Not for publication

ANNUAL REPORTS OF THE FOREST BIOLOGY RANGERS MANITOBA AND SASKATCHEWAN 1960

by

V. Hildahl, L.L. McDowall, B.B. McLeod, M.R. Pratt, G.T. Lalor, J.J. Lawrence, A.E. Campbell, R.W. Hancox, J.A. Drouin, K.L. Mortensen, and J.B. Martin

INTERIM REPORT

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

CANADA

DEPARTMENT OF AGRICULTURE

RESEARCH BRANCH

FOREST BIOLOGY DIVISION

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MANITOBA AND SASKATCHEWAN - 1960

by

V. Hildahl

1.1 INTRODUCTION

A mild winter with light snowfall, followed by a wet spring and a hot dry summer, created conditions apparently favourable to several major forest insect species throughout Manitoba and Saskatchewan in 1960. The abnormally dry weather that prevailed from mid-June through July also increased the incidence of forest fires and the two provinces experienced one of the worst fire seasons in history. Because of the serious fire problem aerial surveys were hindered to some extent, particularly in northern Manitoba where only two hours of co-operative flying could be provided by the Provincial Forest Service. As a result, northern infestation boundaries of the larch sawfly, spruce budworm, and forest tent caterpillar were mapped with somewhat less accuracy than in previous years. On the other hand, the comparatively dry weather greatly aided ground survey work, particularly in regions of the two provinces that are served by few all-weather roads.

The excellent co-operation received from Provincial Forest authorities in previous years continued in 1960. In Saskatchewan the provision of additional aircraft travel facilitated the more precise mapping of spruce budworm infestations in the vicinity of Namew Lake and along the Birch River watershed. Woods operators also extended their services in a number of ways to the Forest Biology Rangers in the field. The co-operation and assistance received from these agencies are gratefully acknowledged.

1.2 FOREST INSECT AND TREE DISEASE CONDITIONS

1.2.1 Forest Insect Conditions

The most outstanding features in insect conditions were the notable changes in distribution and intensity of the larch sawfly, spruce budworm, forest tent caterpillar, balsam-fir sawfly, and a pine tip moth, Rhyacionia sp. Aerial surveys indicated that the larch sawfly outbreak remained severe north of the Churchill River in Saskatchewan, where scattered stands of tamarack over approximately 75,000 square miles were moderately to severely defoliated. In addition, a marked resurgence was evident in the Prince Albert District of Saskatchewan, and the Western and Northern districts of Manitoba. This followed several years of low populations when it was difficult to find larvae at most points in this area.

A further decline in populations of the spruce budworm throughout the infestation area in eastern Manitoba was offset by the occurrence of two new but relatively small infestations in white spruce and balsam-fir stands in the Riding Mountain National Park. The Namew Lake infestation, at the Manitoba-Saskatchewan border, showed a marked extension in boundaries. The small isolated pockets of severe infestation previously reported along the Birch River in Saskatchewan coalesced in 1960 to form a continuous infestation covering about sixteen square miles. The infestation in white spruce stands in the Cypress Hills Provincial Forest continued, and a number of trees are beginning to show dead leaders and forked tops as a result of five consecutive years of severe defoliation.

Outbreaks of the balsam-fir sawfly caused spectacular reddening of the foliage of balsam fir, and to a lesser degree white spruce in widely scattered areas in the Eastern and Northern districts of Manitoba. This was the first recorded occurrence of this species causing extensive damage to native forest stands in the two provinces. Due to severe "weather-injury" in 1958*, and previous spruce budworm attack, many stands are now in a serious state of decline. Therefore heavy mortality of balsam fir may be expected if the infestation continues.

As predicted in 1959, trembling aspen stands in the East and Park blocks of the Cypress Hills Provincial Forest were again severely defoliated by the forest tent caterpillar. Although egg counts indicated a substantial decline when compared with similar counts taken in 1959, the numbers were still sufficiently high to forecast moderate to severe defoliation over much of the area in 1961. The apparent decline here, however, is in contrast to indications of outbreak resurgence throughout the central range of trembling aspen in the two provinces. The discovery of a number of widely scattered infestations in this area, generally covering less than one township, may indicate the beginning of a new outbreak period of this aspen defoliator in this region.

A pine tip moth, Rhyacionia sp. (not the European pine shoot moth) caused conspicuous killing of the current shoots of jack pine in southeastern Manitoba. This is the first record of damage by this as yet undetermined species in the provinces.

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* Cayford, J. H., V. Hildahl, L. D. Nairn and M. P. H. Wheaton. 1959. Injury to trees from winter drying and frost in Manitoba and Saskatchewan in 1958. For. Chron. 35(4): 282-290.

1.2.2 Tree Disease Conditions

No conspicuous change was noted in the status of tree diseases throughout the two provinces. Leaf-spots and blights of trembling aspen and balsam poplar (caused by the fungi, Septoria musiva, Melanconium sp., and Marssonia sp.) were again common, and resulted in some discolouration of foliage in many areas. The most extensive infections were recorded through the Prince Albert District of Saskatchewan and the Western and Northern districts of Manitoba.

A needle rust, Chrysomyxa sp., occurred on black and white spruce throughout all forested regions. However, in all instances, infections by this rust were light. The light infection of this common rust in 1961 is probably due to the abnormally dry weather that prevailed from early July through September.

Infections of the mistletoes, Arceuthobium americanum on jack pine, and A. pusillum on black spruce remained static. The known distribution of A. americanum extends throughout the southern part of the range of jack pine from Lake Athabaska east to Athapapuska Lake and the Winnipeg River in Manitoba. The most westerly occurrence of A. pusillum recorded to date has been in the Hudson Bay District of Saskatchewan.

Increased incidence of the blister rust, Cronartium ribicola, was noted in the white-pine stands of southeastern Manitoba. In previous years the infection was noted only on reproduction, but in 1960 evidence was noted of severe top-killing in mature trees.

The conditions outlined briefly above, together with other important forest insect and tree disease problems are described in detail in the individual Forest Biology Ranger Reports.

1.3 FIELD ASSIGNMENTS

1.3.1 Ranger District Assignments

A number of reassignments were made in Ranger Districts in 1960 with a view to giving junior rangers experience in a wider variety of insect problems and to initiate a system of rotation to be carried on at appropriate intervals in the future. As before, supervisory rangers, McDowall, Lawrence and Drouin, were assigned the southeastern, central, and northwestern regions respectively. District assignments were as follows:

Supervisory region	Forest district	Survey district no.	Forest biology ranger
Southeastern	Southern Dist., Man.	00	L.L. McDowall
	Eastern Dist., Man.	01	B.B. McLeod
	Southern Dist., Sask.	11	M.R. Pratt
Central	Western Dist., Man.	03	J.J. Lawrence
	Northern Dist., Man.	02	A.E. Campbell
	Hudson Bay Dist., Sask.	05	R.W. Hancox
Northwestern	Prince Albert Dist., Sask.	06	J.A. Drouin
	Northern Dist., Sask.	08	J.B. Martin
	Meadow Lake Dist., Sask.	07	K.L. Mortensen
	West-Central Dist., Sask.	12	J.B. Martin and K.L. Mortensen

1.3.2 Transportation Equipment

One new sedan delivery was added to the fleet of Forest Biology Ranger vehicles in 1960. This was a replacement for the unit previously assigned to the Meadow Lake District of Saskatchewan.

1.3.3 Ranger Field Accomodation

No additional field accomodation was provided for rangers in Survey Districts in 1960. However, considerable renovation and improvements were made to existing ranger cabins. The cabins located at Prince Albert, Hudson Bay, and Loon Lake were modernized; running water and sewage facilities were installed in each. In addition, storage sheds were erected at field establishments at Loon Lake and Hudson Bay, Saskatchewan, and at The Pas, Manitoba.

1.3.4 Field Surveys

Field surveys, following prescribed collecting and sampling procedures and standardized methods of rating insect infestations and tree disease infections, were carried out from early May through mid-October. In completing the surveys the rangers covered approximately 147,900 miles by road, 14,500 miles by fixed-wing aircraft, 400 miles by helicopter, and 350 miles by boat.

Chartered and non-chartered aircraft travel used for aerial surveys in the two provinces is summarized below.

Province	Type of flying	Aircraft	No. of hours	No. of man hours	Approx. mileage	Approx. area surveyed (sq. mi.)*
Manitoba	Chartered	Cessna 180	34	64	3840	15,400
		Tri-Pacer	13	18	1430	6,000
		Cessna 175	5	10	1185	5,000
	Non-chartered	Beaver	2	6	200	800
Saskatchewan	Chartered	Cessna 180	32.5	65	3475	13,800
		Piper Cub	14.0	14	1290	5,200
		Tri-Pacer	7.5	15	750	3,000
	Non-chartered	Cessna 180	13	26	1300	5,200
		Cessna 140	5	5	500	2,000
		Super Cub	5	5	500	2,000
		Helicopter	6	12	400	1,600
Totals			137	240	14,870	60,000

* Based on observations of approximately 2 miles each side of flight line. NOTE: Non-chartered flying supplied by Provincial Forest Services.

During the season, 3,754 insect collections and 356 tree disease collections were submitted to the Winnipeg and Saskatoon laboratories. The number of collections by Survey Districts and host trees is shown in Table 1.

1.3.5 Survey Sub-Projects

The major sub-projects currently being carried out by Ranger staff are described briefly below. Standardized methods and procedures are outlined in detail in field work manuals.

The time devoted to special studies in 1960 is given in Table 2.

1. Phenological Survey of the Region. A phenological survey of Manitoba and Saskatchewan was initiated in 1956. Base-line stations were established at Red Rock Lake in Manitoba and Prince Albert in Saskatchewan. Survey stations were established at preselected points, well distributed throughout the various forest districts. The phen-

Table 1

Summary of Forest Insect and Tree Disease Collections
taken from Principal Tree Species

District	Principal Host Trees																						Totals	
	wS		bS		bF		jP		tL		tA		bPo		wB		nM		wE		Misc.			
	I	D	I	D	I	D	I	D	I	D	I	D	I	D	I	D	I	D	I	D	I	D	I	D
Southern Man.	64	1	20	0	20	0	71	0	30	0	71	0	11	0	13	0	17	4	5	8	130	3	452	16
Eastern Man.	62	33	17	6	84	8	73	8	48	0	110	10	25	3	36	1	4	0	1	0	207	17	667	86
Western Man.	79	5	20	1	3	0	12	0	29	0	103	8	17	1	9	0	2	0	0	0	55	1	329	16
Northern Man.	51	14	23	4	16	0	25	1	13	0	29	5	10	0	37	2	0	0	0	0	37	8	241	34
Hudson Bay Sask.	57	9	23	2	3	0	22	9	45	0	130	15	19	2	30	0	4	0	1	0	62	5	396	42
Prince Albert Sask.	36	10	27	2	5	6	76	4	43	0	166	8	37	0	11	0	4	0	0	0	109	23	514	53
Northern Sask.	37	4	27	9	6	3	16	3	26	0	55	0	5	0	9	0	0	0	0	0	60	20	241	39
Meadow Lake Sask.	57	15	16	3	6	2	57	5	40	0	152	7	4	1	18	2	6	1	0	0	45	6	401	42
West-Central Sask.	8	0	0	0	0	0	1	0	0	0	55	3	6	0	0	0	17	0	2	0	42	0	131	3
Southern Sask.	36	2	0	0	0	0	0	0	10	0	201	13	10	0	2	2	44	0	4	0	75	8	382	25
Totals	487	93	173	27	143	19	353	30	284	0	1072	69	144	7	165	7	98	5	13	8	822	91	3754	356

Table 2

Summary of Days Spent on Survey Sub-projects by Forest Biology Rangers

Forest Biology Ranger	Survey Sub-projects by Number									Totals
	1	2	3	4	5	6	7	8	9	
L.L. McDowall	3	-	-	3	-	-	1	-	2	9
B.B. McLeod	1	3	-	9	2	-	3	2	2	22
G.T. Lalor	7	3	-	6	3	4	-	3	3	29
M.R. Pratt	3	6	4	9	5	3	-	2	2	34
J.J. Lawrence	2	5	-	6	2	-	-	2	2	19
A.E. Campbell	4	4	-	9	9	-	-	2	3	31
R.W. Hancox	5	2	-	4	-	-	-	2	2	15
J.A. Drouin	8	4	-	6	-	-	-	3	3	24
J.B. Martin	5	3	-	7	-	3	-	3	3	24
K.L. Mortensen	6	6	-	8	-	7	-	2	2	31
Totals	44	36	4	67	21	17	4	21	24	238

1. Phenological survey of tree species.
2. Forest tent caterpillar surveys.
3. Fall cankerworm population sampling.
4. Larch sawfly studies in permanent sample plots.
5. Sampling budworm populations on white spruce.
6. Population sampling of the boxelder twig borer.
7. Control of white grubs in forest plantings.
8. Surveys for spruce stand openings.
9. Survey for Flammula alnicola decay.

ology of various tree species was based on the rate of terminal shoot elongation. Only open-growing or otherwise exposed trees were selected for study, and all measurements taken on the westerly exposure. One dominant lateral terminal about five feet above ground level was selected for measurement on each of five sample trees. At base-line stations, measurements commenced about May 10 and were taken twice weekly until growth had terminated. Measurements were taken to the nearest millimeter from the base of the bud. The length of the bud is subsequently subtracted to give the total length of the shoot.

Procedure at Survey Stations. Only two measurements are taken at the survey stations, the first after 25-50 per cent of the growth is completed, and the second at the end of the growth period. Dates on which a given percentage growth was reached at survey stations were compared with the dates the same percentage was reached at reference stations. Developmental rates of the various tree species were then expressed in terms of plus or minus days from the base-line stations. The results of phenological surveys are now being summarized and will appear in a forthcoming technical report.

2. Forest Tent Caterpillar Studies. The primary objects of this study are: (1) to develop refined population sampling and survey techniques for forecasting infestation in broad classes of light, moderate and severe on the basis of egg-mass surveys the previous year; and (2) to determine the effects of natural control factors on hatch and survival of early instar larvae. Permanent sampling points have been established in and adjacent to known infestation areas. Three trees, ranging from 3" to 6" d.b.h., are felled at each location and examined for egg bands. Counts are related to subsequent defoliation on the plots to define infestation classes. Egg bands from sample trees are reared and dissected for records on hatch and survival.

Data were obtained in 1960 on the distribution of forest tent caterpillar egg bands throughout the crowns of aspen trees as part of a co-operative project with the Calgary Laboratory. Sampling was conducted at four crown levels: (1) top four branches of the crown; (2) entire upper 1/3 of crown; (3) entire mid 1/3 of crown; and (4) entire lower 1/3 of crown.

3. Fall Cankerworm Population Sampling. Larval counts have been taken annually at sample points established in 1956 throughout southwestern Saskatchewan. Data will be used to develop a reliable method for estimating populations of the fall cankerworm in Manitoba maple shelterbelts. Sampling is carried out during the 4th and 5th instars. Five trees, representative of the stand, are selected and marked for defoliation estimates after larval feeding is complete. Four branches (about 18" long) are removed from each tree at three crown levels. The number of leaf clusters and the number of fall cankerworm larvae are recorded. The average number of larvae per infested leaf cluster will be used as an index for defining infestation classes.

4. Larch Sawfly Studies in Permanent Sample Plots. Permanent sample plots have been established in representative tamarack stands throughout Manitoba and Saskatchewan with the following objectives: (1) to study population trends of the larch sawfly; (2) to obtain annual defoliation records of tamarack and to assess the effects of prolonged defoliation on tamarack trees; and (3) to provide continuous records on the incidence of natural control factors of the larch sawfly, including parasites, predators, disease, and flooding. A sequential sampling technique, based on the number of current tamarack shoots utilized for oviposition by adult sawflies, is used for rating infestations as light, moderate or severe(*). Comparable ratings have been developed and are used for defoliation estimates(**). Plots are tallied at regular intervals for continuous records on the vigor and mortality of host trees.

A parasite appraisal survey is carried out at all permanent plots. Cocoons are collected by placing "larval-drop" trays under selected trees from July until the end of the larval feeding period. A representative sample of cocoons from each tray is subsequently dissected to determine the incidence of larval parasitism and disease. This method of collecting cocoons has provided reliable estimates on the number of sawfly larvae destroyed by parasites and disease organisms. Water levels in permanent plots are measured three times during the field season by means of a pipe driven into the ground to a depth of four feet. These measurements provide continuing records on flooding in tamarack plots. This is recognized as a major control factor of larch sawfly, and has direct effects on vigor and mortality of host trees.

5. Sampling Budworm Egg Populations on White Spruce. Special sampling was commenced in 1959 and intensified in 1960 to provide data for developing a sequential technique for spruce budworm surveys in white spruce stands. Adequate sampling techniques have been developed by Morris*** for rating budworm egg populations in balsam-fir stands. However, most of the infestations in this region occur in areas where white spruce is a major component of the stands, and a comparable technique is required for rating populations on this tree species. Branch sampling was carried out at selected points in pure stands of white spruce and stands mixed with balsam fir where the budworm occurred at various population levels. At each sample point, four branches

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* Ives, W.G.H. and R.M. Prentice. 1958. A sequential sampling technique for surveys of the larch sawfly. Can. Ent. 40(6): 331-338.

** Nairn, L.D. and R.M. Prentice. 1960. Infestation ratings of the larch sawfly in Manitoba and Saskatchewan. For. Chron. 36(3): 225-229.

***Morris, R.F. 1954. A sequential sampling technique for spruce budworm egg surveys. Can. Jour. Zool. 32: 302-313.

(about 18 to 24 inches long) were removed from the mid-crown of each sample tree. The foliage was critically examined and the number of spruce budworm egg masses recorded. Sample trees were marked and subsequent defoliation estimates were related to the number of egg masses per one hundred square feet of foliage area. To date only preliminary analysis has been made of the egg population data, and additional sampling may be required in 1961 to define some of the infestation classes.

6. Population Sampling of the Boxelder Twig Borer. This study has been in progress since 1956 and is designed to follow annual population trends and fluctuations of the boxelder twig borer on Manitoba maple. Sampling was conducted at 33 plots in four of the Survey Districts of the region where the host tree is commonly found in shelterbelts and ornamental plantings. Five sample trees representative of the stand were selected at each plot and marked for future reference. From each tree, one branch (36 inches long) was removed from the four cardinal points at three crown levels and examined. The total number of twigs and the number infested with boxelder twig borer larvae were recorded. The percentage of twigs infested is used as an index for rating population intensity.

7. Control of White Grubs in Forest Plantings. This project was initiated in the Agassiz Forest Reserve of Manitoba by the Forest Insect Survey in 1959 to (1) determine population levels and species of white grubs present and assess the mortality they cause to young pine transplants in reforestration areas; (2) determine if losses due to grub feeding may be reduced by employing different planting procedures. Population and damage appraisal counts are made annually in areas that have been recently planted. Population estimates are calculated as the average number of grubs found per one cubic foot soil samples taken at random throughout the planted area. The soil samples are sifted through a mesh screen and all stages of grubs recorded. The percentage of host mortality is determined from random counts of young transplants. For a more critical appraisal of damage due to grubs, the roots of individual living and dead plants are examined for evidence of grub feeding. "Severe" damage is recorded when the root systems have all the fibrous roots and all or part of the tap root removed. In recent years this study has been concentrated in a permanent study area in the Agassiz Forest Reserve. The main objective is to determine cultural control possibilities.

8. Surveys in Spruce Stand Openings. This study was initiated in 1958 in collaboration with personnel of the Forest Pathology Laboratory, Saskatoon. The primary objectives of the survey are to: (1) locate stands in which white and black spruce is a major component and the disease, Polyporus tomentosus, occurs; (2) determine the incidence of the disease in such stands, and its association to Hylobius root weevil attack. Observations are conducted at a number of points selected throughout the Survey Districts each year.

A one-acre strip (usually 20 chains long and 1/2 chain wide) is cruised for spruce mortality at each sampling point. Only dominant and co-dominant dead trees are recorded. Tree mortality is rated according to the number of patches (4 or more trees), groups (2-3 trees), and single dead trees per acre. The root systems of five living and five dead trees on the plot are examined for incidence of P. tomentosus infection and Hylobius root weevil damage, using techniques outlined by Warren*.

9. Survey for Flammula alnicola decay. This study was commenced in 1960 in collaboration with the Forest Pathology Laboratory at Saskatoon. The main purpose is to obtain information on the distribution of F. alnicola decay in coniferous forest stands throughout Manitoba and Saskatchewan, and an estimate of the incidence of the decay in localities examined. Areas recently cut-over are selected for examination. The surfaces of from 75 to 100 coniferous stumps are examined in each area, and the number infected with disease organisms recorded. If F. alnicola decay is suspected, a specimen from each of 10 sample trees is forwarded to the Saskatoon Laboratory for study and identification.

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* Warren, G. L. 1956. The effects of some site factors on the abundance of Hypomolyx piceus. Ecol. 37(1): 132-139.

2. ANNUAL REPORT OF FOREST BIOLOGY RANGERS

SOUTHERN DISTRICT OF MANITOBA

1960

by

L. L. McDowall
(assisted in southwestern Manitoba by G.T. Lalor)

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

2.1 INTRODUCTION

Field activities in 1960 for the Southern District of Manitoba commenced in early May and continued through to the latter part of October. Outbreaks of the more important insects were mapped and distribution surveys for the minor species and tree diseases were conducted. Several mass collections of selected insects were made for the purpose of assessing parasitism. Further studies of tree mortality were conducted in Scots pine plantations in the Sandilands and Spruce Woods Forest reserves. Sampling was continued at permanent sampling stations to determine the status of various insects currently at low population levels.

A total of 451 insect and 16 tree disease collections were made in 1960. This includes collections by G. Lalor, who was responsible for surveys in southwestern Manitoba. Aerial surveys involved approximately 13 hours of flying. The co-operation and assistance received from Provincial Government personnel and private co-operators is gratefully acknowledged.

2.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

An increase in populations of several insect species was recorded in 1960. Somewhat higher populations of the balsam-fir sawfly, the yellow-headed spruce sawfly, and the green-headed spruce sawfly were noted in southern Manitoba. A marked increase was recorded in the distribution and abundance of the jack-pine sawfly, the red-pine sawfly, and the red-headed jack-pine sawfly. Populations of the jack-pine and spruce budworms remained at very low levels throughout the entire District.

Conspicuous damage on jack pine caused by a tip moth, Rhyacionia sp., was recorded for the first time at several points in the southeastern part of the District.

Special surveys were conducted for the presence of a root and butt decay of conifers, Flammula alnicola, and for blister rust of white pine, Cronartium ribicola. Information on the distribution and abundance of other tree diseases was recorded as in previous years.

2.3 INSECT CONDITIONS

2.3.1 Larch Sawfly, Pristiphora erichsonii (Htg.)

The status of this insect remained much the same as in 1959 throughout the Southern District (Fig. 1). In general, defoliation was light with an occasional patch of moderate attack in the eastern section. Unusually high water levels persisted well into mid-summer in a number of larch swamps. This condition has prevailed for several years and in these areas defoliation has become almost negligible.

Generally light defoliation occurred over most of the southeastern part of the District. One small patch of moderate defoliation was recorded at Birch Point on Buffalo Bay. West of Piney to Menisino and north throughout the Sandilands Forest Reserve, defoliation was classed as light. Scattered light to moderate defoliation was recorded between East Braintree and Falcon Lake. Larch stands in the Hadashville, McMunn, Waugh, and Harrison Creek areas showed only light defoliation. Very light defoliation occurred southwest of Camp Shilo in the western part of the District.

Sequential sampling of egg populations was carried out in four permanent plots. Egg counts and infestation ratings for 1960 are shown below.

Plot No.	Place	Total shoots examined	No. of curled shoots	Rating 1960
101	Sandilands F.R.	110	5	Light.
102	Piney	90	3	Light.
103	Sandilands F.R.	120	6	Light.
104	Camp Shilo	50	0	Light.

Mass collections of larch sawfly cocoons were again collected from three representative points in the District using the drop-tray method. This method was outlined in the 1958 Ranger Report. The cocoons were subsequently dissected at the Laboratory to determine the incidence of parasitism and predation of larch sawfly larvae. Results of the dissections are shown in Table 1.

2.3.2 Spruce Budworm, Choristoneura fumiferana (Clem.)

Only five larvae of this insect were collected in the forested areas of southeastern Manitoba in 1960. Several collections were taken from planted white spruce and Colorado spruce at the Morden experimental farm where populations were low and feeding on the current shoots was classed as light. Low populations, causing only light defoliation, were recorded in the Camp Hughes area of the Spruce Woods Forest Reserve.

2.3.3 Jack-pine Budworm, Choristoneura pinus Free.

A further decline in populations of this species was recorded in southern Manitoba. A number of collections were made from open-growing jack-pine trees in the central and southern portions of the Sandilands Forest Reserve. Scattered collections were also made northwest of Sprague and at Whitemouth Lake. The number of larvae per collection ranged from one to seven, and no defoliation was observed. Heavy male flowering of jack pine was general over the entire District.

Table 1

Cocoon Counts and Dissections of Larch Sawfly from
20 Larval Drop Trays at Three Areas

Location and plot no.	Av. no. of cocoons per tray	No. of cocoons destroyed in field		No. of larvae dissected	No. of larvae containing parasites				Diseased larch sawfly	
		Small mammals	Fall Bessa emergence		Mesoleius tenthredinis eggs	Mesoleius tenthredinis larvae	Bessa harveyi	Trit-neptis klugii	No. of cocoons examined	No. of larvae diseased or dead
Sandilands F.R. 101	4.5	0	7	64	0	0	9	0	90	19
Sandilands F.R. 103	9.2	0	10	142	0	0	46	0	183	31
Douglas 104	0.6	0	0	5	0	0	0	0	12	7

During the past five years, continuous records have been kept of the degree of staminate flowering and defoliation in pine plantations infested with jack-pine budworm in the Spruce Woods Forest Reserve. The abundance of flowering was assessed on the basis of the following classification: Light - tree with few or no staminate flowers; moderate - trees with occasional branches bearing heavy crops of staminate flowers; and heavy - trees with most branches bearing a heavy crop of staminate flowers. Observations recorded in 1960 are shown in Table 2.

Table 2

Relationship Between Defoliation and Staminate Flower Production in 1960 Based on the Examination of 51 Pine Plantations in the Spruce Woods Forest Reserve

Tree species	Defoliation class	Flower production by no. of plantations		
		Light	Moderate	Heavy
Jack pine	Light	1	15	10
Scots pine	Light	0	5	13
Lodgepole pine	Light	6	1	0

2.3.4 American Poplar Beetle, Gonioctena americana (Schaef.)

This insect was commonly found on trembling aspen from Sprague north to Moose Lake, through the northern section of the Sandilands Forest Reserve to Hadashville and south to the Whitemouth River. In general, defoliation in these areas was classed as light, although an occasional small patch of moderate defoliation was recorded. The heaviest populations occurred on smaller trees up to twenty feet in height. Defoliation was classed as very light in the Melbourne, Carberry and Camp Shilo areas in southwestern Manitoba.

2.3.5 Grey Willow-leaf Beetle, Galerucella decora (Say)

Several infestations of this species occurred at widely separated points in southeastern Manitoba. Severe skeletonizing of willow foliage was observed east of St. Anne to Richer and in the Hadashville, Elma, and McMunn areas. South of the above mentioned locations, severe foliage damage was recorded east of Marchand to the Sandilands Forest Reserve boundary and north of Sundown to #12 Highway. The foliage of trembling aspen in this area also suffered moderate to heavy skeletonizing. Willow between Sprague and Middlebro showed light to moderate feeding damage and high populations of adult beetles were present during the latter part of August.

2.3.6 Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

Populations of this insect were relatively light and widely scattered over southern Manitoba. A light to moderate infestation, covering approximately two square miles, was recorded in the Turtle Mountain Forest Reserve.

2.3.7 Spiny Elm Caterpillar, Nymphalis antiopa L.

This insect was common on both willow and aspen in the central and northern portions of the Sandilands Forest Reserve, as well as in the Hadashville, McMunn and East Braintree areas. A number of willow clumps in these areas were between thirty and seventy per cent defoliated. Single aspen trees showed approximately twenty-five per cent defoliation. Moth populations, although relatively high, were considered to be slightly lower than in 1959.

2.3.8 Spotless Fall Webworm, Hyphantria cunea (Drury)

A slight increase in the numbers and distribution of this insect was recorded in 1960. The heaviest concentrations occurred in the South Junction, Sprague, and Moose Lake regions in southeastern Manitoba. It was also collected from East Braintree, Hadashville, and south in the Dawson Ridge area. A number of mass collections were made for rearing purposes in an effort to recover a tachinid parasite, Compsilura concinnata. This parasite is common in eastern Canada, where it occurs on a wide range of hosts. It has never been recovered west of Ontario although most of its known hosts do occur in Manitoba. Collections were taken from a variety of hosts, namely: birch, elm, alder, chokecherry, pincherry and willow. A total of 871 larvae are being reared at the insectary but to date only two parasites, Apanteles hyphantriae and Meterous bakeri, have been recovered.

2.3.9 Red-humped Caterpillar, Schizura concinna A. & F.

Several collections of this caterpillar were made in the northern portion of the Sandilands Forest Reserve between Dawson Cabin and the West Boundary. It was mainly collected from aspen with an occasional collection taken from chokecherry. In all instances defoliation was classed as light.

2.3.10 Yellow-necked Caterpillar, Datana ministra (Drury)

Distribution of this insect was limited to the central and northern parts of the Sandilands Forest Reserve. Populations appeared relatively high and willow was the preferred host. A number of small willow clumps north of the Reserve Headquarters along the west fireguard road were between sixty and eighty per cent defoliated.

2.3.11 Balsam-fir Sawfly, Neodiprion abietis complex

A general increase in populations and distribution of this complex was recorded in southeastern Manitoba. Larvae were collected from balsam fir, white spruce and black spruce. The heaviest feeding occurred in balsam stands ten miles north of Sprague and in the area between Moose Lake and Sprague Lake. Defoliation of the old foliage ranged from ten to forty per cent. Balsam fir in the East Braintree-Falcon Lake region was from ten to twenty per cent defoliated. Although larvae were also common on white and black spruce, defoliation of these hosts was classed as very light.

2.3.12 Jack-pine Sawfly, Neodiprion pratti banksianae Roh.

A substantial increase in populations of this species occurred at several points in the southeastern part of the Province. It was collected from both jack pine and red pine with collections from red pine limited to the area around Moose Lake. A number of colonies were collected from jack-pine stands northwest of Sprague, east of Piney, and in the extreme southwest corner of the Sandilands Forest Reserve. In all instances defoliation was light and confined to one or two branches per tree.

2.3.13 Red-pine Sawfly, Neodiprion nanulus nanulus Schedl.

Increased populations and a more widespread distribution of this sawfly was recorded in 1960. It was collected from both jack pine and red pine in the area around Moose Lake. A number of scattered collections were also taken from jack pine in the northern part of the Sandilands Forest Reserve and at Falcon Lake. Defoliation remained light in these areas.

2.3.14 Red-headed Jack-pine Sawfly, Neodiprion virginianus complex

A marked increase in the abundance and distribution of this species was noted in 1960. It was collected from jack pine at Sprague Lake, Moose Lake, south to the town of Sprague, west to South Junction, Menisino, and north through the Sandilands Forest Reserve to Hadashville. The number of larvae ranged from 20 to 60 individuals per colony. In most instances only single or small groups of trees were attacked and back-feeding on the old foliage ranged from ten to thirty per cent.

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

The high population levels of this sawfly that were recorded in southeastern Manitoba in 1959 persisted in 1960, and a slight increase in numbers was noted in the forested areas. It was consistently

collected from both white and black spruce at Sprague Lake, Moose Lake, South Junction, Piney, Hadashville, McMunn, East Braintree, and Falcon Lake. Defoliation of the current growth on a number of white spruce trees at McMunn and East Braintree ranged up to 60 per cent. Elsewhere in the southeastern part of the District defoliation ranged from light to moderate. Light defoliation of white spruce shelterbelts was recorded at Virden, Pipestone, Poplar Point, and Holland in southwestern Manitoba.

2.3.16 Pine Tortoise Scale, Toumeyella numismaticum (P. & M.)

Although a decline in populations of this species has occurred during the past two years it is still present over a wide area in the Sandilands Forest Reserve. However, only small groups of trees bearing current scales were recorded at any one location, and recent infestations were classed as light. Mature female scales were present in the latter part of May, and male scales during August on both jack pine and Scots pine.

The scale appeared to be more prevalent on young jack pine. In areas where attacks have been prolonged, trees are covered with a conspicuous sooty fungus resulting from a secretion of honey dew by the scales during their early development. The vigor of trees subjected to scale attack is greatly reduced, and it is possible that some mortality may occur.

2.3.17 White-pine Weevil, Pissodes strobi (Peck.)

Leader damage attributed to this weevil was mainly confined to jack-pine reproduction in the southern part of the Sandilands Forest Reserve. With the exception of one plantation, where up to 20 per cent of the leaders of twelve to fifteen year old jack pine were heavily infested, damage was classed as light. Damage to leaders of white spruce in the Spruce Woods Forest Reserve was recorded as light.

2.3.18 Owlet Moth, Enargia decolor Wlk.

Relatively high populations of this insect were present in the vicinity of Moose Lake and north to Sprague Lake. Trembling aspen was the preferred host and only the occasional larva was collected from white birch. The number of larvae collected from a single tree varied between three and fifteen; this was a slight increase over 1959.

2.3.19 Leaf Beetle, Chrysomela crotchi Brown

This leaf beetle was common on alder in the central and northern parts of the Sandilands Forest Reserve. The heaviest populations were recorded along the Dawson Trail from Dawson Cabin west to

the Reserve boundary. Outside of several scattered patches of moderate defoliation, feeding damage was generally light. Collections were also taken from trembling aspen, balsam poplar, and willow in the same general area. Severe defoliation of trembling aspen by this species was recorded in the Turtle Mountain Forest Reserve, and in the area south of Camp Hughes in the Spruce Woods Forest Reserve. Elsewhere throughout southwestern Manitoba light to moderate defoliation prevailed.

2.3.20 A Sawfly on Dogwood, Macremphytus sp.

This sawfly was confined to a small area along the west fireguard in the Sandilands Forest Reserve, four miles north of the Reserve Headquarters. In all instances it was collected from dogwood and although populations appeared high, defoliation was light.

2.3.21 Pine Root Collar Weevil, Hylobius radicis Buch.

Surveys conducted for this insect in pine plantations in the Sandilands Forest Reserve showed an almost complete absence of any current weevil populations. However, an increase in tree mortality was recorded over previous years as a result of an accumulation in five years' sustained attack. Results of studies conducted in permanent study areas are shown in Table 3.

Table 3

Summary of Pine Plantations Showing Number of Dead and Infested Trees in the Sandilands Forest Reserve

Tree species	Plot No.	Acreage	Sampling station No.	No. trees examined	No. trees infested	No. trees dead
Scots pine	2-46	15.9	1	5	5	2
			2	5	3	1
			3	5	4	2
Scots pine	3-48	35.0	1	5	5	3
			2	5	4	2
			3	5	2	1
			4	5	4	2
			5	5	2	1
Scots pine	1-39	15.0	1	5	3	1
			2	5	4	3
			3	5	4	4

Tree species	Plot No.	Acreage	Sampling Station No.	No. trees examined	No. trees infested	No. trees dead
Scots pine	2-48	35.0	1	5	1	1
			2	5	4	2
			3	5	2	1
			4	5	1	1
			5	5	3	2
Scots pine	1-49	35.0	1	5	2	1
			2	5	1	0
			3	5	3	2
			4	5	3	1
			5	5	2	1
Red pine	1-39	8.1	1	5	0	0
			2	5	0	0
			3	5	1*	0
Red pine	1-38	22.1	1	5	0	0
			2	5	0	0
			3	5	0	0
			4	5	0	0
			5	5	0	0
Red pine	2-39	3.7	1	5	0	0

* Not confirmed.

2.3.22 A Pine Tip Moth, Rhyacionia sp.

This tip moth, which infests the current shoots on jack pine was collected for the first time in southeastern Manitoba. Both mature and reproduction pine showed evidence of attack, although damage was more abundant on the smaller trees. A limited survey to determine the distribution and abundance of this species was conducted at five points throughout the infestation area. One branch from each of ten jack-pine trees was examined at each location. The number of tips examined and the number infested were recorded as a population index. These data are shown below.

Location	No. of branches	Av.no.of tips per branch	No. of tips examined	No. of tips infested	Percentage of tips infested
Moose Lake Sec.30, tp.3, rge.17, E.P.M.	10	19.6	196	23	12
Sprague Sec.19, tp.1, rge.14, E.P.M.	10	19.8	198	24	12
Sandilands F.R. Sec.27, tp.1, rge.12, E.P.M.	10	18.0	180	21	11
Sandilands F.R. Sec.31, tp.1, rge.11, E.P.M.	10	17.6	176	60	34
Sandilands F.R. Sec.22, tp.4, rge.10, E.P.M.	10	14.3	143	25	11

2.3.23 Boxelder Twig Borer, Protecteras willingana (Kft.)

Infestations of this twig borer commonly found on shelterbelt and native Manitoba maple remained light in the Southern District of Manitoba. This was indicated by population counts taken at eight representative sample stations established in 1956 throughout the District. Sampling data recorded in 1960 are shown in Table 4.

Table 4

Summary of Boxelder Twig Borer Population Studies

Location	No. of trees examined	Av. ht. (ft.)	Av. crown depth (ft.)	Av. crown width (ft.)	No. of twigs examined and twig borer populations by crown class					
					Lower		Mid		Upper	
					No. twigs	No. borers	No. twigs	No. borers	No. twigs	No. borers
Camp Hughes Sec.33, tp.10, rge.16, W.P.M.	5	20	18	20	320	10	365	6	325	12
Souris Sec.3, tp.8, rge.22, W.P.M.	5	18	15	14	246	8	283	9	278	11
Turtle Mountain Sec.6, tp.1, rge.20, W.P.M.	5	24	18	12	373	2	353	3	380	4
Ninette Sec.13, tp.5, rge.11, W.P.M.	5	25	19	10	252	7	245	5	272	5
Holland Sec.29, tp.7, rge.11, W.P.M.	5	20	19	15	301	4	246	2	293	5
Wawanesa Sec.24, tp.7, rge.17, W.P.M.	5	25	22	19	183	6	246	7	215	3
Sidney Sec.17, tp.11, rge.12, W.P.M.	5	26	22	14	426	27	303	25	421	32
Poplar Point Sec.11, tp.12 rge.5, W.P.M.	5	20	17	13	385	3	257	3	273	5

2.3.24 Other Noteworthy Insects

Insect	Host(s)	No. of collections	Remarks
Pikonema dimmockii	wS, bS	24	General over southeastern Manitoba, defoliation light found mostly on wS.
Acleris variana	wS	10	Populations light in Moose Lake, Falcon Lake and Camp Hughes area.
Pristiphora lena	wS	2	Nil defoliation, populations light.
Nematus limbata	W	11	Causing light to moderate defoliation in the northern part of the Sandilands F.R.
Chermes lariciatus	wS, bS	7	Found in the Moose Lake area, populations show a slight increase.
Anoplonyx canadensis	tL	7	Populations light and widely scattered in southern Manitoba.
Semiothisa sexmaculata	tL	12	Widely scattered over southeastern Manitoba. A slight increase in populations.
Monoctenus mellicipes	eC	5	Very light populations nil defoliation.
Phenacaspis pinifoliae	jP	3	Light to moderate on several trees in Sandilands F.R.
Lambdina fiscellaria fiscellaria	bF	6	Populations light in Falcon Lake area.
Epicnaptera americana	tA	3	Common in the Spruce Woods F.R.
Nepytia canosaria	wS	2	Very light in the Spruce Woods F.R.
Pseudexentera improbana oregonana	tA	4	Throughout the Spruce Woods F.R.
Itame loricaria	W, tA	2	In the Carrol and Souris areas.
Epinotia nisella criddleana	tA	10	Very light throughout the District.
Malacosoma lutescens	cCh	2	Light damage at Carberry.

2.3.25 Permanent Sampling Stations

A summary of insect samples taken at permanent sampling areas first established in 1959 are shown below.

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av. no.of larvae per tree
01	12	9	Neodiprion nanulus	jP	0.8
			Neodiprion abietis	wS	0.9
			Pikonema dimmockii	wS	0.8
			Neodiprion virginianus	jP	1.2
			Semiothisa granitata	bF	0.6
			Miscellaneous		0.5
02	18	16	Choristoneura fumiferana	wS	0.2
			Pikonema alaskensis	wS	0.3
			Pikonema dimmockii	wS	1.0
			Pikonema dimmockii	bS	0.3
			Neodiprion abietis	wS	3.8
			Neodiprion abietis	bF	4.4
			Neodiprion abietis	bS	3.9
			Neodiprion pratti	jP	1.6
			Neodiprion virginianus	jP	6.2
			Enargia decolor	tA	1.1
			Tetralopha asperatella	tA	1.0
			Chrysomelid sp.	tA	3.4
			Miscellaneous		0.2
03	18	17	Pikonema alaskensis	wS	2.4
			Pikonema dimmockii	wS	0.6
			Neodiprion abietis	wS	0.4
			Acleris variana	wS	0.1
			Pikonema alaskensis	bS	0.5
			Neodiprion nanulus nanulus	bF	0.3
			Neodiprion abietis	bF	0.4
			Lambdina fiscellaria fiscellaria	bF	0.2
			Pristiphora erichsonii	tL	4.6
			Nematus sp.	tA	0.1
			Nycteola frigidana	bW	0.3
			Miscellaneous		0.6
04	6	4	Neodiprion virginianus	jP	0.4
			Pikonema alaskensis	wS	0.6
			Neodiprion abietis	wS	0.3
			Anoplonyx canadensis	tL	0.2
			Miscellaneous		0.8

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av. no.of larvae per tree
06	8	5	Choristoneura fumiferana	wS	0.1
			Pikonema dimmockii	wS	0.1
			Miscellaneous		0.1
07	6	5	Choristoneura conflictana	tA	1.3
			Choristoneura conflictana	bPo	0.2
			Gonioctena americana	tA	3.1
			Miscellaneous		0.1
09	10	3	Chrysomela crotchi	tA	0.1
			Miscellaneous		0.1
10	8	6	Choristoneura fumiferana	wS	0.2
			Pseudexentera improbana oregonana	tA	0.2
			Miscellaneous		0.3

2.4 TREE DISEASE CONDITIONS

2.4.1 Blister Rust, Cronartium ribicola

Surveys for distribution and intensity of this disease on white pine were continued in 1960 at Moose Lake in southeastern Manitoba. This infection is confined to a relatively small acreage. However, trees in this area are of a good stature and some light scattered reproduction is present. In previous years specimens of this disease were recovered only from reproduction. This year, however, one collection was taken from mature timber. Similar symptoms, such as flagging and discolouration of foliage, were observed on several other trees in the immediate vicinity. Although this would indicate the presence of this infection in other trees, careful examination must always be carried out to ensure that porcupines, which are common in the area, are not the contributing factor.

2.4.2 Yellow Witches'-broom, Melampsorella cerastii

An extensive survey to determine the distribution of this disease was conducted in balsam-fir stands in areas recently made accessible north of Sprague Lake. A number of brooms, which are conspicuous during the growing season by their yellow foliage, were recorded. Infected branches appeared quite dwarfed and some branch mortality was evident at several points. In most instances only one or two brooms were present per tree.

2.4.3 Vaccinium Rust, Pucciniastrum goeppertianum

During July a light incidence of this needle rust was observed on balsam fir in the northern portion of the Sandilands Forest Reserve. Balsam in this area, three miles east of Dawson Cabin, ranged between two and three inches d.b.h. and from six to fifteen feet high. This is believed to be the first incidence of the disease in southern Manitoba.

2.4.4 Leaf Spot on Balsam Poplar, Septoria musiva

No serious outbreak of this disease was recorded in southeastern Manitoba. It was scattered throughout the District from East Braintree through to Hadashville and into the Sandilands Forest Reserve as far south as Menisino.

2.4.5 Needle Rust on Spruce, Chrysomyxa sp.

This needle rust occurred mainly on black spruce. Although it occurred over a wide area only a few trees were attacked at any one location. The overall damage to trees was classed as light.

2.4.6 Root and Butt Decay of Conifers

A special survey to obtain information on the distribution of the decay, Flammula alnicola (Fr.) Quel., was conducted in three cut-over stands in southeastern Manitoba. The surfaces of approximately 75 to 100 stumps were examined in each location for the frequency of this decay. Results of the survey are shown in the following table.

Location	Size in acres	Tree sp.	Time of cut	Type of cut	No. of stumps examined	Av. d.b.h. (ins.)	No.of stumps with F. alnicola	Other decays
East Braintree Sec.32, tp.7, rge.14, E.P.mer.	1/2	wS, bF	Fall 1959	S	65	9	-	Brown cubicle
Sandilands F.R. Sec.10, tp.8, rge.11, E.P.mer.	1/2	wS	Spring 1960	S	90	10	-	Red heart rot
Moose Lake Sec.12, tp.3, rge.16, E.P.mer.	1	wS, bF	Spring 1960	S	100	8	-	-

S - selective.

2.4.7 Disease of Elm

During July, dying of the foliage of elm shade trees was reported from Oak Bluff, Manitoba. Inspection revealed that six out of twenty-five trees in a shelterbelt were seriously affected.

The condition, which first affected the foliage of a tree on the eastern extremity of the belt, and then spread westward from tree to tree, was characterized by a browning of the outer margin of each leaf, followed by curling and eventual defoliation. Defoliation of six trees occurred over a period of three weeks. Defoliation was, in turn, followed by refoliation. The damage was confined strictly to foliage. There was no evidence of branch mortality.

During August this shelterbelt was examined by Dr. C.G. Riley of the Forest Pathology Laboratory at Saskatoon who concluded that the condition was caused by physiological factors rather than by fungus or bacteria.

2.4.8 Hail Damage

On July 10 a severe wind and hail storm swept through the Camp Hughs area of the Spruce Woods Forest Reserve causing severe damage to native timber stands and plantations. Most of the damage occurred along the northern fringes of the stands, but, in some locations, extended well into the centers. Trembling aspen and bur oak suffered severe defoliation, twig and branch breakage, and stripping of bark from the main stems. Windthrow and branch breakage was prevalent in mature Scots pine plantations. Defoliation of trembling aspen and oak ranged from 50 to 90 per cent.

2.4.9 Black Knot of Cherry, Dibotryon morbosum

This disease was generally distributed over southeastern Manitoba. The heaviest infections were recorded at Moose Lake, Whitemouth Lake, and in the northern parts of the Sandilands Forest Reserve as well as in the McMunn-East Braintree region. Some branch mortality of cherry was noted through the Sandilands Forest Reserve.

2.4.10 Tar Spot on Willow, Rhytisma salicinum

This disease was recorded at several widely scattered points in southeastern Manitoba. With the exception of three areas, infection was classed as light. Moderate to heavy damage occurred at the following points: Middlebro, Sundown, and Woodridge. At least sixty per cent of the willows in the above mentioned areas were affected.

2.4.11 Spindle Rust of Pine

During surveys conducted in Scots pine plantations in the Camp Shilo area, it was noted that this disease is causing considerable damage to mature trees. It was estimated that on some trees 50 to 75 per cent of the branches had been damaged or killed and that an occasional tree was dead as the result of the presence of this rust.

2.4.12 Other Noteworthy Diseases

Host	Organism	Locality	Remarks
Trembling aspen	Hypoxylon pruinatum	Moose Lake	Common between Moose Lk. and Sprague.
Trembling aspen	Polyporus pargamenus	Moose Lake	Lightly scattered throughout District.
Jack pine	Cronartium comandrae	Sandilands F.R.	Common in southeast Manitoba.
Red pine	Armillaria mellea	Sandilands F.R.	Light infection only.
Black spruce	Arceuthobium pusillum	Southeastern Manitoba	Common through southeastern Manitoba.
Birch	Fomes igniarius	Moose Lake	Lightly scattered through District.
Jack pine	Lenzites sepiarius	Sandilands F.R.	Light infections only noted.
Black spruce	Fomes pinicola	East Braintree	Light infections only.
Trembling aspen	Fomes igniarius	Moose Lake	Lightly scattered through District.

3. ANNUAL REPORT OF FOREST BIOLOGY RANGER

EASTERN DISTRICT OF MANITOBA

1960

by

B. B. McLeod
(assisted in Interlake region by G. T. Lalor)

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

3.1 INTRODUCTION

A survey for forest insects and tree diseases was made in the Eastern District from May 15th to October 15th. Sub-projects such as spruce budworm tree mortality plots, white grub population counts, Polyporus tomentosus and Hylobius plots and Flammula alnicola plots in cut-over areas were continued in 1960. A forest tent caterpillar egg band survey was carried out in the infested areas to forecast the severity of the 1961 infestation. Special collections of forest insect and tree disease materials were collected for personnel in the Winnipeg and other laboratories. Twenty-four hours of charter flying were used to map infestations of the larch sawfly, spruce budworm, aspen tortrix, forest tent caterpillar and jack-pine budworm throughout the District. A total of 644 insect and 95 tree disease samples were taken in the District in 1960. This includes collections submitted by G. T. Lalor, who was responsible for conducting ground surveys in the Interlake area.

3.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

The status of several species of forest insects changed in 1960. Populations of the balsam-fir sawfly increased sharply at several locations, causing severe defoliation of the old foliage of balsam fir. The forest tent caterpillar and the large aspen tortrix defoliated trembling aspen stands in the more northern areas. The jack-pine budworm caused moderate defoliation of the new foliage of jack pine in stands in the Stead-Belair and Rosenburg areas. A light infestation of the spruce budworm covered a small area of cut-over white spruce and balsam fir at Crow Duck Lake. Surveys to determine the incidence of the white pocket rot, Polyporus tomentosus, and a butt decay, Flammula alnicola, in white and black spruce stands were continued. P. tomentosus was recovered at about the same intensity as 1959, but F. alnicola was not collected in the Eastern District. A foliage disease, Gleosporium sp., caused some damage to bur oak in the Whiteshell Forest Reserve. This constitutes the first record of the disease in Manitoba.

3.3 INSECT CONDITIONS

3.3.1 Larch Sawfly, Pristiphora erichsonii (Htg.)

Defoliation of tamarack by the larch sawfly remained light in most areas east of Lake Winnipeg. However, small pockets of moderate defoliation were encountered from the O'Hanley River south to the Bear and Bird River areas. Defoliation remained light in the Bissett, Wallace Lake, Long Lake and Caribou Lake areas. Aerial surveys north of Bissett revealed light defoliation of tamarack from Sasaginnigak Lake northward to Moar, Family, and Island lakes. Light defoliation

was mapped southeast of Norway House, and in the Gods Lake and Red Sucker Lake areas. Moderate to severe defoliation prevailed in the Carrot River - Oxford House areas. Tamarack stands in the Interlake portion of the District suffered varying degrees of defoliation. Moderate defoliation was encountered north of Riverton and west to the Broad Valley and Lake St. George areas. Small pockets of severe defoliation were recorded in the vicinity of Washow Bay and Fisher Branch. Light defoliation was recorded in the areas south of Riverton and Arborg (Fig. 1).

Larval drop trays were again used for collecting cocoons of the larch sawfly at three permanent sample plots. Two hundred of the cocoons were dissected from each collection point for parasite and disease studies. The results of this study are shown in Table 1.

Parasitism of the larch sawfly by Bessa harveyi showed a slight change in 1960. A decline in parasitism was noted at Plot 101, while a slight increase in parasitism was recorded at Plot 109. Bessa harveyi remained at approximately the same level as 1959 in Plot 110.

Sequential sampling of larch sawfly egg populations was continued in four permanent tamarack plots in 1960. The infestation rating of each plot, based on the utilization of the current shoots for oviposition, is listed below.

Location and plot no.	Infestation ratings		
	No. of shoots examined	No. of shoots curled	Infestation 1960
Washow Bay Plot 101	140	26	Moderate
Pointe du Bois Plot 109	60	1	Light
Agassiz Plot 110	60	1	Light
Telford Plot 102	70	2	Light

3.3.2 Forest Tent Caterpillar, Malacosoma disstria Hbn.

High populations of the forest tent caterpillar caused moderate to severe defoliation of trembling aspen stands at numerous points in the Eastern District (Fig. 2). Approximately one township of trembling aspen was severely defoliated in the Caribou, Manigotagan and Happy lakes area. Smaller pockets of severe defoliation were also noted at Wallace Lake (twp. 24, rge. 16, E.P. mer.) and at Siderock

Table 1

Results of Cocoon Counts and Larval Dissections of the Larch Sawfly
From 20 Trays on Three Study Areas

Place and plot no.	Av. no. of cocoons	No. of cocoons destroyed in field		No. of larvae dissected	No. of larvae containing parasites				Diseased larch sawfly	
		Small mammals	Fall Bessa emergence		Mesoleius tenthredinis eggs	Mesoleius tenthredinis larvae	Bessa harveyi	Trit-neptis klugii	No. of cocoons examined	No. of larvae diseased or dead
Washow Bay 101	145.4	67	109	200	0	2	36	4	346	146
Pointe du Bois 109	16.6	1	23	200	3	1	114	0	208	8
Agassiz For.Res. 110	3.7	0	10	61	0	0	31	0	74	3

Lake (twp. 23, rge. 16, E.P. mer.). Severe defoliation was evident at Moar Lake (twps. 34 and 35, rges. 16 and 17, E.P. mer.) and around the south end of Family Lake (twp. 33, rges. 14 and 15, E.P. mer.). Trembling aspen stands were also severely defoliated in the areas listed below.

Place	Approximate Acreage Defoliated
Isbister River Area	9000
Colling Bay, Island Lake	4000
Dobbs Lake	500
Stevenson Lake	300
Bolton Lake	7000
Kallieahoolie Lake	1900
Carrot River	4500
Pipestone Lake	900

The occurrence of both the forest tent caterpillar and the large aspen tortrix in the vicinity of these areas made it difficult to determine which of these species caused the defoliation.

A single collection of forest tent caterpillar was taken from the Washow Bay area of the Interlake region.

An egg band survey to determine the probable extent and severity of infestations in 1961 was conducted in late September. A summary of this survey is provided below.

Location	No.of trees	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. crown depth (ft.)	Av. no. of egg bands	Forecast for 1961
Manigotagan Lake	3	6.0	40	29	46.0	Severe
Side Rock Lake	3	5.6	30	21	25.3	Severe
Aikens Lake	3	6.6	38	21	0.0	Nil
Sasaginnigak Lake	3	3.6	21	16	0.6	Light
Family Lake	3	3.3	28	21	6.6	Moderate
Crow Duck Lake	3	3.0	29	17	0.6	Light
Lone Island Lake	3	3.0	25	15	0.3	Light
Brereton Lake	3	3.3	31	22	0.3	Light
Wallace Lake	3	4.3	27	19	6.3	Moderate
West Hawk Lake	3	3.0	25	17	0.0	Nil
Caribou Lake	30	3.7	27	22	48.1	Severe

Continued severe defoliation is forecast for the areas heavily infested in 1960. It would appear that there may be some ex-

tension of infestations in the Wallace Lake, Manigotagan Lake, and Family Lake areas in 1961.

3.3.3 Balsam-fir Sawfly, Neodiprion abietis complex

Severe infestations of this sawfly were recorded at various points throughout the Eastern District. Complete reddening of the old foliage of balsam fir was recorded over an area of approximately 600 square miles on Hecla Island, Black Island, and Washow Bay. The old foliage of white and black spruce in this area also suffered light to moderate damage. The above mentioned infestations are located in an area which suffered severe weather injury in 1958. If the infestation persists, some mortality of balsam fir can be expected in 1961.

Severe damage to the old foliage of balsam fir and light damage to the old foliage of white and black spruce was recorded at Victoria Beach and Caddy Lake. Balsam fir suffered light discoloration throughout the remainder of the Whiteshell Forest Reserve, and along the Winnipeg River. Balsam fir suffered damage at numerous points in the more northern areas, such as Sasaginnigak, Moar, Family, Island, Knee, and Weaver lakes. Severe discoloration of the old foliage of balsam fir and black spruce foliage was mapped on several islands in Stevenson, Molson and Beaverhill lakes. A combination of balsam-fir sawfly and spruce budworm caused severe damage to the old and new foliage of balsam fir on an island in Red Sucker Lake.

3.3.4 Spruce Budworm, Choristoneura fumiferana (Clem.)

There was little change in the status of the spruce budworm in the Eastern District. A small pocket of balsam fir suffered moderate defoliation in the Calders Dock area. Light defoliation of the new foliage of balsam fir and white spruce was encountered in the Pine Dock, Washow Bay, Beaver Creek, Hecla Island, Lake St. George, and Fairford areas. A small cut-over stand of white spruce and balsam fir at Crow Duck Lake was lightly infested. Additional samples of the spruce budworm were taken at Victoria Beach and Wallace Lake. Spruce budworm, in association with the balsam-fir sawfly, caused moderate to severe defoliation of the old and new foliage of balsam fir on an island at the east end of Red Sucker Lake.

Mass collections of spruce budworm larvae and pupae from four locations throughout the infestation in the Interlake region were reared for the recovery of parasites. The number of spruce budworm collected and the percentage of parasitism are listed below.

Location and grid	Type of collection		Per cent parasitism	
	Larvae	Pupae	Larvae	Pupae
Pine Dock 7-089-283	192	203	23.4	20.7
Beaver Creek 7-097-279	33	58	48.5	8.6
Washow Bay 7-088-278	39	61	27.2	23.0
Winnipeg Beach 7-087-267	111	60	25.2	18.3

The incidence of parasitism in 1960 showed a slight increase over the 1959 levels.

Egg population counts were made at six locations in the infested areas. Population estimates were based on the number of egg clusters per 100 square feet of balsam-fir foliage. These counts with the locations and 1961 forecasts are listed below.

Location	1960 defoliation	Calculated no.of egg clusters per 100 sq.ft. of foliage	Infestation forecast for 1961
Pine Dock 1	Light	0	Nil to light
Pine Dock 2	Moderate	18	Light
Pine Dock 3	Light	0	Nil to light
Winnipeg Beach	Light	0	Nil to light
Hecla Island	Light	26	Light
Crow Duck Lake	Light	14	Light

Increased tree mortality in some white spruce and balsam-fir stands has become evident following severe defoliation by the spruce budworm infestation from 1955 to 1958. To determine the amount of mortality present strip-cruises were conducted in six stands in the Interlake, Wallace Lake and Winnipeg River areas. The results of the strip-cruises, based on one-acre strip tallies, are summarized in Table 2.

Table 2

Mortality of White Spruce and Balsam Fir at Six Locations
Based on One-Acre Cruise Strip Tallies

Location	Year tallied	Tree species and d.b.h. (ins.)	No. of trees Living	No. of trees Dead	Basal area (sq.ft.) Living	Basal area (sq.ft.) Dead	Per cent basal area dead
Hecla Island	1960	wS up to 3	4	0	0.037	0.000	0
		wS over 3	3	0	0.441	0.000	0
		bF up to 3	304	72	7.217	2.081	19
		bF over 3	159	38	20.147	5.089	34
Pine Dock	1960	wS up to 3	38	0	0.593	0.000	0
		wS over 3	11	0	2.969	0.000	0
		bF up to 3	129	473	0.781	10.431	54
		bF over 3	0	171	0.000	27.584	100
Wallace Lake #3	1960	wS up to 3	4	0	0.054	0.000	0
		wS over 3	5	2	1.750	1.090	38
		bF up to 3	214	254	3.474	5.468	61
		bF over 3	10	34	1.088	4.942	86
Wallace Lake #4	1960	wS up to 3	2	0	0.010	0.000	0
		wS over 3	2	0	1.844	0.000	0
		bF up to 3	462	330	5.762	10.672	50
		bF over 3	52	194	8.272	22.096	87
Winnipeg River	1960	wS up to 3	9	0	0.062	0.000	0
		wS over 3	0	0	0.000	0.000	0
		bF up to 3	172	26	2.979	0.801	17
		bF over 3	137	29	28.507	6.219	20
Eagle Nest Lk.	1960	wS up to 3	83	3	1.809	0.103	7
		wS over 3	26	7	7.121	1.035	66
		bF up to 3	323	18	5.637	0.395	6
		bF over 3	26	5	4.253	1.035	56

3.3.5 Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

Light defoliation of trembling aspen stands by the large aspen tortrix was recorded in the Fairford, Moosehorn, Ashern, Hnausa, Sandy Hook and Teulon areas throughout the Interlake region. Elsewhere in the Eastern District, no visible defoliation was evident. Larval samples were taken in the Whiteshell, Belair, and Agassiz Forest reserves, and at Bird Lake, Meleb and Victoria Beach. A severe infestation covering some 300 acres of trembling aspen occurred at Molson Lake in the Northern District. Several areas of severely defoliated trembling aspen were mapped in the vicinity of Molson Lake. These are listed in the section of this report dealing with the forest tent caterpillar.

3.3.6 Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

The yellow-headed spruce sawfly caused light defoliation of white spruce in the Pine Falls, Bissett, and Long Lake areas of the Eastern District. Light to moderate defoliation of white spruce reproduction was recorded at Rennie and in the Caddy Lake-West Hawk Lake area. Several white spruce saplings in the Moore Lake area were severely attacked.

This sawfly, in association with the balsam-fir sawfly, caused severe defoliation to white and black spruce on islands in Stevenson Lake. White spruce shelterbelts suffered severe defoliation by the yellow-headed spruce sawfly in the Hodgson, Sylvan and Fisher Branch areas. Ornamental white spruce were also severely defoliated on Hecla Island.

Mass collections of yellow-headed spruce sawfly larvae were made in the Moore Lake area and reared for parasite recovery. This material is still in rearing and results are not available for this report.

3.3.7 Grey Willow-leaf Beetle, Galerucella decora (Say)

The grey willow-leaf beetle severely skeletonized the foliage of willow in the Darwin-Elma area (twps. 10 and 11, rges. 12 and 13, E.P. mer.). This same condition existed in a small area along #12 Highway in the Belair-Amanda area (twp. 19, rge. 7, E.P. mer.). Willows on Hecla Island and in the Riverton, Hnausa, and Arborg areas were lightly skeletonized with small pockets of moderate to severe damage. Light damage was recorded in the Teulon, Poplarfield and Fairford areas.

3.3.8 Jack-pine Budworm, Choristoneura pinus Free.

Jack-pine budworm infestations covered some 36 square miles in the Eastern District in 1960. An area of approximately 11 square miles north of Stead was moderately defoliated with some open-growing

trees suffering complete loss of the new foliage. The same condition existed over an area of seven square miles in the Belair Forest Reserve. A light to moderate infestation covered an area of approximately 18 square miles around Rosenburg Tower in the Interlake region. Mature trees suffered the heaviest damage.

3.3.9 White Grubs, Phyllophaga spp. and Serica intermixta Blatch.

White grub population counts were continued in eight previously established plots in the Agassiz Forest Reserve. Ten one-cubic foot soil samples were examined for the presence of larvae and adults. The population counts for 1958, 1959 and 1960 are listed below.

Plot	Planting history	Average no. of grubs per cubic foot					
		1958		1959		1960	
		Larvae	Adults	Larvae	Adults	Larvae	Adults
A	Non furrowed	2.7	0.1	1.2	0.2	0.7	0.0
B	Non furrowed	1.0	0.4	1.7	0.1	0.6	0.3
C	Furrowed Fall 1958	1.1	0.5	0.1	0.0	0.0	0.2
D	Furrowed Fall 1958	4.9	0.2	0.3	0.1	0.1	0.1
E	Furrowed Fall 1958	3.3	0.0	0.1	0.0	0.0	0.0
F	Furrowed Spring 1959	0.9	0.9	0.3	0.0	0.2	0.0
G	Furrowed Spring 1959	6.7	0.8	0.6	0.1	0.1	0.0
H	Furrowed Spring 1959	2.3	0.5	0.1	0.0	0.0	0.0

For the past three years there has been a reduction of grub populations in the Agassiz study plots. The reduction is most striking in areas where the sod layer was removed one or two years prior to planting.

3.3.10 A Root Weevil, Hylobius sp.

Four additional areas in the Eastern District were surveyed for Hylobius damage to the root systems of white and black spruce using techniques outlined in the 1958 Report. This survey was again carried out in conjunction with the Polyporus tomentosus disease survey. The results of this survey are shown in Table 3.

3.3.11 Spotless Fall Webworm, Hyphantria cunea (Drury)

The spotless fall webworm attacked a variety of broad-leafed trees and shrubs throughout the Eastern District. Recorded below is a list of hosts and sample points where this species was taken.

Table 3

Summary of *Hylobius* sp. Damage Assessment at Four Study Areas in Eastern Manitoba

Location	Av. d.b.h. (ins.)		Av. ht. (ft.)		Damage index		Percentage of roots diseased on trees		Percentage of diseased roots with insect damage	
	Living	Dead	Living	Dead	Living	Dead	Living	Dead	Living	Dead
Riverton	7.6	6.2	49	43	1.2	0.2	20.0	100	50.0	0.0
Cat Creek	13.8	12.0	74	64	1.0	0.3	2.1	100	0.0	0.0
Bird River	15.6	11.4	80	69	1.1	0.1	2.1	100	0.0	0.0
Aikens Lake	7.6	-	60	-	2.3	-	35.4	-	66.7	-

Host	Sample Point
Chokecherry	Ames, Hecla Island, Grassy Narrows, Riverton, Bear River Road.
Pincherry	Hecla Island, Cat Creek, Grassy Narrows.
Alder	Bear River Road, Bird Lake, Caddy Lake.
Bur Oak	Camp Morton, Ames, Eaglenest Lake, Riverton.
Willow	Grassy Narrows, Hecla Island, Bear River Road.
White birch	Bear River Road, Brereton Lake, Star Lake, West Hawk Lake, Caddy Lake.

Four mass collections of late-instar larvae were collected from the Whiteshell Forest Reserve, Bear River Road, and Hecla Island and reared through for parasite recovery. The parasites recovered to date are listed below.

Apanteles hyphantriae Rly.
Meteorus bakeri C. & D.
Meteorus hyphantriae Riley
Hyposoter pilosulus (Prov.)
Rogas sp.
Compsilura concinnata, a common parasite in eastern Canada that has never been recovered west of Ontario.

3.3.12 A Balsam Shoot-mining Sawfly, Pleroneura borealis Felt.

A small but heavy infestation of this shoot-mining sawfly was recorded on balsam fir in the Eleanor-Dorothy lakes area where approximately 75 per cent of the new shoots were infested. Low populations and light damage was also recorded in the following areas: White Lake, Crow Duck Lake, Wallace Lake, Caribou Lake, Long Lake, Sasaginnigak Lake, Moar Lake and Family Lake.

3.3.13 Red-humped Caterpillar, Schizura concinna A. & S.

This insect was commonly found feeding on trembling aspen reproduction throughout the Whiteshell Forest Reserve. Colonies of caterpillars were collected in the Bird Lake, Cat Lake, and Bear River areas. Infestation was generally light although individual host trees were severely defoliated. Low populations caused light defoliation of willow bushes on Hecla Island in the Interlake region.

3.3.14 The Leaf Beetles, Chrysomela crotchi Brown., and Chrysomela knabi Brown.

These two species of leaf beetles caused considerable damage

to trembling aspen in the Eastern District. Severe skeletonizing of the foliage on trembling aspen reproduction occurred throughout the Whiteshell, Agassiz and north end of the Belair Forest reserves. Light damage was recorded in the Weaver and Molson lakes areas. A single collection of C. knabi was taken at the Red Rose Tower in the Interlake region.

3.3.15 Neodiprion Sawflies on Conifers

Several species of Neodiprion sawflies were collected from jack pine throughout the Eastern District in 1960. Generally, the infestations were light in intensity but some jack-pine reproduction suffered moderate defoliation of the old foliage.

The species, Neodiprion virginiana Roh., was most prevalent and caused light to moderate defoliation of jack pine at Brereton and Crow Duck lakes. Light defoliation was recorded also at Cat Creek, Bear River, Weaver Lake and throughout the Whiteshell Forest Reserve.

Neodiprion nanulus nanulus Schedl. was widely collected throughout the District, but caused only light defoliation of the old foliage of jack pine. Collections were taken at Brereton Lake, Jessica Lake, Telford, Agassiz Forest Reserve and Weaver Lake.

Neodiprion americanus banksianae Roh. was found at low population levels, and caused only very light defoliation of jack pine. Colonies of this species were collected at Crow Duck, Brereton and Red Rock lakes.

Low populations of Neodiprion swainei Midd. were encountered in the Whiteshell area. Collections were taken in the Brereton Lake area where the defoliation was very light.

A single collection of Neodiprion maurus Roh. was made in the Rennie area where light defoliation of the old foliage of jack pine was observed.

3.3.16 Other Noteworthy Insects

Insect	Host(s)	No. of collections	Remarks
Acleris variana	wS, bF	9	Low populations throughout the District.
Acrobasis betulella	wB	2	Low populations in Whiteshell area.
Arge pectoralis	wB, spAl	3	Moderate defoliation at Weaver Lake. Light elsewhere.
Anoplonyx luteipes	tL	3	Low populations.
Anoplonyx canadensis	tL	3	Low populations.
Badebecia urticana	tA	19	Common in all trembling aspen stands.
Bucculatrix canadensisella	waB	2	Light skeletonization in Whiteshell Area.
Cecidomyia reeksi	jP	2	Low populations.
Chermes lariciatus	bS, wS	6	Low populations.
Dioryctria poss. zimmermani	jP	8	Common in eastern portion of District.
Dasyneura balsamicola	bF	4	Light damage along Winnipeg River.
Dioryctria reniculella	bF	2	Associated with spruce budworm at Crow Duck Lake.
Eriophyes sp.	gAs	1	Common at Pine Falls, Bear River and Bird Lake areas.
Hemichroa crocea	spAl	1	Light defoliation at Weaver Lake.
Lambdina fiscellaria fiscellaria	bF	26	Common in all spruce-balsam stands.
Lithocolletis salicifoliella	tA	5	Common on aspen reproduction.
Nycteola frigidana	bPo, W	17	Common throughout the District.
Pissodes strobi	jP	14	Common in all pine stands.
Pissodes sp.	jP	1	Collection taken in Agassiz Forest Reserve.
Petrova albicapitana	jP	4	Low populations.
Pikonema dimmockii	bS, wS, bF	13	Low populations.
Saperda calcarata	bPo, tA	12	Common in all aspen stands.
Semiothisa granitata	bF	6	Low populations.
Semiothisa sexmaculata	tL	9	Low populations.
Schizura ipomoeae	wB, bO	2	Low populations in Whiteshell Forest Reserve.
Tetralopha asperatella	tA, bO	6	Common throughout District.
Tetralopha robustella	jP	1	Low populations.
Tetralopha sp.	X	3	Low populations.
Toumeyella numismaticum	jP	6	Low populations.

Insect	Host(s)	No. of collections	Remarks
Chilocorus stigma	tA, W	3	Low populations.
Mulsantina picta	jP	2	Low populations.
Aphid spp.	Misc.	42	Special collections.
Proteoteras willingana	mM	5	Low populations.
Recurvaria sp.	bS	3	Pointe du Bois infestation subsided in 1960.
Malacosoma lutescens	cCh	3	Low populations.
Malacosoma americana	cCh	2	Low populations.
Malacosoma pluviale	tA, W, wB	7	Common in the Caribou and Wallace lakes areas.
Argyresthia laricella	tL	0	Surveys in three areas proved negative.

3.3.17 Permanent Sample Stations

Table 4

Summary of Collections of Major Insects from Permanent Sample Areas Based on 5 Tree Beating Samples

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av.no. of larvae per tree sampled
01	7	6	Pikonema alaskensis	wS	5.6
			Pikonema alaskensis	bS	1.1
			Pikonema dimmockii	bS	0.1
			Miscellaneous		0.2
02	6	4	Miscellaneous		0.4
03	6	5	Choristoneura conflictana	tA	0.4
			Gonioctena americana	tA	0.8
			Neodiprion abietis	bF	4.8
			Lambdina fiscellaria fiscellaria	bF	0.4
			Miscellaneous		2.8
04	3	3	Choristoneura conflictana	tA	0.1
			Tetralopha asperatella	tA	1.5
			Miscellaneous		1.2

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av.no. of larvae per tree sampled
05	12	12	Malacosoma pluviale	wB	0.4
			Malacosoma pluviale	tA	0.1
			Choristoneura fumiferana	bF	0.2
			Neodiprion abietis	bF	9.2
			Malacosoma disstria	tA	0.2
			Malacosoma disstria	spAl	0.1
			Malacosoma disstria	Do	1.2
			Miscellaneous		1.0
06	5	4	Gonioctena americana	tA	0.3
			Choristoneura conflictana	tA	0.1
			Miscellaneous		0.2
07	5	5	Lambdina fiscellaria fiscellaria	bF	0.8
			Neodiprion abietis	bF	5.6
			Pikonema alaskensis	wS	0.2
			Neodiprion abietis	wS	0.4
			Acleris variana	wS	0.2
			Galerucella decora	W	0.4
			Malacosoma disstria	tA	0.2
			Miscellaneous		0.9
08	5	5	Malacosoma disstria	tA	0.8
			Neodiprion abietis	wS	3.4
			Pikonema alaskensis	wS	0.2
			Pikonema dimmockii	wS	0.6
			Acleris variana	wS	0.2
			Lambdina fiscellaria fiscellaria	bF	0.6
			Neodiprion abietis	bF	7.2
			Galerucella decora	W	1.0
			Malacosoma disstria	W	0.2
			Malacosoma disstria	Do	0.2
			Miscellaneous		0.4
09	9	9	Pikonema alaskensis	wS	1.6
			Pristiphora erichsonii	tL	1.8
			Choristoneura conflictana	tA	2.2
			Neodiprion abietis	bS	3.8
			Chrysomela knabi	spAl	4.6
			Miscellaneous		1.2

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av.no. of larvae per tree sampled
10	2	2	Neodiprion abietis	bF	27.6
			Miscellaneous		1.8
12	15	15	Choristoneura fumiferana	bF	0.6
			Choristoneura fumiferana	wS	0.5
			Neodiprion abietis	bF	0.1
			Pikonema alaskensis	wS	0.1
			Lambdina fiscellaria fiscellaria	bF	0.1
			Miscellaneous		0.2
13	4	4	Choristoneura fumiferana	bF	3.5
			Lambdina fiscellaria fiscellaria	bF	0.5
			Arge pectoralis	wB	2.2
			Miscellaneous		0.3
14	28	28	Neodiprion abietis	bF	3.9
			Neodiprion abietis	wS	0.2
			Neodiprion abietis	bS	3.3
			Neodiprion abietis	tL	1.0
			Choristoneura fumiferana	bF	2.3
			Choristoneura fumiferana	wS	0.4
			Pristiphora erichsonii	tL	1.5
			Pikonema alaskensis	bS	1.2
			Pikonema dimmockii	wS	0.2
			Lambdina fiscellaria fiscellaria	bF	0.1
			Lambdina fiscellaria fiscellaria	wS	0.1
			Galerucella decora	W	0.4
			Miscellaneous		0.9
15	5	5	Pristiphora erichsonii	tL	2.6
			Anoplonyx luteipes	tL	0.5
			Miscellaneous		0.1
16	7	7	Pristiphora erichsonii	tL	1.0
			Pikonema alaskensis	wS	0.4
			Miscellaneous		0.3
17	4	3	Choristoneura fumiferana	wS	0.6
			Miscellaneous		0.3

3.4 TREE DISEASE CONDITIONS

3.4.1 White Pocket Rot, Polyporus tomentosus

Three areas were selected in 1960 to determine the incidence of the white pocket rot attacking the root systems of white and black spruce. Five trees were selected from each site and the roots examined for decay. Two diseased roots were taken from each tree and submitted to the Saskatoon Laboratory for culture and identification. The results obtained are shown in Table 5.

3.4.2 Root and Butt Decay of Conifers, Flammula alnicola

Surveys designed to detect the presence of the decay, Flammula alnicola, were carried out in 1960. One hundred stumps were examined, and 10 stumps sampled at each of four locations. Decay samples were submitted to the Forest Pathology Laboratory for identification. The results are listed as follows:

Location	Size in acres	Tree sp.	Time of cut	Type of cut	No. of stumps examined	Av. d.b.h. (ins.)	No.of stumps with F. alnicola	No.of stumps with Other decays
Beaver Crk. Sec.7, tp.28, rge.5, E.P.M.	15	wS	1960	S	100	21	0	Unknown
Hecla Island Sec.34, tp.25, rge.6, E.P.M.	5	wS	1960	C	100	6	0	Unknown
Crow Duck Lk. Sec.28, tp.13, rge.16, E.P.M.	200	wS	1958 1959	S	100	10	0	P. tomentosus
Manigotagan Rd. Sec.36, tp.22, rge.9, E.P.M.	300	wS	1960	S	100	6	0	A. mellea

S - selective; C - clear.

3.4.3 Leaf Blight on Bur Oak

This blight, associated with Gleosporium sp., caused moderate to severe damage to the foliage of bur oak in the White Lake area of

Table 5

Results of Surveys for White Spruce Stand Openings of Polyporus tomentosus

Location	Size of plot (acre)	Av. tree ht. (ft.)	Av. age of stand	No. of patches per acre	No. of groups per acre	No. of single trees per acre	No. of trees examined	No. of healthy roots	No. of decayed roots	No. of decomposed roots	No. of root samples with		
											P. tomentosus	A. mellea	unknown
Bird Lk. Rd., Sec. 25,tp.17, rge.14, E.P.M.	1	75	75	1	5	25	5	0	26	23	0	3	6
Bear River Rd.,Sec.26, tp.19,rge. 14, E.P.M.	1	60	90	0	1	17	5	0	42	2	0	9	1
Washow Bay Sec.30,tp. 25,rge.4, E.P.M.	1	50	40	0	2	17	5	0	33	15	0	3	7

the Whiteshell Forest Reserve. Light defoliation occurred on several trees and samples, which were collected in June and July, were first records for Manitoba.

3.4.4 Dwarf Mistletoe on Jack Pine, Arceuthobium americanum

A survey of jack-pine stands along the new Grand Rapids Road showed a mistletoe infection on mature trees that have escaped repeated fires which have occurred in this area. Jack pine at two locations at Crow Duck Lake were heavily broomed similar to mistletoe attack. Surveys in 1961 will determine if this brooming is caused by Arceuthobium americanum.

3.4.5 Dwarf Mistletoe on Black Spruce, Arceuthobium pusillum

Surveys of black spruce stands in the Bissett, Winnipeg River and Eaglenest Lake areas failed to show any additional infected stands other than those previously recorded.

3.4.6 Shoestring Root Rot, Armillaria mellea

This disease was observed infesting white and black spruce and balsam fir in most areas surveyed in the Eastern District as far north as Aikens Lake. A. mellea sporophores were particularly plentiful in areas where balsam fir was destroyed in the winter of 1958.

3.4.7 Other Noteworthy Diseases

Host	Organism	Locality	Remarks
Balsam fir	Melampsorella cerastii	Pointe du Bois	Witches'-broom occasionally found on fir.
Balsam fir	Aleuridiscus amorphus	Manigotagan	Very common on winter killed balsam fir.
Balsam fir	Stereum sang sanguinolentum	Manigotagan	Very common on winter killed balsam fir.
Balsam fir	Pucciniastrum goeppertianum	Wallace Lake	Light attack on new foliage.

Host	Organism	Locality	Remarks
Aspen	Ciborina bifrons	Whiteshell F.R.	Light attack of leaf blight.
Aspen	Macrophoma tumefasciens	Pinawa, Rennie, Red Rock Lake	Aspen galls common in area.
Balsam poplar	Septoria musiva	Beresford Lk.	Common on foliage.
Mountain ash	Tubercularia vulgaris	Norway House	Dieback.
Aspen	Melanconium sp.	Molson Lake	Light attack.
Willow	Melampsora bigelowii	God's Lake	Common in District.
White spruce	Chrysomyxa sp.	Pointe du Bois	Light infection.
Black spruce	Chrysomyxa sp.	Interlake area	Light infection.

4. ANNUAL REPORT OF FOREST BIOLOGY RANGER SOUTHERN DISTRICT OF SASKATCHEWAN

1960

by

M. R. Pratt

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

4.1 INTRODUCTION

Forest insect and tree disease surveys were carried out in the Southern District of Saskatchewan from April 25 to September 15. A total of 382 insect and 25 tree disease collections were taken from shelterbelts, plantations, and native stands throughout the District. In addition to general sampling, a number of mass collections were made of the spruce budworm, forest tent caterpillar, larch sawfly cocoons, false webworm, and adults of the beetle, Chilocorus stigma, for special studies. During the first two weeks of September, a forest tent caterpillar egg band survey was conducted in the Cypress Hills Provincial Forest. Population counts of fall cankerworm and boxelder twig borer were continued in Manitoba maple shelterbelts throughout the District.

4.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

The forest tent caterpillar infestation in the Cypress Hills continued to be the most serious insect problem in southern Saskatchewan in 1960. Spruce budworm populations remained high in the West Block of the Cypress Hills Provincial Forest, but only low populations occurred in shelterbelts and on ornamental plantings. The yellow-headed spruce sawfly caused only light defoliation to spruce shelterbelts throughout the District. The leaf rollers, Epinotia nisella criddleana and Pseudexentera improbana oregonana, caused considerable damage to the foliage of native aspen stands in the eastern half of the District. Larvae and adults of the leaf beetle, Chrysomela crotchi, caused considerable skeletonizing on foliage of trembling aspen in the southeastern part of the Province.

Samples of the decay fungus, Radulum caesearium, were taken for the first time in Saskatchewan from windthrown trembling aspen in the Moose Mountain Provincial Park.

4.3 INSECT CONDITIONS

4.3.1 Spruce Budworm, Choristoneura fumiferana (Clem.)

For the past five years, white spruce stands along the Battle Creek in the West Block of the Cypress Hills Provincial Forest have been infested with spruce budworm. During this period light to moderate defoliation has occurred over an area of approximately seven square miles. Although no tree mortality has been noted to date, trees that have been defoliated for three or more consecutive years show evidence of dead leaders and forked tops.

In 1960 moderate populations of the spruce budworm defoliated approximately one hundred acres of white spruce along the Battle Creek Valley in Secs. 2 and 11, tps. 8, rge. 30, W.3rd mer. (Fig. 5). Back feeding was noted on old foliage of the more severely infested trees.

Egg counts were made at four locations in the most heavily infested area in order to forecast the probable intensity of spruce budworm populations in 1961. A summary is shown in Table 1.

Table 1

Spruce Budworm Defoliation Forecast at Four Sample Points in the West Block of the Cypress Hills Provincial Forest (based on the examination of one 18" branch on 10 white spruce at each sampling point)

Sample Station	Location Sec.	Tp.	Rge.	Mer.	Av. no. egg clusters per 100 sq.ft. of foliage	Probable intensity of defoliation in 1961
1	2	8	30	W.3	68	Moderate
2	2	8	30	W.3	88	Moderate
3	11	8	30	W.3	74	Moderate
4	11	8	30	W.3	62	Moderate

These counts indicate no appreciable changes in budworm egg counts from 1959, and the infestation is expected to continue at about the same intensity in 1961.

During the first week in July, mass collections of spruce budworm larvae and pupae were taken from the infestation area and reared at the Winnipeg Laboratory for estimates of parasitism. Seventy-one per cent of the larvae, and eighteen per cent of the pupae were parasitized. To date all parasite species obtained in the rearings have not been positively identified. The parasites most commonly recovered from the mass collections are listed below.

Parasites taken from larval rearings	Parasites taken from pupal rearings
Aplomya caesar	Pseudosarcophaga affinis
Tortriciophaga tortricis	Pseudoperichaeta erecta
Madremyia saundersii	Itoplectis conquisitor
Phryxe pecocensis	
Glypta fumiferana	

Very light populations of the spruce budworm were encountered occasionally in spruce plantations and shelterbelts in the agricultural area of southern Saskatchewan. Larval collections were taken at Cupar, Finnie, Grenfell, Whitewood and Moosomin.

4.3.2 Forest Tent Caterpillar, Malacosoma disstria Hbn.

The severe infestation of forest tent caterpillar which has defoliated deciduous trees and shrubs in the Cypress Hills Provincial Forest for the past four years continued in 1960. The boundaries of infestation are shown in Fig. 3.

In the Park Block 60 to 70 per cent of the aspen stands were severely defoliated. Severe defoliation also occurred in the East Block along the northern slopes extending east to west for a distance of approximately 15 miles. Although an occasional egg band was collected in late summer from trembling aspen in the West Block, no defoliation was noted in this area during the larval feeding period.

Very light populations occurred in scattered locations throughout the aspen grove region of the District. Larval samples were taken in the Moose Mountain Provincial Park, Carlyle, Manor, Qu'-Appelle and Moosomin.

The first emergence of larvae from the eggs was observed on May 12 on sheltered trembling aspen in the Cypress Hills. Cool wet weather appeared to have delayed larval and host tree development. By the second week in June only a very small percentage of the larvae had commenced pupating. The prolonged period of larval development in this area appeared to be detrimental to survival. Although no population counts were made, it was observed that larvae became noticeably less abundant as the feeding period progressed. As indicated below this evidence of a general decline in outbreak intensity is substantiated by egg band counts in the fall of 1960 which were considerably lower than in 1959.

In order to forecast population levels in 1961, egg band counts were taken in mid-September on native aspen stands throughout the Cypress Hills and at points in the aspen grove region where larvae were found earlier in the season. The survey in the Cypress Hills was somewhat more intensive than in 1959 to provide a better knowledge of infestation boundaries. The egg counts indicated a substantial decline in populations when compared with population counts made in 1959. Despite this decline, however, numbers remain sufficiently high to cause moderate to severe defoliation over most of the Cypress Hills Park and East blocks. The West Block remains relatively free of forest tent caterpillar. No egg bands were found at other locations in southern Saskatchewan, indicating the probability that the 1961 infestation will be confined to the Cypress Hills. Data from this survey are summarized in the following table.

Mass collections of forest tent caterpillar larvae and pupae were collected in the Cypress Hills and reared for parasite recovery. Results of these rearings indicate a significant increase in larval and pupal parasitism. In 1960 larval parasitism was estimated as 13 per cent as compared to 2 per cent in 1959. Pupal parasitism was 30 per cent in 1960 as compared to 5 per cent in 1959.

Location	No.of trees	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. crown depth	Av. no. egg bands 1959	Av. no. egg bands 1960	Forecast 1961
Cypress Hills West Block	3	2.5	15	10'	0.3	0.7	Light
Cypress Hills West Block	3	2.7	23	17	0.0	0.33	Light
Cypress Hills West Block	3	3.5	30	15	-	0.3	Light
Cypress Hills West Block	3	3.7	25	13	-	0.3	Light
Cypress Hills West Block	3	3.0	23	13	-	0.0	Light
Cypress Hills West Block	3	3.3	18	11	-	0.0	Light
Cypress Hills West Block	3	2.5	18	12	0.3	0.0	Light
Cypress Hills West Block	3	2.5	18	10	-	0.0	Light
Cypress Hills West Block	3	2.4	16	9	-	3.0	Light
Cypress Hills East Block	3	3.8	22	14	-	21.0	Severe
Cypress Hills East Block	3	2.8	22	13	54.3	21.7	Severe
Cypress Hills East Block	3	3.1	26	14	-	12.0	Severe
Cypress Hills East Block	3	2.6	16	10	23.6	1.3	Light
Cypress Hills East Block	3	3.6	22	11	5.3	4.3	Severe
Cypress Hills East Block	3	3.6	22	11	-	14.3	Severe
Cypress Hills East Block	3	4.8	25	18	64.3	12.0	Severe

Location	No.of trees	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. crown depth	Av. no. egg bands 1959	Av. no. egg bands 1960	Forecast 1961
Cypress Hills East Block	3	4.1	22	18	2.6	11.6	Severe
Cypress Hills East Block	3	3.0	22	9	50.3	7.0	Severe
Piapot 12 mi. south	3	3.3	21	17	-	2.0	Light
Cypress Hills Park Block	3	4.1	22	15	-	10.3	Severe
Cypress Hills Park Block	3	4.1	21	12	35.3	11.0	Severe
Cypress Hills Park Block	3	3.2	27	7	-	0.3	Light
Cypress Hills Park Block	3	4.0	24	10	10.7	0.3	Light
Cypress Hills Park Block	3	3.5	22	7	56.0	2.0	Light-moderate
Cypress Hills Park Block	3	3.3	21	8	-	9.0	Severe
Cypress Hills Park Block	3	5.3	38	14	-	20.0	Severe
Cypress Hills Park Block	3	3.7	24	11	18.0	1.0	Light
Cypress Hills Park Block	3	5.0	37	9	-	4.6	Moderate-Severe
Maple Creek 9 mi. south	3	2.3	17	10	-	0.3	Light
Birch Creek Ranger Stn.	3	3.6	22	13	-	49.0	Severe
Manor, Sask.	3	3.5	24	17	0.0	0.0	Light
Moose Mountain	3	4.2	25	14	0.0	0.0	Light

4.3.3 Fall Cankerworm, Alsophila pometaria (Harr.)

The fall cankerworm continued to be the most destructive pest of Manitoba maple and white elm shelterbelts through southwestern Saskatchewan. Severe infestations continued in the vicinity of Swift Current, Success, Rosetown and Maple Creek. In these areas, a considerable amount of branch mortality at all crown levels was noted where severe defoliation has occurred for the past four years. Elsewhere in the District, infestations of this insect were light and caused little or no defoliation. The severe infestations reported in 1957 and 1958 at Findlater, Grenfell, Yorkton and Melville have completely subsided. Light populations of this insect were found on maple and elm in the Estevan-Carlyle areas.

Population counts were continued in Manitoba maple shelterbelts at Swift Current, Success, Ernfold, Wymark, Stewart Valley, and Maple Creek. The results are shown in Table 2.

Table 2

Results of Special Sampling to Determine Incidence of the Fall Cankerworm on Manitoba Maple Shelterbelts

Location	Tree no.	No. of leaf clusters examined	No. of leaf clusters containing larvae	Percentage of leaf clusters infested	Av. no. of larvae/ infested leaf clusters	Percentage of defoliation at end of feeding
Ernfold	1	48	47	98	3.7	80
Sec. 7,	2	48	48	100	4.9	85
tp. 17,	3	48	48	100	4.2	80
rge. 17,	4	48	48	100	7.5	100
W.3 mer.	5	48	48	100	6.5	95
Beverly	1	48	48	100	10.2	100
Sec. 28,	2	48	48	100	10.5	100
tp. 15,	3	48	48	100	10.3	100
rge. 15,	4	48	48	100	10.7	100
W.3 mer.	5	48	48	100	15.0	100
Cantuar	1	48	24	50	1.3	40
Sec. 10,	2	48	25	52	1.2	50
tp. 16,	3	48	39	81.2	1.5	55
rge. 15,	4	48	41	85.4	2.0	65
W.3 mer.	5	48	36	75	1.4	55

Location	Tree no.	No. of leaf clusters examined	No. of leaf clusters containing larvae	Percentage of leaf clusters infested	Av. no. of larvae/ infested leaf clusters	Percentage of defoliation at end of feeding
Stewart Valley	1	48	48	100	8.3	95
Sec. 13,	2	48	48	100	11.3	100
tp. 19,	3	48	48	100	10.1	95
rge. 14,	4	48	48	100	10.5	100
W.3 mer.	5	48	48	100	10.6	100
Maple Creek	1	48	48	100	3.4	70
Sec. 36,	2	48	43	90	2.6	65
tp. 11,	3	48	48	100	3.6	75
rge. 36,	4	48	46	96	3.6	65
W.3 mer.	5	48	48	100	2.8	60
Wymark	1	48	48	100	9.8	95
Sec. 27,	2	48	48	100	7.8	85
tp. 13,	3	48	48	100	9.3	95
rge. 14,	4	48	48	100	9.4	90
W.3 mer.	5	48	48	100	7.3	85

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

Populations of the yellow-headed spruce sawfly were generally light on white spruce shelterbelts and ornamental plantings in southern Saskatchewan. Light to moderate infestations still persist on ornamental spruce at Kenosee Lake and in the Duff-Lorlie areas.

4.3.5 Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

The large aspen tortrix occurred only in the aspen grove region in the eastern part of the District. Populations were very low with only an occasional larva or pupa collected during May and June.

4.3.6 Pine Needle Scale, Phenacaspis pinifoliae (Fitch.)

This scale was lightly distributed on white spruce shelterbelts and ornamental plantings throughout the southeastern part of the District. In most cases only a few trees in each shelterbelt suffered any noticeable scale damage.

A special survey was carried out to determine the distribution of the Coccinellid beetle, Chilocorus stigma (Say), which is a predator of the pine scale. Larvae and adults of this beetle were found in shelterbelts at Lemberg, Creelman, Grenfell, Neudorf, Wolseley, Summerberry, and Indian Head. This material was shipped to Sault Ste. Marie for cytogenetic studies.

4.3.7 Spruce Spider Mite, Oligonychus ununguis (Jac.)

Low populations of the spruce spider mite occurred on ornamental and shelterbelt spruce. Strong winds and cool wet weather during May and June were probably the main factors responsible for the decreased activity of this pest. Light damage to the foliage of white spruce was recorded in plantations at Indian Head and in shelterbelts at Yorkton, Qu'Appelle, Melville, and Wolseley. Spruce plantings in the central and western portions of the District were relatively free from spider mite damage.

4.3.8 Boxelder Twig Borer, Proteoteras willingana (Kft.)

The boxelder twig borer was found on most Manitoba maple shelterbelts, but populations remained at about the same level as in 1959. This was indicated by sampling carried out at seven representative sample points established throughout the District in 1956. In each area, five trees were selected for examination and the number of twig borers was counted on four branch samples taken at each of three crown levels. The results of these counts are shown in Table 3.

4.3.9 Ugly-nest Caterpillar, Archips cerasivorana (Fitch.)

Low populations of the ugly-nest tortrix were recorded this year in the Southern District of Saskatchewan. A few nests of this insect were found at Caron and in the Frenchman Creek area near Eastend and Ravenscrag. Through the remainder of the District, this insect caused very little damage to roadside cherry.

4.3.10 Gray Willow-leaf Beetle, Galerucella decora Say

A light infestation of the gray willow-leaf beetle occurred on soft-leafed willows in the Cypress Hills Provincial Forest. Elsewhere in the District only an occasional adult and larva were collected.

Table 3

Summary of Boxelder Twig Borer Population Counts

Location	No. of trees examined	Av. ht. (ft.)	Av. crown depth (ft.)	Av. crown width (ft.)	No. of twigs examined and twig borer populations per crown class					
					Lower		Mid		Upper	
					No. twigs	No. borers	No. twigs	No. borers	No. twigs	No. borers
Swift Current Sec.6, tp. 17, rge.13, W.3mer.	5	24	15	10	413	3	453	4	419	8
Findlater Sec.20, tp.21, rge.25, W.2mer.	5	25	20	11	477	17	453	5	419	7
Moose Jaw Sec.33, tp.15, rge.25, W.2mer.	5	23	18	12	379	9	382	5	386	6
Willowbrook Sec.4, tp.26, rge.3, W.2mer.	5	27	13	11	401	17	395	20	447	10
Indian Head Sec.35, tp.19, rge.13, W.2mer.	5	22	15	12	267	6	372	6	440	10
Carlyle Sec.31, tp.5, rge.2, W.2mer.	5	23	17	12	293	3	311	1	293	3
Maple Creek Sec.36, tp.11, rge.27, W.3mer.	5	17	14	9	173	0	161	0	163	0

4.3.11 American Poplar Beetle, Phytodecta americana Schffr.

A light infestation of this beetle occurred on small trembling aspen in the Cypress Hills Provincial Forest. Only an occasional colony was collected from small aspen groves in the eastern half of the District.

4.3.12 Leaf Rollers of Aspen

Combined feeding by the leaf rollers, Epinotia nisella criddleana and Pseudexentera improbana oregonana, caused patches of severe damage to foliage of native aspen. These leaf rollers destroy aspen foliage by rolling a tight protective cover of four to six leaves while in the larval and pupal stages. Populations reached infestation proportions in the aspen grove region from Indian Head east to the Manitoba boundary. All the foliage on many trees had been rolled by leaf rollers and by the end of June dried and withered foliage was very noticeable throughout this region.

During the peak of the larval feeding period a sample of 117 larvae was beaten from one 4 1/2 inch d.b.h. aspen tree in the Grenfell area. By the last week of June most of the leaf rollers had left the protective leaf envelopes to pupate in the duff at the base of the infested trees.

4.3.13 A Leaf Beetle, Chrysomela crotchi

A moderate infestation of this leaf-skeletonizing beetle extended through most native aspen groves eastward from Mortlach to the Manitoba-Saskatchewan boundary. Leaf beetle skeletonizing was mainly confined to small trees ranging from one to three inches d.b.h.

A particularly severe infestation occurred in bluffs of small aspen in the Moose Mountain Provincial Forest and adjacent areas. Throughout this infestation, a small percentage of Chrysomela crotchi larvae were parasitized by an insect which deposits from six to twelve small, white eggs on the host larvae. Samples of the parasitized material were collected and forwarded to the Winnipeg Laboratory for further study and identification.

4.3.14 The False Sawfly, Acantholyda sp.

White spruce in the Cupar cemetery was severely defoliated by larvae of the false sawfly, Acantholyda sp. A mass collection of 100 larvae was forwarded to the Winnipeg Laboratory for parasite emergence records. This is the first record of this insect in southern Saskatchewan.

4.3.15 Larch Sawfly, Pristiphora erichsonii (Htg.)

Larch sawfly populations remained low in plantations at Wolseley, Indian Head, and at the Battle Creek Ranger Station. A mass collection of larch sawfly cocoons was taken from the Wolseley plantation and dissected for parasite recovery. Results of cocoon dissections are shown in Table 4.

4.3.16 Prairie Tent Caterpillar, Malacosoma lutescens (N. & D.)

Moderately high populations of this tent caterpillar occurred across the southern part of Saskatchewan, where it was commonly found on rose, gooseberry and chokecherry bushes. Collections were taken in the Cypress Hills, Moose Jaw, Qu'Appelle and Moose Mountain areas.

4.3.17 Webworms on Aspen, Meroptera pravella Grt. and Tetralopha asperatella Clem.

These webworms were common on trembling aspen in the Cypress Hills Provincial Forest and surrounding area. The heaviest concentrations of larvae were found in aspen stands previously defoliated by forest tent caterpillar, where they were frequently found inhabiting the old emerged forest tent caterpillar pupal cases.

A noticeable increase in webworm populations occurred in the eastern half of the District. Native aspen stands from Moose Jaw east to the Manitoba boundary were lightly infested. In this area, larvae were most abundant on aspen foliage that had previously been damaged by the leaf rollers, Epinotia nisella criddleana and Pseudexentera improbana oregonana. Colonies of webworm larvae were frequently found feeding within partially skeletonized leaf clusters vacated by leaf rollers.

4.3.18 Other Noteworthy Insects

Insect	Host	No. of collections	Remarks
Operophtera bruceata	Trembling aspen	17	Common throughout the District.
Lithocolletis salicifoliella	Trembling aspen	5	Found occasionally on small trees, caused no significant damage.
Nymphalis antiopa	Black poplar	8	Occasionally found in the eastern portion of the District.

Table 4

Summary of Larch Sawfly Cocoon Dissections

Location	No. of cocoons examined	No. of larch sawfly containing Mesoleius		Percentage effective parasitism based on living larvae			Percentage cocoons diseased	Percentage larvae dead from unknown causes
		eggs	larvae	Bessa harveyi	Mesoleius tenthredinis	Tritneptis klugii		
Wolseley Sec.2, tp.17, rge.10, W.2mer.	229	0	0	25.5	0	0	23.7	14.5

Insect	Host	No. of collections	Remarks
Trichiosoma triangulum	Willow	10	Common in the eastern portion of the District.
Thida cordigera	Green ash	5	Occasionally found in plantations.
Mordwilkoja vagabunda	Trembling aspen	13	Common in the eastern part of the District.
Dioryctria reniculella	White spruce	10	Low populations associated with spruce budworm in the Cypress Hills.
Olene vagans	Trembling aspen	4	Found occasionally on trembling aspen.
Orthosia hibisci	Manitoba maple, trembling aspen	7	Found occasionally throughout the District.
Chrysomela interrupta	Trembling aspen	5	Found occasionally throughout the District.

4.3.19 Permanent Sample Stations

Sampling stations, previously established throughout the District, were sampled regularly during the season. The average number of larvae per tree, based on collections taken during the larval feeding period, is shown in the following table.

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av.no.of larvae per tree sampled
01	9	5	Miscellaneous	tA	0.6
			Nymphalis antiopa	bPo	2.0
			Chrysomela sp.	tA	4.1
			Pikonema alaskensis	wS	8.6
			Tethida cordigera	E	0.2
02	12	5	Miscellaneous	wB	0.6
			Chrysomela crotchi	tA	6.8
			Pikonema alaskensis	wS	2.7
03	5	1	Miscellaneous	wS	0.4

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av.no.of larvae per tree sampled
05	9	5	Pristiphora erichsonii	tL	6.0
			Choristoneura fumiferana	wS	14.0
			Dioryctria reniculella	wS	0.7
06	8	5	Tetralopha asperatella	tA	1.6
			Miscellaneous	W	0.8
			Malacosoma disstria	tA	1.0
			Pseudexentera improbana oregonana	tA	0.6
07	9	4	Miscellaneous	tA	0.5
			Malacosoma disstria	tA	1.3
			Gonioctena americana	tA	2.1
31	5	0	Negative (scale)	wS	
32	3	2	Tetralopha asperatella	tA	2.3
33	2	1	Alsophila pometaria	mM	6.2
61	7	2	Miscellaneous	tA	0.7
66	4	3	Miscellaneous	tA	1.0
			Epinotia nisella criddleana	tA	7.3
99	9	4	Semiothisa sexmaculata	tL	2.8
			Anacamptodes vellivolata	tL	0.4
			Pristiphora erichsonii	tL	6.7

4.4 TREE DISEASE CONDITIONS

4.4.1 Canker of Aspen, Hypoxylon pruinatum

Hypoxylon canker occurs commonly throughout all aspen stands in the Southern District of Saskatchewan. Dead tops and branches, caused by complete girdling are common through the aspen grove region in the southeast section of Saskatchewan. Aspen stands in southern Saskatchewan are particularly susceptible to this disease as growth conditions are seldom ideal. Over the years, trembling aspen in the prairie region has been continuously battered by severe hail storms, which have caused bark bruises and openings, and made the trees particularly susceptible to disease.

4.4.2 Slash Decay, Polyporus pargamenus

Samples of this fungus were collected from windthrown trembling aspen in both the Moose Mountain and Cypress Hills Provincial forests. No evidence of this slash fungus was observed in aspen groves on the prairies or in shelterbelts.

4.4.3 Slash Decay, Radulum casearium

Samples of the trunk rot, Radulum casearium, were collected from overmature aspen stands in the Moose Mountain Provincial Park. Fruiting bodies of this disease were taken from the undersurface of windthrown dead trembling aspen.

4.4.4 White Pocket Rot, Polyporus tomentosus

Surveys for the occurrence of white pocket rot, Polyporus tomentosus, were carried out in two areas in southern Saskatchewan. The root systems of five dead trees in each area were examined and ten root samples from each study plot were sent to the Pathology Laboratory at Saskatoon for further study. A summary of the data obtained from this survey is shown in Table 4.

Table 4

Results of Survey of Spruce Stand Openings for *Polyporus tomentosus*

Location	Size of plot (ch.)	Av. tree ht. (ft.)	Av. age of stand (yrs.)	No. of patches per acre	No. of groups per acre	No. of single trees per acre	No. of trees examined	No. of healthy roots	No. of decayed roots	No. of decomposed roots	No. of root samples with *P. tomentosus*	No. of root samples with *A. mellea*	No. of root samples unknown
Cypress Hills Park Block Sec.21, tp.8, rge.2, W.3mer.	1x1	54	80	1	0	3	5	12	23	8	0	10	0
*Indian Head For. Farm Sec.12, tp.18, rge.13, W.2mer.	1x1	26	44	4	0	0	5	41	0	0	0	0	3

* All trees examined were dead and dry. Slight trace of red stain on all roots, but roots seemed to be sound and hard, no punky or rotten roots encountered.

4.4.5 Other Noteworthy Diseases

Host	Organism	Locality	Remarks
Lodgepole pine	Spherical gall rust	Cypress Hills	Lightly infests small percentage of lpP in Park area.
Trembling aspen	Polyporus picipes	Moose Mountain	Slash fungus.
Trembling aspen	Poria sp.	Moose Mountain	Common on tA windthrow.
Trembling aspen	Polyporus adustus	Moose Mountain	Slash fungus.
White birch	Fomes igniarius	Moose Mountain	Common on mature wB in Moose Mnt. area.
Willow	Rhytisma salicinum	Moose Jaw	Tar spot, very noticeable towards end of August.
White spruce	Peridermium coloradense	Cypress Hills	Yellow witches'-broom found occasionally on wS.
Cherry	Dibotryon morbosum		Commonly seen where cCh bushes occur in southern Sask.
Trembling aspen	Fomes igniarius	Moose Mountain, Cypress Hills	Common on windthrown tA.

5. ANNUAL REPORT OF FOREST BIOLOGY RANGER

WESTERN DISTRICT OF MANITOBA

1960

by

J. J. Lawrence

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

5.1 INTRODUCTION

Forest insect and tree disease surveys were conducted by the writer from May 15 to October 15 in the Western District of Manitoba during 1960.

The following surveys and sub-projects were carried out: (1) a phenological survey; (2) foliage production, defoliation estimates and water level measurements in tamarack stands; (3) sequential sampling of larch sawfly egg populations; (4) larch sawfly cocoon collections from larval drop trays for parasite studies; (5) distribution survey for the white pocket rot, Polyporus tomentosus, in conjunction with Hylobius spp. damage assessment; (6) a survey for the distribution of the decay, Flammula alnicola; (7) frequency of occurrence studies of spruce foliage insects; (8) establishing permanent sample plots in tamarack stands; (9) spruce budworm egg sampling on white spruce; and (10) forest tent caterpillar egg band survey. Four hours and forty-five minutes of flying time were used on aerial surveys in western Manitoba for mapping infestations of spruce budworm, forest tent caterpillar, large aspen tortrix and leaf beetles, Chrysomela sp.

The assistance and co-operation given by the Provincial Forest services, National Parks personnel and private co-operators in carrying out the field program is gratefully acknowledged.

5.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

Populations of the larch sawfly showed a further increase in 1960. Moderate defoliation with an occasional pocket of severe defoliation occurred from Minnedosa north through Riding Mountain National Park, Dauphin, and Winnipegosis to the Duck Bay area. Light to moderate defoliation was recorded in the southern portion of the Duck Mountain Forest Reserve, the Boggy Creek area, Benito and northwest of Cowan to Renwer.

Two infestations of the spruce budworm were recorded in Riding Mountain National Park; one of light intensity was noted on white spruce in the vicinity of Clear Lake and the other of moderate intensity on mature balsam fir along the east slopes of the Park west of McCreary. Elsewhere this insect caused only light defoliation.

A moderate infestation of the forest tent caterpillar covering approximately 2 townships of trembling aspen was recorded south of Ashville in Riding Mountain National Park. Activity of the large aspen tortrix on trembling aspen stands declined throughout the District and only three small infestations remained, two near Clear Lake and the third north of Grandview. The yellow-headed spruce sawfly was found on white and black spruce throughout the District but defoliation was confined to reproduction in native stands and to shelterbelts.

An increase in populations of the balsam-fir sawfly caused moderate defoliation in a white spruce shelterbelt at Strathclair and in a small native stand at Camperville. Three species of leaf beetles, Chrysomela crotchi, C. knabi, and Altica populi, caused moderate to severe skeletonizing of trembling aspen and balsam poplar foliage and light defoliation of alder at a number of locations.

A survey for the decay, Flammula alnicola, was carried out at 3 locations with negative results. Investigations of stand openings in spruce were carried out at two locations to determine the incidence of the white pocket rot, Polyporus tomentosus. Tree mortality was negligible on the plots examined; one dead spruce was noted on the first plot examined and two on the other plot. Leaf blights, Melanconium sp. and Septoria musiva, caused considerable damage to the foliage of trembling aspen and balsam poplar in the townsite of Wasagaming. A needle rust of white and black spruce, Chrysomyxa sp., occurred in scattered locations, with the heaviest infections again occurring in Riding Mountain National Park.

A twig blight, Napicladium tremulae, caused considerable damage to the new growth of trembling aspen reproduction at several locations throughout the District. An ink spot, Ciborina bifrons, caused only light damage to trembling aspen foliage during 1960.

5.3 INSECT CONDITIONS

5.3.1 Larch Sawfly, Pristiphora erichsonii (Htg.)

Although the intensity of infestations varied between stands, there was a general increase in populations of the larch sawfly. Excellent shoot growth and foliage production was noted in most stands examined. Surface water disappeared from most tamarack bogs early in the season. Infestation ratings and distribution of the larch sawfly are shown in Figure 1.

Moderate to severe defoliation prevailed in widely scattered stands of tamarack from Minnedosa north to the Park and west from Onanole through Horod and Seech to Russell. Throughout Riding Mountain National Park defoliation of tamarack by the larch sawfly was moderate with a few widely scattered pockets of severe defoliation noted in the eastern and northern sections of the Park. From Dauphin north to Winnipegosis, and from Pine River to Duck Bay, defoliation ranged from moderate on mature trees to severe on smaller trees in the one and two inch diameter classes. North of Rorketon to Skowman defoliation was light with occasional moderate attack on tamarack reproduction. Defoliation was light to moderate in the southern portion and light in the northern part of the Duck Mountain Forest Reserve. In the Cowan area, defoliation was light with some scattered pockets of moderate attack. Pockets of moderate defoliation were also recorded in the vicinity of Benito and Boggy Creek.

Sequential sampling of egg populations of the larch sawfly was carried out in three permanent tamarack sample plots. Infestation ratings were based on the per cent utilization of current shoots for oviposition by adult sawflies. Results are shown below.

Location and plot no.	No. shoots examined	No. curled shoots	Infestation rating 1960
Riding Mountain N.P. 107	60	1	Light
Riding Mountain N.P. 108	120	17	Moderate
Cowan 111	70	2	Light

Cocoons were again collected from two permanent tamarack plots, one in Riding Mountain National Park, and the other at Cowan. Results of the larval dissections and cocoon counts are shown in Table 1.

Parasitism by Bessa harveyi ranged from 28 per cent at Riding Mountain National Park to 48 per cent at Cowan. This represents a decrease of 11 per cent at the former location and an increase of 19 per cent at the latter over the previous year. Effective parasitism by Mesoleius tenthredinis was 2 and 3 per cent respectively, an increase of 2 per cent at both locations.

5.3.2 Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

A general decrease in populations of the large aspen tortrix was again evident throughout the District (Fig. 4). In Riding Mountain National Park two small areas of defoliation remained. One infestation occurred east of Wasagaming in secs. 26, 27, 28 and 29, and the south half of secs. 34 and 35, tp. 18, rge. 19, W.P. mer. The other infestation covered secs. 14, 21, 22, 23, 37 and 38, tp. 20, rge. 19, W.P. mer. Throughout both infestations defoliation of trembling aspen by this species ranged from light to moderate.

In the Duck Mountain Forest Reserve there was also a sharp reduction in the area infested by the large aspen tortrix. Light to moderate defoliation was recorded in the north half of tp. 26, rges. 24 and 25, and the south half of tp. 27, rges. 24 and 25, W.P. mer. Within the remaining boundary of the 1959 infestation only light defoliation was encountered.

Table 1

Results of Cocoon Counts and Larval Dissections of the Larch Sawfly from 20 Larval Drop Trays at Two Study Areas

Location and plot no.	No. of cocoons	No. of cocoons destroyed in field		No. of larvae dissected	No. of larvae containing parasites				Diseased larch sawfly	
		Small mammals	Fall Bessa emergence		Mesoleius tenthredinis eggs	Mesoleius tenthredinis larvae	Bessa harveyi	Trit-neptis klugii	No. of cocoons examined	No. of larvae diseased or dead
R.M.N.P. 108	3354	126	86	200	3	5	56	0	332	132
Cowan 111	2438	596	338	200	9	2	97	0	410	210

Numerous collections were taken throughout the southern half of the District but defoliation was negligible.

5.3.3 Spruce Budworm, Choristoneura fumiferana (Clem.)

The spruce budworm reached infestation proportions in two widely separated areas in the Riding Mountain National Park. One infestation was located in the vicinity of Clear Lake and the other along the eastern slopes of the Park west of McCreary (Fig. 5). Elsewhere in the District, defoliation was very light. A summary of budworm collections showing frequency of occurrence in collections taken throughout the District is shown in Table 2.

With #10 Highway as the western boundary the infestation at Clear Lake extended north from the junction of #10 Highway and the Norgate Road to sec. 22, tp. 20, rge. 19, W.P. mer., thence north and east to Elk Lake, and southwest past Whirlpool Lake to the Norgate Road. Within this boundary, defoliation of the new growth of white spruce ranged from trace to 35 per cent. Stand composition is mainly white spruce ranging from 1 to 14 inches in diameter with some mature trembling aspen and scattered black spruce.

The infestation west of McCreary covered secs. 4, 5, 6, 7, 8, 9 and 10 and the south half of secs. 15, 16 and 17, tp. 21, rge. 16, W.P. mer. Stand composition in the accessible portion of the infestation consists of a pure stand of balsam fir. The defoliation of the new growth on balsam fir ranged from 5 to 75 per cent. Examination of the infested trees indicated that the infestation has been building up over the past three years.

5.3.4 Balsam-fir Sawfly, Neodiprion abietis complex

The balsam-fir sawfly caused moderate defoliation of white spruce at two widely separated locations: (1) a shelterbelt 1/2 mile east of Strathclair on trees ranging from 8 to 10 inches d.b.h.; (2) one mile north of Camperville (sec. 18, tp. 35, rge. 19, W.P. mer.) on a few open-growing native white spruce up to 6 inches d.b.h. Populations were also recorded in the townsite of Wasagaming, but defoliation was light. It was commonly found on white spruce elsewhere in the District but only a trace of defoliation was noted. A summary of all balsam-fir sawfly collections showing frequency of occurrence on sample trees is shown in Table 2.

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

Larval collections of this species were taken in nearly all white and black spruce stands in the Western District. Moderate defoliation was confined to reproduction at the following locations: 5 miles south of Skownan, 5 miles north of Bield, 4 miles south of Bield, 18 miles northwest of Grandview, and 4 miles east of Clear Lake. At

Newdale where extensive feeding had been recorded in previous years on a shelterbelt, populations were considerably lower apparently due to sparce foliage. Although defoliation was light this year, many of the trees showed signs of mortality. Throughout the remainder of the District defoliation was very light.

The green-headed spruce sawfly was found in conjunction with yellow-headed spruce sawfly at most locations but populations were at very low levels. A summary of yellow-headed and green-headed spruce sawfly collections showing frequency of occurrence on sample trees is shown in Table 2.

Table 2

Frequency of Occurrence of Sawflies and Budworms in Collections from White and Black Spruce Sample Points

Insect species	Host	No. of host trees sampled	Percentage of samples containing larvae	Av. no. of larvae per 5 tree sample*
Spruce budworm	wS	46	6	1
	bS	21	0	0
Black-headed budworm	wS	46	2	1
	bS	21	0	0
Yellow-headed spruce sawfly	wS	46	67	4
	bS	21	52	5
Green-headed spruce sawfly	wS	46	37	2
	bS	21	57	2
Balsam-fir sawfly	wS	46	24	7
	bS	21	10	4

* Only 5 tree beating samples were considered in this analysis.

5.3.6 Forest Tent Caterpillar, Malacosoma disstria (Hbn.)

Larvae of the forest tent caterpillar were collected at widely scattered locations throughout the District. Collections were taken at Onanole, Grandview, Cowan and Boggy Creek. At each location populations were at a very low level and little or no defoliation was recorded.

During an aerial survey in July a fairly extensive area of moderately defoliated trembling aspen was mapped south of Ashville inside the north boundary of Riding Mountain National Park (Fig. 2). A ground check in this area showed the presence of both the large aspen tortrix and forest tent caterpillar but indicated that high populations of the forest tent caterpillar in this area were responsible for most

of the defoliation. The infestation covered the north half of tp. 22, rges. 21 and 22, and the south half of tp. 23, rges. 21 and 22, W.P. mer., a total of approximately 72 square miles.

An egg band survey was carried out in early October to forecast the probable intensity and extent of the infestation in 1961. At each sample point three trembling aspen were felled and the branches examined for egg bands. A summary of these data are shown below.

Location	No. of trees examined	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. crown depth	Av. no. of egg bands	Forecast for 1961
Grandview	3	3.9	29	13	0.0	Nil
Grandview	3	4.3	33	18	0.0	Nil
Grandview	3	6.2	47	13	0.0	Nil
Boggy Creek	3	4.8	37	16	0.0	Nil
Boggy Creek	3	5.5	48	25	0.3	Light
Boggy Creek	3	4.8	38	22	0.3	Light
Boggy Creek	3	3.6	32	19	0.6	Light
Boggy Creek	3	3.6	33	13	0.3	Light
Boggy Creek	3	5.0	37	18	0.3	Light
Bield	3	3.0	22	19	0.3	Light
Bield	3	2.9	24	20	0.0	Nil
Audy Lake	3	4.0	30	16	12.6	Severe
Audy Lake	3	4.9	40	17	0.3	Light
Audy Lake	3	5.2	49	16	0.0	Nil
Wasagaming	3	3.2	26	18	0.0	Nil
Wasagaming	3	3.3	28	15	0.0	Nil
Wasagaming	3	3.2	26	17	0.0	Nil
Katherine Lk.	3	3.2	26	13	0.0	Nil
Clear Lake	3	4.2	36	16	0.0	Nil
Audy Lake	30	4.8	40	20	6.3	Moderate

Populations of the forest tent caterpillar in 1961 will be generally light throughout the District. Moderate to severe defoliation will be generally restricted to the area infested in 1960.

5.3.7 Spiny Elm Caterpillar, Nymphalis antiopa L.

Collections of this insect were taken at Audy Lake, Whitewater Lake, and along the Rolling River Road in Riding Mountain National Park. It was also collected north of Grandview and at Singoosh Lake in the Duck Mountain Forest Reserve. In these areas it caused moderate defoliation to small clumps of willow. Elsewhere in the District larvae were found only on nettles.

5.3.8 A Leaf Beetle, Chrysomela sp.

Three species of leaf beetles, Chrysomela crotchi, C. knabi, and Altica populi, caused considerable skeletonizing of trembling aspen and balsam poplar foliage throughout the District. Most of the larval feeding damage was on reproduction, while adult feeding occurred extensively on both reproduction and mature trees. Of the three species C. crotchi and C. knabi were the most common.

Defoliation by adults and larvae was severe on both reproduction and mature trembling aspen in the Minnedosa River Valley, in an area running north from the townsite of Minnedosa for approximately 4 miles and 1 mile in width. Other areas of moderate defoliation of aspen reproduction were located 4 miles east of Clear Lake, along the Rolling River Road, 10 miles west of Dauphin, 14 miles north of Grandview, 22 miles northwest of Grandview, 16 miles northeast of Bield and 12 miles east of Pine River. At all of the above locations the infestations were relatively small in size. At other locations where this insect was encountered defoliation was light.

5.3.9 A Root Weevil, Hylobius sp.

Two one-acre plots of spruce were cruised to determine the incidence of the root weevils, Hylobius spp. The number of dead dominant and co-dominant trees was recorded. Where mortality was encountered the root systems of 5 living and 5 dead trees were examined for weevil damage. A record was taken of the number of diseased roots. Results of the survey are shown in Table 3.

Table 3

Damage Index of Hylobius spp. at Two Study Plots

Location	Av. d.b.h. (ins.)		Av. ht. (ft.)		Damage index		Percentage of roots diseased on trees		Percentage of diseased roots with insect damage	
	Living	Dead	Living	Dead	Living	Dead	Living	Dead	Living	Dead
Riding Mnt. N.P.	10	10	46	40	0.8	0.3	41	23	13	0
Duck Mnt. F.R.	8.5	5.4	46	39	0.0	1.2	0	95	0	0

5.3.10 Other Noteworthy Insects

Insect	Host(s)	No. of collections	Remarks
Pissodes strobi	wS, jP	2	Two to 3% of leaders on wS dead in several small areas in R.M.N.P. Only 1 jP recorded as infested at the location west of Pine River.
Archips cerasivorana	rHaw, cCh	5	A moderate infestation from #10 Hwy. west to Audy Lake. Light webbing from Onanole west to Silverton. Severe infestation 6 miles north of Grandview on cCh and Haw.
Physokermes piceae	wS	8	Common on wS examined but damage was light.
Acleris variana	wS	4	Slight increase in populations but defoliation was negligible.
Epinotia nisella criddleana	tA	2	Very light.
Proteoteras willingana	mM	2	Very light.
Lecanium corni	mM	1	Very light.
Petrova albicapitana	jP	2	Very light.
Arge pectoralis	wB	1	Very light.
Fenusa dorhnii	spAl	1	Moderate in small area near Clear Lake.
Lithocolletis salicifoliella	tA	1	Very light.
Neodiprion virginiana	jP	1	Very light.
Phenacaspis pinifoliae	jP	1	Very light.
Malacosoma lutescens	cCh	1	Very light.
Dioryctria reniculella	wS	3	Very light.
Galerucella decora	W	1	Very light.
Nematus limbatus	W	3	Common in Duck Mnt. F.R.
Semiothisa sexmaculata	tL	12	Common but light defoliation.
Anoplonyx luteipes	tL	6	Common but light defoliation.
Neodiprion maurus	jP	1	Very light.
Anoplonyx canadensis	tL	2	Very light.

5.3.11 Permanent Sample Areas

The permanent sampling areas which were established in 1959 were sampled at various intervals during the season. Collections were taken from all tree species within the area. The average number of larvae per tree, based on the collections taken during the larval feeding period, is shown in Table 4.

Table 4

Summary of Collections of Major I sect Species from Permanent Sample Areas Based on 5 Tree Beating Samples

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av. no. of larvae per tree sample
01	17	11	Malacosoma disstria	tA	0.1
			Gonioctena americana	tA	0.1
			Chrysomela crotchi	tA	0.9
			Chrysomela crotchi	bPo	0.1
			Pristiphora erichsonii	tL	0.6
			Miscellaneous		0.7
02	16	12	Choristoneura fumiferana	wS	0.1
			Dioryctria reniculella	wS	0.2
			Choristoneura conflictana	tA	0.2
			Gonioctena americana	tA	0.3
			Tetralopha asperatella	tA	0.3
			Chrysomela knabi	tA	0.4
			Chrysomela knabi	bPo	0.4
			Tetralopha asperatella	bPo	0.4
			Pikonema alaskensis	wS	0.2
			Pikonema alaskensis	bS	0.4
			Pikonema dimmockii	wS	0.4
			Pikonema dimmockii	bS	0.2
			Pristiphora erichsonii	tL	1.4
			Miscellaneous		0.6
03	17	17	Neodiprion abietis	bS	0.7
			Pikonema alaskensis	bS	0.2
			Pikonema dimmockii	bS	0.7
			Pikonema dimmockii	wS	0.2
			Pikonema alaskensis	wS	0.3
			Chrysomela knabi	bPo	0.9
			Chrysomela knabi	tA	2.1
			Chrysomela crotchi	bPo	0.9
			Chrysomela crotchi	tA	0.1
			Pristiphora erichsonii	tL	2.6
			Neodiprion virginiana complex	jP	0.8
			Miscellaneous		0.6

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av. no. of larvae per tree sample
04	20	20	Choristoneura fumiferana	wS	0.1
			Pikonema alaskensis	wS	0.5
			Pikonema alaskensis	bS	1.1
			Pikonema dimmockii	wS	0.4
			Pikonema dimmockii	bS	0.1
			Neodiprion abietis complex	bS	0.1
			Neodiprion abietis complex	wS	0.1
			Pristiphora erichsonii	tL	3.5
			Chrysomela knabi	bPo	0.9
			Chrysomela crotchi	tA	2.2
			Tetralopha asperatella	bPo	0.6
			Arge pectoralis	wB	0.8
			Miscellaneous		0.7

5.4 TREE DISEASE CONDITIONS

5.4.1 Ink Spot on Trembling Aspen, Ciborina bifrons

There was a general decrease this past season in the intensity of this fungus, which commonly attacks the foliage of trembling aspen. Throughout Riding Mountain National Park and Duck Mountain Forest Reserve, only light damage was recorded at widely scattered points. In the Rorketon area, where in the previous year a light to moderate infection covered approximately one township, only a trace of this disease was noted.

5.4.2 Spruce Needle Rust, Chrysomyxa sp.

Some spruce needle rust was noted on most white and black spruce examined throughout the District, but for the most part the infection was light. Heavier infection was noted especially on black spruce 7 miles east of Clear Lake along the Norgate Road.

5.4.3 Leaf Spot on Trembling Aspen, Melanconium sp.

This foliage disease on trembling aspen was noted in two widely separated locations. In the trailer camp in Riding Mountain National Park, a few trees were infected, on which up to 70 per cent of the foliage turned black. The other area consisted of several small pockets (10 to 30 trees) between Toutes Aides and Meadow Portage. Up to 75 per cent of the foliage was infected in these pockets.

5.4.4 Leaf Blight on Balsam Poplar, Septoria musiva

This fungus caused severe browning of balsam poplar foliage in the trailer camp at Riding Mountain National Park. The first symptoms of the disease appeared in late June, and by the latter part of August the majority of the infected leaves had fallen leaving the trees bare. The area of attack covered about one acre.

5.4.5 Twig Blight on Trembling Aspen, Napicladium tremulae

This infection was common on most trembling aspen reproduction up to one inch d.b.h. throughout the District. Damage was characterized by wilting, turning black, and dying of the current leader growth. In some cases new shoots on the branches were also infected. Percentage of trees infected in the stand ranged from 10 to 20 per cent.

5.4.6 Needle Case on White Spruce, Hypodermella sp.

A collection of this disease was taken from one tree 24 miles north of Bield in the Duck Mountain Forest Reserve. Approximately 40

per cent of the 1959 needle growth on the infected tree had turned brown.

5.4.7 White Pocket Rot, Polyporus tomentosus

Two one acre cruise plots were surveyed for stand openings: one in Riding Mountain National Park, and the other in Duck Mountain Forest Reserve. In the Park, the root systems of 5 living white spruce and one dead black spruce were examined. No P. tomentosus was detected in the 5 living trees. In the Duck Mountain Forest Reserve, the root systems of 5 living and 2 dead white spruce were examined. The root systems of the 5 living trees were all healthy. Results of the survey of the root systems of the dead trees are shown in Table 5.

5.4.8 Root and Butt Decay of Conifers, Flammula alnicola

A survey was carried out in the Western District of Manitoba to detect the distribution of F. alnicola decay in recently cut-over areas of white spruce. Three areas were examined but no F. alnicola decay was found. A summary of the findings from each plot is shown in the following table.

Location	Size in acres	Tree sp.	Time of cut	Type of cut	No. of stumps examined	Av. d.b.h. (ins.)	No. of stumps with F. alnicola	Other decays
Riding Mountain National Park Sec.12, tp.21, rge.20, W.P.M.	2	wS	1959 1960	S	50	18	0	Coniophora putiana
Riding Mountain National Park Sec.7, tp.22, rge.19, W.P.M.	3	wS	1959 1960	S	45	22	0	Coniophora putiana
Duck Mountain Forest Reserve Secs. 1 & 2, tp.29, rge. 27 W.P.M.	5	wS	1959 1960	S	50	21	0	Coniophora putiana

S - selective.

Table 5

Results of Survey for Spruce Stand Openings of *P. tomentosus*

Location	Size of plot (acre)	Av. tree ht. (ft.)	Av. age of stand	No. of patches per acre	No. of groups per acre	No. of single trees per acre	No. of trees examined	No. of healthy roots	No. of decayed roots	No. of decomposed roots	No. of root samples with *P. tomentosus*	*A. mellea*	unknown
Duck Mnt. Forest Reserve	1	43	65	0	0	2	2	1	15	1	8	0	8
Riding Mnt. National Park	1	45	80	0	0	1	1	10	3	0	3	0	0

6. ANNUAL REPORT OF FOREST BIOLOGY RANGER

NORTHERN DISTRICT OF MANITOBA

1960

by

A. E. Campbell

FOREST BIOLOGY LABORATORY

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March, 1961

6.1 INTRODUCTION

Most of the survey projects which have been outlined in previous reports were continued and in some instances extended throughout the District in 1960. Surveys for forest insects and tree diseases were intensified in the Thompson smelter smoke easement area of northern Manitoba. Special collections of insect material were made for parasite and disease studies for personnel at the Winnipeg and other laboratories. Special studies relating to the effect of budworm infestations on white spruce stands in the Namew Lake region were continued. Surveys for the occurrence and distribution of insects attacking the root systems of white and black spruce were also continued.

Tree disease surveys were conducted throughout the District, with special attention given for the occurrence and distribution of Polyporus tomentosus and Flammula alnicola in white and black spruce stands. Inaccessible areas in the District required 25 hours of flying time representing some 2,700 air miles. Surveys by boat involved approximately 350 miles. Two hundred and forty-one insect and 27 tree disease collections were made in 1960.

The assistance and co-operation received from the Manitoba Forest Service and private co-operators during the season is gratefully acknowledged.

6.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

The spruce budworm continued to infest spruce and balsam-fir stands in the Namew and Amisk lakes region along the Manitoba - Saskatchewan boundary. Infestation boundaries showed further extensions to the northeast and west in 1960. There was some indication of increased tree mortality in the older part of the infestation near the Sturgeon Weir Settlement.

The distribution of the larch sawfly remained about the same as in 1959. However, egg population sampling indicated a general increase in numbers after several years of low populations.

Several small, but severe infestations, of the balsam-fir sawfly occurred in spruce and balsam-fir stands in the Setting and Wintering lakes area. This constitutes the first record of serious damage by this sawfly in the Northern District of Manitoba.

The forest tent caterpillar caused heavy defoliation of trembling aspen stands at several points throughout the northern section of the District; the largest of these infestations occurred along the south shore of Amisk Lake, and covered approximately three hundred and fifty acres.

The birch sawfly was commonly found on birch in the immediate vicinity of Atikameg Lake, but it was causing no appreciable defolia-

tion. Several species of Neodiprion sawflies were common on most jack pine examined throughout the District, but caused only a trace of defoliation to individual trees. A root weevil, Hylobius sp., caused moderate damage to the root systems of mature white spruce in the Simonhouse Lake area.

Light to moderate defoliation caused by a complex of insect species attacking the "club-tops" of black spruce was noted between Prospector and Root Lake. Elsewhere in the District, this type of feeding damage was negligible.

There was no change in the status of most tree diseases in the District. In 1960 special attention was given to the incidence and distribution of jack-pine rusts and their occurrence on alternate hosts, but the survey showed negative results. Special surveys were made for the incidence of the root and butt rots, Polyporus tomentosus and Flammula alnicola, in white and black spruce stands. The results of this survey are shown elsewhere in the report.

6.2.1 Pre-Operational Surveys in the Thompson Smelter Smoke Easement Area

Pre-operational aerial and ground surveys were conducted in early August to determine the general occurrence and abundance of forest insects and tree diseases within an area covering approximately 11,700 square miles in the immediate vicinity of the mining town of Thompson.

Merchantable forest stands in the Thompson area are generally restricted to lake shores, along river courses, and on the occasional island in the larger lakes. The remainder of the area is covered mostly with tamarack and black spruce swamps, and rock and gravel ridges.

Ground checks were made at widely scattered points throughout the easement area for the presence of forest insects and tree diseases. Where possible, a standard five tree beating sample was taken from major tree species usually in the vicinity of the SO_2 stations established by the International Nickel Company.

The most common forest insects in order of abundance found during the surveys were the larch sawfly, causing moderate to severe defoliation to tamarack stands throughout the area; and the balsam-fir sawfly, causing moderate to severe defoliation to spruce-balsam stands at several points. The balsam-fir sawfly was most abundant in the Setting Lake area and on several islands on the lake supporting mature balsam fir and white spruce. Spruce budworm populations were generally low in most stands examined. Considerable winter drying of balsam fir was noted in the area between Thicket Portage and Thompson in 1959. Due to the abnormally high populations of the balsam-fir sawfly recorded through this area in 1960 it is now considered that some of the discolouration of balsam-fir foliage reported as winter drying in 1959 may have been due to feeding damage by this insect.

6.3 INSECT CONDITIONS

6.3.1 Larch Sawfly, Pristiphora erichsonii (Htg.)

Surveys in 1960 indicated little change in the distribution of the larch sawfly (Fig. 1). Population levels were high north and east from The Pas to Split Lake and south along the Nelson River to Norway House where moderate to severe defoliation occurred in most tamarack stands. Light to moderate defoliation was generally recorded from Snow and Chisel lakes to Flin Flon, Cranberry Portage, and Amisk Lake. However, an occasional small stand of tamarack was completely defoliated in this area. Larch sawfly defoliation from The Pas south to Westray, The Bog, and the Overflowing River was generally light. The same conditions were observed in the Dawson Bay, Mafeking and Swan River regions.

Egg population counts of the larch sawfly were continued at four permanent sampling plots in the Northern District. The infestation ratings at each plot were based on the percentage of current shoots utilized for oviposition by adult sawflies. The egg counts indicate a light but general increase in the numbers of the larch sawfly from 1959, and this trend is likely to continue in 1961. The results of this years' sequential sampling of larch sawfly egg populations are shown in the following table.

Plot No.	Place	Infestation ratings		
		Total shoots examined	No. of curled shoots	1960
101	The Pas	70	2	Light
102	Cranberry Portage	90	4	Light
103	Amisk Lake	140	8	Light
105	The Bog	80	2	Light

The most common parasite found attacking the larch sawfly was Bessa harveyi (Tnsd.). Parasitism by this species ranged up to 35 per cent. The dissections showed that two or more living B. harveyi larvae feeding on one host is common. Most of the eggs of Mesoleius tenthredinis Morley taken from the larch sawfly larvae were encapsulated. Disease and fungus were absent from any sawfly larvae examined. A screen cover placed on all the drop trays is mainly responsible for the absence of small mammal predation to larch sawfly cocoons.

There was no indication of any mortality of tamarack in the permanent sample plots re-tallied in 1960 that could be attributed to the larch sawfly. Some mortality of tamarack was apparent during aerial surveys in the Sitchai and Dyce lakes area, but ground checks could not be made in this area to varify the cause. These stands will be examined in 1961.

Mass collections of larch sawfly cocoons were taken from two permanent plot areas in 1960. The cocoons were collected in drop trays that were set out under individual tamarack trees in early July. The cocoons were removed from the trays in late fall and 200 cocoons from each plot area were subsequently dissected to determine the incidence of parasites and disease. The results are shown in Table 1.

6.3.2 Spruce Budworm, Choristoneura fumiferana (Clem.)

Aerial and ground surveys indicated a more widespread distribution of the spruce budworm in the Namew Lake area on the Manitoba-Saskatchewan border. The most notable extensions in the infestation occurred north and east of Athapapuskow Lake in Manitoba and along the Sturgeon-Weir River, west of Amisk Lake in Saskatchewan (Fig. 6). Special surveys conducted in the Setting Lake area failed to locate the small but severe infestation reported on a small island in 1959. Conspicuous reddening of balsam fir and spruce was common in this area in 1960, but the damage was not caused by the spruce budworm. Elsewhere in the District only occasional larvae of this species were found and defoliation was negligible.

Defoliation of white spruce and balsam fir by the spruce budworm ranged from moderate to severe in the older part of the infestation and light to moderate along the fringes of the present boundaries. Extensive back-feeding was evident on both tree species throughout most of the original infestation area. The highest larval populations again occurred around the Sturgeon Landing Settlement (the focal point of the infestation) and the effects of nine consecutive years of heavy defoliation are reflected in reduced foliage production on affected trees. Moderate defoliation was noted in a small stand of black spruce east of Saskoba Lake. This stand is adjacent to white spruce and balsam-fir stands supporting high numbers of budworms. It is the first record of appreciable defoliation of black spruce by the spruce budworm in the Namew Lake infestation.

Considerable tree mortality has occurred in the older part of the infestation area during the past two years, and if the infestation persists, mortality will likely increase in succeeding years. This is particularly evident in the Sturgeon Landing and Chocolate Lake areas where examination of several white spruce and balsam fir showed that most of the living trees are in a reduced state of vigor due to several years of spruce budworm attack. Foliage production is sparse, leaders and numerous branches are dead, and bark beetle and weevil attack is general on both tree species.

Studies to assess the mortality of balsam fir and white spruce in stands with various defoliation histories are being carried out in the infestation area. Two methods of determining tree mortality are employed. One method consists of tallying all living and dead trees on a 1 x 10 chain cruise strip and the other consists of maintaining an annual record on the condition of all trees on a 1/10 acre permanent plot.

Table 1

Cocoon Counts and Dissections of the Larch Sawfly from 20 Larval Drop Trays at Two Plots

Plot no. and place	No. of cocoons	No. of cocoons destroyed in field		No. of larvae dissected	No. of larvae containing parasites				Diseased larch sawfly	
		Small mammals	Fall Bessa emergence		Mesoleius tenthredinis eggs	Mesoleius tenthredinis larvae	Bessa harveyi	Tritneptis klugii	No. of cocoons examined	No. of larvae diseased or dead
101 The Pas	632	0	38	200	13	1	75	0	200	0
102 Cranberry Portage	493	0	8	200	13	6	67	0	200	0

The results of the tallies taken from the permanent plots and cruise strips to date throughout the infestation area are shown in Table 2.

Table 2

Mortality of White Spruce and Balsam Fir at Thirteen Locations Throughout the Spruce Budworm Infestation Area (based on 1 acre tallies)

Location and grid	No.of years moderate to severe defoliation	Tree species and d.b.h. (ins.)	No.of trees Living	No.of trees Dead	Basal area sq.ft.	Percentage of basal area dead
Chocolate Creek 7-036-329	9	wS up to 3	225	107	6.232	34.0
		wS over 3	188	22	65.148	5.3
		bF up to 3	3	2	0.063	80.9
		bF over 3	7	0	1.078	0.0
Sturgeon Landing 7-035-329	9	wS up to 3	72	79	3.859	38.0
		wS over 3	236	7	50.667	1.3
		bF up to 3	28	26	1.209	49.0
		bF over 3	57	9	16.081	8.0
Sturgeon Landing west 7-036-329	9	wS up to 3	49	58	3.976	49.0
		wS over 3	289	22	82.702	3.0
		bF up to 3	12	2	0.199	27.0
		bF over 3	2	0	0.000	0.0
Sturgeon Landing east 7-035-329	9	wS up to 3	164	168	6.226	62.0
		wS over 3	143	32	26.567	11.0
		bF up to 3	76	1	1.080	0.5
		bF over 3	14	2	5.669	19.0
Namew Lake 7-035-329 Plot 106	7-8	wS up to 3	170	120	8.060	32.0
		wS over 3	720	150	188.770	18.0
		bF up to 3	0	0	0.000	0.0
		bF over 3	0	0	0.000	0.0
Namew Lake 7-036-329 Plot 107	7-8	wS up to 3	110	120	7.620	44.0
		wS over 3	250	80	85.770	25.0
		bF up to 3	120	160	7.030	57.0
		bF over 3	150	80	43.150	41.0

Location and grid	No.of years moderate to severe defoliation	Tree species and d.b.h. (ins.)	No.of trees Living	Dead	Basal area sq.ft.	Percentage of basal area dead
Chocolate Lk.	6	wS up to 3	165	52	5.453	15.0
7-036-328		wS over 3	180	20	35.769	7.0
		bF up to 3	6	1	0.052	10.0
		bF over 3	0	0	0.000	0.0
Amisk Lake	4-5	wS up to 3	120	20	4.290	1.0
7-032-334		wS over 3	360	20	82.850	3.0
Plot 105		bF up to 3	0	0	0.000	0.0
		bF over 3	0	0	0.000	0.0
Amisk Lake	4-5	wS up to 3	210	10	6.860	0.01
7-032-334		wS over 3	490	20	94.970	0.01
Plot 104		bF up to 3	0	0	0.000	0.0
		bF over 3	0	0	0.000	0.0
Denare Beach	2	wS up to 3	540	0	14.830	0.0
7-033-335		wS over 3	370	0	72.610	0.0
Plot 101		bF up to 3	190	0	5.800	0.0
		bF over 3	320	0	49.870	0.0
Amisk Lake	2	wS up to 3	160	10	6.000	0.5
7-032-332		wS over 3	480	0	93.910	0.0
Plot 103		bF up to 3	0	0	0.000	0.0
		bF over 3	80	0	15.140	0.0
Bakers Narrows	2	wS up to 3	660	10	19.410	0.03
7-038-335		wS over 3	360	0	75.450	0.0
Plot 108		bF up to 3	0	0	0.000	0.0
		bF over 3	0	0	0.000	0.0
Bakers Narrows	1	wS up to 3	560	0	20.010	0.0
7-038-335		wS over 3	500	0	75.070	0.0
Plot 102		bF up to 3	310	0	7.920	0.0
		bF over 3	140	0	14.360	0.0

No definite conclusions can be drawn from the limited number of plots that have been tallied to date. However, the data does indicate that mortality of white spruce ranged from 25 to 30 per cent in areas that have been severely defoliated for 7 to 9 consecutive years. About 11 per cent mortality is indicated for areas severely defoliated

for six years, and about 1 per cent in areas severely defoliated five years or less. Generally mortality of both tree species was substantially higher in the smaller diameter classes. These are the first records of the spruce budworm causing appreciable mortality of white spruce in Manitoba and Saskatchewan.

Infestation forecasts in the Namew Lake infestation have been hampered to some extent by the lack of a reliable sampling method for assessing egg populations on white spruce. Field studies were initiated in 1959 to gather basic data for designing sampling procedures on this tree species. Spruce budworm egg counts, based on the examination of a number of 18 inch branch tips from the mid-crowns of sample trees, were taken in several points throughout the infestation area. Similar samples were taken from balsam fir as a means of comparing the counts with that tree species. The population sampling was conducted in both the older parts of the infestation and along the fringes of areas more recently infested. These data are summarized in the following table.

Location and plot no.	Tree species	No. of trees sampled	No. of branches examined	Total area of foliage examined (sq. ft.)	Total no. of egg masses	No. of egg masses per 100 sq.ft. of foliage
Amisk Lake Plot 101	wS	20	80	153.1	194	127
	bF	10	40	86.3	150	174
Paradise Lodge Plot 102	wS	20	80	127.9	241	188
	bF	10	40	74.8	35	47
Amisk Lake Plot 103	wS	10	40	61.5	273	444
Amisk Lake Plot 104	wS	10	40	67.2	180	268
Amisk Lake Plot 105	wS	10	40	63.4	269	424
Mistik Lake Plot 106	wS	10	40	69.8	99	142

Location and plot no.	Tree species	No. of trees sampled	No. of branches examined	Total area of foliage examined (sq. ft.)	Total no. of egg masses	No. of egg masses per 100 sq. ft. of foliage
Whitefish Lk., Plot 107	wS	10	40	80.2	186	232
Whitefish Lk., Plot 108	wS	10	40	78.2	92	118
Whitefish Lk., Plot 109	wS	10	40	75.5	64	85
Whitefish Whitefish Lk., Plot 110	wS	10	40	71.3	369	518
Sturgeon-Weir, Plt. B	wS	2	8	16.9	12	71
Leaf Lake Plot G	wS	2	8	11.1	3	27
Namew Lake Plot E	wS	2	8	16.9	2	12
Chocolate Lk., Plot A	wS	2	8	10.8	38	352
Flin Flon Plot K	wS	2	8	12.7	10	79
Bakers Narrows Plot J	wS	2	8	14.7	11	75
Namew Lake Plot I	wS	2	8	15.5	5	32
Saskoba Lk. Plot H	wS	2	8	14.7	11	75

The counts shown above will be related to defoliation after the 1961 spruce budworm feeding season. Egg counts at most sample points are sufficiently high to cause about the degree defoliation in 1961 as in 1960, and no appreciable change in the infestation pattern is expected.

6.3.3 Balsam-fir Sawfly, Neodiprion abietis complex

Serious damage to balsam-fir and in some cases white spruce foliage was recorded at a number of points in northern Manitoba (Fig. 7). The most severe infestations occurred on islands and shore-lines in the Setting and Wintering lakes region. Heavy feeding damage in this area caused complete drying and reddening of most of the old foliage on balsam fir. Affected trees are showing signs of decline and some mortality can be expected if the infestation continues.

Some reddening of balsam-fir foliage was recorded in the Northern District in 1959. The damage at that time was attributed to severe winter drying, but this was not confirmed by ground checks. It is now considered more likely that the damage in 1959 was caused by balsam-fir sawfly and that the infestation in this area probably has a two year history. This constitutes the first records of severe and extensive infestations of balsam-fir sawfly in the forested areas of Manitoba and Saskatchewan. Surveys in other parts of the District indicate light activity by this species in the Duck and Cross lakes area and along the Nelson River.

Several mass collections of balsam-fir sawfly cocoons and diseased larvae were made from the Setting Lake area to determine the incidence of parasitism and disease. No disease organisms could be isolated from dead larvae. Cocoon collections are still in rearing and parasite records are not as yet available. However, there is no evidence of any high rate of parasitism or disease of this sawfly.

There are no definite indications of any mortality occurring which could be attributed to the current feeding damage of the balsam-fir sawfly. Trees examined in the heavily infested areas showed no signs of decline, however, the effect of this years' sawfly attack in these stands will not be known until they are re-examined in 1961.

6.3.4 Forest Tent Caterpillar, Malacosoma disstria Hbn.

Several small but severe infestations of this insect occurred in trembling aspen stands in the Northern District of Manitoba in 1960 (Fig. 2). The areas infested ranged from 5 to 300 acres. The largest of the infested areas was along the south shore of Amisk Lake. A number of spot infestations were recorded from the air in the vicinity of Archibald, Leaf, Simonhouse, Kisnetto and Cross lakes.

Egg band surveys were conducted in and adjacent to accessible infested areas. These surveys form the basis for forecasting the population trends and defoliation in 1961. Sampling procedures were adjusted in 1960 to obtain data on the crown level distribution of egg bands. Counts were recorded for four crown levels of each of three sample trees at each sample station. The summary of these counts, together with the defoliation forecasts for 1961 are shown in Table 3.

Table 3

Summary of Forest Tent Caterpillar Egg Band Surveys
Based on Individual Crown Levels

Location	Tree No.	D.B.H. (ins.)	Tree ht. (ft.)	Crown depth (ft.)	No. of egg masses: Top 4 branches	Upper 1/3	Mid 1/3	Lower 1/3	Av. no. of egg masses	Defoliation forecast 1961
Sturgeon Weir	1	5	48	18	0	0	0	0		
Sec.12,tp.63,	2	6	46	17	0	1	0	0	1.0	Light
rge.2, W.2	3	6 1/4	48	24	0	0	2	0		
Amisk Lake	1	4	30	24	0	0	1	0		
Sec.28,tp.63,	2	3	35	21	0	0	0	0	0.3	Light
rge.1, W.2	3	3	28	22	0	0	0	0		
Amisk Lake	1	2	24	19	0	0	0	1		
Sec.29,tp.64,	2	2	20	13	0	0	0	0	0.3	Light
rge.1, W.2	3	4	35	17	0	0	0	0		
Denare Beach	1	2	24	19	0	0	0	1		
Sec.34,tp.65,	2	2	20	13	0	0	0	0	0.3	Light
rge.1, W.2	3	4	35	17	0	0	0	0		
Leaf Lake	1	5	30	18	5	4	6	3		
Sec.35,tp.63,	2	5	39	12	1	3	3	3	16.0	Severe
rge.30, W.P.	3	5	42	21	6	4	5	5		
Atikameg	1	3	21	15	0	1	0	0		
Sec.2,tp.58,	2	4	25	20	0	0	0	0	0.6	Light
rge.25, W.P.	3	3	15	12	0	1	0	0		
Prospector	1	3	22	14	0	0	0	0		
Sec.22,tp.57,	2	5	35	25	0	0	0	0	0.0	Light
rge.26, W.P.	3	2	12	9	0	0	0	0		

Location	Tree No.	D.B.H. (ins.)	Tree ht. (ft.)	Crown depth (ft.)	No. of egg masses: Top 4 branches	Upper 1/3	Mid 1/3	Lower 1/3	Av. no.of egg masses	Defoliation forecast 1961
Simonhouse Lk. Rd. Sec.13,tp.63, rge.27, W.P.	1	2	22	12	0	0	0	0	0.0	Light
	2	3 1/4	38	18	0	0	0	0		
	3	2 1/4	34	15	0	0	0	0		
Simonhouse Lk. Rd. Sec.25,tp.63, rge.26, W.P.	1	5	48	18	0	0	0	0	1.0	Light
	2	6	46	17	0	1	0	0		
	3	6 1/4	48	24	0	0	2	0		
Simonhouse Lk. Rd. Sec.4,tp.64, rge.25, W.P.	1	6 1/2	50	22	0	0	0	0	1.0	Light
	2	3 1/4	33	12	0	0	0	0		
	3	7	54	21	0	0	0	3		

6.3.5 Birch Sawfly, Arge pectoralis (Leach)

The birch sawfly was generally distributed throughout the Northern District. It was collected from most white birch examined and occasionally from swamp birch, but defoliation was generally light and confined to one or two branches on the lower crown of affected trees.

6.3.6 Leaf Beetle, Chrysomela sp.

This insect occurred in small numbers in most aspen stands examined. In most instances this species caused only a trace of skeletonizing, except for the occasional small pockets of trembling aspen in the vicinity of Orak and Denare Beach where moderate skeletonizing occurred.

6.3.7 Neodiprion Sawflies

Several species of Neodiprion sawflies were common on jack pine throughout the District. Defoliation by these species was light and usually confined to one or two branches per tree. Several colonies were taken from widely scattered points to be reared at the laboratory for regional contributions to a national taxonomic treatise of this genus. The most common species of Neodiprions taken from jack pine in order of relative abundance were:

Neodiprion virginianus complex
Neodiprion maurus
Neodiprion nanulus

6.3.8 Insects Attacking Black Spruce Tops

Light to moderate defoliation occurred on several black spruce tops in the vicinity of Prospector and Wanless. Collections showed that a complex of insect species was responsible for the damaged tops. The most common insects collected in order of relative abundance were:

Herculia thymetusalis
Archips albertus
Dioryctria abietivorella
Pikonema alaskensis

Elsewhere throughout the District, insect activity was general in most black spruce tops examined but feeding damage was not conspicuous.

6.3.9 A Root Weevil, *Hylobius* sp.

A survey of root damage and tree mortality caused by this insect was carried out in conjunction with a survey to determine the incidence of white pocket rot, *Polyporus tomentosus*, in white spruce in the Simonhouse Lake area. The root systems of five living and five dead white spruce trees were appraised for weevil damage. The data is recorded in Table 4.

Table 4

Summary of *Hylobius* sp. Damage

Location	Av. d.b.h. (ins.)		Av. ht. (ft.)		Av. damage index		Percentage of roots diseased on trees		Percentage of diseased roots with insect damage	
	Living	Dead	Living	Dead	Living	Dead	Living	Dead	Living	Dead
Simonhouse Lake	13.2	10.1	80	80	3.8	7.8	36	100	44	100

NOTE: All of the root systems in the five dead trees examined were decomposed.

6.3.10 Other Noteworthy Insects

Insect	Host(s)	Locality	Remarks
Acrobasis betulella	wB	The Pas - Cranberry Ptge.	Caused light defoliation to young wB and swamp birch.
Acleris variana	wS, bS	Entire District	Populations low.
Itonida balsamicola	bF	Entire District	Common but caused no serious damage.
Chrysomela crotchi	tA	The Pas and Paint Lk. areas	Causing light defoliation.
Petrova albicapitana	jP	Entire District	Populations low.
Rhyacionia sp.	jP	Atikameg Lk.	Confined to a small stand of jP causing light shoot damage.
Semiothisa granitata	bF, bS	Entire District	Associated with N. abietis. Fairly high numbers.
Croesus latitarsus	wB	Entire District	Trace of feeding damage at most locations.

6.3.11 Permanent Sampling Stations

Five permanent sampling areas were established in the Northern District. Most of the major tree species were represented in each area. The number and location of each area are listed below.

Station No.	Place	Grid	Tree species represented
01	The Pas	7-042-324	wS, bF, tA, bS, wB, jP, tL, W.
02	Simonhouse Lk.Rd.	7-042-332	wS, bS, tA, wB, jP, tL, bF, W.
03	Red Deer River	7-043-305	wS, bS, tA, wB, jP, tL, bF, W.
04	Westray	7-040-317	wS, bS, tA, wB, jP, tL, W.
06	Amisk Lake	7-033-335	wB, bS, tA, wB, jP, tL, bF, W.

The five tree standard beating sample was used for sampling the major tree species at the sample areas. Each species was sampled at least once during the larval feeding period of the major insect species. Only the samples taken during the larval feeding period were considered in calculating the average number of larvae per tree as shown as follows.

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av.no. of larvae per tree sampled
01	32	19	Pristiphora erichsonii	tL	3.8
			Pikonema alaskensis	wS	0.4
			Acrobasis betulella	wB	0.2
			Semiothisa granitata	wS	0.2
			Miscellaneous		0.4
02	17	15	Choristoneura fumiferana	wS	1.1
			Choristoneura fumiferana	bS	1.1
			Neodiprion virginianus complex	jP	3.7
			Pikonema alaskensis	wS	0.4
			Miscellaneous		0.8
03	5	5	Epizeuxis americalis	wS	0.4
			Campaea perlata	tA	0.2
			Miscellaneous		0.2
04	14	8	Arge pectoralis	wB	0.6
			Pristiphora erichsonii	tL	1.8
			Pikonema dimmockii	wS	0.4
			Chrysomela sp.	tA	2.1
			Miscellaneous		0.3
06	11	4	Choristoneura fumiferana	bF	2.0
			Miscellaneous		0.9

6.4 TREE DISEASE CONDITIONS

6.4.1 White Pocket Rot, Polyporus tomentosus

A one acre plot of white spruce at Simonhouse Lake was examined for the presence of this disease. The root systems of five dead dominant trees were examined for the presence of red stain and white pocket rot which is characteristic of P. tomentosus. Several samples taken from the roots were sent to the Forest Pathology Laboratory at Saskatoon. The root systems of five living trees were also examined but no P. tomentosus was detected. The results obtained from this survey are shown in Table 5.

6.4.2 Root and Butt Decay of Conifers, Flammula alnicola

Surveys for the occurrence and distribution of F. alnicola decay were conducted in three areas that were cut-over during the winter season of 1959-60. One hundred white spruce stumps were examined at each location, but no decay was detected. Results of this survey are shown in the following table.

Location	Size in acres	Tree sp.	Time of cut	Type of cut	No. of stumps examined	Av. d.b.h. (ins.)	No. of stumps with F. alnicola	No. of stumps with Other decays
Cranberry Sec.30, tp.64, rge.26, W.P.M.	150	wS	1959 1960	S	100	12	0	0
Denare Beach Sec.33, tp.65, rge.1, W.2mer.	100	wS	1959 1960	S	100	10	0	0
Wanless Sec.11, tp.60, rge.27, W.P.M.	400	wS	1959 1960	C	100	8	0	0

S - selective; C - clear.

6.4.3 Rust on the Fruit of Saskatoon, Gymnosporangium sp.

The distribution and occurrence of Gymnosporangium rust on the berries of Saskatoon remained the same as in 1959. The most severe infection occurred in the vicinity of The Pas, Prospector and Wanless.

Table 5

Date Recorded from *P. tomentosus* Survey

Location	Size of plot (acre)	Av. tree ht. (ft.)	Av. age of stand	No. of patches per acre	No. of groups per acre	No. of single trees per acre	No. of trees examined	No. of healthy roots	No. of decayed roots	No. of decomposed roots	No. of root samples with *P. tomentosus*	No. of root samples with *A. mellea*	No. of root samples with unknown
Simonhouse Lk., Sec. 33, tp. 63, rge. 25, W.P.M.	1	70	150	1	1	5	5	0	46	0	0	1	7

6.4.4 Needle Rust on Spruce, Chrysomyxa sp.

Needle rust, Chrysomyxa sp., was generally distributed throughout the District. Dead tops caused by complete girdling of the stems were conspicuous along the Simonhouse Lake Road, and in the vicinity of Birch River and Baden.

6.4.6 Slash Fungus, Radulum casearium

Special attention was given to the slash and windthrown trees in trembling aspen stands in an attempt to detect this decay, but no signs of R. casearium were found.

6.4.7 Mistletoe on Jack Pine, Arceuthobium americanum

There was no change in the occurrence and distribution of the jack-pine mistletoe throughout the District in 1960. Special attention was given to jack-pine stands in the Thompson, Thicket Portage and Nelson House areas, but no A. americanum was detected.

6.4.8 Dwarf Mistletoe on Black Spruce, Arceuthobium pusillum

No new occurrence of this mistletoe was recorded during the 1960 season. Black spruce trees supporting several brooms were common in two stands, one at the north end of Dawson Bay and the other between The Bog and Westray.

6.4.9 Armillaria Root Rot, Armillaria mellea

This root rot was commonly found on the roots of dead white spruce examined for the white pocket rot, Polyporus tomentosus. Samples of this disease were also taken from windthrown jack pine.

6.4.10 Yellow Witches'-broom, Peridermium coloradensis

Brooms of P. coloradensis were common on black spruce in most stands examined. However, they were most abundant on black spruce along the Nelson River north of Sipiwisk Lake and in the vicinity of Pikwitonei and Witchai lakes. A trace of tree mortality was noted, particularly on trees supporting several brooms. The yellow-orange coloured brooms were quite conspicuous from the air.

6.4.11 Pre-operational Tree Disease Surveys - Thompson Lake Easement Area

Surveys were conducted within the Thompson Smelter Easement area in August to determine by aerial and ground surveys the occurrence and distribution of the more common tree diseases prior to the operation of the Smelter. Ground checks were made in the vicinity of SO_2 (sulphur dioxide) study plots established by the International Nickel Company. The results of this survey are shown in tabular form below.

Disease organism	Plot where it occurred	Tree species affected	Remarks
Chrysomyxa needle rust	16, 17, 18	wS, bS	Light at all plots but most conspicuous on wS.
Peridermium coloradensis	7, 8, 10, 12, 17	bS	Common on most bS. Most abundant at plots 10 and 12.
Cone rust	8	wS	Infection light.
Polyporus betulinus	18	wB	Common on standing and fallen timber, birch only host.
Fomes fomentarius	7, 8, 10, 12, 16, 17, 18	wB	Common at all plot areas. Infection light.
Spherical rust galls	10, 12, 17	jP	Fairly common. Occasional dead branch on jP.

The yellow witches' - broom was the most common tree disease observed from the air, being most abundant near Whitehai Lake and the Burntwood River areas. Chrysomyxa sp. needle rust was commonly found on white and black spruce but infection in most cases was very light.

6.4.12 Leaf Blight, Marssonia sp.

Moderate infection caused by Marssonia sp. on trembling aspen was observed in the vicinity of Athapapuskow and Simonhouse lakes. A somewhat lighter infection occurred north of Birch River along the east slopes of the Porcupine Mountains. In all instances the extent of infected stands was less than 25 acres. Elsewhere in the District the occurrence of this blight was negligible.

6.4.13 Other Noteworthy Diseases

Host	Organism	Locality	Remarks
Jack pine	Globose rust galls	Atik	Fairly common.
White spruce	Cone rust	Natowahunan Lake	Widely distributed.
White birch	Fomes fomentarius	Nelson House	Common on birch.
White birch	Polyporus betulinus	Paint Lake	One location only.
Trembling aspen	Fomes igniarius	Throughout District	Common on aspen.

7. ANNUAL REPORT OF FOREST BIOLOGY RANGER

HUDSON BAY DISTRICT OF SASKATCHEWAN

1960

by

R. W. Hancox

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

7.1 INTRODUCTION

Surveys were conducted in the field from June 7 to September 14, 1960, to determine the status and distribution of forest insects and tree diseases in the Hudson Bay District of Saskatchewan. A total of 426 insect and 42 tree disease samples were submitted to the Winnipeg and Saskatoon laboratories (Table 1). Special projects included: (1) distribution of larval drop trays in two permanent tamarack plots for larch sawfly parasite studies; (2) sequential sampling of larch sawfly eggs for population estimates; (3) a forest tent caterpillar egg band survey; (4) collections of aphids for G. Bradley of the Winnipeg Laboratory; (5) a Hylobius sp. damage assessment survey; (6) phenological surveys; (7) a survey for distribution of the white pocket rot, Polyporus tomentosus; and (8) a distribution survey of the butt rot, Flammula alnicola.

Approximately 10 hours and 45 minutes flying by fixed-wing aircraft and 5 hours and 45 minutes by helicopter, was supplied by the Saskatchewan Department of Natural Resources which facilitated mapping defoliation by spruce budworm and other forest insects through inaccessible areas of the Porcupine and Northern Provincial forests. In addition, 7 hours and 30 minutes of chartered flying time was utilized for defoliation surveys in the aspen grove region and the Porcupine Provincial Forest.

The assistance and co-operation received from the Saskatchewan Department of Natural Resources is gratefully acknowledged.

Table 1

A Summary of Insect and Tree Disease Samples

Host tree	No. of insect samples	No. of tree disease samples
Trembling aspen	131	15
White spruce	59	9
Tamarack	49	-
Willow	37	1
White birch	33	-
Jack pine	28	9
Black spruce	25	2
Balsam poplar	22	2
Alder	18	-
Balsam fir	3	-
Chokecherry	3	2
Swamp birch	3	-
Manitoba maple	4	-
Dogwood	2	-
Miscellaneous	9	2

7.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

The most noteworthy changes in the status of forest insects in the Hudson Bay District this season were: (1) a decline in the large aspen tortrix infestation in the Porcupine Provincial Forest south of Reserve; (2) increased activity of the forest tent caterpillar on the east slopes of the Pasquia Hills west of Ceba; (3) an increase in larch sawfly along the Carrot and Saskatchewan river watersheds; (4) a slight eastward extension of the spruce budworm infestation on the Birch River; and (5) an increase in leaf beetles, Chrysomela crotchi and Chrysomela knabi, which caused light to moderate defoliation of young trembling aspen at scattered points throughout the forested area. Little change was noted in the status of the balsam fir sawfly and sawflies on jack pine. Populations of the yellow-headed spruce sawfly remained low, with only light defoliation recorded.

Spruce needle rust, Chrysomyxa sp., lightly infected the foliage of black and white spruce throughout the northern part of the District. Discolouration of aspen foliage by a leaf blight, Marssonia sp., was light north of Hudson Bay and light to moderate in the south-west part of the District. Small pockets of trembling aspen north of Hudson Bay were severely infected by a leaf spot, Melanconium sp. The twig blight, Napicladium tremulae, was common on young trembling aspen at scattered points throughout the District.

7.3 INSECT CONDITIONS

7.3.1 Larch Sawfly, Pristiphora erichsonii (Htg.)

Infestation ratings of the larch sawfly in the Hudson Bay District based on ground and aerial surveys in shown in Figure 1. The larch sawfly showed a notable increase in abundance along the Carrot and Saskatchewan river watersheds from the Manitoba border to the Sipanok Channel where severe defoliation of tamarack was recorded. Throughout the Pasquia Hills, defoliation was moderate decreasing to moderate to light along the southern slopes. Several small pockets of light defoliation occurred in the Porcupine Provincial Forest and along the Armit Road from Hudson Bay to the Manitoba border. An increase in larch sawfly was noted along the Flin Flon Highway in the Northern Provincial Forest. Defoliation in this area ranged from a trace to light on mature trees and increasing to moderate on reproduction. Severe defoliation occurred on open-growing tamarack in three widely separated stands throughout the District. An aerial survey carried out in early August showed only light defoliation of tamarack through the Sturgeon-Weir River area to Hanson Lake and south to the Mossy River in the Northern Provincial Forest.

Shoot production and needle growth in younger tamarack stands was good, while mature trees showed poor shoot production and short needle growth.

Sequential sampling (Ives and Prentice*) of larch sawfly egg

*Ives, W.G.H. and R.M. Prentice. 1958. Sequential Sampling Technique for Surveys of the Larch Sawfly. Can. Ent. 90: 331-338.

populations was carried out in three permanent sample plots in the District. Results of the sequential sampling are shown in the following table.

Plot No.	Place	Infestation Rating		
		No. of shoots examined	No. of shoots curled	1960
101	Armit	190	13	Light
102	Peepaw Lake	50	0	Light
103	Flin Flon Highway	50	0	Light

Twenty larval drop trays were set out in each of two study areas during the first two weeks in July for the purpose of collecting larch sawfly cocoons. After the larval drop period, the moss was collected from the trays and forwarded to the Winnipeg Laboratory. Cocoons were subsequently removed from the moss and dissected for parasite studies. The results of this study are shown in Table 2.

7.3.2 Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

There was a decline in numbers of the large aspen tortrix in most areas, with a small pocket of severe defoliation over an area of 6 square miles southwest of Reserve (Fig. 4). A trace to light defoliation on trembling aspen by the large aspen tortrix was recorded along the Armit Road, along the south slope of the Pasquia Hills from Hudson Bay to Crooked River, and northeast of Greenwater Lake in the Greenwater Provincial Park. Occasional larvae of this species were collected at Madge Lake in the Duck Mountain Provincial Park, along the Flin Flon Highway in the northern Provincial Forest and in the Ketchen-Okla area, but defoliation was negligible.

7.3.3 Forest Tent Caterpillar, Malacosoma disstria Hbn.

Larval collections of this insect were made west of Bjorkdale, from Canora west to Wadena, and at Kelvington, Leross, and Madge Lake. Populations were low and only a trace to light defoliation was recorded. One larva was collected at Goose Lake near the Sipanok Channel. The distribution of larval collections is shown in Figure 2.

A localized infestation of the forest tent caterpillar was recorded 8 miles west of Ceba on the east slopes of the Pasquia Hills. The infestation caused severe defoliation over an area of approximately eight sections (secs. 19, 20, 29, 30 and 31, tp. 47, rge. 3, W.2 mer., secs. 25 and 36, tp. 47, rge. 3, W.2 mer., and sec. 1, tp. 47, rge. 4, W.2 mer.).

Table 2

Results of Cocoon Counts and Larval Dissections of Larch Sawfly from 20 Larval Drop Trays in Two Areas

Location and plot no.	Total no. of cocoons	No. of cocoons destroyed in field		No. of larvae dissected	No. of larvae containing parasites				Diseased larch sawfly	
		Small mammals	Fall Bessa emergence		Mesoleius tenthredinis eggs	Mesoleius tenthredinis larvae	Bessa harveyi	Trit-neptis klugii	No. of cocoons examined	No. of larvae diseased or dead
Armit 101	809	37	198	200	5	4	143	0	243	43
Flin Flon Highway 103	360	13	44	200	1	2	97	0	223	23

In view of the apparent increase in forest tent caterpillar numbers, egg band surveys were conducted at Bjorkdale, Buchanan, and at Bankend. The results of the egg band survey shown in Table 3 indicate that defoliation will be light in these areas in 1961.

Table 3

Summary of Forest Tent Caterpillar Egg Band Survey and Defoliation Forecasts for 1961

Place	Location Sec.	Tp.	Rge.	Mer.	Tree No.	d.b.h. (ins.)	Ht. (ft.)	Crown depth (ft.)	No. of egg bands/ tree	Ave. no. of egg bands/ tree	Forecast 1961
Bjorkdale	17	43	12	W.2	1	3	32	20	1		
					2	3 1/2	33	24	1		
					3	4	39	24	2	1.3	Light
Bjorkdale	10	43	13	W.2	1	2 3/4	25	20	0		
					2	3	25	19	0		Nil to
					3	2	21	15	0	0	Light
Bjorkdale	10	44	12	W.2	1	3	30	15	0		
					2	2 1/2	26	14	0		Nil to
					3	4 1/2	38	25	0	0	Light
Bjorkdale	16	42	12	W.2	1	2 1/2	21	15	0		
					2	3 1/2	24	20	1		
					3	3 1/4	23	20	0	0.3	Light
Bjorkdale	18	41	12	W.2	1	2	28	10	0		
					2	3	32	15	0		Nil to
					3	3 1/2	33	15	0	0	Light
Bjorkdale	17	43	11	W.2	1	3	31	14	0		
					2	2 1/2	30	10	0		Nil to
					3	4	45	17	0	0	Light
Bankend	13	28	14	W.2	1	2	24	16	0		
					2	2	22	16	0		Nil to
					3	2	20	14	0	0	Light

Place	Location Sec.	Tp.	Rge.	Mer.	Tree No.	d.b.h. (ins.)	Ht. (ft.)	Crown depth (ft.)	No. of egg bands/ tree	Ave. no. of egg bands/ tree	Forecast 1961
Bankend	1	29	14	W.2	1	2 1/2	24	18	0		
					2	2 1/2	26	20	0		Nil to
					3	2	25	21	0	0	Light
Bankend	11	28	13	W.2	1	2 1/2	26	14	0		
					2	3 1/2	28	18	0		Nil to
					3	2	22	14	0	0	Light
Bankend	14	27	14	W.2	1	2	21	12	0		
					2	2 1/2	24	11	0		Nil to
					3	2 3/4	26	16	0	0	Light
Buchanan	36	31	6	W.2	1	4 1/2	35	12	0		
					2	3 3/4	34	15	0		Nil to
					3	4	35	11	0	0	Light
Buchanan	34	31	5	W.2	1	3	27	15	0		
					2	3	32	16	0		Nil to
					3	2 1/2	30	18	0	0	Light
Buchanan	23	30	6	W.2	1	2 1/2	27	12	0		
					2	2 3/4	26	14	1		
					3	3 1/4	30	15	0	0.3	Light
Buchanan	35	29	6	W.2	1	2 1/2	22	16	0		
					2	2	18	14	0		Nil to
					3	3 1/2	21	15	0	0	Light
Buchanan	36	31	7	W.2	1	4 1/2	34	20	0		
					2	2 1/2	21	14	0		Nil to
					3	3	26	17	0	0	Light
Buchanan	35	32	6	W.2	1	3	24	16	0		
					2	2 3/4	23	15	0		Nil to
					3	3	30	16	0	0	Light

7.3.4 Spruce Budworm, Choristoneura fumiferana (Clem.)

There was little apparent change in the status of this insect throughout the Hudson Bay District this season (Fig. 5). A single larva was collected at each of the following collection points: Hendon, White Fox Fire Tower, Madge Lake, and in the Porcupine Provincial Forest, at Dagg Creek and near Tall Pines. No new infestations were recorded in the Pasquia Hills and adjacent northern area.

There was a significant extension of the infestation previously recorded in tp. 54, rges. 4 and 5, W.2 mer. along the Birch River in the Northern Provincial Forest. The infestation, which covered approximately 400 acres in 1959, spread eastward and moderate to severe defoliation of white spruce and balsam fir now extends over an area of some 16 square miles. Larval counts taken between the western extremity of the infestation to the Sipanok Channel during June indicated that light populations of the spruce budworm occurred along the Birch River as far west as the Sipanok Channel (Table 4). Indications are that further extension of the spruce budworm may be expected in this area in 1961.

7.3.5 Balsam-fir Sawfly, Neodiprion abietis (Harr.)

Populations of this insect were at a very low level throughout the District in 1960. Larvae were collected at three points: Chemong, Bankside Lake, and near Prairie River. In the Birch River - Sipanok Channel Area of the Northern Provincial Forest where moderate populations were recorded in 1959, no evidence of this sawfly was apparent this year.

Populations of N. abietis were negligible in shelterbelts in the agricultural areas of the District.

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

Populations of the yellow-headed spruce sawfly were low throughout the District and defoliation was generally confined to a few branches per tree. Light populations were evident in the forested areas of the Porcupine and Northern Provincial forests, and the Duck Mountain Provincial Park.

Small planted white spruce (1 - 2" d.b.h.) in shelterbelts at Peesane and Reserve in the Porcupine Provincial Forest were moderately defoliated. Very light populations were found on spruce shelterbelts elsewhere throughout the District.

Larvae of the green-headed spruce sawfly, Pikonema dimmockii (Cress.), were taken at most collection points in conjunction with the yellow-headed spruce sawfly, but populations of this species were low.

Table 4

Spruce Budworm Larval Counts on 18 inch Branch Samples Taken from White Spruce in the Birch River-Sipanok Channel Area

Location and grid	Tree no.	Tree sp.	No. of shoots and budworm larvae per branch sampled								Percentage of terminals infested	Percentage of defoliation at time of sampling	
			No. of shoots per branch				No. of budworm larvae per branch					New foliage	Old foliage
			N	E	S	W	N	E	S	W			
Birch River 7-028-319	1	wS	75	41	46	68	11	5	6	4	18	50	32.5
	2	wS	44	35	44	28	9	9	12	7			
Birch River 7-027-319	1	wS	31	52	37	26	2	4	1	2	6.6	5	0.0
	2	wS	53	26	36	46	4	3	2	2			
Birch River 7-026-319	1	wS	67	59	52	48	3	3	4	5	7.5	5	0.0
	2	wS	22	15	21	20	1	2	2	1			
Sipanok Chnl. 7-028-317	1	wS	5	21	45	109	0	4	1	4	5.1	5	0.0
	2	wS	27	35	44	12	1	0	2	1			

N - north; E - east; S - south; W - west.

7.3.7 Grey Willow Leaf Beetle, Galerucella decora (Say)

The grey willow leaf beetle was common throughout the District. Populations were generally light in the Porcupine Provincial Forest and throughout the entire area north from Hudson Bay to Hanson Lake in the Northern Provincial Forest. The most conspicuous defoliation occurred along the Carrot and Saskatchewan river watersheds, where an occasional pocket of willow suffered moderate defoliation.

Very light populations of this leaf beetle occurred in the agricultural region.

7.3.8 White Pine Weevil, Pissodes strobi Peck.

Adults of the white pine weevil were collected at widely scattered points throughout the forested region. Collections were taken along The Pas Highway, in the Porcupine Provincial Forest and near White Fox Fire Tower in the Northern Provincial Forest. Populations were low and damage caused by this insect was very light.

7.3.9 Ugly Nest Tortrix, Archips cerasivorana (Fitch.)

The ugly nest tortrix was widely scattered throughout most of the District. A small moderate infestation on chokecherry was noted south of Hudson Bay. A moderate infestation on chokecherry, trembling aspen reproduction, saskatoon and willow, extended east from #9 Highway for 3 miles along the Armit Road.

7.3.10 American Poplar Leaf Beetle, Gonioctena americana (Schaeff.)

A small infestation of this beetle was noted north of Usherville in the Porcupine Provincial Forest (sec. 16, tp. 38, rge. 5, W.2 mer.). Defoliation was generally light with some moderate feeding noted on trembling aspen reproduction. Elsewhere in the District only very low populations were present. Collections were taken at Sheho, Ituna, Okla, Veillardville, and south of Hudson Bay, but defoliation was light.

7.3.11 Leaf Beetles on Trembling Aspen

Six species of leaf beetles were collected at widely scattered points throughout the District. These species included: (1) Chrysomela crotchi, (2) Chrysomela knabi, (3) Phratora americana canadensis, (4) Orsodacne atra, (5) Syneta pilosa, and (6) Altica sp. During June the following species, P. americana canadensis, O. atra, S. pilosa and Altica sp. caused light defoliation throughout the agricultural area and the Duck Mountain Provincial Park.

Light to moderate defoliation on trembling aspen by C. crotchi and C. knabi was recorded throughout the forested area during July and August. The two species were common along the Armit and Peepaw roads in the Porcupine Provincial Forest, along the east slopes of the Pasquia Hills, north of Veillardville, in the Clemenceau-Weeks area and part of the agricultural area from Yorkton to the Manitoba border, where moderate defoliation was found mainly on trembling aspen reproduction.

7.3.12 Leaf Rollers on Trembling Aspen

Leaf rollers were common throughout the agricultural area of the District. Light to moderate infestations were noted from Kelvington south to Ituna and east to Yorkton where 20 to 40 per cent of the leaves on small farm bluffs were curled. Another moderate infestation was noted over a small area north and east of Good Spirit Lake. Several small stands of aspen reproduction in the Porcupine Provincial Forest and the forested region north of Hudson Bay were lightly attacked. Most common of the leaf rollers were: (1) an undetermined Tortricid sp., (2) Epinotia nisella criddleana, (3) Pandemis canadana, and (4) Sciaphila duplex.

7.3.13 Webworm on Aspen, Tetralopha asperatella Hlst.

This insect was found feeding on trembling aspen throughout most of the Hudson Bay District. Collections were taken near Steen, Bjorkdale, Crooked River, Reserve, Peepaw Lake, Parr Hill Lake and from Bertwell to Clemenceau. In the Northern Provincial Forest collections were taken near Veillardville and the White Fox Fire Tower. Populations were light and defoliation was negligible.

7.3.14 A Root Weevil, Hylobius sp.

A survey was conducted in a one acre plot in the Porcupine Provincial Forest to determine the incidence of root weevil attacks in white spruce. This area was situated 5.8 miles west of Armit and 1.5 miles south of the Armit Road (sec. 1, tp. 44, W.P. mer.). White spruce on the plot ranged in height from 33 to 52 feet, and 5.1 to 11 inches d.b.h. One dead white spruce was recorded on the one acre plot. The Hylobius sp. damage assessment for this plot (techniques outlined in the 1958 Report) is shown in Table 5.

Table 5

Hylobius sp. Damage Index and Percentage of Diseased Roots on Five Living White Spruce

Location	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. damage index	Av. per cent of diseased roots	Av. per cent of diseased roots with insect damage
Armit Road	7.7	41.4	1.4	41	18

7.3.15 Pitch Midge, Cecidomyia reeksi Vockeroth

There was little apparent change in the status of this insect. Three collections of the pitch midge were taken in jack-pine stands, south and east of Hudson Bay and 2 miles west of Chemong on The Pas Highway. Populations were low and counts indicate about one per cent of the twigs were infested. No pitch midge was found this season along the Flin Flon Highway.

7.3.16 Spruce Pineapple Gall Aphid, Chermes lariciatus (Patch.)

Galls caused by this aphid were noted throughout most spruce stands in the forested region of the District. Galls were most common on immature white spruce. Light to moderate infestations were recorded along the Fir River in the Pasquia Hills and near the south boundary of the Porcupine Provincial Forest north of Usherville. Elsewhere throughout the District, this aphid was found in very low numbers.

7.3.17 European Alder Leaf Miner, Fenusa dohrnii (Tisch.)

Light to moderate populations of the alder leaf miner were found at scattered points throughout the District, and samples were taken from nearly all alder examined. Moderate populations occurred in the Greenwater Provincial Park where about 40 per cent of the foliage on most trees was attacked. Light populations were noted throughout the Porcupine Provincial Forest, and from Hudson Bay north to Cumberland Lake.

7.3.18 Pine Tortoise Scale, Toumeyella numismaticum (Pettit & McD.)

This scale occurred on an occasional jack pine southeast of Hudson Bay. Of twenty trees examined in the area, two trees were infested, with one tree showing heavy damage. The Coccinellid beetle, Chilocorus stigma, which is a predator of Toumeyella scale, was found in moderate numbers feeding on the immature scales. Jack-pine stands

in the vicinity of White Fox Fire Tower (sec. 7, tp. 53, rge. 12, W.2 mer.) were examined for scale but none was found.

7.3.19 Other Noteworthy Insects

Insect species	Host(s)	No. of collections	Remarks
Choristoneura pinus	jP	2	Light - White Fox Fire Tower.
Acleris variana	bS	2	Light.
Neodiprion nanulus nanulus	jP	1	Very light.
Neodiprion virginiana complex	jP	1	Very light.
Petrova albicapitana	jP	6	Light scattered population.
Physokermes piceae	wS	10	Light population throughout forested area.
Lithocolletis salicifoliella	tA	3	Lightly scattered throughout District.
Bucculatrix canadensisella	wB	1	Light near Bjorkdale.
Anoplonyx luteipes	tL	16	Common on tamarack June 30 to August 11.
Anoplonyx canadensis	tL	14	Common on tamarack August 26 to Sept. 2.
Semiothisa sexmaculata	tL	30	Found in most tamarack stands.
Mordwilkoja vagabunda	tA	2	Common on aspen in agricultural areas.
Oporophtera bruceata	tA	10	Common on aspen.
Proteoteras willingana	mM	1	Very light south of Hudson Bay.
Campaea perlata	tA, W, wS, bS, bPo, tL, wB, Do, Spal	39	Common throughout the District.
Mulsantina picta	wS, bS, wB, Spal	13	Common throughout forested area.
Acantholyda sp.	wS, bS, jP	5	Light scattered population.
Hylobius pinicola	wB, tL	2	Very light population.
Corythucha sp.	wB, W, waB	4	Light.
Pontania sp.	tA, W, bPo	19	Common through District.
Aphid spp.	jP, W, bPo, wS, tL, tA, wB	21	Light to moderate populations mainly on young open growing trees.

7.3.20 Summary of Collections of Insect Species from Permanent Sampling Areas (based on 5 tree beating samples)

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host(s)	Av.no. larvae/ tree sampled
01	20	20	Malacosoma disstria	tA	0.1
			Choristoneura conflictana	tA	0.1
			Gonioctena americana	tA	0.6
			Chrysomela crotchi	tA	2.0
			Choristoneura fumiferana	wS	0.1
			Dioryctria reniculella	wS	0.1
			Pikonema alaskensis	wS	0.4
			Pikonema dimmockii	wS	0.4
			Malacosoma disstria	bPo	0.2
			Chrysomela crotchi	bPo	0.1
			Pristiphora erichsonii	tL	0.2
			Miscellaneous	All hosts	1.4
02	17	15	Choristoneura conflictana	tA	0.2
			Dioryctria reniculella	wS	0.2
			Choristoneura fumiferana	wS	0.1
			Pikonema dimmockii	wS	0.2
			Tetralopha asperatella	bPo	0.7
			Pristiphora erichsonii	tL	0.2
			Miscellaneous	All hosts	0.7
04	17	17	Pikonema dimmockii	bS	0.4
			Pikonema alaskensis	bS	0.3
			Acleris variana	bS	0.3
			Pristiphora erichsonii	tL	0.5
			Choristoneura fumiferana	tL	0.1
			Pikonema dimmockii	wS	1.0
			Pikonema alaskensis	wS	0.4
			Chrysomela knabi	tA	0.4
			Miscellaneous	All hosts	0.4
05	17	15	Choristoneura conflictana	tA	0.2
			Choristoneura fumiferana	tL	0.1
			Pristiphora erichsonii	tL	0.6
			Pikonema alaskensis	wS	0.6
			Pikonema dimmockii	wS	0.3
			Pikonema alaskensis	bS	0.1
			Pikonema dimmockii	bS	0.2
			Miscellaneous	All hosts	0.7

7.4 TREE DISEASE CONDITIONS

7.4.1 White Pocket Rot, Polyporus tomentosus

A one acre plot of white spruce was surveyed southwest of Armit (sec. 1, tp. 44, rge. 31, W.P. mer.) in the Porcupine Provincial Forest for the incidence of white pocket rot. The root systems of 5 living white spruce were examined. The root systems of four of the five examined showed evidence of stain. One dead tree was examined, but the root system was decomposed. Results of the survey are shown in Table 6.

7.4.2 Root and Butt Decay of Conifers, Flammula alnicola

The stump surfaces of three recently cut-over areas of white spruce were surveyed in the Hudson Bay District for the occurrence of this fungus. Fifty stumps were examined at each location but the decay was not detected. Results of the survey are shown as follows.

Location	Size in acres	Tree sp.	Time of cut	Type of cut	No. of stumps examined	Av. d.b.h.	No. of stumps with F. alnicola	No. of stumps with Other decay	Type of decay
Whitefox Sec.10, tp. 54, rge.11, W.2 mer.	2	wS	1960	C	50	17	0	9	H.R.
Hudson Bay Sec.17, tp. 50, rge. 19, W.2 mer.	10	wS	1959 1960	S	50	22	0	39	H.R.
Hudson Bay Sec.21 & 22, tp.42, rge. 3, W.2 mer.	5	wS	1959 1960	C	50	17	0	16	H.R.

C - clear; S - selective; H.R. - heartrot.

7.4.3 Spruce Needle Rust, Chrysomyxa sp.

Light rust infections were recorded on white and black spruce at scattered points throughout the Northern Provincial Forest in the Hudson Bay District in 1960. Infection was most severe along the eastern slopes of the Pasquia Hills and in the vicinity of Bankside Lake where an occasional tree was moderately infected. On the south slopes of the Pasquia Hills infection was light, in most cases occurring only on the odd needle. A light infection of this rust was also recorded on the Sipanok Channel near Goose Lake.

Table 6

Results of Survey for Spruce Stand Openings *P. tomentosus*

Location	Size of plot (acre)	Av. tree ht. (ft.)	Av. age of stand	No. of patches per acre	No. of groups per acre	No. of single trees per acre	No. of trees examined	No. of healthy roots	No. of decayed roots	No. of decomposed roots	No. of root samples with *P. tomentosus*	No. of root samples with *A. mellea*	No. of root samples unknown
Armit	1	50	60	0	0	1	1	0	0	10	0	0	3

7.4.4 Leaf Blight, Marssonia sp.

This leaf blight fungus caused light damage to the foliage of trembling aspen in the vicinity of White Fox Fire Tower in the Northern Provincial Forest where browning was noted on several trees over a small area. The trees infected were all 3" d.b.h. and over. Light to moderate damage was quite extensive in the Kelvington-Wadena area in Tps. 34, 35, 36, and 37, and Ranges 11, 12 and 13, W.2 mer., where pockets of 8 to 10 trees showed from 25 to 50 per cent of their foliage infected by leaf blight.

7.4.5 Leaf Spot, Melanconium sp.

Small pockets of leaf spot on trembling aspen were noted throughout the Pasquia Hills, along the Carrot and Birch river watersheds, and at Hudson Bay. Infections were usually limited to small areas ranging from one to ten acres in size. Within these pockets, however, 75 to 100 per cent of the foliage was infected with leaf spot.

7.4.6 Twig Blight, Napicladium tremuloidea

Twig blight was common on small trembling aspen reproduction at scattered points throughout the Hudson Bay District in 1960. It was noted in the Porcupine Provincial Forest near Reserve, and in the Northern Provincial Forest north of Veillardville, and along The Pas Highway near Chemong. Damage caused by twig blight was light.

7.4.7 Jack-pine Spherical Gall Rust

Jack-pine spherical gall rust occurred throughout most jack-pine stands in the Hudson Bay District. South and east of Hudson Bay along the Armit Road infection was light on an occasional tree. North of Veillardville examination of 12 trees revealed 7 were infected, of which 3 were moderately infected.

7.4.8 Comandra Blister Rust, Cronartium comandrae

Swellings caused by this rust occurred in a jack-pine stand in the Porcupine Provincial Forest near Parr Hill Lake (sec. 19, tp. 39, rge. 1, W.2 mer.). Fifteen trees were examined and 6 were infected with approximately 6 to 8 swellings per tree.

7.4.9 Rust on Jack Pine, Coleosporium solidaginis

This rust of jack-pine foliage occurred in stands south of Hudson Bay and in the Pasquia Hills near 13 Mile Tower. Infection was light on an occasional tree.

Asters heavily infected with this rust were noted 10 miles south of Hudson Bay. A collection was taken and forwarded to the Saskatoon Laboratory.

7.4.10 Jack-pine Mistletoe, Arceuthobium americanum

A stand of jack pine near White Fox Fire Tower (tp. 53, rge. 12, W.2 mer.) which has been infected with mistletoe for several years, indicates severe infection on reproduction as well as mature trees. Twenty-five trees were examined for the fungus, Wallrothiella arceuthobii, which attacks the female flower of the mistletoe. One cluster of mistletoe was found infected with this fungus. The infected mistletoe occurred on a small jack pine and was growing close to the ground. W. arceuthobii was not common in the area.

Pockets of mistletoe were noted in jack-pine stands west of Cumberland Lake to Erickson Lake on an aerial survey. Infection ranged from moderate to severe with some branch mortality occurring in the most heavily infected areas.

7.4.11 Spruce Mistletoe, Arceuthobium pusillum

No change was noted in the spruce mistletoe infection in Tp. 51, Rge. 1, W.2 mer. during the 1960 season. No evidence of the mistletoe spreading to spruce reproduction was noted.

7.4.12 Hail Damage

A hail storm in early June of 1960 near Carragana, moderately defoliated trees over an area 3 1/2 miles wide by 4 miles long. The area consisted mainly of trembling aspen and balsam poplar, which refoliated by late summer.

7.4.13 Other Noteworthy Diseases

Host	Locality	Disease	Remarks
Trembling aspen	Carrot River, Porcupine P.F.	Ink spot, Ciborina bifrons	Scattered, light to moderate.
Trembling aspen	Greenwater Lk., Hudson Bay, Clemenceau	Leaf scorch	Common.

Host	Locality	Disease	Remarks
Chokecherry	Throughout Hudson Bay Dist.	Black knot, Dibotryon morbosum	Common.
Willow	Porcupine P.F.	Powdery mildew Uncinula salici	Scattered - light mainly in understory.
Willow	Porcupine P.F.	Tar spot, Rhytisma salicinum	Scattered, light found mainly with powdery mildew.
Trembling aspen	Throughout aspen groves of Hudson Bay District.	Hypoxylon canker, Hypoxylon pruinatum	Common, light to moderate.

8. ANNUAL REPORT OF FOREST BIOLOGY RANGER PRINCE ALBERT DISTRICT OF SASKATCHEWAN

1960

by

J. A. Drouin

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

8.1 INTRODUCTION

Surveys for forest insects and tree diseases were carried out in the Prince Albert District from May to September inclusive in 1960. These consisted of assessing and mapping infestations, and recording damage and distribution of major and minor insects and tree diseases. Survey sub-projects on phenological measurements, Polyporus tomentosus disease, Hylobius sp. plots, Saperda sp. mortality plots, and Xyelid sp. study plots were continued. A survey to determine incidence of Flammula alnicola, a root and butt decay of softwoods, was initiated in 1960.

A total of 492 insect and 53 disease collections were submitted to the Winnipeg and Saskatoon laboratories respectively from this region.

Aerial surveys were made by charter aircraft and by aircraft provided by the Saskatchewan Department of Natural Resources. The assistance of Provincial personnel and private co-operators is gratefully acknowledged.

8.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

Several changes in the status of the major insect species occurred in 1960. A notable increase in defoliation of tamarack by the larch sawfly was recorded. A further significant increase in populations of the forest tent caterpillar was apparent, and pockets of light to moderate defoliation previously reported in the trembling aspen stands in the Bodmin area coalesced to form a continuous severe infestation.

The large aspen tortrix infestation south of Prince Albert continued, and covered approximately 350 square miles. A decline in populations and defoliation by this species was noted north of Candle Lake. Continued low populations of the spruce budworm, jack-pine budworm, yellow-headed spruce sawfly, and sawflies attacking jack pine were recorded. Populations of a complex of insect species attacking black spruce tops remained at low levels.

Additional data on the incidence of the white pocket rot, Polyporus tomentosus, on white and black spruce was collected from Bar and Hatchet lakes. The latter area constitutes the most northerly known collection point to date. Moderate to severe pockets of infections of a leaf blight, Marssonia sp., were recorded throughout the District.

8.3 INSECT CONDITIONS

8.3.1 Larch Sawfly, Pristiphora erichsonii (Htg.)

A notable increase in populations of the larch sawfly was recorded in tamarack stands in the southern portion of the Prince Albert District. In the northern sections, few changes were observed with continued light defoliation recorded in most stands examined (Fig. 1).

Moderate to severe defoliation occurred throughout the MacDowall Block north to Prince Albert, and through the Home, Holbein, Red Rock, and Steep Creek blocks of the Nisbet Provincial Forest. Severe defoliation extended west to Shellbrook and Mont Nebo and north to include the Canwood Block area. Defoliation was light north from Canwood through the Big River Provincial Forest and east to the Prince Albert National Park boundary, including the Dore-Smoothstone lakes area to Lac la Plonge.

In the eastern section of the Prince Albert District, severe defoliation extended from Whitestar to the Fort a la Corne Provincial Forest. Moderate with scattered severe defoliation was recorded north of Highway 55 to the Torch River, into the Nipawin Provincial Forest and north to the south shoreline of Deschambault Lake.

A wet, cool spring retarded adult emergence to some extent, increasing the overlap in larval instars. Feeding was completed by early August in most stands examined. The foliage production of 10 individual trees at each of 3 permanent sample plots listed below was again assessed for growth conditions in 1960. Records indicated excellent foliage and shoot growth averaging 24 millimeters in needle length, and up to 150 millimeters in shoot growth. Cone production showed a slight increase over 1959. Similar growth conditions were recorded at most tamarack stands examined elsewhere in the District. The larch sawfly infestations at these plots were rated according to percentage of current tamarack shoots utilized for oviposition by adult sawflies. The results are shown below.

Plot No.	Place	Infestation Ratings		
		No. of shoots examined	No. of shoots curled	1960 infestation
102	Crutwell	150	34	Severe
112	Dumble	70	0	Light
114	Red Rock Block	60	27	Severe

Larch sawfly cocoons were again collected by the larval drop tray method. The moss was shipped to Winnipeg for examination and cocoon dissections. Results of cocoon counts and dissections from the larval drop trays are shown in Table 1.

The dipterous parasite, Bessa harveyi, showed a decrease from 1959 at both locations. The chalcid parasite, Tritneptis klugii, found only at Crutwell in 1959, occurred at both plots in 1960. At Crutwell the number of larch sawfly cocoons in the drop trays parasitized by T. klugii varied from 90 to 100 per cent. Due to a possibility of contamination within the bagged moss from each tray, a mass collection of cocoons will be made in the spring of 1961 as a further check on this chalcid parasite.

Water level measurements were continued at the two tamarack plots set up for this purpose in 1959. Both plots showed high water levels. Surface water was recorded in the plot at Dumble during all three measurements.

8.3.2 Forest Tent Caterpillar, Malacosoma disstria Hbn.

A significant increase in populations of the forest tent caterpillar was recorded in 1960. The small pockets of light to moderate defoliation reported in the Bodmin area in 1959 merged into a single, severe infestation encompassing approximately five square miles.

Small pockets of severe defoliation of trembling aspen were recorded at Moonlight Lake near the west boundary of Prince Albert National Park, and north of the Nipawin Provincial Forest at Stewart Lake. A slight population build-up occurred at Christopher and Emma lakes. Throughout the remainder of the District larvae were common in most of the trembling aspen stands examined (Fig. 2).

Egg bands were first noted in the severe infestation at Bodmin on July 19. In this area pupal parasites were common and light predation by ants and birds was observed.

Egg band surveys were conducted in the fall to predict population trends and probable intensity of attack for 1961. Egg band counts were made on three felled trees in the Bodmin infestation and at 5 mile intervals to the periphery of the infestation. A total of 18 locations were sampled. A summary of these data is shown below.

Table 1

Results of Cocoon Collections and Larval Dissections of the Larch Sawfly from 20 Larval Drop Trays at Two Study Areas

Plot No. and Location	No. of cocoons	No. of cocoons destroyed in field		No. of larvae dissected	No. of larvae containing parasites				Diseased larch sawfly	
		Small mammals	Fall Bessa emergence		Mesoleius tenthredinis eggs	Mesoleius tenthredinis larvae	Bessa harveyi	Tritneptis klugii	No. of cocoons examined	No. of larvae diseased or dead
102 Crutwell	4231	0	220	200	1	3	16	453	600	90
104 Red Rock Blk.	6381	0	709	200	1	1	48	115	680	482

Location	No. of trees examined	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. crown depth	Av. no of eggs bands per tree	Forecast for 1961
Emma Lake	3	4.3	36	12	0.7	Light.
Prince Albert	3	3.6	33	14	0.0	Nil to light.
Home Block	3	4.0	30	12	0.0	Nil to light.
Ordale	3	3.0	20	13	0.0	Nil to light.
Shellbrook 7 S.	3	3.6	20	10	0.3	Light.
Shellbrook 20 S.	3	4.3	25	11	0.0	Nil to light.
Wingard Ferry	3	4.6	22	15	0.0	Nil to light.
Duck Lake	3	4.3	29	16	0.0	Nil to light.
St. Laurent Ferry	3	4.0	25	9	0.0	Nil to light.
Bodmin	3	3.6	27	19	28.6	Severe.
Big River	3	4.3	32	26	0.0	Nil to light.
Ladder Lake	3	4.6	38	28	3.0	Light to moderate.
P.A.N.P. West Boun.	3	3.0	24	17	0.0	Nil to light.
Bodmin 5 W.	3	4.0	25	19	1.6	Nil to light.
Big River P.F.	3	4.3	32	18	0.0	Nil to light.
Big River 6 S.	3	5.3	36	26	0.0	Nil to light.
Christie Lake	3	4.3	27	17	0.0	Nil to light.
Ladder Lake	30	3.4	27	16	17.8	Severe.

On the basis of these counts, populations of the forest tent caterpillar in 1961 will cause light defoliation in most of the District, with an area of severe defoliation reoccurring in the present infestation at Bodmin. Some extension of boundaries in this infestation will probably occur.

8.3.3 Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

A further decline in numbers of the large aspen tortrix was recorded in 1960, but the extensive infestation in the aspen grove region south and east of Prince Albert still persisted (Fig. 4). Moderate to severe defoliation of aspen stands in this region covered approximately 350 square miles. A smaller infestation, covering some 35 square miles, was also recorded at the north end of Candle Lake.

Moderate to severe defoliation extended south from Prince Albert to the South Saskatchewan River and southeast into the Crystal Springs - St. Benedict areas. Defoliation in the Duck Lake - MacDowall areas was confined to pockets varying in intensity from light to moderate. West of the North Saskatchewan River in the Shellbrook and Parkside areas, defoliation ranged from light to moderate, with an occasional severe pocket.

Throughout the remainder of the District, larvae were common in most trembling aspen stands examined. The aspen tortrix was frequently found in association with a complex of leaf rollers on aspen. Heavy populations of leaf rollers were recorded at Crutwell. The American poplar leaf beetle was found causing light defoliation to aspen regeneration at most collection points.

8.3.4 Jack-pine Budworm, Choristoneura pinus Free.

This species remained at very low levels in 1960. An occasional larva was collected from the Nisbet and Big River Provincial forests, but in both areas defoliation was negligible.

8.3.5 A Sawfly in the Galls of Jack Pine, Xyelid sp.

In 1957, a sawfly larva, observed inhabiting galls on the terminals of jack pine, was tentatively identified as Xyelid sp. To obtain more specific identification and information on life history, attempts to rear this sawfly under laboratory and field conditions were continued in 1960. Observations in 1958 and 1959 indicated that the sawfly emerges in early spring and presumably oviposits on the young terminal shoots of jack pine causing a gall formation. On maturing in mid-June, the larva bores out through the gall, drops to the ground and overwinters in the soil.

An attempt to overwinter this sawfly was made in 1959 by placing 107 mature galls collected in mid-June in a screened cage. After the larval drop period, the caged material was examined and 18 Xyelid sp. larvae were found in the sand. The material was overwintered and examined in the early spring of 1960. However no adult emergences were recorded.

A further effort was made to collect adults of Xyelid sp. by means of sweeping the foliage of jack pine with a net in May. The areas sampled had shown consistent populations of this species over the past few years. Results were negative, therefore the foliage sweeps were discontinued in late May. In early June at the first signs of terminal swellings, 12 sleeve cages were placed over Xyelid sp. galls to determine the timing for mass collections and to ensure against possible larval parasitism. Six cages were widely spaced on jack-pine regeneration near the Prince Albert headquarters. The remaining 6 cages were set up in a similar manner at the Buckland Plantation. Galls were examined periodically and after the first larval emergence the galls were collected and sent by rail express to the Winnipeg Laboratory. Unfortunately, emergence occurred en route through a delay in transit and the larvae were dessicated on arrival. It is interesting to note that no parasitism by the parasite Habrocytus sp. occurred on the galls within the sleeve cages.

A mass collection of 100 galls from jack-pine regeneration was made in early July at Buckland and in the Big River Provincial Forest. These galls were dissected for population counts of Xyelid sp. and a chalcid, Eurytoma near juniperina, which causes a similar gall. Results of dissections are shown in Table 2.

These data indicate that the majority of Xyelid sp. galls occur at the base of the terminals. Populations of Xyelid sp. were higher than those of the chalcid, Eurytoma near juniperina. High parasitism by Habrocytus sp. was also recorded.

The unsuccessful attempts to rear Xyelid sp. larvae to date may be attributed to the following: (1) high rate of mortality of larvae overwintering in the soil; (2) relatively low numbers of material available for rearing; (3) dessication of larvae during rearing and in transit; and (4) heavy parasitism by Habrocytus sp. The poor rearing results are not surprising when we consider that similar rearings, conducted by Webb and Forbes*, of the sawfly Pleroneura borealis Felt. produced only 4 living adults from approximately 1000 field collected larvae during a two year study period.

8.3.6 Poplar Borer, Saperda calcarata Say

This species continued to cause light to medium mortality in stagnated trembling aspen stands in the District. In association with a carpenter moth, Cossid sp., and flat-headed borers, it caused light to medium tree mortality throughout the southern section of the Prince Albert District. Mortality was most noticeable throughout most of the Nisbet Provincial Forest and in woodlots and shelterbelts west of Prince Albert. Scattered mortality was also recorded on forest-type aspen north of Big River.

Mortality and rate of spread studies were continued on a plot established in 1958 four miles west of Prince Albert. Plot tallies from 1958 to 1960 are summarized in Table 3.

These data indicate a low rate of spread and subsequent mortality by Saperda sp. Increased mortality of aspen is expected on the plot as a large number of the tagged trees are showing an increasing loss of vigor, dying of branches and tops, and premature yellowing of foliage. The most noteworthy change during the past two years is the increase in the incidence of Hypoxylon canker on trees infested with Saperda sp.

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* Webb, F. E. and R. S. Forbes. 1951. Notes on the biology of Pleroneura borealis Felt. (Hymenoptera:Xyelidae). Can. Ent. 181-183.

Table 2

Dissections of 100 Jack-pine Galls to Determine Species Within, and Position of the Gall on the Terminals

Location of galls on terminal	Total no.of galls	Av. length of galls in mm.	No. of galls with Xyelid sp.	No. of galls with Eurytoma near juniperina	A parasite of Xyelid sp. Habrocytus sp.	Galls with no insects present	Av. no. of Eurytoma near juniperina per gall
Base	79	13.4	10	23	28	18	5.3
Apex	11	11.5	0	3	5	3	2.6
Complete*	10	13.6	0	3	6	1	3.3
Total	100	12.8	10	29	39	22	4.9

* Terminal completely utilized.

Table 3

Tally of Dead and Living Trembling Aspen in a Six Grid Plot with Records on the Occurrence of Saperda sp. and Disease

Grid No.	No. of trees	d.b.h. Average	d.b.h. Range	No. of living trees showing damage by Saperda 1958	1959	1960	Hypoxylon 1958	1959	1960	Fomes 1958	1959	1960	No. of dead trees showing damage by Saperda 1958	1959	1960	Hypoxylon 1958	1959	1960	Fomes 1958	1959	1960	Accumulative no. of dead trees in 1958	1959	1960
1	4	4.9	4.0-5.5	1	1	2	0	0	0	0	0	0	2	2	2	2	2	2	0	0	0	2	2	2
2	4	2.7	2.1-4.4	1	1	1	0	0	0	0	0	0	0	0	0	2	1	1	1	0	0	3	3	3
3	7	4.9	3.5-6.0	5	7	7	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
4	23	4.8	2.5-6.0	18	18	21	0	0	2	0	0	1	0	0	0	1	2	1	0	0	0	1	3	3
5	17	4.9	3.6-6.0	12	15	14	0	1	3	0	0	0	0	1	2	0	1	2	0	0	0	0	2	5
6	9	4.7	2.7-5.5	4	4	7	0	0	4	0	0	0	1	1	1	1	1	2	0	0	0	2	2	2

8.3.7 Leaf Beetle on Balsam Poplar, Altica populi Brown

Infestations on balsam poplar stands by this species of leaf beetle decreased to some extent in 1960. The main body of the infestation was centered in the same general area as in 1959; namely along the North and South Saskatchewan rivers, and the Shell River north to the Emma Lake area.

Small pockets of moderate to severe skeletonizing were recorded at Buckland, Prince Albert and in the MacDowall Block. Throughout the remainder of the District, light skeletonizing occurred west from Prince Albert to Mont Nebo, north along the Shell River, and some sections of the Sturgeon River Valley. Similar conditions were noted south of Shellbrook, and in the Canwood and Debden areas.

8.3.8 A Round-headed Root Collar Borer on Poplar, Saperda sp.

Surveys for a poplar borer, Saperda sp., in 1957 indicated that it occurred in trembling aspen and balsam poplar on dry, sandy soils usually associated with jack pine. The most active infestations were found in small pockets of stagnated open-growing trembling aspen under 10 feet in height. Trees infested by borers were readily identified by the bulbous and gnarled appearance of the root collar. Examination in most cases showed scars, emergence holes, feeding damage and large amounts of frass and sawdust around the base of the tree. Both Cerambycid and Buprestid larvae contribute to this damage. Some mortality was observed as a result of girdling by the larvae beneath the bark but considerably more damage resulted from decay in the abandoned mines, and the breaking off of the tree where the heartwood had been weakened. Studies were undertaken in 1958 to determine distribution and degree of damage and mortality. A study plot was established 11 miles west of Prince Albert. The area supports mainly open-growing jack pine and small pockets of stagnated and immature trembling aspen.

Twenty conical screen cages were placed at random around infested root collars of trembling aspen to collect adult material for identification. Only two adults of the Buprestid, Poccilonata poss. cyanipes, emerged within the cages in 1959. The cages were removed from the twenty tagged root collars in 1960. The root collars with a portion of the root system were then dissected and examined for borer damage. Results of the examination of tagged trees are summarized below.

Tree No.	Height (ft.)	No. of wood borers		Old tunnelling damage	Tree mortality
		Cerambycidae	Buprestidae		
1	5	1	1	Severe	-
2	6	1	-	Moderate	-
3	5	-	2	Severe	Dead
4	5	-	-	Moderate	-
5	4	-	3	Light	-
6	5	1	2	Severe	Dead
7	3	-	-	Severe	Dead
8	3	1	-	Severe	Dead
9	5	-	3	Light	-
10	6	-	2	Light	-
11	7	-	-	Severe	-
12	3	1	2	Severe	Dead
13	4	-	-	Severe	Dead
14	4	-	2	Severe	Dead
15	3	1	-	Moderate	-
16	4	1	1	Severe	-
17	5	1	-	Severe	Dead
18	5	1	-	Severe	Dead
19	3	1	-	Severe	Dead
20	3	-	-	Severe	Dead

The data indicate that 55 per cent of the trees are now dead in the study plot. Further mortality is anticipated, as 3 of the remaining trees were in poor condition in 1960. About 75 per cent of the old damage was attributed to round-headed wood borers, although at the time of examination more Buprestids were present than Cerambycids. The Buprestids are considered to be secondary invaders, and in most cases occurred on weakened or dying trees previously infested by round-headed wood borers.

Feeding damage and galleries made by both species are easily recognized. The rounded galleries and fibrous, excelsior-like shreds of frass are characteristic of Cerambycid larvae. The galleries of Buprestid larvae are flattened, oval in cross section and winding, gradually enlarging as the larvae increase in size. The larval mines are always tightly packed with fine sawdust-like frass. On emerging through the bark, the beetles leave very characteristic elliptical exit holes.

Mass collections of round-headed wood borer larvae were collected in 1959. These were reared artificially on a medium of sawdust of trembling aspen and agar. Rearings were continued in 1960, and 8 adults were obtained and shipped to the Winnipeg Laboratory. A number of larvae and adults were also shipped to Dr. L. Gardiner for morphological studies. Results of his studies indicated the possibility of a new species of Saperda. Interest was also expressed by Dr. S. G. Smith who is conducting cytological studies.

A carpenter moth, Cossid sp., was also found in the root systems of the trees examined during the past 3 years. Galleries varying in length from 2 to 8 inches were observed along the main root systems. At the study plot west of Prince Albert up to 80 per cent of the root systems examined were damaged by the carpenter moth.

9.3.9 American Poplar Leaf Beetle, Gonioctena americana Schaef.

This leaf beetle caused light to severe defoliation of trembling aspen regeneration at scattered points in the District. Small pockets of severe defoliation on aspen regeneration were observed at Duck Lake, Shellbrook, Wingard Ferry, Holbein, and Christie Lake. Similar conditions were recorded at Bodmin along the periphery of the forest tent caterpillar infestation.

Scattered pockets of light defoliation were noted north of Prince Albert in the agricultural areas through the Sturgeon Valley, west to Debden and north in the Big River-Dore Lake region.

8.3.10 Neodiprions on Jack Pine

Low population levels of the sawfly, Neodiprion virginiana complex, continued in the Prince Albert District in 1960. Defoliation in all areas examined remained very light, and was confined to a few scattered trees. Occasional clusters of the complex were collected from jack pine in the Nisbet Provincial Forest, at Dumble and Big River.

Light defoliation caused by N. maurus was recorded in a small pocket of immature, open-growing jack pine at Bodmin.

8.3.11 White-pine Weevil, Pissodes strobi (Peck.)

Light, scattered damage to leaders of white and black spruce caused by this species was recorded in 1960. A small pocket of medium damage covering approximately one-tenth acre on black spruce leaders was observed one mile west of the MacDowall headquarters. Leader damage also occurred on white and black spruce in the Canwood, Polwarth, Debden, and Bodmin areas. Similar conditions existed in the Shell Lake, Mont Nebo and Christopher Lake areas on white spruce.

Damage was also recorded on one Scots pine in a plantation at the MacDowall field headquarters.

8.3.12 A Weevil on Jack-pine Terminals, Pissodes poss. terminalis

Studies undertaken in 1958 to determine the distribution and biology of this species were continued in 1960. Damage to the leaders of jack-pine reproduction remained light with an occasional pocket of moderate damage. The most extensive damage was noted in a plantation

of jack pine near Buckland and in several areas of jack-pine reproduction in the Home Block. An occasional leader damaged by this species was also recorded in most jack-pine reproduction examined in the MacDowall Block, at Dumble, Bodmin, and in the Big River Provincial Forest. There is some evidence that this species is becoming more prevalent in natural stands of jack pine (Fig. 8). On request from Dr. S.G. Smith, efforts to obtain special collections of adults of this species for cytological studies were made at the Buckland Plantation. Jack-pine foliage was sampled from May to mid-June by means of a sweep net at two areas, but no adults were obtained.

Larval development appeared complete by the end of July and light parasitism was observed at this time. Mass collections of infested jack-pine leaders were made in late July and shipped to Sault Ste. Marie for further studies.

8.3.14 A "Complex" of Insects in Tops of Black Spruce

No significant changes were noted in populations of the complex of insect species found in the "club tops" of black spruce. The most abundant species identified were as follows: Herculia thymetusalis Wlk., Dioryctria abitivorella (Grote), Archippus albertus (McD.) and Recurvaria sp. One other species, Epizeuxis americalis Gn., occurred in two out of numerous collections.

Moderate current feeding damage in tops of black spruce was recorded in the large black spruce swamps in the Dore-Sled lakes area, and along the Green Lake Road. Moderate needle and cone damage also occurred in the Candle and Whiteswan lakes area.

8.3.15 Leaf Roller on Jack Pine, Sparganothis tristriata Kft.

This leaf roller on jack pine caused light to medium damage to plantation growth in the Buckland area. Up to 35 per cent of the current growth showed signs of damage. Scattered populations caused light damage to reproduction and immature jack pine at numerous other collection points in the Home Block of the Nisbet Provincial Forest.

8.3.16 A Root Weevil, Hylobius sp.

A survey of root damage and tree mortality caused by this weevil was continued in 1960. This project was undertaken in conjunction with a survey to determine the incidence of the white pocket rot, Polyporus tomentosus. Emphasis was placed on distribution in northerly regions or previously inaccessible areas. Weevil damage to the roots of white spruce was appraised by systematic examination of the root systems of 5 living and 5 dead trees.

A damage index (Warren, 1956*) was applied to each root system. Results of this survey are shown below.

Place	Av. d.b.h. Living	Av. d.b.h. Dead	Av. ht. Living	Av. ht. Dead	Damage index Living	Damage index Dead	Percentage roots diseased on living trees	Percentage roots diseased showing insect damage
Fishing Lakes	6.4	5.6	51	45	0	0.73	0	0

8.3.17 A Webworm, Tetralopha asperatella Clem.

This species caused medium damage to a small pocket of trembling aspen at Duck Lake. In the remainder of the area, damage by this webworm was very light but general.

* Warren, G. L. 1956. The effect of site factors on the abundance of Hypomolyx piceus. Ecol. 37(1): 132-139.

8.3.18 Other Noteworthy Insects

Insect	Host(s)	No. of collections	Remarks
Choristoneura fumiferana	wS	1	Very low populations.
Pikonema alaskensis	wS, bS	13	Some scattered medium defoliation to single trees.
Neodiprion abietis	wS	3	Few - widely scattered.
Pikonema dimmockii	wS	4	Low populations.
Dioryctria reniculella	wS	1	Occasional larva.
Dasyneura balsamicola	bF	3	Scattered - low populations.
Pseudexentera improbana oregonana	tA, bPo	16	Common - defoliation light, wide distribution.
Galerucella decora	tA, W, bPo	11	Common - light defoliation.
Epinotia nisella criddleana	tA	12	Common - wide distribution.
Meroptera pravella	tA	2	Occasional - low populations.
Oberea schaumi	tA	1	Common - light damage.
Archips cerasivorana	cCh	9	Wide distribution.
Petrova albicapitana	jP	16	Light damage in plantation.
Toumeyella sp.	jP	7	Wide distribution, low populations.
Fenusa dohrnii	spAl	4	Medium damage at Crutwell, light otherwise - common.
Proteoteras willingana	mM	1	Occasional on shelterbelt.
Aphid spp.	tA, W, bS, spAl, bPo, mM, wB, tL	36	Common - light damage in some areas.
Coccinellid spp.	tA, jP, W, wS	14	Special collections of coccinellids for S. G. Smith. Common on white spruce.

8.3.19 Permanent Sample Areas

The following table shows the frequency of occurrence of the various insect species in the larval stages on individual host trees at permanent sample stations in 1960.

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host(s)	Av.no.of larvae/ tree sampled
01	21	21	Gonioctena americana	tA	1.7
			Choristoneura conflictana	tA	0.1
			Pseudexentera improbana oregonana	tA	0.1
			Epinotia nisella criddleana	tA	0.1
			Malacosoma disstria	tA	0.02
			Pikonema alaskensis	wS	1.1
			Pikonema dimmockii	wS	0.2
			Neodiprion abietis	wS	0.6
			Pristiphora erichsonii	tL	6.4
			Tetralopha asperatella	tA	0.6
			Tetralopha asperatella	bPo	0.06
			Malacosoma disstria	bPo	0.06
			Miscellaneous	all hosts	1.1
02	10	9	Pristiphora erichsonii	tL	6.8
			Gonioctena americana	tA	4.7
			Epinotia nisella criddleana	tA	0.5
			Pseudexentera improbana oregonana	tA	1.3
			Pikonema alaskensis	wS	1.0
			Pikonema dimmockii	wS	0.5
			Neodiprion abietis	wS	0.5
			Anoplonyx luteipes		0.5
			Semiothisa sexmaculata		0.2
			Miscellaneous	all hosts	0.1
03	10	9	Pristiphora erichsonii	tL	6.3
			Gonioctena americana	tA	1.8
			Semiothisa sexmaculata	tL	1.4
			Pikonema dimmockii	wS	1.0
			Choristoneura conflictana	tA	0.2
			Malacosoma disstria	tA	0.2
			Tetralopha asperatella	tA	0.4
			Anoplonyx luteipes	tL	0.2
			Anoplonyx canadensis	tL	0.4

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host(s)	Av.no.of larvae/ tree sampled
03			Pikonema dimmockii	bS	0.4
			Pseudexentera improbana oregonana	tA	0.8
			Anomogyna elimata	jP	0.4
			Campaea perlata	W	0.2
			Miscellaneous	all hosts	0.8
04	7	6	Pseudexentera improbana oregonana	bPo	0.8
			Choristoneura conflictana	bPo	0.2
			Malacosoma disstria	tA	0.5
			Tetralopha asperatella		0.6
			Miscellaneous	all hosts	1.3

8.4 TREE DISEASE CONDITIONS

8.4.1 Root and Butt Decay, Flammula alnicola

A survey was conducted to obtain information on the distribution of F. alnicola decay, and an estimate of the frequency of the decay in the areas examined.

Seven cut-over stands were examined in the Prince Albert District in 1960 for the presence of this disease with no results. Procedures involved examination of from 75 to 100 freshly cut stump surfaces in each area selected. Specimens of decay from infected stumps, identified by characteristic pattern and odour, were forwarded to the Pathology Laboratory at Saskatoon. No collections of F. alnicola mushrooms were made in August and September due to continuing dry weather. Pertinent data regarding locations, size, tree species, and results of the survey are shown in the following table.

Location	Size in acres	Tree sp.	Time of cut	Type of cut	No. of stumps examined	Av. d.b.h. (ins.)	No. of stumps with F. alnicola	No. of stumps with Other decays
Sled Lake Sec.31, tp.62, rge.9, W.3mer.	1/10	wS, bF	May 1960	C	40	10	-	Brown cubical
Dore Lake Road Sec.34, tp.61, rge.10, W.3mer.	1	wS, bF	Fall 1959	S	75	14	-	Brown cubical
Green Lake Road Sec.4, tp.61, rge.11, W.3mer.	1/2	wS, bF	Spring 1960	S	83	12	-	nil
Prince Albert Sec.16, tp.49, rge.26, W.2mer.	1	jP	Spring 1960	C	125	6	-	nil
Wheatley Sec.7, tp.51, rge.26, W.2mer.	3	wS, bS	Aug. 1960	S	116	8	-	nil
Prince Albert Sec.20, tp.49, rge.25, W.2mer.	1	jP	Spring 1960	C	50	8	-	nil
Prince Albert Sec.24, tp.49, rge.26, W.2mer.	25	wS	Fall 1959	S	100	12	-	Brown cubical

C - clear; S - selective.

8.4.2 Leaf Blight on Trembling Aspen

Moderate to heavy infections of a leaf blight, Marssonia sp., on trembling aspen were recorded throughout the Prince Albert District in 1960. In all cases leaf blight infections were confined to pockets. Scattered pockets, of up to 5 acres, were recorded in the MacDowall Block, Duck Lake, and Shellbrook-Shell Lake areas. Scattered pockets extended north of Prince Albert to the Big River, Green Lake, and Dore Lake areas. In the eastern section of the District, pockets of leaf blight were noted in the Fort a la Corne, Candle Lake, and Nipawin Provincial Park areas.

8.4.3 Rust on Conifers, Chrysomyxa sp.

Light rust infections were recorded on white and black spruce at numerous points in the Prince Albert District in 1960. The most common occurrences were noted at Crutwell, Dumble, and Big River where it occurred on both reproduction and mature white spruce.

8.4.4 Armillaria Root Rot, Armillaria mellea

This root rot was recovered from jack-pine reproduction at scattered points in the Nisbet Provincial Forest, Briarlea, and in the Big River Provincial Forest. Light mortality due to Armillaria root rot attack was again recorded in the jack-pine plantings in the Fort a la Corne Provincial Forest.

8.4.5 Tar Spot on Willow, Rhytisma salicinum

Very light infections of tar spot on willow were recorded from widely scattered areas of the District in 1960. Of these, the most common occurrence was noted in the MacDowall Block, in the vicinity of Big River and along the west shore of Candle Lake.

8.4.6 Wind Damage

Moderate to severe patches of damage, caused by high winds, were recorded during aerial and ground surveys in the northern sections of the Prince Albert District in 1960. Uprooted and broken trees, estimated at 100 per cent of the stand in some areas, was observed in the mature stands north of the Cowan River extending to Sled Lake, and on the east shore of Candle Lake.

Pockets of severe damage were also common in the Dore Lake, Green Lake regions and along the Dore and Big River roads, particularly in the cut-over areas.

8.4.7 Animal Damage

Severe feeding damage by rabbits on jack-pine and trembling aspen reproduction, was observed in the Fort a la Corne Provincial Forest near Elk House and English Cabin. This same condition existed in some parts of the Steep Creek Block, Canwood Block, Home and Red Rock blocks of the Nisbet Provincial Forest, and in the Bodmin area where larch reproduction showed light mortality.

8.4.8 Jack-pine Rusts on Alternate Hosts

Surveys to determine the incidence of uredia and telia stages of rusts on alternate hosts were continued in 1960. A Puccinia rust on Ribes sp. was recorded at Crutwell and on buffalo berry Shepherdia argentea and S. canadensis in the Home Block. No rust was found on Melampyrum lineare (cow wheat), and Castilleja sp. (Indian paint brush) in the Prince Albert and Shellbrook areas.

8.4.9 Other Noteworthy Diseases

Host	Organism	Locality	Remarks
Willow	Leaf rust	Crutwell-Dumble	Common - scattered.
Cow wheat	Powdery mildew	Prince Albert	Common - light.
Aspen	Melanconium leaf spot	Ordale	Single collection.
Balsam fir	Needle cast, Phacidium infestans	Big River	Common - widely scattered.
Balsam fir	Hypodermella needle cast	Green Lake	Single collection.
Wild Rose	Phragmidium rust	Dumble-Christopher Lk.	Very common.
Pincherry	Cylindrosporium hiemale, leaf spot	Prince Albert	Single collection.
Jack pine	Comandra blister rust	Briarlea	Scattered - light.
Jack pine	Walrothiella on mistletoe	Christie Lake	Common.
Chokecherry	Powdery mildew	Ordale-Dumble	Common - scattered.
Balsam poplar	Powdery mildew	Prince Albert	Common - scattered.
Ground ash	Powdery mildew	Red Rock Block	Single collection.

9. ANNUAL REPORT OF FOREST BIOLOGY RANGER NORTHERN DISTRICT OF SASKATCHEWAN

1960

by

J. B. Martin

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

9.1 INTRODUCTION

Forest insect and tree disease surveys were carried out in the Northern District of Saskatchewan from May 3 to September 23 in 1960. The District was travelled mainly by truck, but inaccessible areas were surveyed by chartered aircraft, and through co-operative flying arrangements with the Saskatchewan Department of Natural Resources. The assistance of the Department of Natural Resources personnel in this and other field assignments is gratefully acknowledged.

In 1960 a survey of spruce stands for insects and tree diseases was extended northward to the northern boundary of Saskatchewan. One result of this was a large extension northward in the known range of the disease, Polyporus tomentosus.

A total of 209 insect samples and 43 tree disease samples were made in the Northern District in 1960.

9.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

Populations of the larch sawfly continued to increase in 1960 causing widespread defoliation of tamarack. The forest tent caterpillar caused scattered pockets of severe defoliation in trembling aspen stands from Prince Albert National Park to Reindeer Lake. The large aspen tortrix caused no appreciable damage north of Lac la Ronge but some light defoliation of trembling aspen was recorded in Prince Albert National Park and in the area south of Lac la Ronge. The yellow-headed spruce sawfly caused severe defoliation of black spruce at widely scattered points from Prince Albert National Park to the northern boundary of the Province.

A leaf blight, Marssonia sp., caused discolouration of trembling aspen foliage over the entire range of the host in the Northern District of Saskatchewan. Chrysomyxa sp., a needle rust of spruce, lightly infected widely scattered stands of spruce in northern Saskatchewan in 1960.

9.3 INSECT CONDITIONS

9.3.1 Larch Sawfly, Pristiphora erichsonii (Htg.)

The larch sawfly infestation south of the Churchill River remained about the same as in 1959. Light defoliation was recorded in all stands examined. North of the Churchill River moderate to severe defoliation was recorded in all tamarack stands examined. The infestation ratings and distribution of the larch sawfly are shown in Figure 1.

Larch stands from Lac la Ronge along the Churchill River to Needle Rapids and Kelly Lake were lightly defoliated. Moderate defoliation was general in the northeastern part of the District at the following points: Macoun, Deception, Fontaine, Herbert and Bailey lakes. The greater part of the Northern District, however, suffered moderate to severe defoliation. These conditions were observed from the Clearwater River in the west, north to Lake Athabaska and in the northeast from the Reindeer River north to Wollaston Lake.

To determine the incidence of parasites and diseases, 20 larch sawfly larval drop trays were again used for collecting cocoons in plots at Mayview and Waskesiu in the Prince Albert National Park. The results of the cocoon counts and dissections are shown in Table 1.

Results of these cocoon dissections indicate that the dipterous parasite, Bessa harveyi, was slightly more prevalent at the Waskesiu plot. Fall emergence of Bessa harveyi increased at Mayview and remained at about the same level as last year at Waskesiu.

Sequential sampling to determine infestation levels of the larch sawfly was continued in three permanent sample plots in 1960. The infestations in the plots were rated according to the percentage utilization of current tamarack shoots for oviposition sites. The population counts and infestation ratings for these plots are listed below.

Location and plot no.	No. of shoots examined	No. of shoots curled	Infestation rating 1960
Mayview - 111A	90	4	Light
Waskesiu - 116	210	15	Light
Rabbit Creek - 101A	50	0	Light

9.3.2 Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

The large aspen tortrix was widely distributed throughout the Northern District of Saskatchewan in 1960. In Prince Albert National Park, small pockets of light defoliation were observed along the south boundary road, immediately south of Waskesiu, and west of Waskesiu to Waskesiu Narrows (Fig. 4).

North of Waskesiu patches of very light to light defoliation were found as far as Lac la Ronge. From Lac la Ronge to the Churchill River no defoliation was noted but larvae were recovered in most beating samples.

Table 1

Cocoon Counts and Dissections of Larch Sawfly from 20 Larval Drop Trays

Location and plot no.	No. of cocoons	No. of cocoons destroyed in field		No. of larvae dissected	No. of larvae containing parasites				Diseased larch sawfly	
		Small mammals	Fall Bessa emergence		Mesoleius tenthredinis eggs	Mesoleius tenthredinis larvae	Bessa harveyi	Trit-neptis klugii	No. of cocoons examined	No. of larvae diseased or dead
Mayview 111A	872	0	94	200	3	1	71	1	204	4
Waskesiu 116	1126	0	78	200	1	2	111	1	207	7

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

Scattered open-growing spruce in Prince Albert National Park were severely defoliated by the yellow-headed spruce sawfly in 1960. Pockets of severe defoliation were observed at Scenic View and south along #2 Highway to the Park gate. A small island of black spruce was completely defoliated at Bailey Lake in the northeast corner of the Province. Severe defoliation was recorded on black spruce at Syntak Lake and on two islands in Deschambault Lake.

An infestation on Hungry Island in Wollaston Lake which was reported as severe in 1958 showed a general decline in 1960. Several years of severe defoliation has resulted in severe mortality to black spruce stands on the island with some scattered mortality on the mainland.

Defoliation in other parts of the District was negligible, although scattered larvae were found at most locations.

9.3.4 Forest Tent Caterpillar, Malacosoma disstria Hbn.

Severe defoliation of trembling aspen by the forest tent caterpillar occurred at widely scattered pockets from Prince Albert National Park to Methy and Reindeer Lakes (Fig. 2).

In Prince Albert National Park, moderate to severe defoliation was noted at Sandy Lake and extending south to Bell Hill Tower. Severe defoliation was spotty and confined to aspen growing at higher elevations. Small infestations were noted at Amyot and Moonlight lakes. North of the Park, an infestation was noted on the west shore of Montreal Lake covering townships 61 and 62. Small pockets of defoliation were also recorded at Sandfly, Steephill, Deschambault, Methy and Reindeer lakes and in scattered pockets along the Reindeer River.

An infestation reported in 1959 at Bar Lake subsided and very low populations were recorded during an aerial survey and ground check in 1960. Low populations of larval and pupal parasites on forest tent caterpillar were observed at Sandy Lake. High bird populations and predation by the numerous avian species was also recorded at this area.

A survey was conducted in accessible areas during September to determine the number of forest tent caterpillar egg bands per tree and probable intensity of infestations in 1961. The results are shown below.

Location	No. of trees examined	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. crown depth	Av. no. of egg bands per tree	Forecast for 1961
Mayview	3	4.0	30	16	0.0	Nil to L
Buffalo Park	3	5.0	27	13	0.0	Nil to L
Sandy Lake	3	5.0	34	13	23.0	Severe
Sandy Lk. 5N.	3	5.0	36	19	0.0	Nil to L
Montreal Lake	3	5.0	38	11	0.0	Nil to L
Skunk Creek	3	5.0	36	12	0.0	Nil to L
Pine Creek	3	5.0	31	8	0.0	Nil to L

L - light.

No general increase of tent caterpillar populations is expected in 1961. Egg surveys indicate that high populations will be restricted to areas which suffered severe defoliation in 1960.

9.3.5 American Poplar Leaf Beetle, Gonioctena americana (Schaeff.)

Although fairly high populations of the American poplar leaf beetle were common as far north as the Churchill River, defoliation by this leaf beetle was not conspicuous. The only appreciable damage caused was light defoliation of trembling aspen regeneration in the Prince Albert National Park and the area immediately north of the Park to the Montreal River.

The frequency of occurrence of the American poplar leaf beetle in beating samples at selected points is shown in Table 2.

9.3.6 A Root Weevil, Hylobius sp.

A survey to detect insect damage and tree disease on the root systems of white and black spruce was continued in 1960. The roots of five living and five dead spruce were examined at Bar Lake northwest of Lac la Ronge and at Hatchet Lake north of Wollaston Lake. The survey plot at Hatchet Lake constitutes the first and most northerly survey record of P. tomentosus in this region. The incidence of a root weevil, Hylobius sp., and a white pocket rot was determined and the damage indices are tabulated below.

Location	Av. d.b.h. Living	Dead	Av. ht. Living	Dead	Damage index Living	Dead	Percentage diseased roots on living trees	Percentage diseased roots with insect damage
Bar Lake 8-069-348	8	7	48	50	2.7	1.2	29	40
Hatchet Lake 7-019-404	5	6	27	28	0.0	0.0	0	0

9.3.7 Other Noteworthy Insects

Insect	Host(s)	No. of collections	Remarks
Neodiprion maurus	jP	6	Scattered colonies causing light defoliation to reproduction, P.A.N.P. to Molanosa.
Neodiprion virginiana	jP	1	Trace defoliation, P.A.N.P.
Neodiprion americanus banksianae	jP	2	Severe defoliation confined to single scattered trees near Montreal Lake Mission.
Neodiprion nanulus nanulus	jP	1	Trace defoliation, P.A.N.P.
Neodiprion sp.	jP	2	Scattered colonies, Bow River.
Petrova albicapitana	jP	2	Scattered nodules throughout P.A.N.P.
Mordwilkoja vagabunda	tA	7	Widely scattered throughout District, generally light. Previous infestation at P.A.N.P. subsided.
Hemichroa crocea	spAl	5	Moderate defoliation at Deschambault Lake. Light defoliation at Herbert, Fontaine lakes.
Pissodes strobi	wS, bS	3	Light damage of ornamental spruce at Waskesiu townsite, scattered throughout P.A.N.P.

Insect	Host(s)	No. of collections	Remarks
Choristoneura pinus	jP	1	No defoliation.
Gracillarid sp.	W	8	Moderate defoliation at La Ronge, light north of Churchill River. Caused severe damage in 1959.
Aphid spp.	bPo, tL, bF, spAl	29	Populations abundant on most tree species but negligible damage at all areas examined.
Semiothisa sexmaculata	tL	12	Common in all larch stands but defoliation very light.
Tetralopha asperatella	tA	2	Low scattered populations in P.A.N.P.
Dioryctria abietivorella	bF	1	Cones on balsam fir lightly infested.
Altica populi	bPo	5	Increased distribution since 1959 but still causing only light defoliation in south portion of P.A.N.P.
Malacosoma lutescens	wcCh	3	Widely scattered south of Lac la Ronge.
Malacosoma pluviales	wcCh	2	No defoliation, both locations south of Lac la Ronge.
Coccinellid sp.	wS	7	Adult beetle populations most abundant on spruce infested with scale.
Anoplonyx luteipes	tL	3	Decrease in populations trace defoliation.

9.3.8 Permanent Sampling Stations

Studies on the frequency of occurrence of insects from permanent sample stations were continued in 1960. The locations and descriptions of these plots remained unchanged. The results are shown in Table 2.

Table 2

Summary of Collections of Major Insect Species from Permanent Sampling Areas Based on 5 Tree Beating Samples

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av. no.of larvae per tree sampled
01	8	8	Herculia thymetusalis	bS	0.4
			Pikonema dimmockii	wS	0.4
			Pikonema alaskensis	wS	0.2
			Parorgyia plagiata	wS	0.2
			Semiothisa granitata	wS	0.2
			Choristoneura conflictana	tA	0.4
			Pandemis canadana	tA	0.2
			Pseudexentera improbana oregonana	tA	0.4
			Miscellaneous		1.7
06	3	3	Herculia thymetusalis	bS	1.6
			Epizeuxis americalis	bS	0.2
			Gonioctena americana	tA	4.4
			Pristiphora erichsonii	tL	1.4
			Anoplonyx luteipes	tL	0.2
05	18	16	Gonioctena americana	tA	5.9
			Malacosoma disstria	tA	0.2
			Syngrapha alias	wS	0.2
			Zeiraphera fortunana	wS	0.2
			Pikonema alaskensis	wS	0.8
			Pikonema dimmockii	wS	0.2
			Pristiphora erichsonii	tL	6.0
			Semiothisa sexmaculata	tL	0.3
			Anoplonyx luteipes	tL	0.4
			Cimbex americana americana	spAl	0.4
			Arge clavicornis	spAl	0.2
			Nematus unicolor	spAl	0.2
			Hyperetis amicaria	spAl	0.2
			Neodiprion maurus	jP	3.4
			Miscellaneous		1.9

9.4 TREE DISEASE CONDITIONS

9.4.1 Jack-pine Mistletoe, Arceuthobium americanum

This mistletoe was found severely attacking jack pine at Ile-a-la-Crosse and north along the Alberta border to Lake Athabasca. North of Peter Pond Lake, jack pine is the predominant species. Numerous dead trees caused by mistletoe kill were seen in this area.

Large areas of severe mistletoe infection were noted in the vicinity of Hanson Lake, an area which extends from Candle Lake to Fishing Lake, Torch River, and Nipawin, and includes Big Sandy Lake and ZN Lake in the north. To the south the infection was particularly severe throughout the Ft. a la Corne Provincial Forest.

Suitable points for further studies on the spread of mistletoe to young uninfected stands were noted at Pine Creek (Tp. 67, Rge. 22, W.2nd mer.) and at ZN Lake (Tp. 59, Rge. 14, W.2nd mer.).

While extensive areas of jack-pine mistletoe were seen, particularly severe infection and high mortality of trees were noted at the following locations:

Peter Pond Lake	Big Sandy Lake
Methy Lake	Fishing Lakes
Clearwater River	Torch River
Rene Lake	Ft. a la Corne Provincial Forest

9.4.2 Yellow Witches'-broom, Peridermium coloradense

Additional areas of severe infection of P. coloradense on spruce were observed during aerial surveys in northern Saskatchewan in 1960. Infections of varying intensity extended from Crackingstone Point on Lake Athabaska, east to Hatchet Lake. Severe infections on black spruce were particularly noticeable at Fontaine Lake, Bailey and Hatchet Lake.

9.4.3 White Pocket Rot, Polyporus tomentosus

Three additional plots were examined in 1960 for the incidence of P. tomentosus, a white pocket rot of spruce.

Plot I (N.1). This plot was established on an island in Bar Lake located about 50 miles northwest of Lac la Ronge in Sec. 16, Tp. 75, Rge. 3, W.3 mer. The stand was composed of mature white spruce of moderate density with a ground cover of shallow moss over rock. Mortality in the spruce was light.

Plot II (N.2). This plot was located north of the Fishing Lakes on the Hanson Lake Road about 60 miles north of Smeaton in Sec. 3, Tp. 60, Rge. 18, W.2 mer. The stand was composed of mature white spruce of moderate density, with a medium ground cover of moss. Only light tree mortality was recorded.

Plot III (N.3). This plot was located at Hatchet Lake (Sec. 12, Tp. 111, Rge. 9, W.2 mer.) on an island formed by an esker. The soil was very sandy and contained some gravel. The site was very dry, with a moderate number of dead trees. Mature and over-mature black spruce was the main species. Growth was dense on the level ground and moderate on the hills.

9.4.4 Leaf Blight on Aspen, Marssonia sp.

Leaf blight caused severe browning of the foliage in trembling aspen stands. The damage was patchy and areas infected were noted in the Prince Albert National Park and at points as far north as Lake Athabaska as well as the entire province of Saskatchewan from east to west.

Particular points of infection were noted at:

Beauval	Pellican Narrows
Ile-a-la-Crosse	Waskesiu
Oldman River	South Boundary P.A.N.P.
Farand Lake	Montreal Lake
Syntak Lake	Molanosa
Herbert Lake	La Ronge
Methy River	Bigstone Lake

9.4.5 Animal Damage

Moderate animal damage to young aspen and jack pine was caused by rabbits eating the bark in the Prince Albert National Park near Rabbit Cabin, along the south boundary, near Sandy Lake and immediately south of Waskesiu. Young balsam fir was severely browsed by rabbits near Waskesiu. Young aspen also were lightly browsed between Prince Albert National Park and La Ronge.

9.4.6 Winter Drying of Balsam Fir

Winter drying of balsam fir was noted lightly scattered throughout the District. The red foliage on balsam indicating mortality was particularly noticeable at the following locations:

East of Trout Lake	Clam Lake
West of Trout Lake	The Churchill River from
Big Sandy Lake	Sandfly Lake to Trade Lake.
Head Lake	Clearwater Valley near
	Alberta Border.

Table 3

Data Recorded from P. tomentosus Survey

Location	Size of plot (acre)	Av. tree ht. (ft.)	Av. age of stand	No. of patches per acre	No. of groups per acre	No. of single trees per acre	No. of trees examined	No. of healthy roots	No. of decayed roots	No. of decomposed roots	No. of root samples with P. tomentosus	A. mellea	unknown
N.1 Bar Lake Sec.16,tp. 75,rge.3, W.3 mer.	1	60	130	7	8	25	5	0	29	6	10	-	-
N.2 Fishing Lks. Sec.3,tp. 60,rge.18, W.2 mer.	1	60	65	1	3	11	5	0	32	6	10	-	-
N.3 Hatchet Lk. Sec.12,tp. 111,rge.9, W.2 mer.	1	30	72	2	6	17	5	0	29	4	4	-	2

9.4.7 Survey for Root and Butt Decay, Flammula alnicola

A survey was conducted to detect this decay in northern Saskatchewan in 1960. About 100 stumps were examined in two recently cut areas. The information regarding these plots is summarized in the following table.

Location	Size in acres	Tree sp.	Time of cut	Type of cut	No. of stumps examined	Av. d.b.h. (ins.)	No.of stumps with F. alnicola	No.of stumps with Other decays
Montreal Lake Sec.14, tp.58, rge.25, W.2mer.	5	bS	Fall 1960	S	100	7	-	nil
Christopher Lake Sec.4, tp.53, rge.26, W.2mer.	3	wS	Spring 1960	S	93	14	-	nil

9.4.8 Other Noteworthy Diseases

Host	Organism	Locality	Remarks
White spruce	Chrysomyxa rust	Waskesiu	Light infection.
White spruce	Chrysomyxa rust	Calder Lake	Light and scattered.
Black spruce	Chrysomyxa rust	Skunk Creek	Light and scattered.
Willow	Melampsora bigelowii	Pine Creek	Light and scattered.
Balsam fir	Pucciniastrum geoppertianum	Bow River	Light.
Rose	Phragmidium rust	Calder Lake	One bush only.
White spruce	Lophodermium pinastri	Waskesiu	Found on one tree only.
Willow	Rhytisma salicinum, tar spot	Hatchet, Ithingo and Unknown lakes	Light, widely scattered.

10. ANNUAL REPORT OF FOREST BIOLOGY RANGER MEADOW LAKE DISTRICT OF SASKATCHEWAN

1960

by

K. L. Mortensen

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

10.1 INTRODUCTION

Forest insect and tree disease surveys were conducted in the Meadow Lake District from May 9 to October 19. During this period 401 insect collections and 42 tree disease collections were made. Insect samples were submitted to the Forest Biology Laboratory, Winnipeg, and tree disease samples to the Forest Pathology Laboratory, Saskatoon, for identification and further study. Major insect outbreaks were mapped and the damage to infested stands was assessed. Survey sub-projects, including phenological measurements and Polyporus tomentosus disease surveys, were continued.

Four and one-half hours flying time were provided by the Saskatchewan Department of Natural Resources for aerial surveys of the District.

The writer wishes to extend his appreciation to the personnel of the Saskatchewan Department of Natural Resources for their co-operation and assistance during the field season.

10.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

Some changes in insect conditions occurred in the Meadow Lake District in 1960. A general increase in the distribution of the forest tent caterpillar was apparent. Defoliation of aspen, due to various leaf rollers, was again common along the west side of the District. Populations of the pitch nodule maker continued to increase throughout the young jack-pine stands.

Special emphasis was placed on surveys for Flammula alnicola. Examinations conducted at 3 points in recently cut-over white spruce stands failed to reveal the presence of this tree disease at the points examined in the Meadow Lake District. Further sampling for Polyporus tomentosus was conducted along the Buffalo Narrows Road.

10.3 INSECT CONDITIONS

10.3.1 Larch Sawfly, Pristiphora erichsonii (Htg.)

There was no change in the status of the larch sawfly in the Meadow Lake District in 1960. Very light populations occurred in all tamarack stands examined (Fig. 1). Generally, the tamarack occurring throughout the District is in poor condition. Foliage production surveys conducted in June at 5 permanent plots showed sparse foliage and poor shoot production. On the other hand, tamarack reproduction is abundant in the District, and it is on these young trees that the highest insect populations were recorded.

Five permanent tamarack study plots are maintained in the Meadow Lake District. The infestation ratings for 1960, based on the percentage of current tamarack shoots utilized for oviposition by the adult sawfly, are shown below.

Plot No.	Location	Infestation ratings		
		Total shoots counted	Total shoots curled	Infestation rating
101	Meadow Lake P.F.	80	2	Light
102	Loon Lake Resort	90	3	Light
103	Loon Lake	70	0	Light
104	Pierceland	80	2	Light
105	St. Cyr	80	1	Light

Over the past 10 years, approximately 50 per cent tree mortality has occurred in Plots 101, 103, and 104. During this period defoliation by the larch sawfly has been generally light and the mortality is attributed mainly to high water levels which have persisted for the past 5 years. These plots are located at Pierceland, the Meadow Lake Provincial Forest, and 6 1/2 miles north of Loon Lake. Plots 102 and 105 at St. Cyr and Loon Lake Resort contain younger, healthier trees. Larch sawfly populations are highest at the Loon Lake Resort plot but are very low at the St. Cyr plot.

Larch sawfly cocoons were collected in larval drop trays at Plot 102, Loon Lake Resort, and Plot 104 at Pierceland. Twenty 2 ft. by 2 ft. trays were used at each plot. The results of cocoon collections and larval dissections are shown in Table 1.

10.3.2 Forest Tent Caterpillar, Malacosoma disstria (Hbn.)

A general increase in the abundance and distribution of the forest tent caterpillar was observed in the Meadow Lake District in 1960. In 1959, a moderate infestation was recorded on the southeast shore of Cold Lake. In 1960, the defoliation increased to severe proportions, although the boundaries of the infestation remained much the same. Severe defoliation was mapped over approximately two townships of pure aspen-type forest extending from the mouth of the Cold River south to the Cold Lake Fire Tower and approximately one-half mile into the Province of Alberta. No defoliation was observed north of Cold Lake, and egg band sampling north of the Cold River indicated only low populations. Southeast from the infestation at Cold Lake, small pockets of light defoliation occurred throughout the Bronson Provincial Forest. Larval populations were general but light throughout the rest of the District. Larval collections made at Loon Lake, Lloydminster, Battleford, Green Lake, and Grand Rapids indicate more widespread distribution of the insect than in 1959 (Fig. 2).

Table 1

Cocoon Counts and Dissections of Larch Sawfly from 20 Larval Drop Trays at Two Areas

Location and plot no.	Total no. of cocoons	No. of cocoons destroyed in field		No. of larvae dissected	No. of larvae containing parasites				Diseased larch sawfly	
		Small mammals	Fall *Bessa* emergence		*Mesoleius tenthredinis* eggs	*Mesoleius tenthredinis* larvae	*Bessa harveyi*	*Trit-neptis klugii*	No. of cocoons examined	No. of larvae diseased or dead
Loon Lake 102	187	0	2	134	0	5	53	0	187	51
Pierceland 104	137	0	0	108	0	0	19	0	137	29

Extensive egg band sampling was conducted in September and October to predict probable tent caterpillar populations for 1961. Owing to the limited number of counts made in 1959, no reliable comparison can be made. However, counts in 1960, as shown in Table 2, indicate that a further extension of the Cold Lake infestation is to be expected. Moderate defoliation can be expected in the Pierce Lake and Pierceland area, while pockets of moderate to severe defoliation will probably occur in the Ministikiwan Lake and Loon Lake area. Elsewhere throughout the District populations will generally be light.

Table 2

Summary of Forest Tent Caterpillar Egg Band Counts and Defoliation Forecast for 1961

Location	No. of trees examined	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. crown depth	Av. no. egg bands per tree	Forecast for 1961
Cold Lake	3	3	21	13	0.7	Light
Cold River	3	3	26	15	3.7	Light
Pierce Lake	3	3	24	18	7.7	Moderate
Pierceland	3	3	30	18	4.0	Moderate
Pierceland	3	3	31	16	5.0	Moderate
Beacon Hill	3	4	34	15	1.3	Light
Goodsoil	3	3	24	17	0.7	Light
Beaver River	3	3	28	17	0.3	Light
Loon River	3	3	33	20	1.7	Light
Big Bush	3	3	28	17	0.3	Light
St. Walburg	3	3	26	14	0.0	Nil
Meadow Lake P.F.	3	3	28	22	1.3	Light
Meadow Lake P.F.	3	3	28	14	0.7	Light
St. Cyr	3	3	22	15	0.3	Light
Prince	3	3	25	17	0.0	Nil
Loon Lake	3	5	34	17	5.7	Moderate
Steeles Narrows	3	3	26	14	1.7	Light
South Makwa	3	3	32	16	0.7	Light
South Makwa	3	3	32	16	0.7	Light
Pierceland	3	3	24	14	3.0	Light
Pierceland	3	4	32	18	8.0	Moderate
Pierceland	3	3	28	15	5.3	Moderate
Whelan	3	3	22	16	2.0	Light
Ministikiwan	3	3	25	10	9.7	Severe
Meadow Lake	3	3	21	13	0.3	Light
Barnes Crossing	3	5	40	15	1.7	Light
Waterhen River	3	3	22	12	0.0	Nil
Flotten Lake	3	4	35	14	0.3	Light
Salt Creek Tower	3	5	43	20	0.3	Light
Meadow Lake	3	3	24	12	0.7	Light

Location	No. of trees examined	Av. d.b.h. (ins.)	Av. ht. (ft.)	Av. crown depth	Av. no. egg bands per tree	Forecast for 1961
Peck Lake	3	4	35	18	0.7	Light
Fishing Lake	3	4	32	14	0.0	Light
Green Lake	3	3	23	16	0.3	Light
Buffalo Narrows Road, mi. 25	3	3	43	22	0.7	Light
Grand Rapids	3	4	43	25	0.3	Light
Divide Tower	3	4	40	16	0.0	Nil

10.3.3 Defoliators of Trembling Aspen

Trembling aspen suffered moderate to severe defoliation in parts of the Meadow Lake District (Fig. 4). In order of relative abundance, the defoliators were identified as: the leaf rollers, Pseudexentera improbana oregonana and Epinotia nisella criddleana, and the American poplar leaf beetle, Gonioctena americana. Defoliation was most prevalent along the west side of the District from Cold Lake to the southern boundary of the District at Marsden. Generally defoliated areas were not extensive but confined to 5 to 10 acres. Fairly large patches of severe defoliation were observed in the Maidstone-Lashburn area, along the Monnery River west of Paradise Hill, and at Loon Lake.

Defoliation by the American poplar leaf beetle was confined mainly to the lower branches of smaller aspen trees. Moderate infestations mostly covering less than one square mile were noted at Pierce Lake, Flotten Lake, Ministikiwan Lake, Divide Tower and Bolney.

10.3.4 Boxelder Twig Borer, Proteoteras willingana (Kft.)

Populations of the boxelder twig borer remained low throughout all Manitoba maple shelterbelts examined. Population studies were continued at the following locations: Loon Lake, Onion Lake, Goodsoil, Paradise Hill, and Edam. The percentage of twigs infested ranged from nil at Loon Lake to 4 per cent at Edam. The results of these studies, showing insect distribution by crown levels, are shown in Table 3.

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

Low populations of the yellow-headed spruce sawfly were common in spruce stands and shelterbelts throughout the Meadow Lake District. Heavy infestations were encountered in plantings at Barthel, Goodsoil and in the Loon Lake Resort area. In native stands of spruce the green-headed spruce sawfly, Pikonema dimmockii, occurred in association with P. alaskensis.

Table 3

Summary of Boxelder Twig Borer Population Counts

Location	No. of trees examined	Av. ht. (ft.)	Av. crown depth (ft.)	Av. crown width (ft.)	No. of twigs examined and twig borer populations per crown class					
					Lower		Mid		Upper	
					No. twigs	No. borers	No. twigs	No. borers	No. twigs	No. borers
Paradise Hill	5	19.2	13.6	6.8	189	2	189	3	115	0
Onion Lake	5	21.8	18.4	10.8	176	7	184	7	144	1
Goodsoil	5	14.4	13.0	9.6	156	1	163	2	118	1
Edam	5	23.0	15.0	7.2	209	9	242	13	152	2
Loon Lake	5	12.0	10.0	7.2	179	0	180	0	90	0

10.3.6 Pitch Nodule Maker, Petrova albicapitana (Busck.)

A marked increase in numbers of pitch nodule maker was noted in the Meadow Lake District in 1960. Young jack pine 6 to 15 feet supported the heaviest populations of this species. The most severe infestation was recorded on young jack pine in the Beacon Hill area.

Strip tallies were made in the Beacon Hill area, and at a number of pine plantations in the Bronson Provincial Forest. The results of these tallies are summarized below.

Location	Type of forest	No. of trees examined	No. of trees attacked by nodule maker
Beacon Hill	1/10 acre regeneration	144	25
Beacon Hill	1/10 acre regeneration	84	33
Peck Lake	Pine reforestration	105	33
Little Fishing Lake	Pine reforestration	100	4
South Entrance of Bronson P.F.	Pine reforestration	100	5

10.3.7 A Root Weevil, Hylobius sp.

Further damage index assessments were made in the Meadow Lake District in 1960. Two one-acre plots were examined; one at Mile 11 and, another at Mile 87 on the Buffalo Narrows Road. At each plot the root systems of 5 living and 5 dead trees were examined and a damage index recorded. Examination was made of white spruce at Mile 11, and black spruce at Mile 87. Insect damage to both living and dead roots was light at both locations. The results of these examinations are synopsized below.

Place	Av. d.b.h.		Av. ht.		Damage index		Percentage of roots diseased on living trees	Percentage of roots diseased showing insect damage
	Living	Dead	Living	Dead	Living	Dead		
Mi. 11	11.8	8.4	49.8	53.6	0.62	0.67	0.8	40
Mi. 87	5.6	5.6	41.4	42.2	0.40	0.20	0.0	20

10.3.8 Spruce Galls, Chermes lariciatus (Patch)

Galls caused by this aphid were very common on both white and black spruce throughout the District. Both large and small trees were attacked. The damage by this insect could become of economic importance in tree farming areas and more extensive surveys of the condition are planned for 1961.

10.3.9 Sawflies on Jack Pine, Neodiprion spp.

A special effort was made to collect colonies of sawflies from jack pine in 1960, but numbers were generally low throughout the District. Eleven colonies were submitted to the Winnipeg Laboratory for rearing and further study. The sawfly species collected are listed below.

Sawfly species	Location	No. of colonies collected
Neodiprion nanulus nanulus	Buffalo Narrows Rd.	2
	Divide Tower	1
	Golden Ridge	1
Neodiprion americanus banksianae	Buffalo Narrows Rd.	4
	Neeb	1
Neodiprion virginiana	Loon Lake	1
Neodiprion sp.	Loon Lake	1

10.3.10 White-Pine Weevil, Pissodes strobi Peck

The white-pine weevil continued to cause damage to leaders of white and black spruce throughout the Meadow Lake District in 1960. Young, open growing black and white spruce were the preferred hosts. Considerable leader mortality was observed at the southwest end of Turtle Lake. Damaged leaders of spruce were less common in the northern limits of the District.

10.3.11 Other Noteworthy Insects

The following table contains a list of other noteworthy insects collected in the Meadow Lake District in 1960.

Insect	Host(s)	No. of collections	Remarks
Campaea perlata	tA, W, wB	57	Very common on deciduous hosts.
Itame loricaria	W, tA	40	Very common on deciduous hosts.
Gelechiid sp.	tA	28	Occurred commonly during August and September.
Operophtera bruceata	W, tA	27	Common on deciduous hosts.
Galerucella decora	W, tA	19	Low populations throughout the District.
Anoplonyx luteipes	tL	17	Common during September.
Parorgyia vagans	tA	15	Common in aspen samples.
Pandemis canadana	W, tA wB	13	Common throughout the District.
Semiothisa sexmaculata	tL	11	Common throughout tamarack stands.
Aphid sp.	Misc.	9	Submitted to G. Bradley Forest Biology, Wpg.
Semiothisa bicolorata	jP	7	Found occasionally.
Anoplonyx canadensis	tL	6	Common in late September.
Tetralopha asperatella	tA	5	Very low populations.
Acleris variana	wS	4	Occasional larva, wide distribution.
Acantholyda sp.	wS	4	Occasional larva, wide distribution.
Archips cerasivorana	Misc.	4	Heavy populations near Rex and Barthel.
Neodiprion abietis	wS	4	Occasional larva, wide distribution.
Malacosoma lutescens	Misc.	2	Very low populations.
Chilocorus stigma	wS, tA	2	Submitted to Dr. Smith, Sault Ste. Marie.
Cephalcia sp.	wS	2	Only occasional larva found.
Mulsantina hudsonica	jP	2	Submitted to Dr. Smith, Sault Ste. Marie.
Malacosoma pluviale	W	1	Collected at mi. 41, Buffalo Narrows Road.
Choristoneura fumiferana	wS	1	Collected in Meadow Lake Prov. Forest.

10.3.12 Permanent Sampling Areas

During 1959, five permanent sampling areas were established in the Meadow Lake District. The frequency of occurrence of the more common insect species at each sample area in 1960, based on 5 tree beating samples taken during the larval feeding period, is shown in the following table.

Station No.	No. of collections	No. of collections containing larvae	Insect species present	Host	Av.no.of larvae per tree sampled
01	10	9	Pseudexentera improbana oregonana	tA	1.7
			Pikonema alaskensis	wS	1.9
			Pikonema dimmockii	wS	0.2
			Pikonema alaskensis	bS	2.4
			Pristiphora erichsonii	tL	0.9
			Anoplonyx luteipes	tL	0.3
			Anoplonyx canadensis	tL	2.7
			Miscellaneous	Misc.	0.6
02	7	5	Pseudexentera improbana oregonana	tA	0.5
			Pikonema alaskensis	wS	0.6
			Miscellaneous	Misc.	0.3
03	2	2	Epinotia nisella criddleana	tA	0.2
			Gonioctena americana	tA	2.6
			Campaea perlata	tA	0.3
			Platycampus sp.	tA	2.1
			Parorgyia vagans	tA	0.2
04	4	2	Pristiphora erichsonii	tL	1.8
			Malacosoma disstria	tA	0.2
			Anoplonyx luteipes	tL	0.4
			Campaea perlata	tA	0.1
			Operophtera bruceata	tA	0.1
			Miscellaneous	Misc.	0.4
05	12	11	Gonioctena americana	tA	2.2
			Anoplonyx canadensis	tL	2.1
			Pristiphora erichsonii	tL	4.6
			Campaea perlata	tA	0.8
			Semiothisa bicolorata	jP	0.2
			Gelechiid sp.	tA	0.3
			Miscellaneous	Misc.	0.2

10.4 TREE DISEASE CONDITIONS

10.4.1 White Pocket Rot, Polyporus tomentosus

The survey on stand opening disease of spruce was continued in 1960. Emphasis was centered on occurrence and distribution in the northerly areas of the Meadow Lake District.

Two one acre plots were examined along the Buffalo Narrows Road; one at mile 11 and the other at mile 87. At mile 11, examination of mature white spruce in a mixed stand along Moccasin Creek, showed no root mortality. At mile 87, a black spruce stand was selected for study. Light mortality was recorded throughout the plot area which consisted of black spruce interspersed with scattered tamarack. Table 4 shows data recorded at the two plots in 1960.

10.4.2 Root and Butt Decay, Flammula alnicola

This fungus occurs on white spruce causing a yellow stringy root and butt rot which rarely extends up to breast height. Surveys to determine distribution and estimates of frequency of F. alnicola decay were carried out in 1960.

Location	Size in acres	Tree sp.	Time of cut	Type of cut	No. of stumps examined	Av. d.b.h. (ins.)	No.of stumps with F. alnicola	No.of stumps with Other decays
Loon Lake Sec.16, tp.59, rge.16, W.3mer.	4	wS	May	S	30	10	0	0
South Makwa Sec.13, tp.58, rge.20, W.3mer.	1	wS	May	S	20	10	0	0
Green Lake Sec.17, tp.61, rge.12, W.3mer.	5	wS	Aug.	S	50	18	0	0

S - selective.

10.4.3 Rust on Conifers, Chrysomyxa sp.

Light rust infections were recorded on white and black spruce stands in the Meadow Lake area in 1960. A small, moderate infection, confined to a few trees, was noted at the north end of Loon Lake. A similar condition was observed near Loon Lake on two white spruce

Table 4

Data Recorded from *P. tomentosus* Survey

Location	Size of plot (acre)	Av. tree ht. (ft.)	Av. age of stand	No. of patches per acre	No. of groups per acre	No. of single trees per acre	No. of trees examined	No. of healthy roots	No. of decayed roots	No. of decomposed roots	No. of root samples with *P. tomentosus*	No. of root samples with *A. mellea*	No. of root samples unknown
M.L. 1 Moccasin Creek	1	42	80	1	3	11	5	0	21	8	0	4	6
M.L. 2 Buffalo Narrows Road	1	65	70	2	4	9	5	0	37	3	0	2	8

where 75 per cent of the current foliage on the west side of the trees was infected. Further surveys of balsam-fir stands along the Buffalo Narrows Road showed very little incidence of this rust.

One collection of yellow witches'-broom on balsam fir was collected at Canoe Lake. Examination showed approximately 50 per cent of the current growth was infected.

10.4.4 Leaf Blight on Trembling Aspen, Marssonia sp.

Small, localized pockets of this leaf blight on trembling aspen were prevalent throughout the Meadow Lake District in 1960. Small patches varying from 1/10 acre to 5 acres were recorded along the Buffalo Narrows Road north to the Ile-a-la-Crosse area. Similar conditions extended north to the Churchill River basin at Methy and Peter Pond lakes.

Scattered, small pockets of severe infection were also observed in the Meadow Lake, Green Lake, and Glaslyn areas. Patches of leaf blight were particularly common in the Bolney, Lloydminster areas.

10.4.5 Jack-pine Rusts on Alternate Hosts

Surveys to determine the incidence of the uredial and telial stages of the following rusts on their alternate hosts were continued in 1960.

Cronartium comandrae: alternate host, Comandra. The alternate host, Commandra, bearing rust spores, was collected at Loon Lake and Ile-a-la-Crosse.

10.4.6 Wind Damage

Very strong winds in the latter part of July caused considerable windthrow in the forested sections of the Meadow Lake District. Trees most seriously affected were overstory trembling aspen and white spruce. Breakage was heaviest in the cut-over areas, and occurred generally 15 to 20 feet above ground. Heavy damage was confined mainly to the Green Lake and Ile-a-la-Crosse areas. The Department of Natural Resources personnel conducted an aerial survey in the Green Lake areas to determine possible salvage operations. Some salvage operations were already in progress in the vicinity of Green Lake by local operators.

Light wind damage to mature white spruce and balsam poplar also occurred at Loon Lake.

10.4.7 Other Noteworthy Diseases

Host	Organism	Locality	Remarks
White spruce	Needle cast	Turtle Lake	Single collection.
Jack pine	Jack-pine mistletoe	Brightsand Lk.	Common - scattered.
Manitoba maple	Canker, *Septogleum* sp.	Goodsoil	Single collection.
Trembling aspen	*Macrophomia tumefasciens*	Green Lake	Single collection.
Jack pine	Rust gall	Fishing Lake	Scattered - few.
Black spruce	*Fomes pini*	Meadow Lk.P.F.	Common.
Black spruce	*Melampsorella cerasti*	Loon Lake	Common.
Juniper	*Gymnosporangium* sp.	Lloydminster	Single collection.
White spruce	*Polyporus tomentosus*	Loon Lake	Mushroom - single collection.
White spruce	*Armillaria mellea*	Pierceland	Mushrooms on old stump.
Balsam fir	*Stereum sanguinolentum*	Meadow Lk.P.F.	Single collection.
Trembling aspen	*Radulum caesearium*	Green Lake	Single collection.

11. ANNUAL REPORT OF FOREST BIOLOGY RANGERS

WEST-CENTRAL DISTRICT OF SASKATCHEWAN

1960

by

J. B. Martin and K. L. Mortensen

FOREST BIOLOGY LABORATORY

WINNIPEG, MANITOBA

March, 1961

11.1 INTRODUCTION

Surveys for forest insects and tree diseases were carried out in the West - Central District of Saskatchewan from May 15 to October 15. A total of 140 insect and 3 tree disease collections were submitted to the Winnipeg and Saskatoon laboratories for identification and study. Phenological measurements were taken at Scott, Saskatoon, Melfort, and Lanigan. Population studies of the boxelder twig borer were continued at a number of locations. Several insect infestations were mapped and sampling for minor insect species carried out.

11.2 REVIEW OF FOREST INSECT AND TREE DISEASE CONDITIONS

The status of forest insects and tree diseases in the West-Central District changed very little in 1960.

The large aspen tortrix and other leaf rollers were the main defoliators of trembling aspen stands. Noticeable defoliation by these species was noted in the Pike Lake Provincial Park, at Yellow Creek, St. Benedict, St. Louis and Battleford. Populations of the forest tent caterpillar remained generally low throughout the District.

Defoliation of spruce by the yellow-headed spruce sawfly was confined to a few isolated shelterbelts which were widely scattered across the northern half of the District.

Hypoxylon canker continued to be the major disease of trembling aspen. A leaf blight of aspen, Marssonia sp., was prevalent in small patches throughout the District.

11.3 INSECT CONDITIONS

11.3.1 Forest Tent Caterpillar, Malacosoma disstria Hbn.

Populations of the forest tent caterpillar were generally low in the West - Central District in 1960 (Fig. 2). Larval collections were taken at Domremy, Yellow Creek, Crystal Springs, Wakaw, Ethelton, Bay Trail, Borden Bridge, Saskatoon and Valley Centre. Slightly higher populations were found at Reynaud, St. Benedict, Lepine and Battleford. The very light infestation reported at Resource in 1959 completely subsided. No defoliation or larvae were observed in this area in 1960.

An egg band survey was conducted throughout the West-Central District during September and October. Three trembling aspen trees were examined at 20 locations, including six points in the Pike Lake Provincial Park. One egg band was found one mile south of Battleford. Elsewhere the counts were negative. From these surveys it would appear that forest tent caterpillar populations will be nil to very light in 1961.

11.3.2 Leaf Roller, Pseudexentera improbana oregonana Wlshm.

This leaf roller caused moderate defoliation throughout the aspen stands of the western portion of the District. Small bluffs of aspen were moderately defoliated in the Sutherland-Dundurn area. More extensive defoliation occurred in the Battelford-Sweetgrass area. In the eastern portion of the District this insect occurred in association with the large aspen tortrix. Low populations of Pseudexentera improbana oregonana were found at Domremy, Brancepeth, Crystal Springs, Birch Hills, and Runciman. Occasional larvae were collected in aspen samples from Lanigan, Lepine, Keppel and Duperow.

11.3.3 Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

The large aspen tortrix was widely distributed in the West-Central District in 1960. It caused light defoliation throughout the eastern portion of the District. Patches of moderate to severe defoliation extended from St. Louis to Domremy, and in the Yellow Creek, Meskanaw and St. Benedict areas. Predation by birds was observed east of Yellow Creek in an area of high tortrix populations.

11.3.4 Leaf Roller, Epinotia nisella criddleana Kft.

Light populations of this leaf roller were found in the eastern portion of the West-Central District. Samples were taken near Tway, Crystal Springs, Lepine, Reynaud, Leacross, Borden, Saskatoon, Sweetgrass and Duperow.

11.3.5 The Webworm, Tetralopha asperatella Hlst.

This webworm was common in the eastern portion of the West-Central District. Very light defoliation was noted near Melfort. Very low populations, causing no appreciable defoliation, were observed near Condo, Crystal Springs, Yellow Creek, and south along #20 Highway to Reynaud.

11.3.6 Grey Willow-leaf Beetle, Galerucella decora (Say)

Numbers of the grey willow-leaf beetle remained very low throughout the District. Collections of this insect were recorded near Haey, Lepine, Middle Lake, Ethelton, Leacross and Muenster.

11.3.7 Boxelder Twig Borer, Proteoteras willingana (Kft.)

Very little change was found in the distribution of the boxelder twig borer in 1960. Populations continued to decline and damage to the twigs of Manitoba maple was very light.

Population counts of the boxelder twig borer at permanent sampling stations were continued in 1960. The location of the study areas and the crown-level distribution of twig borers is shown in Table 1. These figures indicate a further decline in numbers from 1959.

11.3.8 American Poplar Beetle, Gonioctena americana Schffr.

Although larvae of the American poplar beetle were commonly found throughout the District the only appreciable damage to trembling aspen foliage was observed at Domremy and Burr.

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

The yellow-headed spruce sawfly was present in nearly all white spruce shelterbelts examined in the northern portion of the West-Central District. Severe defoliation was limited to shelterbelts at Kinistino, Crystal Springs, Melfort and Primate. Light defoliation was recorded in shelterbelts at Luseland, Macklin, Unity and Scott.

11.3.10 Ugly Nest Tortrix, Archips cerasivorana (Fitch)

Large areas of chokecherry reproduction were severely infested by the ugly nest tortrix. The heaviest infestations were found near Hoey, Ethelton and throughout the Manito Provincial Forest. Elsewhere throughout the eastern portion of the District scattered nests were commonly found on chokecherry, rose and willow.

11.3.11 Spiny Elm Caterpillar, Nymphalis antiopa L.

A slight increase in the numbers of the spiny elm caterpillar was noted in the northwestern portion of the District. Larvae were collected from trembling aspen at Red Pheasant and from elm at Salvador and Battleford.

Table 1

Summary of Boxelder Twig Borer Population Studies

Location	No. of trees examined	Av. ht. (ft.)	Av. crown depth (ft.)	Av. crown width (ft.)	No. of twigs examined and twig borer populations by crown class					
					Lower		Mid		Upper	
					No. twigs	No. borers	No. twigs	No. borers	No. twigs	No. borers
Macklin	5	24.0	19.8	8.4	195	3	193	5	186	1
Vanscoy	5	20.0	16.0	5.8	225	8	233	10	167	1
Millerdale	5	9.8	8.6	5.4	255	1	229	0	182	1
Outlook	5	23.0	19.0	9.2	219	3	238	4	164	0
Floral	5	18.4	16.4	8.4	278	12	336	14	92	8
Radisson	5	16.2	11.8	5.0	244	7	225	7	153	3
Ethelton	5	14.2	9.8	7.8	852	5	795	16	711	15
Watrous	5	20.0	13.8	13.2	526	3	702	8	729	13
Domremy	5	25.4	17.8	20.2	714	10	747	4	710	14

11.3.12 Other Noteworthy Insects

Insect	Host(s)	No. of collections	Remarks
Itame loricaria	tA, W	14	No damage discernable.
Parorgyia vagans	tA, W	8	Widely scattered.
Operophtera bruceata	tA	8	Wide distribution.
Gelechiid sp.	tA	8	Light defoliation at Scott, Vanscoy and Battleford.
Enargia declor	tA	7	Widely scattered.
Nematus sp.	tA, W	7	Low populations.
Mordwilkoja vagabunda	tA	6	Widespread but not heavy.
Malacosoma lutescens	W, cCh, Rose	4	Widely scattered.
Pandemis canadana	tA	2	No defoliation.
Chilocorus stigma	wS	2	Submitted to Dr. Smith, Sault Ste. Marie, predator of scale insects.
Pontania sp.	tA, W	2	Found occasionally.
Badebecia urticana	tA	2	Found occasionally.
Lytta nuttali	Misc.	2	Causing damage to gardens in the Wilkie district.
Alsophila pometaria	mM	2	Occasional larvae at Asquith and Duperow.
Altica populi	bPo	1	Trace defoliation near Saskatchewan River.
Phenacaspis pinifoliae	wS	1	Causing damage to wS on Saskatoon City Hospital grounds.

11.4 TREE DISEASE CONDITIONS

11.4.1 Hypoxylon Canker of Aspen, Hypoxylon pruinatum

Samples of Hypoxylon canker were taken near Ethelton, Saskatchewan. The stand sampled was mature aspen where the average tree was about 5 inches in diameter at breast height. The cankers were found on the main stem. A few dead trees were observed in the vicinity.

Elsewhere in the West-Central District, Hypoxylon cankers were common in woodlots and shelterbelts.

11.4.2 Aspen Leaf Blight, Marssonia sp.

Marssonia leaf blight was very common in the West-Central District of Saskatchewan. Samples were taken near Crystal Springs. Pockets of Marssonia leaf blight were recorded in the following areas: Watrous, Nokomis, St. Louis, Domremy, Lanigan and Melfort.

11.4.3 Black Knot on Cherry, Dibotryon morbosum

Black knot was abundant on chokecherry in the Meskanaw and Yellow Creek areas. The swellings were large, and dead branches were common. The infection appeared to be at least several years old judging by the amount of mortality, the size of the swellings and the large area infected. The infected stands were quite similar and mostly composed of mature and over-mature trembling aspen with an undergrowth of willow and cherry. Several scattered specimens of Dibotryon sp. were seen on cherry bushes near Resource and Melfort.

11.4.4 Animal Damage

Rabbit feeding caused light damage to trembling aspen reproduction near Crystal Springs, Saskatchewan. The affected trees were about one-half inch in diameter at breast height and were growing in a burnt-over area. Scattered trees were completely girdled causing light tree mortality over an area of about 100 acres.

11.4.5 Frost Damage

Aspen foliage suffered light damage by frost near Melfort. On May 18, the edges and tips of the leaves were black. The frozen foliage occurred mainly on young vigorous trees of about 2" d.b.h. on an exposed site, and it is suspected that the trees produced leaves earlier than the trees in the vicinity.

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- I -

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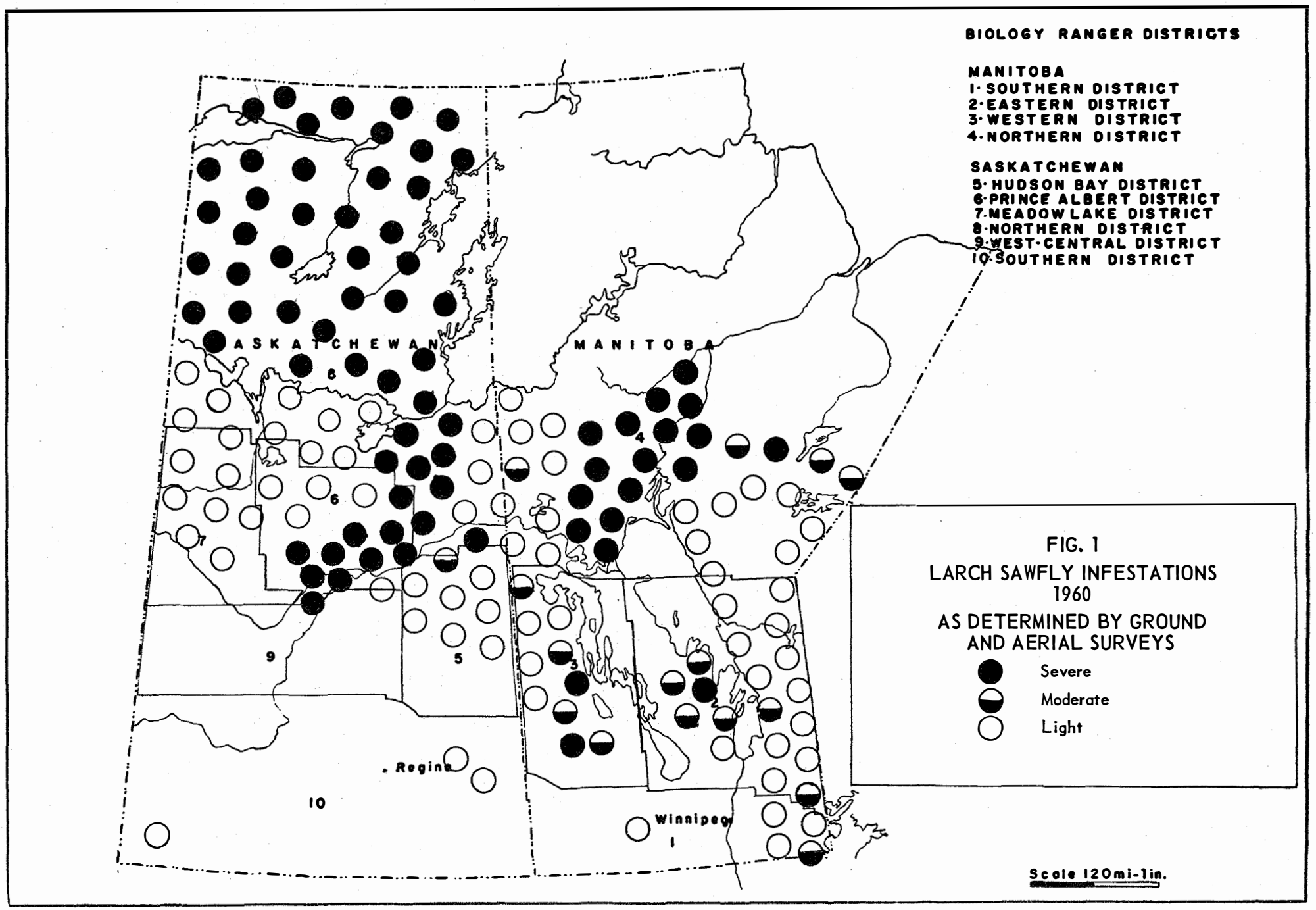
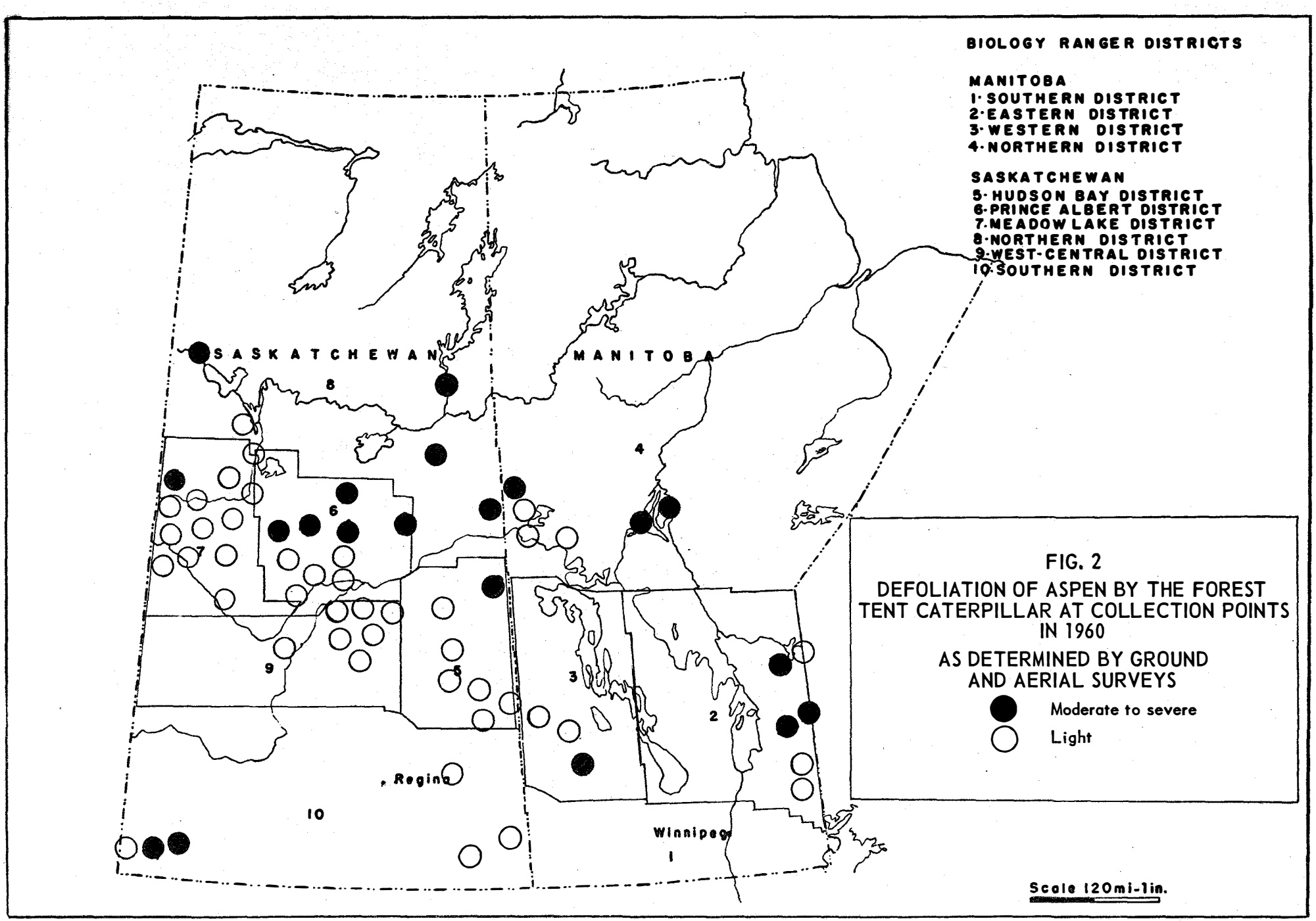
MAPS

PHOTOGRAPHS


BIOLOGY RANGER DISTRICTS
MANITOBA
1-SOUTHERN DISTRICT
2-EASTERN DISTRICT
3-WESTERN DISTRICT
4-NORTHERN DISTRICT
SASKATCHEWAN
5-HUDSON BAY DISTRICT
6-PRINCE ALBERT DISTRICT
7-MEADOWLAKE DISTRICT
8-NORTHERN DISTRICT
9-WEST-CENTRAL DISTRICT
10-SOUTHERN DISTRICT
SASKATCHEWAN
MANITOBA
Regina
Winnipeg
FIG. 1
LARCH SAWFLY INFESTATIONS
1960
AS DETERMINED BY GROUND
AND AERIAL SURVEYS
Severe
Moderate
Light
Scale 120mi-1in.


BIOLOGY RANGER DISTRICTS
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9-WEST-CENTRAL DISTRICT
10-SOUTHERN DISTRICT
SASKATCHEWAN
MANITOBA
Regina
Winnipeg
FIG. 2
DEFOLIATION OF ASPEN BY THE FOREST TENT CATERPILLAR AT COLLECTION POINTS IN 1960
AS DETERMINED BY GROUND AND AERIAL SURVEYS
Moderate to severe
Light
Scale 120mi-1in.

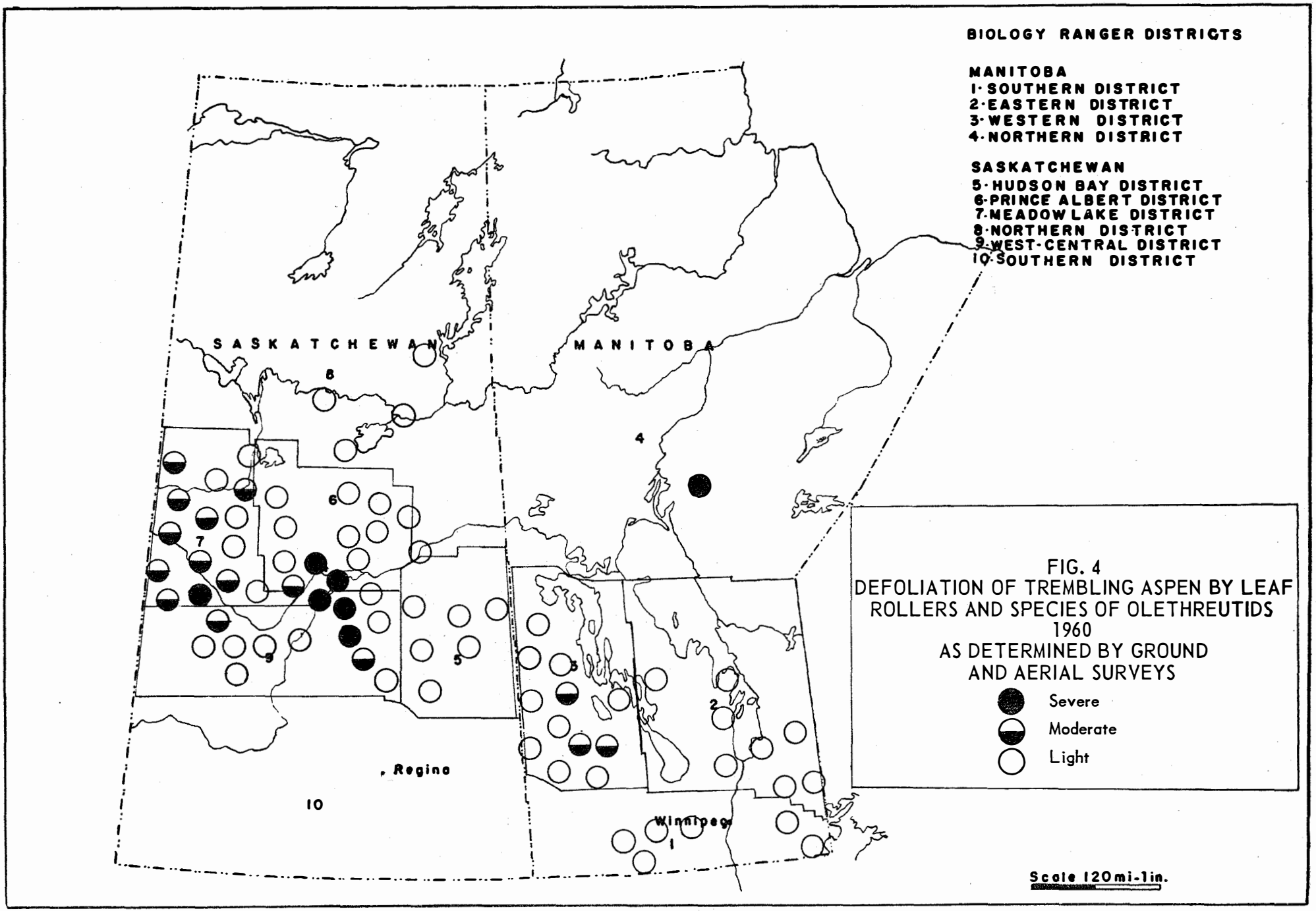


FIG. 4
DEFOLIATION OF TREMBLING ASPEN BY LEAF ROLLERS AND SPECIES OF OLETHREUTIDS
1960
AS DETERMINED BY GROUND AND AERIAL SURVEYS

Severe
Moderate
Light

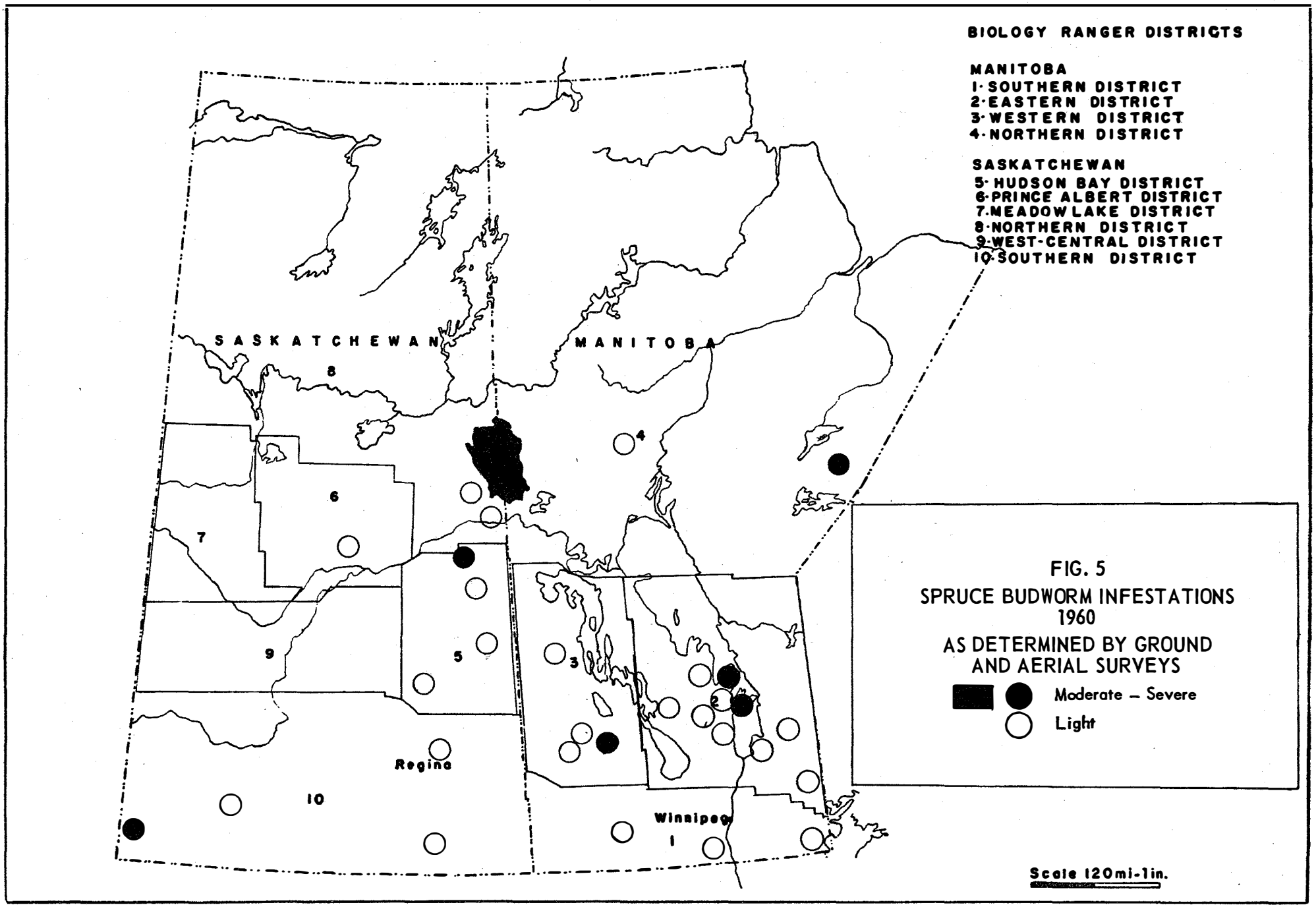


FIG. 5
SPRUCE BUDWORM INFESTATIONS
1960
AS DETERMINED BY GROUND
AND AERIAL SURVEYS

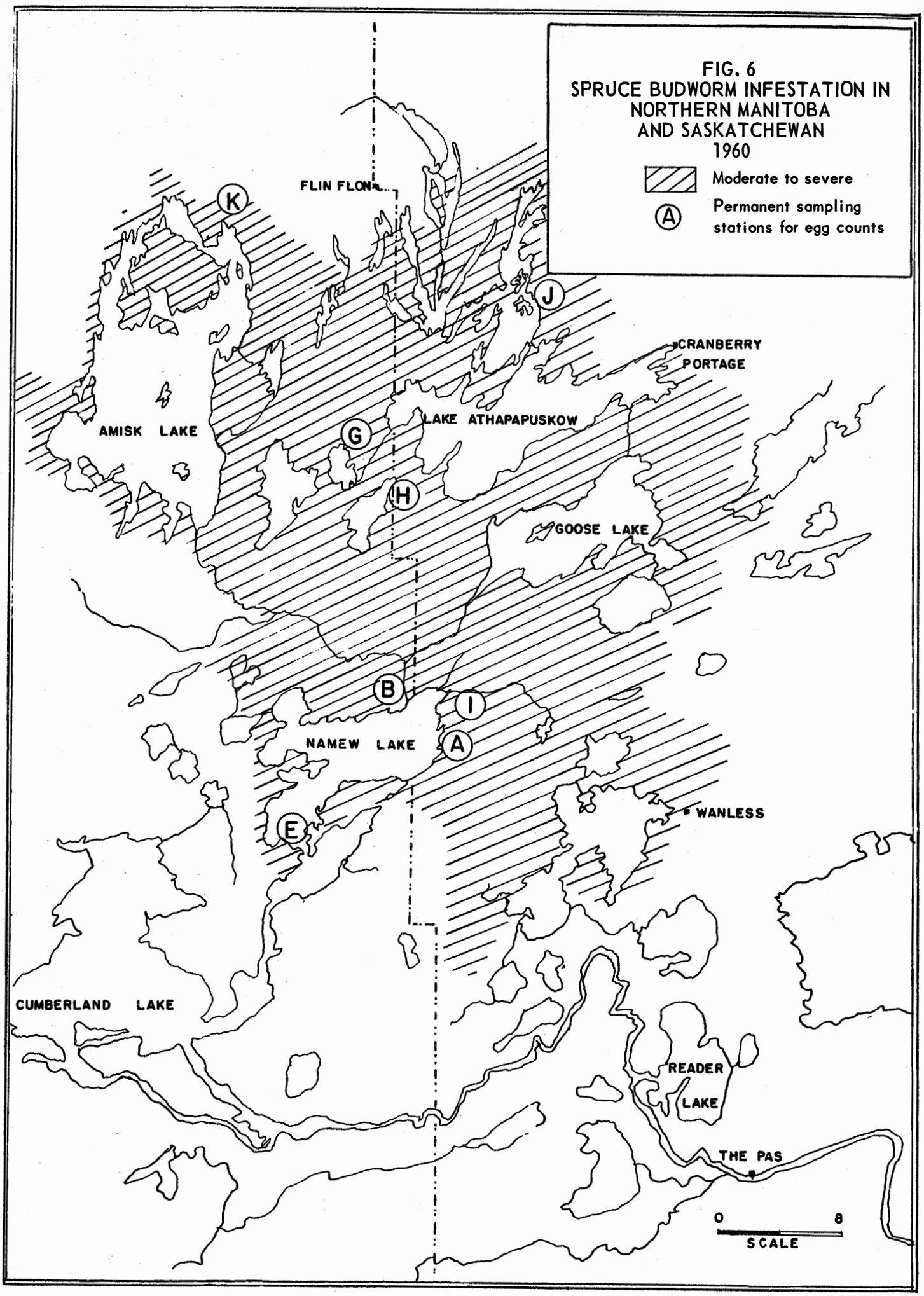
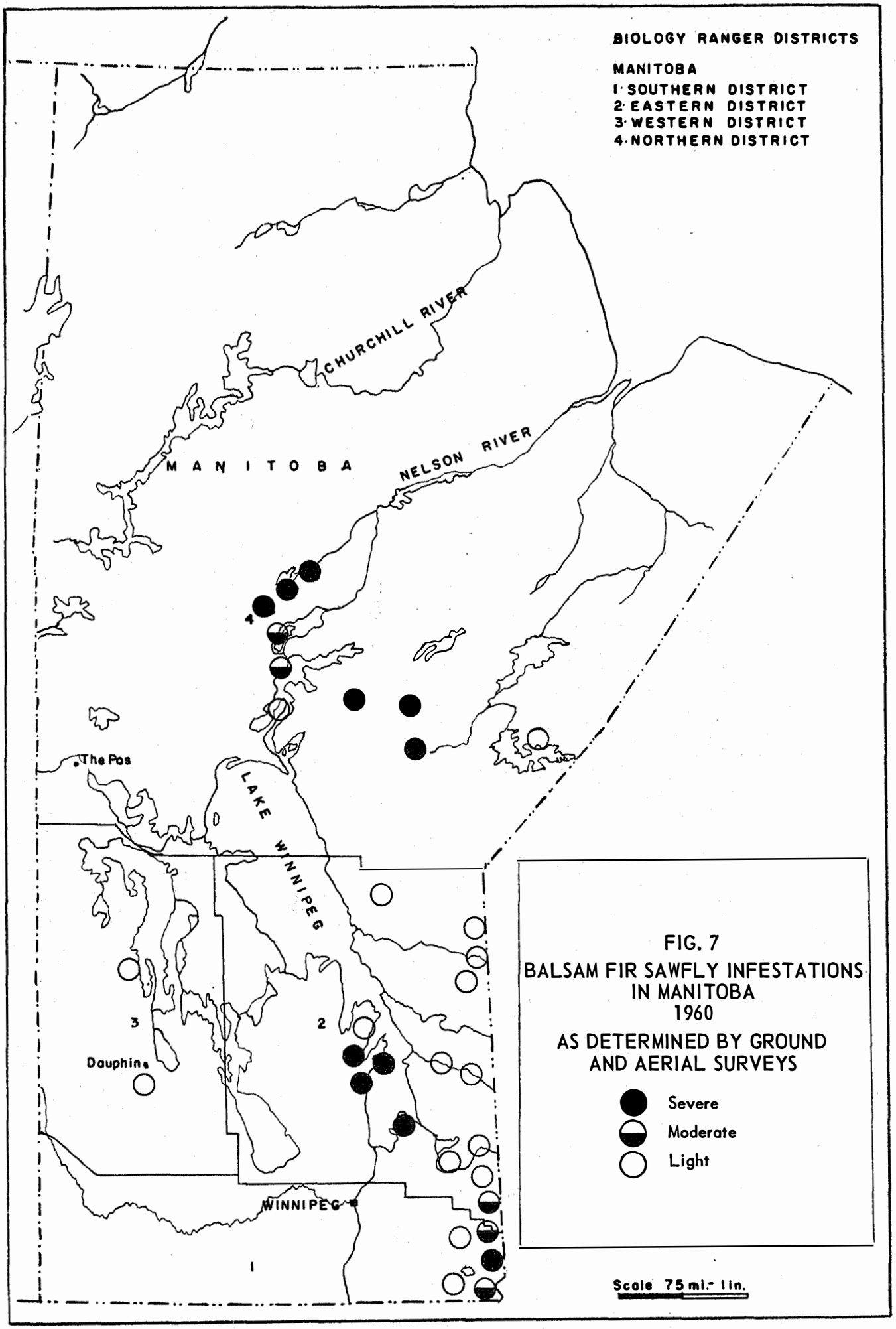


FIG. 6
SPRUCE BUDWORM INFESTATION IN
NORTHERN MANITOBA
AND SASKATCHEWAN
1960
Moderate to severe
Permanent sampling
stations for egg counts
FLIN FLON
K
J
CRANBERRY
PORTAGE
AMISK LAKE
G
LAKE ATHAPAPUSKOW
H
GOOSE LAKE
B
I
NAMEW LAKE
A
E
WANLESS
CUMBERLAND LAKE
READER
LAKE
THE PAS
0
8
SCALE


BIOLOGY RANGER DISTRICTS
MANITOBA
1 SOUTHERN DISTRICT
2 EASTERN DISTRICT
3 WESTERN DISTRICT
4 NORTHERN DISTRICT
CHURCHILL RIVER
MANITOBA
NELSON RIVER
The Pas
LAKE WINNIPEG
Dauphin
WINNIPEG
1
2
3
4
FIG. 7
BALSAM FIR SAWFLY INFESTATIONS
IN MANITOBA
1960
AS DETERMINED BY GROUND
AND AERIAL SURVEYS
Severe
Moderate
Light
Scale 75 mi.- 1 in.

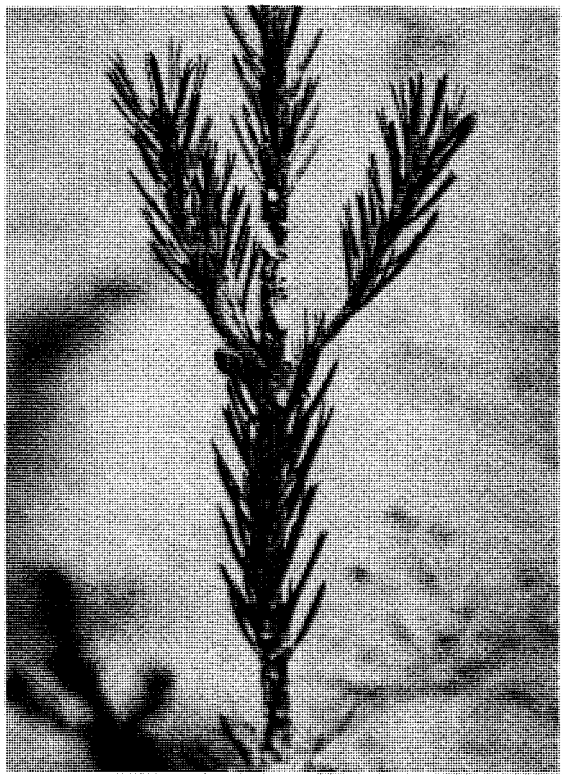


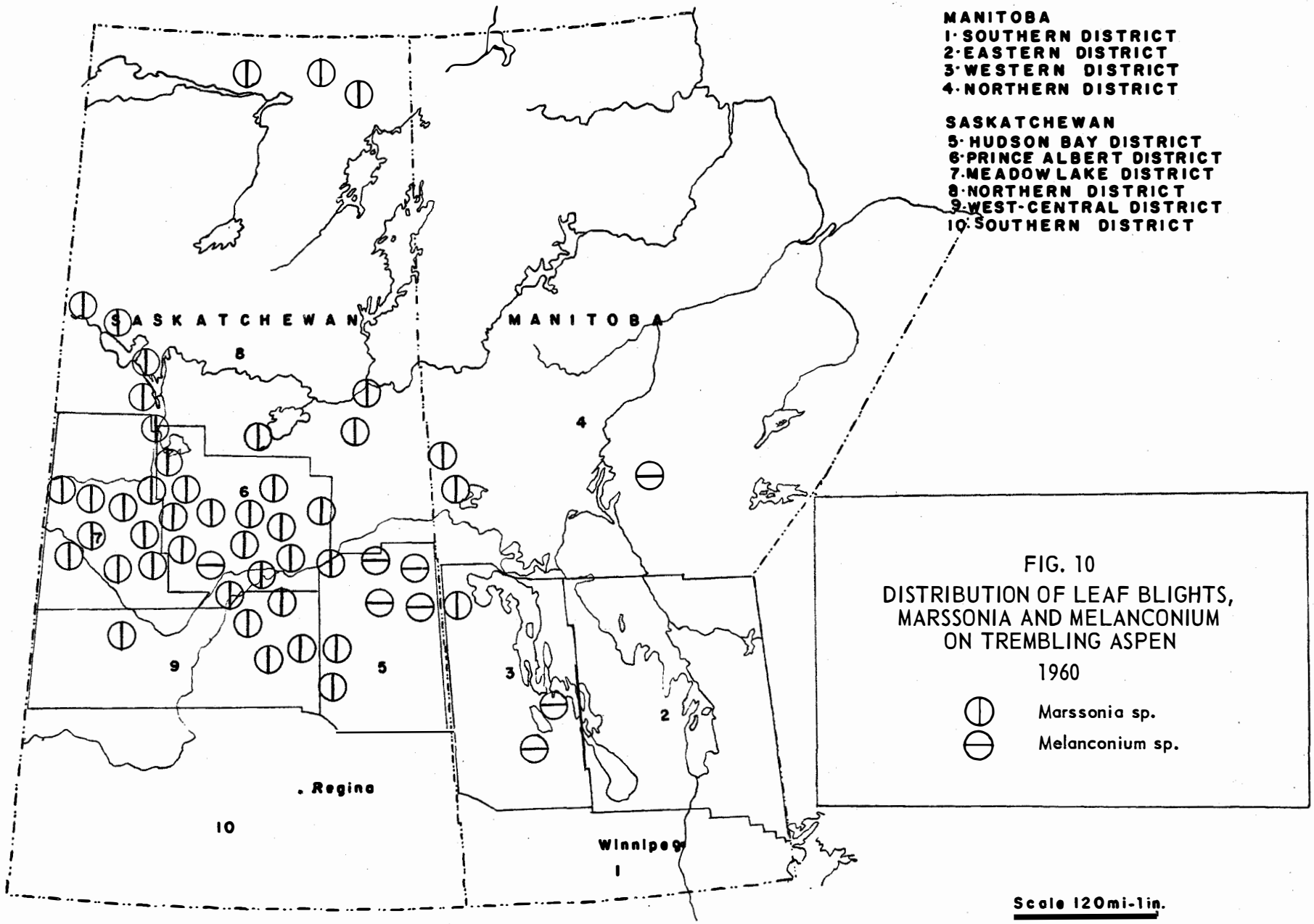
FIG. 8

Jack Pine Leader Damage by a Weevil,
Pissodes sp.
Photo by J.A. Drouin

FIG. 9

Forest Tent Caterpillar Defoliation of Trembling Aspen
– Cypress Hills, 1960.

Photo by R.M. Pratt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10·SOUTHERN DISTRICT
SASKATCHEWAN
MANITOBA
8
4
6
7
9
5
3
2
Regina
10
Winnipeg
1
FIG. 10
DISTRIBUTION OF LEAF BLIGHTS, MARSSONIA AND MELANCONIUM ON TREMBLING ASPEN
1960
Marssonia sp.
Melanconium sp.
Scale 120mi-1in.