pine budworm. A small stand of semi-mature, open-growing jack pine in Buchanan Township was the only sample point in which defoliation occurred (Table 17).

TABLE 17

Summary of Jack-pine Sawfly Colony Counts in the Pembroke District
from 1966 to 1968

Location (township)	Av. d.b.h. of sample trees in inches	Av. no. of colonies per tree		
		1966	1967	1968
Bronson	6	0.00	0.10	0.00
Buchanan	6	0.00	3.20	0.09
Maria	6	1.60	4.10	0.00
Petawawa	4	1.40	4.10	0.00
Richards	6	0.00	3.10	0.00

Yellow-headed Spruce Sawfly, Pikonema alaskensis (Roh.)

The two heavy infestations in white spruce plantations in Buchanan and Lyell townships persisted in 1968, although defoliation was somewhat lighter (approximately 50 and 60 per cent, respectively) than in 1967. Small numbers of larvae were collected in beating samples at widely-scattered points elsewhere in the district.

White-pine Weevil, Pissodes strobi (Peck)

White-pine weevil damage was observed in plantations and natural stands of pine and spruce throughout the district. Population levels of this insect tend to fluctuate from year to year as reflected in counts at sample stations (Table 18).

TABLE 18

Summary of White Pine Shoot Damage by the White-pine Weevil
in the Pembroke District from 1966 to 1968

Location (township)	Av. height of sample trees in feet	No. of trees examined	Per cent trees weevilled		
			1966	1967	1968
Alice	12	100	29	5	12
Bronson	12	100	16	14	12
Buchanan	8	100	26	28	14
Sproule	15	100	16	19	16
White	11	100	9	10	6

Larch Sawfly, Pristiphora erichsonii (Htg.)

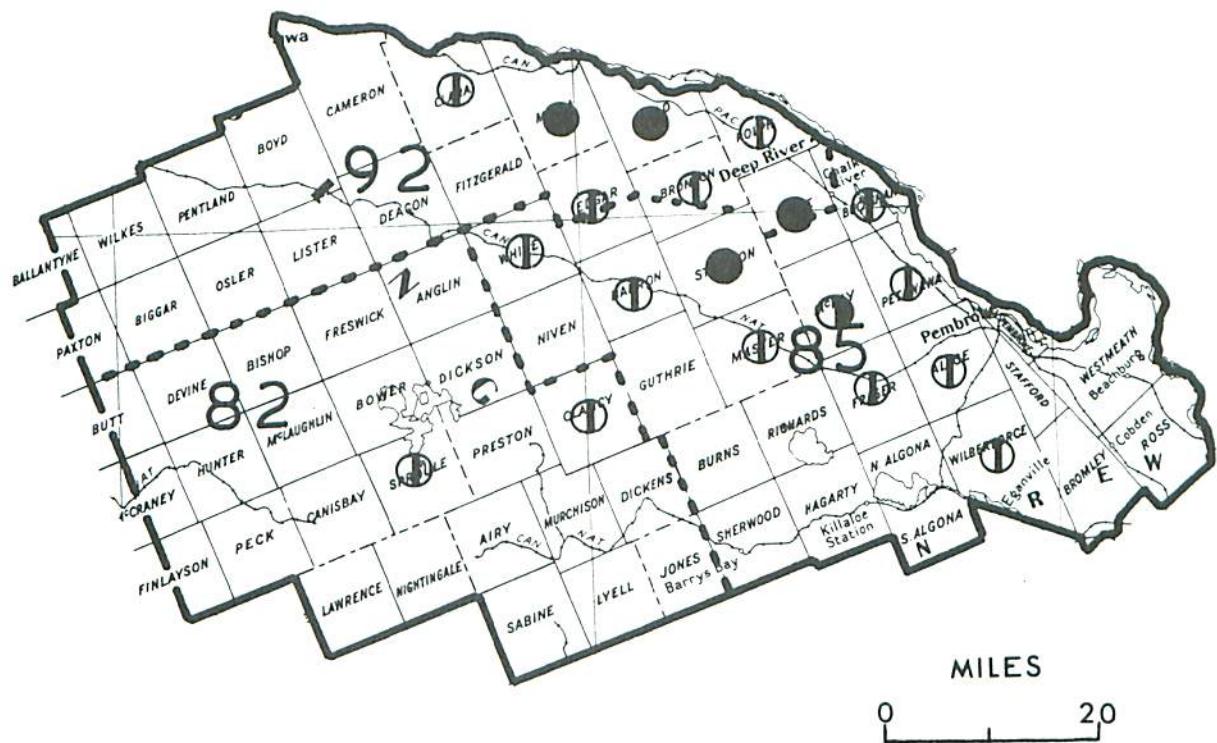
Population levels of the larch sawfly declined in 1968. Tamarack stands in Alice, Cameron, Clara, Westmeath, and Wilberforce townships which were heavily infested in 1967, suffered only light to medium defoliation. Small pockets of light infestation occurred in Barron and Wylie townships and small numbers of colonies were observed at numerous widely-scattered points in the district.

A Red-pine Needle Midge, Thecodiplosis piniresinosae Kearby

Infestations of this insect recurred at many locations in the central and northern parts of the district. Injury to the current year's foliage was severe at several points in Head, Maria, Stratton, and Wylie townships, where over 50 per cent of the needles were killed. Elsewhere in the district damage was light to medium (see map).

The larvae of this minute insect feed inside the needle fascicles in late summer and early fall, causing the needles to turn progressively white from the tip to the base. The infested needles eventually turn brown and absciss. By early spring, there are no signs of injury except for the somewhat thin appearance of the previous season's growth.

PEMBROKE DISTRICT



A CECIDOMYIID MIDGE IN RED PINE NEEDLES

Locations where infestations were observed in 1968

Legend

- Light infestation ----- (1)
- Medium infestation ----- (1)
- Heavy infestation ----- (1)

TABLE 19

Summary of Miscellaneous Insects Collected in the Pembroke District

Insect	Host(s)	Remarks
<i>Acleris chalybeana</i> Fern.	Hazel	Moderately infested shrubs in Buchanan Twp.
<i>Acrobasis betulella</i> Hlst.	wB	Moderately infested trees in S. Algona Twp.
<i>Adelges abietis</i> Linn.	wS	Occasional scattered trees in S. Algona Twp. heavily infested
<i>Anchylopera burgessiana</i> Zell.	rO	Low population levels in Buchanan Twp.
<i>Aphrophora parallela</i> (Say)	jP, rP, wP, wS	wP moderately, other hosts lightly infested in Freswick, Sproule, and Peck twps.
<i>Archips cerasivoranus</i> (Fitch)	cCh	High population levels in Cameron Twp., scattered nests throughout the district
<i>Archips fervidanus</i> Clem.	rO	Numerous webs on understory trees in Fraser Twp.
<i>Badebecia urticana</i> Hbn.	wB	Occasional larvae in association with other defoliators in Rolph Twp.
<i>Brachys aerosus</i> Melsh.	sM	Common at many points in the district
<i>Buprestis maculativentris</i> Say	lA	Small numbers of adults on new logs in Buchanan Twp.
<i>Calosoma</i> sp.	Soil	Occasional larvae in Butt Twp., probably predaceous on pupae of <u><i>Heterocampa guttivitta</i></u>
<i>Cecidomyia citrina</i> O.S.	Ba	Moderate population levels in Westmeath Twp.
<i>Cenopis acerivorana</i> Mack.	rM	Occasional understory trees lightly infested in Buchanan Twp.

TABLE 19 (continued)

Insect	Host(s)	Remarks
<i>Choristoneura rosaceana</i> Harr.	wS, cCh, Hazel, Aralia sp.	Low population levels on a wide variety of hosts at many points in the district
<i>Coleophora frischella</i> (L.)	Melilotus sp.	High population levels at many points in the district
<i>Curculio obtusus</i> Blanch	wS	Occasional adults in Head Twp.
<i>Dasyneura balsamicola</i> (Lint.)	bF	Lightly infested trees at numerous points in the district
<i>Dioryctria reniculella</i> (Grt.)	wS	Small numbers of larvae in Maria and S. Algona twps.
<i>Diprion hercyniae</i> (Htg.)	wS	Small numbers of larvae in beat- ing samples at many points in the district
<i>Epinotia aceriella</i> Clem.	sM	Common in Buchanan and Westmeath twps.
<i>Epinotia solandriana</i> Linn.	wB	High population levels in Rolph and S. Algona twps.
<i>Eriophyes populi</i> Nal.	lA, tA	Occasional galls in Buchanan Twp.
<i>Eucordylea blastovora</i> McLeod	wS	Low population levels in S. Algona Twp.
<i>Eucosma gloriola</i> Heinr.	jP, rP	Lightly infested plantations in S. Algona Twp.
<i>Gonioctena americana</i> Schaeef.	tA	Clumps of moderately infested trees in S. Algona and Wilberforce twps.
<i>Hydria prunivora</i> Ferg.	bCh	Occasional small trees heavily infested in McLaughlin Twp.
<i>Hylobius radicis</i> Buch.	scP	Small patches of trees infested in a plantation in S. Algona Twp.
<i>Hypagyrtis piniata</i> Pack.	bF	Small numbers of larvae in beating sample in Westmeath Twp.

TABLE 19 (continued)

Insect	Host(s)	Remarks
Ips pini (Say)	jP	Clumps of jack pine infested in Stratton Twp.
Lambdina fiscellaria fiscellaria (Gn.)	bF	Occasional larvae in beating samples
Lecanium sp.	rO, I	Lightly to moderately infested trees in Buchanan and Ross twps.
Lithocolletis sp.	Lo	Low population levels in plantation in Westmeath Twp.
Lithocolletis hamadryadella Clem.	rO	Lightly infested trees in Buchanan Twp.
Lithocolletis ostryarella Cham.	I	Numerous lightly infested trees in Buchanan, S. Algona, and Westmeath twps.
Lithocolletis salicifoliella Cham.	bPo	Light infestation in Fitzgerald Twp.
Malacosoma americanum (F.)	pCh	Small numbers of tents at many points in the district
Malacosoma disstria Hbn.	No host	Infestation collapsed, no larvae observed
Messa populifoliella (Townsend)	Po	Heavily infested ornamentals in Buchanan Twp.
Nepytia canosaria Wlk.	bF, ws	Small numbers of larvae in beating samples in Buchanan, Cameron, Westmeath, and Wyylie twps.
Orthosia hibisci Gn.	ws	In beating samples in Maria Twp.
Parectopa robiniiella Clem.	Lo	Moderately infested locust plantation in Westmeath Twp.
Petrova albicapitana (Busck)	JP	Small pocket of heavily infested regeneration in Westmeath Twp.

TABLE 19 (continued)

Insect	Host(s)	Remarks
<i>Phyllocoptes minutissimus</i> Hodgk.	rM	Heavily infested understory trees in Buchanan Twp.
<i>Pikonema dimmockii</i> (Cress.)	wS	Small numbers of larvae in beating samples at widely-scattered points in the district
<i>Pineus similis</i> Gill	wS	High population levels in Buchanan and Head twps.
<i>Pityophthorus rhois</i> Sw.	Su	Severely infested shrubs in Westmeath Twp.
<i>Pristiphora geniculata</i> (Htg.)	Mo	Small numbers of colonies at many points in the district
<i>Pristiphora lena</i> Kinc.	wS	Small numbers in beating sample in Nightingale Twp.
<i>Protopoarmia porcelaria</i> <i>indicataria</i> Wlk.	bF, wS	Occasional larvae in beating samples in Cameron and S. Algona twps.
<i>Psilocorsis quercicella</i> Clem.	rO	Lightly infested regeneration in Buchanan Twp.
<i>Rhabdophaga salicisbatatas</i> O.S.	W	Heavily infested shrubs in Buchanan Twp.
<i>Sciaphila duplex</i> Wlshm.	lA	Occasional larvae in Buchanan Twp.
<i>Setoptus jonesi</i> Keifer	JP, rP	Of common occurrence at many locations
<i>Tetralopha robustella</i> Zell.	rP	Lightly infested plantation-grown trees in Buchanan Twp.
<i>Trichotaphe levisella</i> Fyles	Aster sp.	Low population levels in Buchanan Twp.
<i>Triisetacus alborum</i> Keifer	wP	Heavily infested seedlings in Paxton Twp.

TABLE 19 (concluded)

Insect	Host(s)	Remarks
<i>Trishormomyia crataegifolia</i> (Felt)	Haw	Heavily infested shrubs in N. Algona Twp.
<i>Vasates quadripes</i> Shim.	rM	Heavily infested understory trees in Buchanan Twp.
<i>Xylomyges dolosa</i> Grt.	lA	Occasional larvae in Buchanan Twp.
<i>Zale duplicata largera</i> Sm.	JP	In beating samples in Fitzgerald Twp.
<i>Zale helata</i> Sm.	wP	Occasional larvae on regeneration in Buchanan Twp.
<i>Zeiraphera canadensis</i> Mut. & Free.	wS	Lightly infested trees in S. Algona Twp.
<i>Zeiraphera destitutana</i> (Walker)	wS	Small numbers of larvae in beating samples in S. Algona Twp.