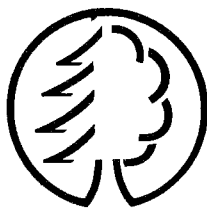


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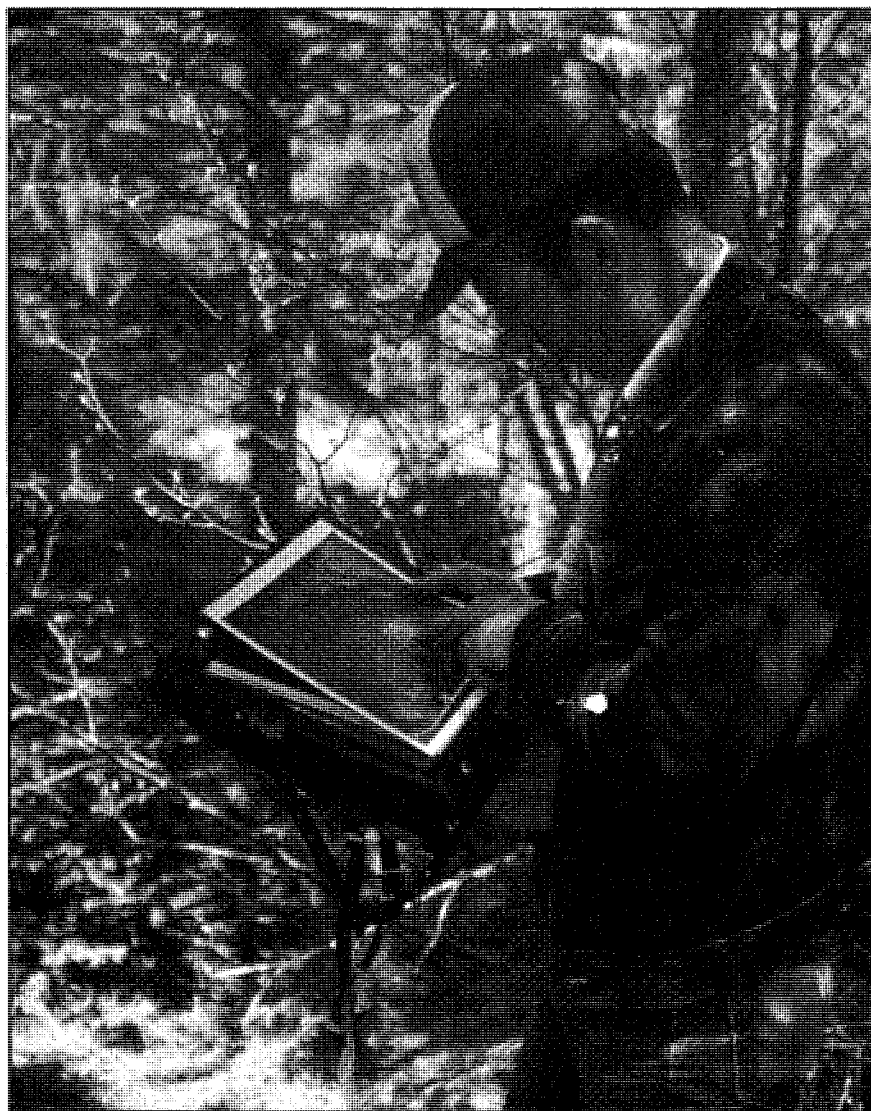
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Forest insect and disease conditions in Newfoundland and Labrador in 1992

W.W. Bowers, E.C. Banfield, D.S. O'Brien, D.M. Stone, W.J. Sutton, K.E. Pardy and G.C. Carew

Newfoundland and Labrador Region • Information Report N-X-289



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Cover Photo: FIDS ranger Wally Sutton using aerial photos to locate plot position.

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by

W.W. Bowers, E.C. Banfield, D.S. O'Brien, D.M. Stone, W.J. Sutton, K.E. Pardy,
and G.C. Carew

INFORMATION REPORT N-X-289
1993

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ABSTRACT

This report summarizes forest pest conditions in Newfoundland and Labrador in 1992 and forecasts infestations of major defoliators for 1993. Summaries were compiled from information collected by Forest Insect and Disease Survey staff in 12 districts of the Province.

Total area of infestations of the **hemlock looper** increased to 9 800 ha in 1992, from 4 870 ha in 1991. Moderate and severe defoliation for the Island in 1992 totalled 7 115 ha. The area of infestation is forecast to cover a total of 75 925 ha in 1993 including 36 636 ha of moderate and severe defoliation. A slight decrease in spruce budworm defoliation was recorded in 1992 to 2 640 ha of which 1 919 ha were moderate and severe. Defoliation in 1993 is forecast to occur on 21 300 ha, including 1 760 ha in the moderate and severe category. Pheromone trapping produced 38 moths per location in 1992, as compared to 122 moths per location in 1991.

The area of infestation by the **balsam fir sawfly** decreased in 1992, due mainly to the collapse of the outbreak near Bay d'Espoir. In Management District (MD) 14, a total of 1 256 ha was defoliated, including 723 ha in the severe category. Moderate and severe defoliation is predicted to occur on 4 374 ha in MD 14 and 6 945 ha is forecast to be lightly defoliated in 1993. Defoliation caused by the **blackheaded budworm** decreased from 16 400 ha in 1991 to 6 700 ha in 1992. A further decrease is forecast for 1993, with defoliation expected to occur on a total of 4 900 ha including 600 ha in the moderate and severe category.

RÉSUMÉ

Le rapport résume la situation des insectes ravageurs des forêts à Terre-Neuve et au Labrador en 1992 et présente les prévisions d'infestation par les principaux défoliateurs pour 1993. Des résumés ont été établis à partir des données recueillies dans 12 districts de la province par le personnel du Relevé des insectes et des maladies des arbres.

En 1992, les secteurs infestés par l'arpenteuse de la pruche ont augmenté par rapport aux 4 870 ha de 1991 pour atteindre 9 800 ha, y compris 7 115 ha modérément et gravement défoliés. En 1993, l'infestation par ce ravageur devrait entraîner la défoliation de 75 925 ha, y compris 36 636 ha modérément et gravement défoliés. Une légère diminution de la défoliation par la tordeuse des bourgeons de l'épinette a été enregistrée en 1992 avec 2 640 ha, dont 1 919 ha modérément et gravement défoliés. Quelque 1 760 ha devraient être modérément et gravement défoliés en 1993 et la défoliation pourrait affecter 21 300 ha en tout. Une moyenne de 38 papillons mâles par site étaient capturés dans les pièges à phéromone en 1992, par rapport à 122 par site en 1991.

Les superficies défoliées par le diprion du sapin ont diminué en 1992, surtout à cause de l'effondrement de l'infestation près de Bay d'Espoir. Dans le district d'aménagement (DA) 14, un total de 1 256 ha ont été défoliés, dont 723 gravement. On prévoit que la défoliation modérée et grave atteindra 4 374 ha dans le DA 14, et que 6 945 ha seront légèrement défoliés, en 1993. Le territoire infesté par la tordeuse à tête noire a diminué, passant de 16 400 ha en 1991 à 6 700 ha en 1992. Une autre diminution est prévue pour 1993, la défoliation devant affecter 4 900 ha, y compris 600 ha de défoliation modérée et grave.

A total of 10 other insect species and 15 diseases caused minor forest damage.

Winter drying, frost and wind caused severe damage throughout several areas of the Province.

Au total, 10 autres espèces d'insectes et 15 maladies ont causé des dégâts mineurs aux forêts.

La dessiccation hivernale, le verglas et le vent ont causé des dégâts graves dans plusieurs régions de la province.

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FOREST INSECT AND DISEASE CONDITIONS IN NEWFOUNDLAND AND LABRADOR IN 1992

by

W.W. Bowers, E.C. Banfield, W.J. Sutton, D.M. Stone, D.S. O'Brien,
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INTRODUCTION

The aim of the Forest Insect and Disease Survey is to summarize the factors that decrease the health of the forests of Newfoundland and report these changes to clients at the regional and national level. Information on forest health, in the form of describing pest populations and other conditions, are disseminated through seasonal highlights, special reports, Information Reports and the Annual Report of the Forest Insect and Disease Survey. Pertinent data surveys are added in appendices.

This report provides forest managers with information of pest conditions in Newfoundland, Forest Statistics with regional information for national summaries, and forms a part of the historical record of pest conditions for Newfoundland. Insects, diseases, and conditions that were wide-spread in 1992, or caused considerable concern are discussed in detail in the text, whereas those of lesser importance are presented in tabular form.

The Forest Insect and Disease Survey monitored the abundance of forest pests and their damage in forested areas throughout the Island and Labrador in 1992. The extent of major pest infestations was mapped, population levels sampled and the distribution of damage surveyed to provide their status in 1992. A forecast of infestations of major defoliators is provided for 1993.

Survey personnel collected 631 insect and 282 disease samples in the 12 ranger districts (Fig. 1) and 19 Forest Management Units (Fig. 2) in the Province.

Staff changes during the year resulted in Dr. W.W. Bowers being appointed acting Survey Head for the Forest Insect and Disease Survey in May 1992, while Dr. A.G. Raske is on Development Leave in Arizona for a period of one year. Rangers remained in essentially the same districts as assigned in 1991, with the exception that Port Hope Simpson-Goose Bay district was re-assigned to D.S. O'Brien from W.J. Sutton.

Special collections of tree cones were sent to Dr. Jean Turgeon, **larch beetle** infested tamarack bolts to Dr. D. Langor and **spruce budworm** larvae to Dr. Gary Grant.

A total of 180 hours was flown in fixed-wing aircraft and helicopters to sample inaccessible areas, to map insect defoliation and damage and to sample egg populations to forecast infestations of major forest defoliators. ARNEWS plots were monitored for damage and permanent sample plots were monitored for damage and increment.

Quantitative estimates of pest conditions were obtained whenever possible, but for various reasons some information can only be reported in qualitative terms. In this report classes of population levels or damage express the following ranges:

Trace	1% to 5%
Light	6% to 25%
Moderate	26% to 75%
Severe	76% to 100%
Extreme	100% plus additional damage

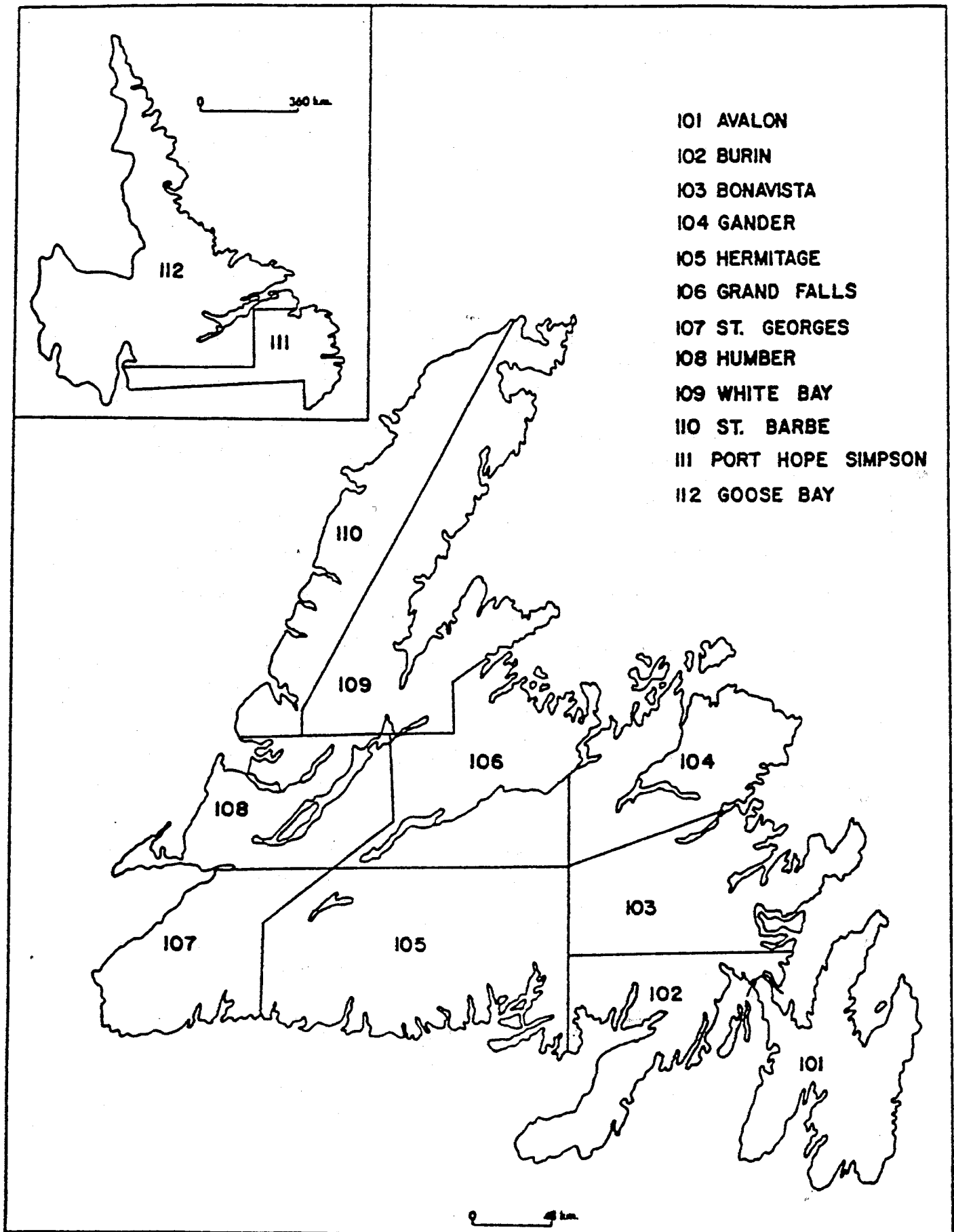


Figure 1. Forest Insect and Disease Survey Districts.

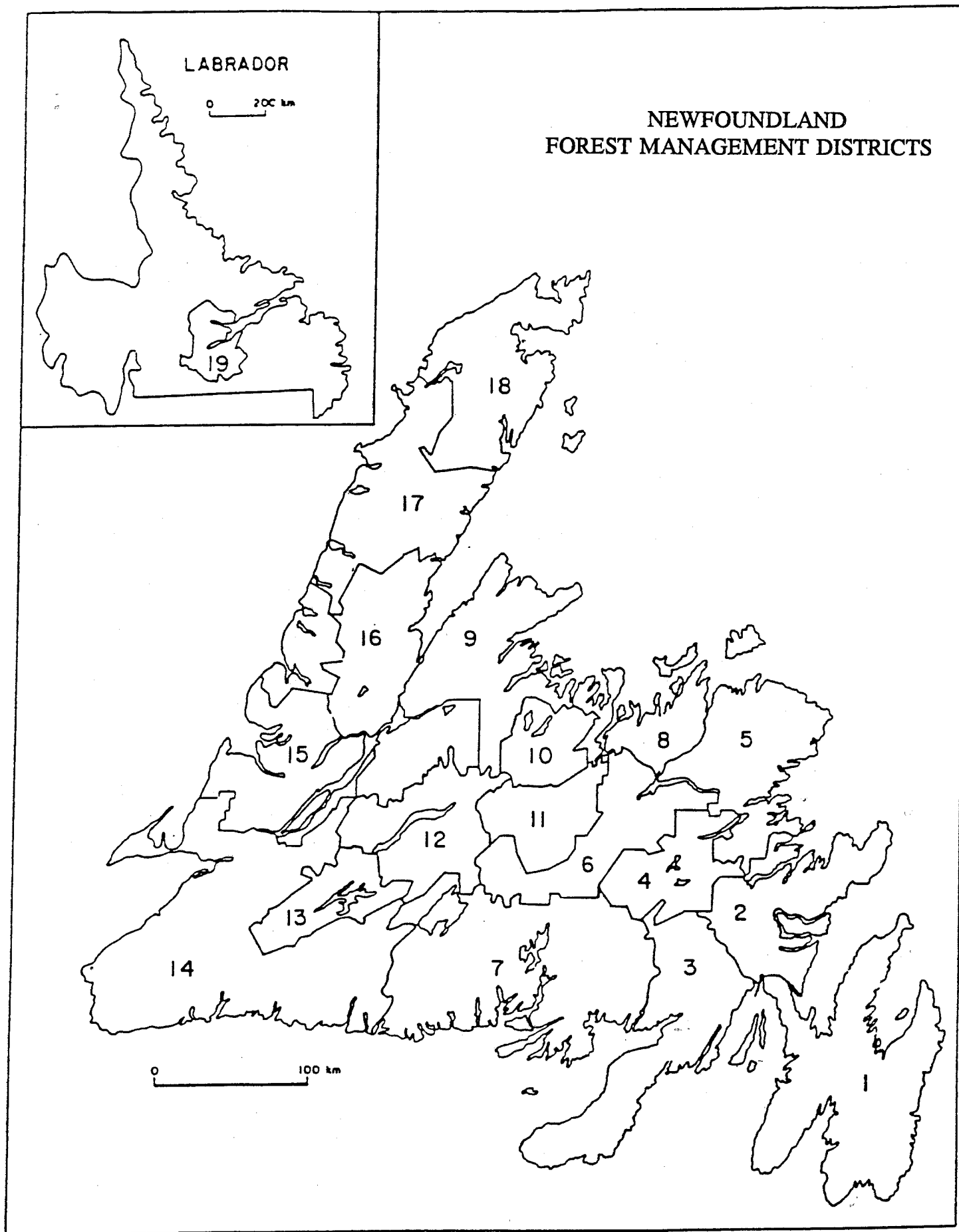


Figure 2. Newfoundland Forest Management Districts.

The damage assessment survey of the Island was conducted in the fall as a coordinated project by the Provincial Department of Forestry and Agriculture and the Forest Insect and Disease Survey.

Warm temperatures and near normal precipitation was experienced on the Island during late May and early June. From early June until the latter part of July cool, wet weather prevailed throughout the Province, delaying insect development by about three weeks. A heavy, late frost occurred during the weekend of July 4-5 and caused severe damage to current growth of balsam fir and black spruce regeneration in several areas of central Newfoundland. One of the most severe wind and rain storms recorded in nearly 40 years occurred during the night of October 7, 1992. Power disruptions, severe property damage (roofs torn off buildings etc.) flooding and uprooting of 100 plus years old trees included some of the worst damage.

IMPORTANT PESTS

INSECTS

Hemlock Looper

Lambdina fiscellaria

The outbreak that commenced on the Northern Peninsula in 1985 collapsed in 1992. A few pockets of moderate and severe defoliation persisted on the Bonavista Peninsula.

The total area of infestation in all forested land increased from 4 870 ha in 1991 to 9 800 ha in 1992. On the Avalon Peninsula moderate and severe defoliation increased from 2 000 ha in 1991 to 4 700 ha in 1992, with the damage occurring in previously and newly infested areas. A new outbreak totalling 2 700 ha was also discovered in the Bay d'Espoir area, with moderate and severe defoliation accounting for 2 200 ha (Table 1, Fig. 3). The total area of infestation in productive forests increased from 3 042 ha in

1991 to 5 625 ha in 1992 (Table 1).

A control program was carried out against the hemlock looper in several precommercial thinnings of balsam fir stands in the Salmonier Line area in the Avalon Peninsula. A total of 538 ha was treated with a water based formulation of *Bacillus thuringiensis* (B.t.) (Futura XLV), a biological insecticide.

A pheromone grid was established in summer 1992 using 50 permanent sample locations throughout Newfoundland. At each location, 3 pheromone baited traps (Multi-pher I, Multi-pher II, and gypsy moth) were used to capture adult males (Figs. 4, 5, and 6). The multi-pher I type trap caught significantly higher numbers of moths (\bar{x} number per trap = 698) than the multi-pher II (\bar{x} = 170.80) and gypsy moth (\bar{x} = 117.7) types. The mean number of moths per trap caught in central and eastern Newfoundland was identical (\bar{x} = 419) and significantly higher than the numbers captured in western Newfoundland (\bar{x} = 231). In western Newfoundland the highest moth catches occurred near La Scie (3025), Lomond (2738), Burlington (1430) and George's Lake (1228). The highest catches in central Newfoundland occurred near Burnt Woods Road (3330), St. Joseph's Cove (2220), Exploits Dam (1810) and Twillick Brook (1390). In eastern Newfoundland, the highest catch was recorded at Logy Bay (2516), followed by Salmonier Line (2270) and Hillview Junction (1308).

No parasites were reared from hemlock looper larvae (n = 558) collected from the Avalon Peninsula (Salmonier Line). The level of parasitism was less than 2% from larvae collected throughout the Island. The majority of these were identified as *Winthemia* sp. (Diptera). Diseases killed 74% of developing larvae, and was caused primarily by fungi, bacteria, yeast-like organisms, and by *Microsporidium nosema* (Protozoa). Branch sampling for over-wintering looper eggs was made at 780 locations from mid- to late October.

Table 1. Areas (ha) of defoliation and gross merchantable volume (m³) of stands defoliated by the hemlock looper in productive forests and total area of infestations in Newfoundland in 1992.**

Mgmt. Unit	Productive Forest*								Total Infestation (ha)			
	Light		Moderate		Severe		Total					
	Vol. Area (x 000)		Vol. Area (x 000)		Vol. Area (x 000)		Vol. Area (x 000)		Light	Mod.	Sev.	Total
1	1 155	47.0	625	29.2	1 191	56.4	2 971	132.7	2 191	969	3 718	6 878
2	33	1.7	10	0.6	133	6.1	176	8.4	33	22	179	234
7	406	13.8	644	21.4	1 428	60.9	2 478	96.2	469	799	1 428	2 696
Totals	1 594	52.5	1 274	51.2	2 752	123.4	5 625	237.3	2 693	1 790	5 325	9 808

* Provided by the Forest Management Division, Dept. of Forestry & Agriculture.

** Light = 6-25%
 Moderate = 26-75%
 Severe = 76-100%

Moderate and severe defoliation is predicted to occur on 36 600 ha in Management Districts 1, 7, and 12. Light defoliation is also forecast on an additional 39 300 ha in Management Districts 1, 7, 9, 11, 12, 13, 14, 17 and 18 (Table 2, Fig. 7). No significant defoliation is expected in Management District 2.

Spruce Budworm *Choristoneura fumiferana*

The infestation which began in 1989 in the Codroy Valley in western Newfoundland continued in 1992 in the same general area with a slight decrease in overall area. High larval populations caused moderate and severe defoliation on 1 919 ha in 1992 as compared to 2 251 ha in 1991. Light defoliation increased to 721 ha in 1992 from 520 ha in 1991. Moderate and severe defoliation in productive forests totalled 1 452 ha and light defoliation on 538 ha affecting 94 300 m of timber (Table 3, Fig. 8).

The Provincial Department of Forestry conducted an aerial spray program in the present budworm outbreak and in previous undefoliated and adjacent areas which included pre-commercial thinnings. A total of 7 757 ha were treated with Futura XLV and Foray 48b, water-based formulations of *B.t.* Some spray blocks received a number of spray applications ranging from one to three, depending on present insect populations and severity of previous defoliation.

Data on mortality factors were collected from the infestation in western Newfoundland. Ten percent of the larvae (n = 711) reared were parasitized and 43% were killed by diseases. The principal larval parasite responsible for mortality was *Glypta fumiferanae* (*Ichneumonidae*, *Hymenoptera*). Most spruce budworm diseases in 1992 were caused by fungi, bacteria, yeast-like organisms, and by the protozoan, *Nosema* sp.

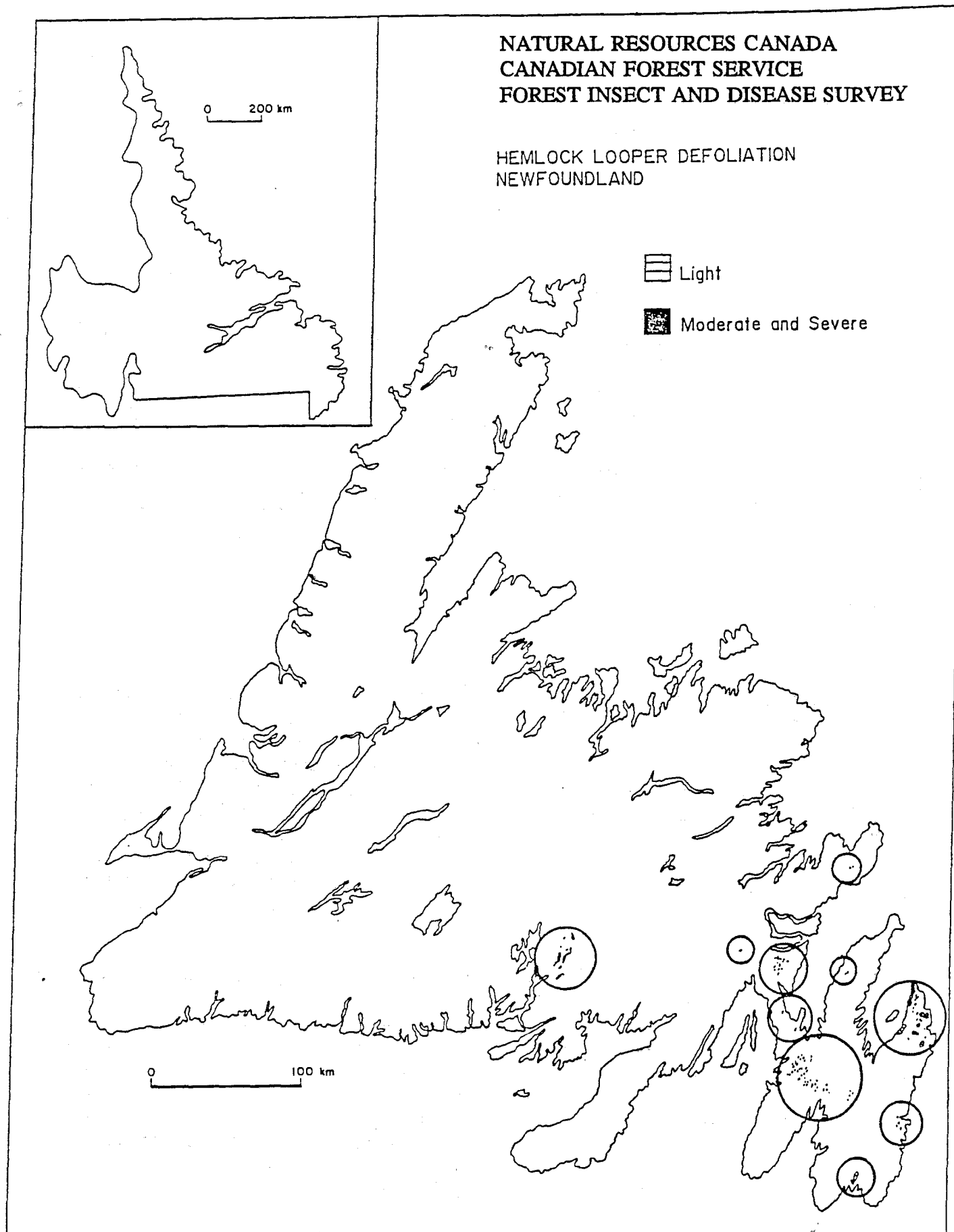


Figure 3. Areas of defoliation by the hemlock looper in forested areas of Newfoundland in 1992.

NATURAL RESOURCES CANADA
CANADIAN FOREST SERVICE
FOREST INSECT AND DISEASE SURVEY

RESULTS OF 1992 HEMLOCK LOOPER PHEROMONE TRAPS

MULTI-PHER II

- △ 1 - 750
- 751 - 1500
- 1501 - 2250
- 2251 - 3000
- > 3000

0 200 km

0 100 km

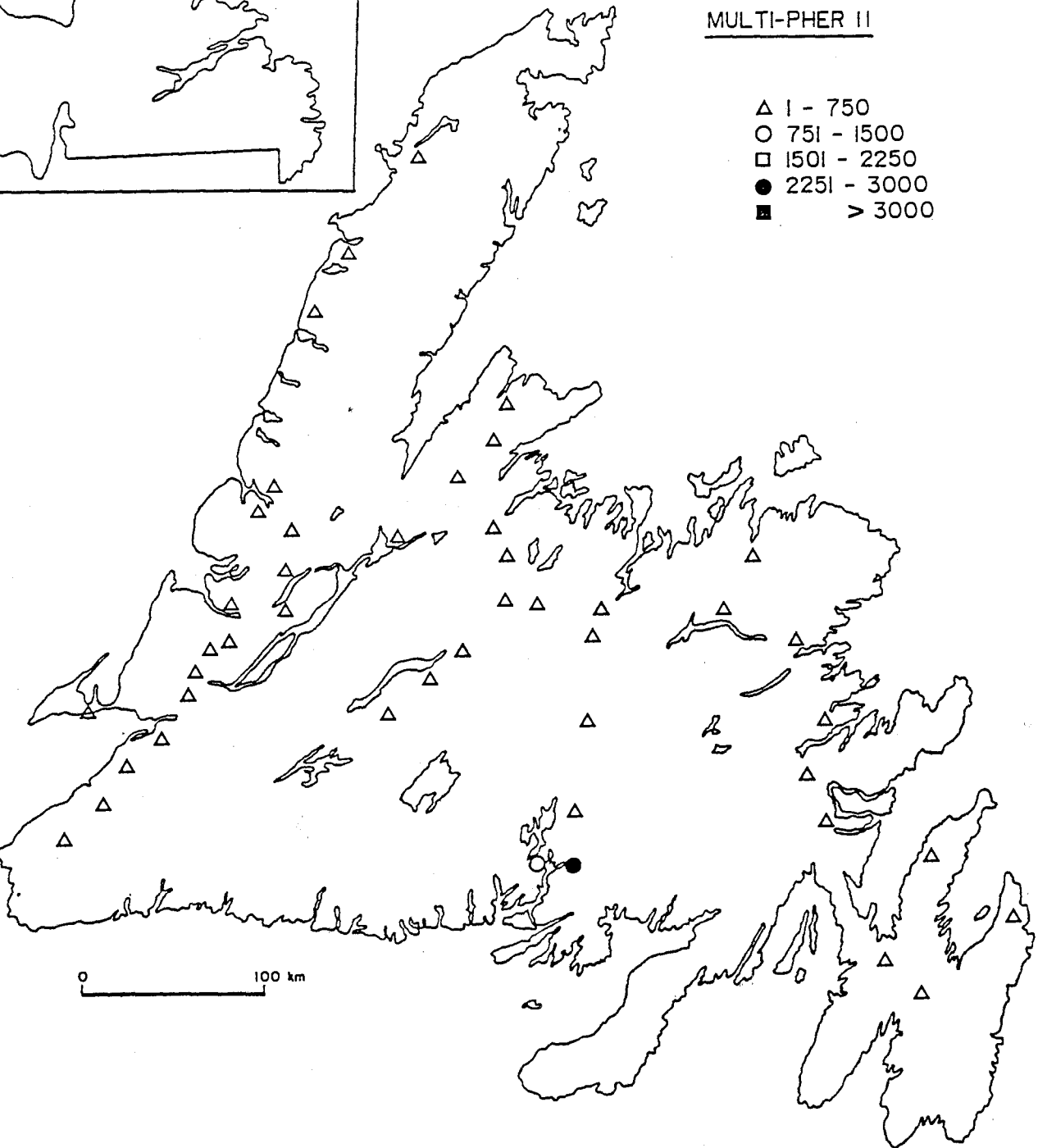


Figure 5. Number of adult hemlock looper captured in Multi-pher II traps in 1992.

NATURAL RESOURCES CANADA
CANADIAN FOREST SERVICE
FOREST INSECT AND DISEASE SURVEY

RESULTS OF 1992 HEMLOCK LOOPER PHEROMONE TRAPS

GYPSY MOTH TYPE

- △ 1 - 750
- 751 - 1500
- 1501 - 2250
- 2251 - 3000
- > 3000

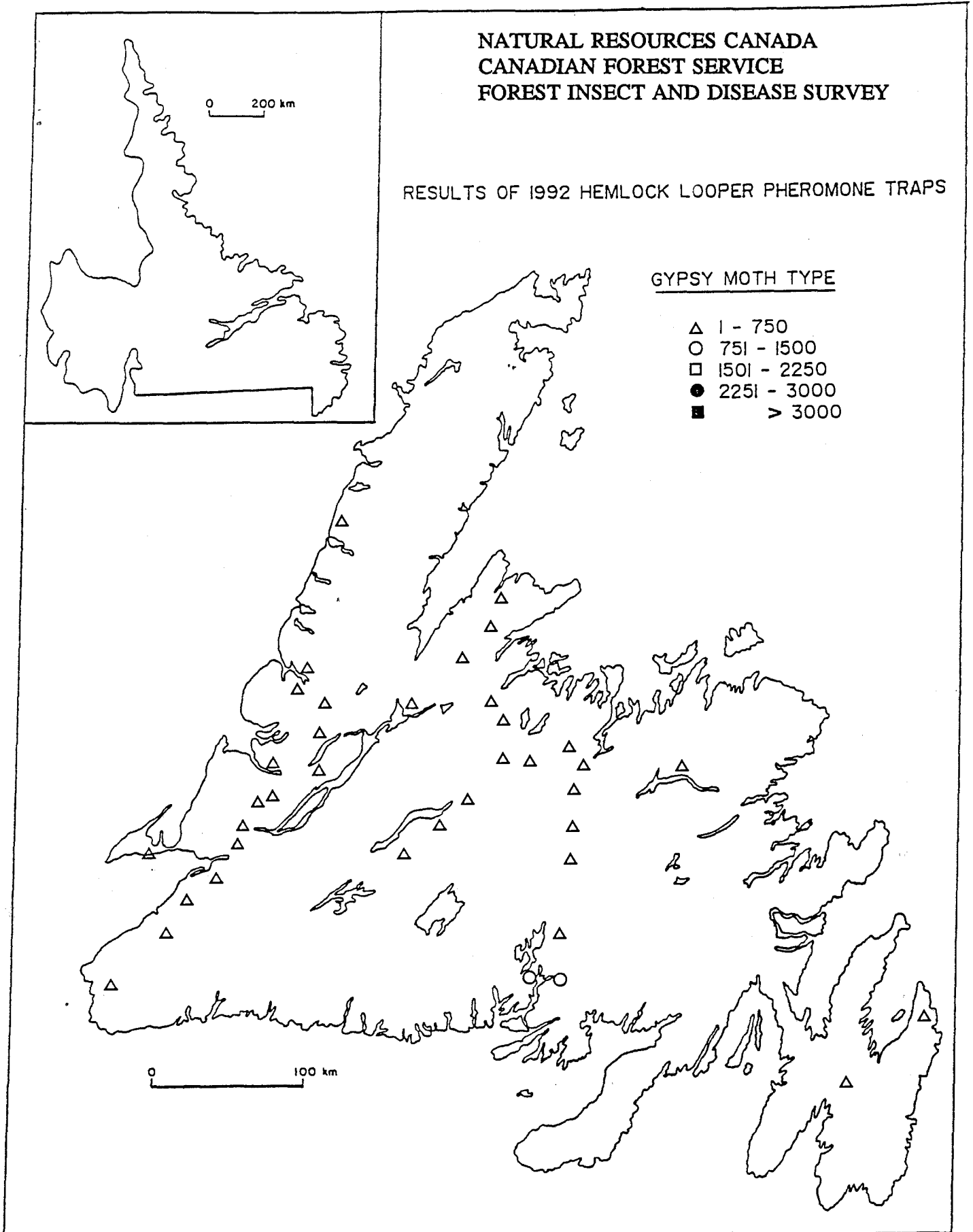


Figure 6. Number of adult hemlock looper captured in gypsy moth type traps in 1992.

Table 2. Areas (ha) of defoliation by the hemlock looper forecast in forested areas of Newfoundland for 1993.

Management District No.	Defoliation Class*		
	Light**	Moderate & Severe***	Total
1	10 032	7 101	17 133
7	12 801	17 341	30 142
9	1 054	-	1 054
11	740	-	740
12	11 084	12 194	23 278
13	1 176	-	1 176
14	628	-	628
17	758	-	758
18	1 016	-	1 016
Total	39 289	36 636	75 925

* Light = 6-25%
 Moderate = 26-75%
 Severe = 76-100%

** Areas with low egg density (1-3 eggs/branch)

*** Areas with moderate and high egg density (4 or more eggs/branch)

Table 3. Areas (ha) of defoliation and gross merchantable volume (m³) of stands defoliated by the spruce budworm in productive forests and total area of infestations in Newfoundland in 1992.**

Mgmt. Unit	Productive Forest*								Total Infestation (ha)			
	Light		Moderate		Severe		Total					
	Vol. Area (x 000)	Vol. Area (x 000)	Vol. Area (x 000)	Vol. Area (x 000)	Vol. Area (x 000)	Vol. Area (x 000)	Light	Mod.	Sev.	Total		
14	538 16.5	264 12.1	1 188 65.6	1 990 94.3	721 375	1 544 2 640						
Totals	538 16.5	264 12.1	1 188 65.6	1 990 94.3	721 375	1 544 2 640						

* Provided by the Forest Management Division, Dept. of Forestry & Agriculture.

** Light = 6-25%
 Moderate = 26-75%
 Severe = 76-100%

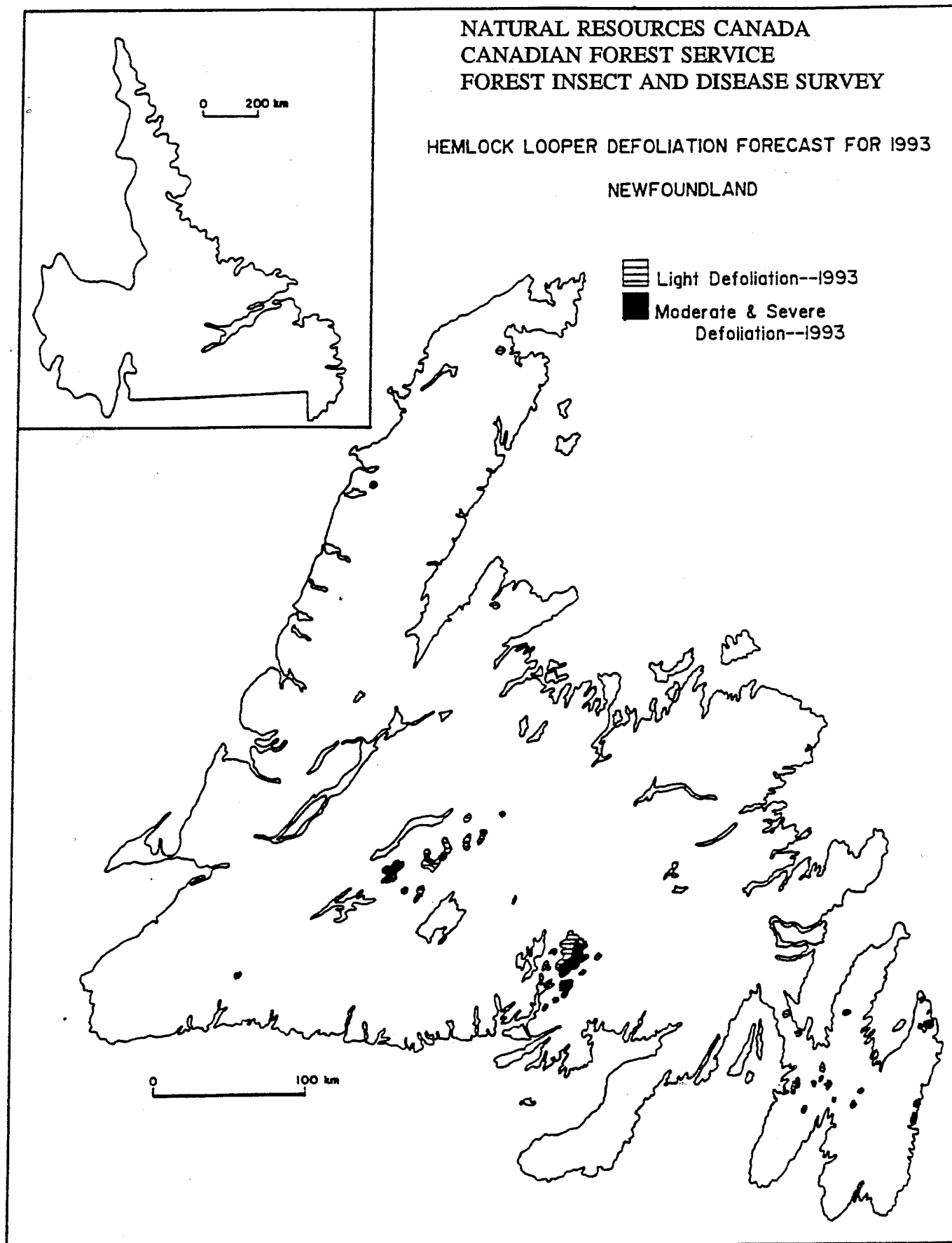




Figure 7. Areas of defoliation by the hemlock looper forecast in forested areas of Newfoundland in 1993.

NATURAL RESOURCES CANADA
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FOREST INSECT AND DISEASE SURVEY

SPRUCE BUDWORM DEFOLIATION
NEWFOUNDLAND

 Light
 Moderate and Severe

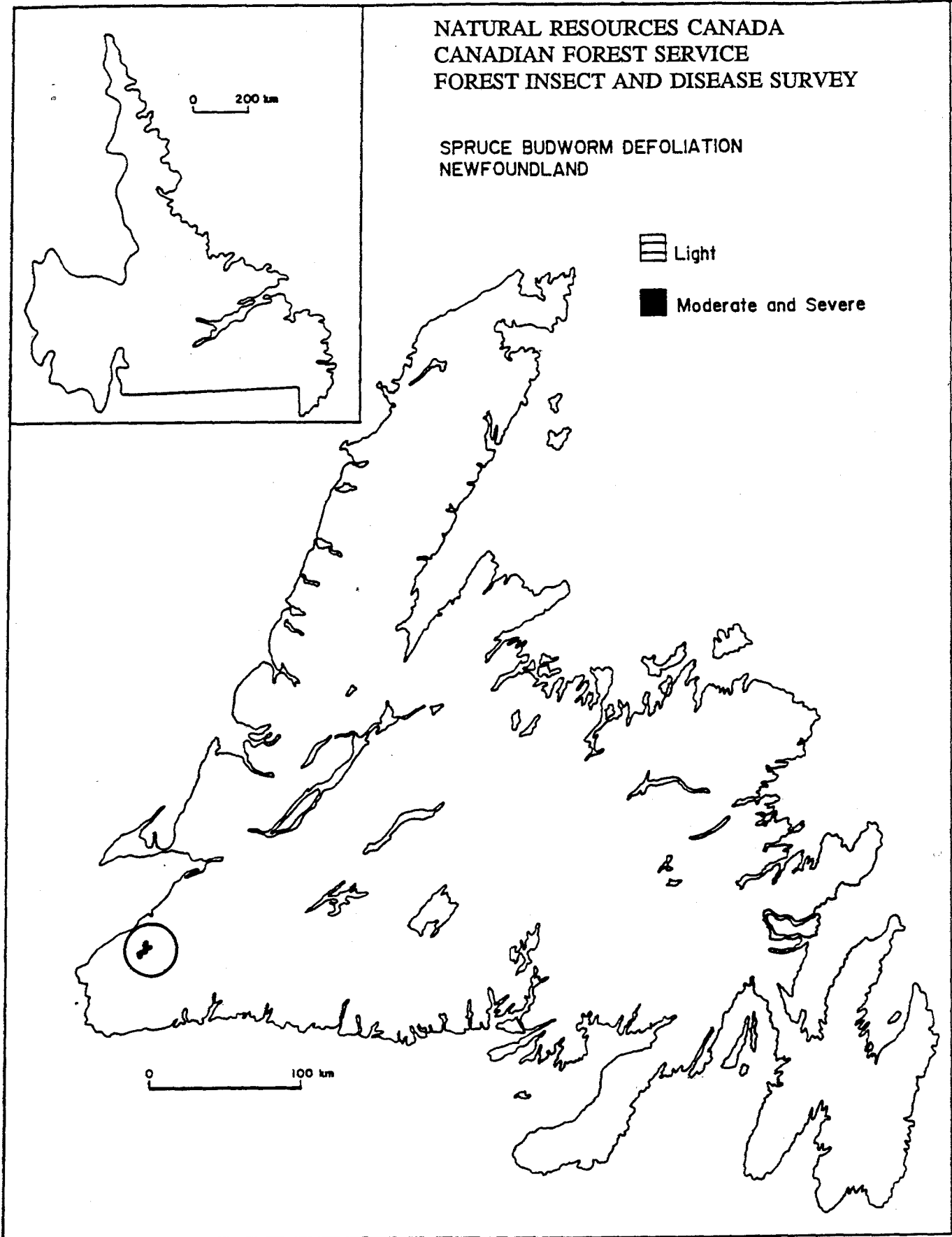


Figure 8. Areas of defoliation by the spruce budworm in forested areas of Newfoundland in 1992.

Pheromone traps were placed at 50 permanent sample locations throughout the Island (Fig. 9). The total number of moths captured decreased about three-fold from 6086 in 1991 to 1898 in 1992. In western Newfoundland the mean number of moths per location was 48.6, compared to 209 in 1991. The highest numbers trapped were along the west coast of the Island at Campbells Creek (\bar{x} number per trap = 86.0) and Bay of Islands (\bar{x} = 69.0). The next highest trap catches were recorded at three coastal locations in western Newfoundland: Codroy Pond (\bar{x} = 38.0), Sally's Cove (\bar{x} = 30.3) and Trout Brook (\bar{x} = 28.3).

In central Newfoundland, traps at 17 locations averaged 38 moths per location, a number identical to 1991. The highest trap catch was at Twillick Brook (\bar{x} = 28.0); however, the average number of moths per trap was 13.2. Trap catches in eastern Newfoundland, including the Avalon Peninsula, were significantly lower than in western and central Newfoundland. Trap catches in 8 locations in eastern Newfoundland, averaged 4.4 moths per location in 1992, compared to an average of 27 moths in 1991. The highest trap catch in eastern Newfoundland was at Heart's Content (\bar{x} = 4.0), and the overall average catch per trap decreased from 9 in 1991 to only 1.7 in 1992 (Fig. 10). In contrast to 1991 few moths were observed in the traps prior to local emergence.

Overwintering hibernacula populations were sampled in conjunction with the hemlock looper, blackheaded budworm and balsam fir sawfly egg surveys from mid- to late October. Moderate and severe defoliation is forecast to occur on 1 762 ha of balsam fir forests in Management Districts 7 and 14 (Bay d'Espoir and LaPoile River Valley areas respectively). In the Codroy Valley outbreak where severe defoliation was recorded yearly since 1989, results of the fall hibernacula survey indicate the intensity of defoliation to decline sharply in 1993 and only light defoliation is expected on about 600 ha. A

total of 19 547 ha of light defoliation is predicted in Management Districts 1, 2, 7, 14, 15, 16 and 17, and in Terra Nova National Park (Table 4, Fig. 11).

Balsam Fir Sawfly *Neodiprion abietis*

The infestation in the Bay d'Espoir area which started in 1989 collapsed in 1992. Pockets of high larval numbers persisted throughout the summer but no noticeable defoliation resulted, possibly because of the presence of parasites and disease within the population. In western Newfoundland high larval populations were recorded in the Bottom Brook - Trout Brook outbreak in 1992. A total of 1 256 ha were defoliated, with moderate and severe defoliation accounting for 723 ha (Table 5, Fig 12). This area is predominantly young balsam fir stands and pre-commercially thinned.

Parasites and a viral disease were responsible for reducing high populations of balsam fir sawfly throughout the Bay d'Espoir infestation. Overall mortality among developing stages was 92.8%. Within the outbreak in western Newfoundland, 92.3% of developing larvae were diseased. Identification of the sawfly parasites and disease is in progress.

An overwintering egg survey for forecasting 1993 sawfly conditions was conducted from mid- to late October in conjunction with egg/larval surveys of other major softwood defoliators.

Moderate and severe defoliation is expected to occur on 4 374 ha in Management District 14, and an additional 6 945 ha is forecast to be lightly defoliated (Table 6, Fig. 13).

Blackheaded budworm *Acleris variana*

The latest outbreak of blackheaded budworm started on the Northern Peninsula in 1987 and encompassed 35 000 ha of balsam fir

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FOREST INSECT AND DISEASE SURVEY

SPRUCE BUDWORM PHEROMONE TRAP LOCATIONS

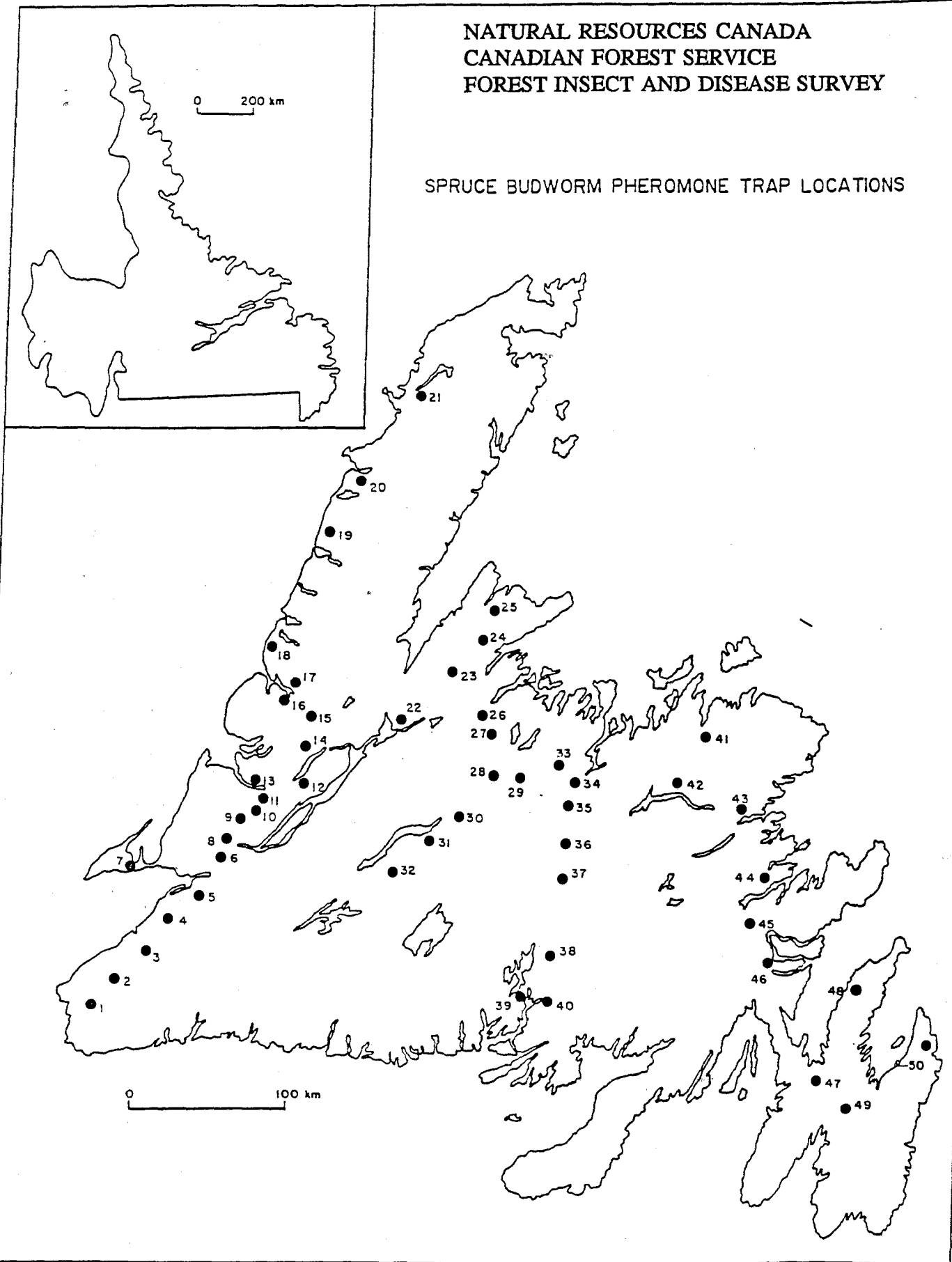


Figure 9. Spruce budworm pheromone trap locations.

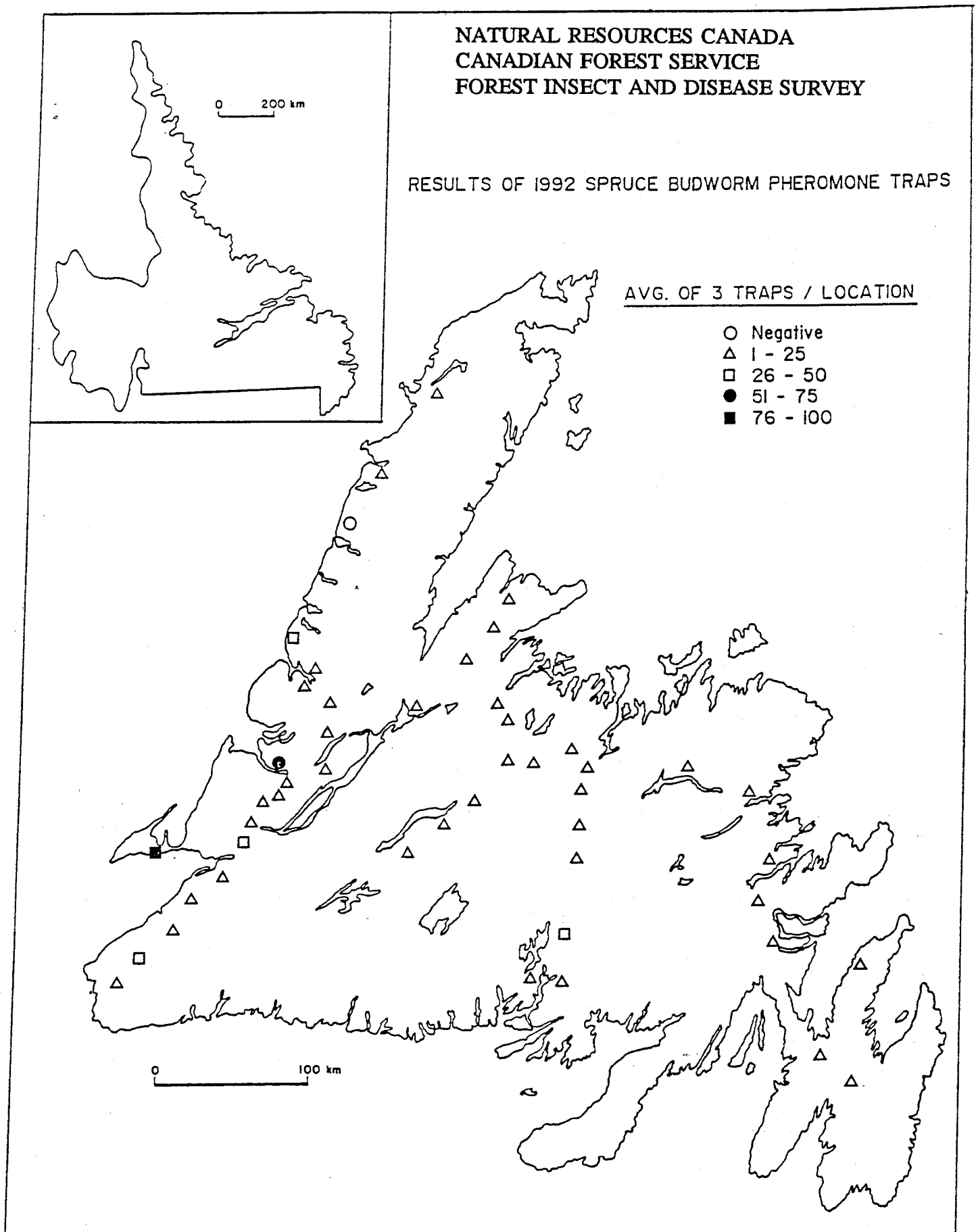


Figure 10. Number of spruce budworm captured in Newfoundland in 1992.

Table 4. Areas (ha) of defoliation by the spruce budworm forecast in forested areas of Newfoundland for 1993.

Management District No.	Defoliation Class*		
	Light**	Moderate & Severe***	Total
1	1 071	-	1 071
2	1 200	-	1 200
7	9 170	1 302	10 472
14	5 706	460	6 166
15	600	-	600
16	600	-	600
17	600	-	600
Total	18 947	1 762	20 709
TNNP	600	-	600
Grand Total	19 547	1 762	21 309

- * Light = 6-25%
 Moderate = 26-75%
 Severe = 76-100%

** Areas with low egg density (35-108 eggs/10 m foliage)

*** Areas with moderate and high egg density (109 + eggs/10 m foliage)

Table 5. Areas (ha) of defoliation and gross merchantable volume (m³) of stands defoliated by the balsam fir sawfly in productive forests and total area of total infestations in Newfoundland in 1992.**

Mgmt. Unit	Productive Forest*								Total Infestation (ha)			
	Light		Moderate		Severe		Total					
	Vol. Area (x 000)		Vol. Area (x 000)		Vol. Area (x 000)		Vol. Area (x 000)		Light	Mod.	Sev.	Total
14	426	8.5			708	30.9	1 134	39.4	533	-	723	1 256
Totals	426	8.5			708	30.9	1 134	39.4	533	-	723	1 256

* Provided by the Forest Management Division, Dept. of Forestry & Agriculture.

- ** Light = 6-25%
 Moderate = 26-75%
 Severe = 76-100%

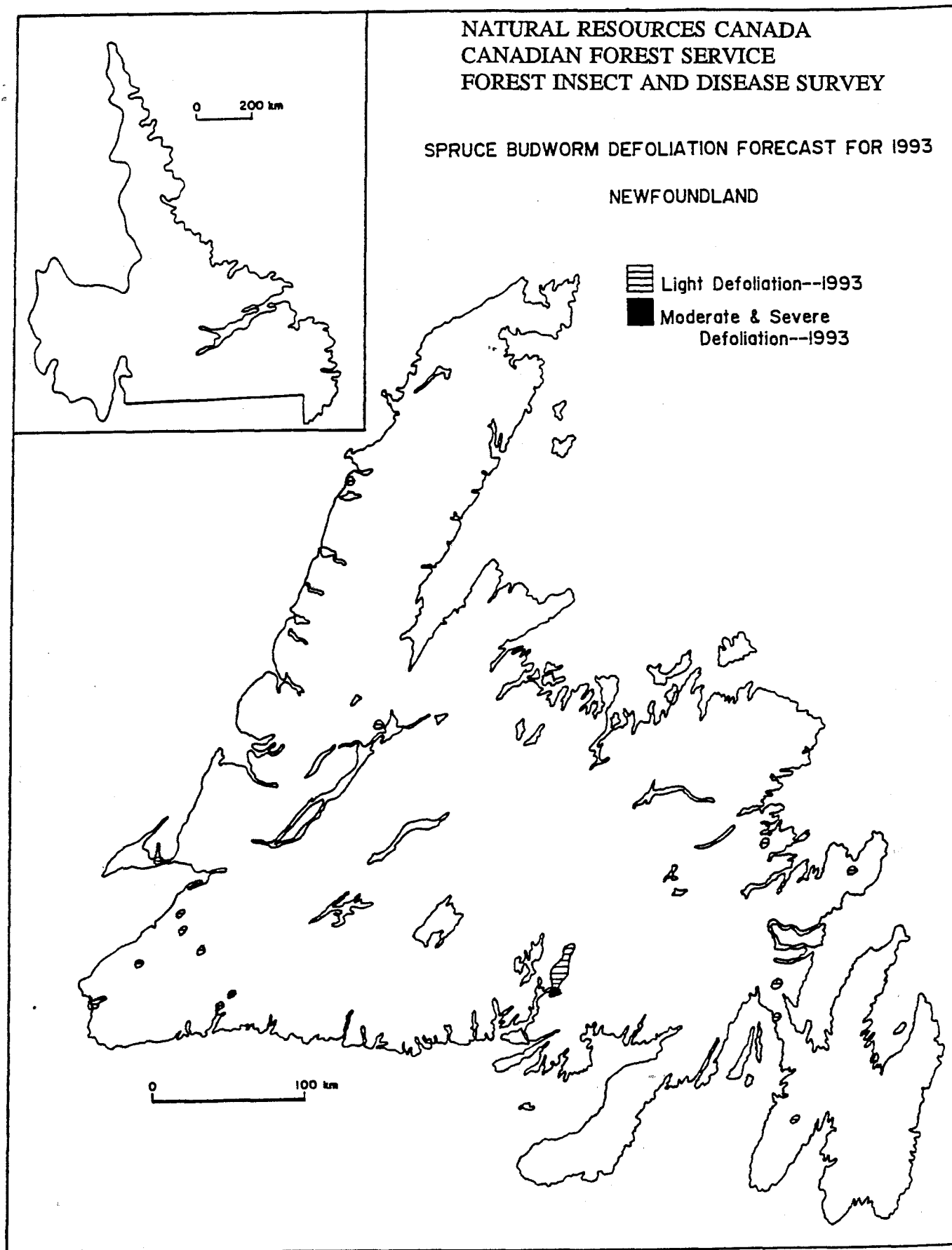


Figure 11. Areas of defoliation by the spruce budworm forecast in forested areas of Newfoundland in 1993.

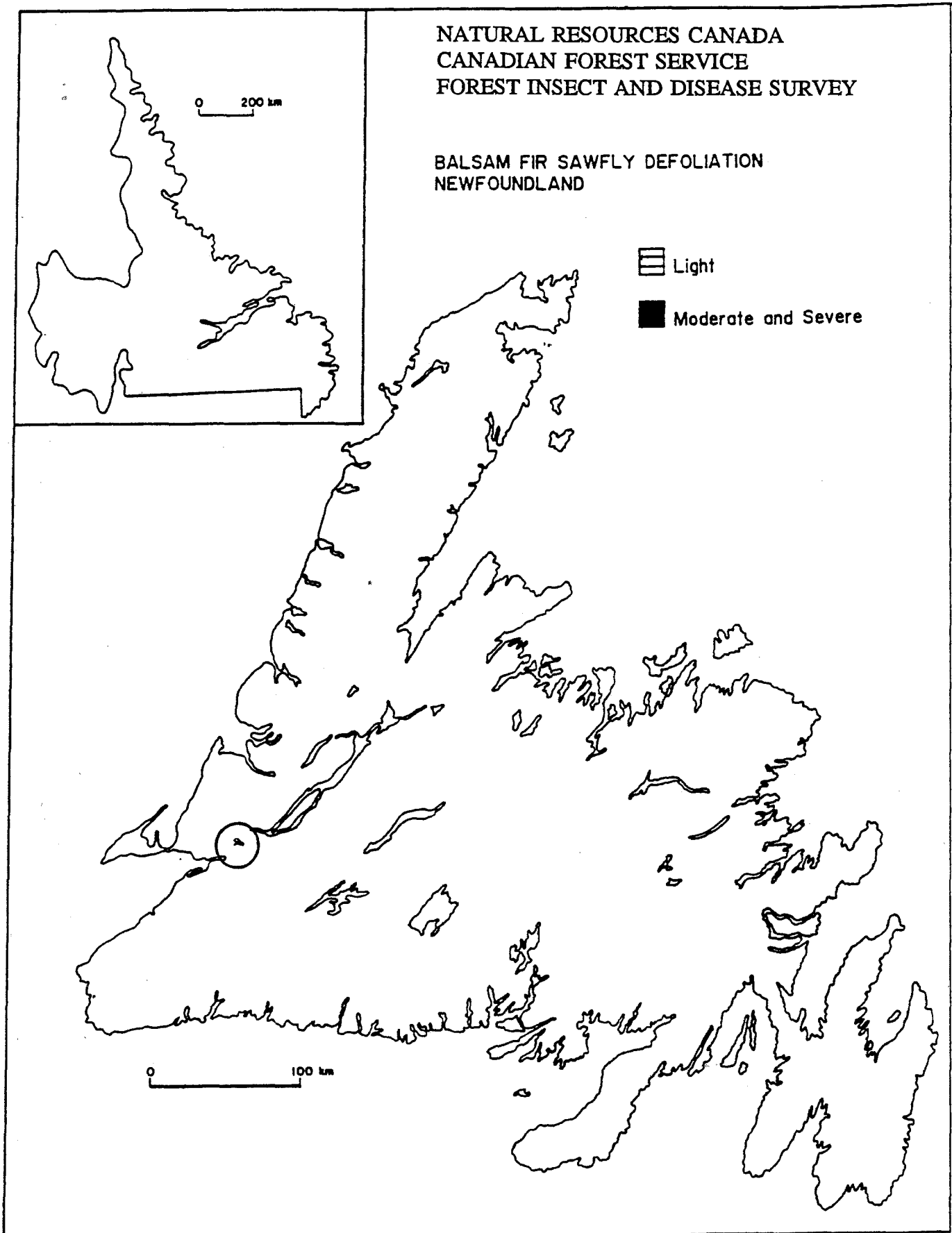


Figure 12. Areas of defoliation by the balsam fir sawfly in forested areas of Newfoundland in 1992.

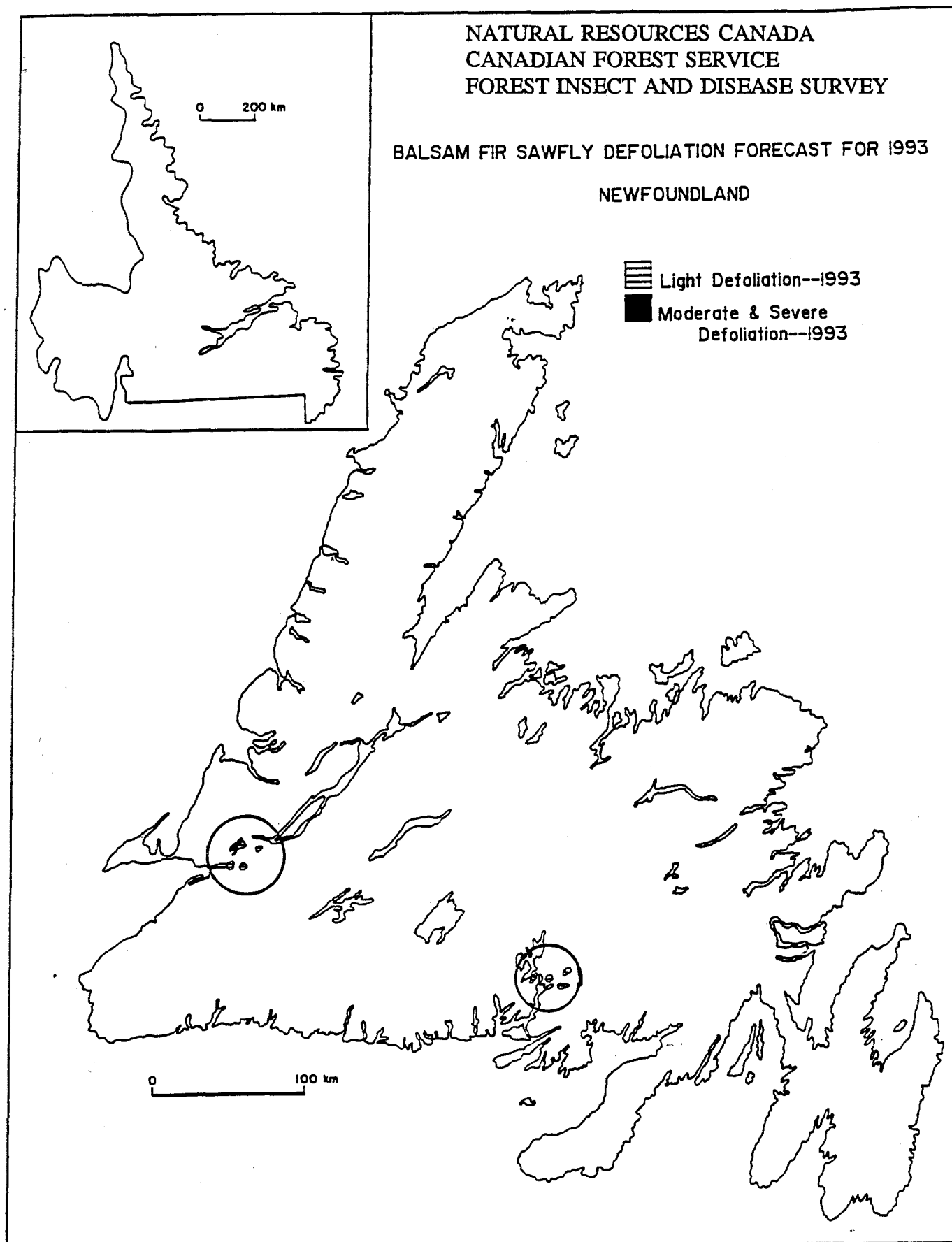


Figure 13. Areas of defoliation by the balsam fir sawfly forecast in forested areas of Newfoundland in 1993.

Table 6. Areas (ha) of defoliation by the balsam fir sawfly forecast in forested areas of Newfoundland for 1993.

Management District No.	Defoliation Class*		
	Light**	Moderate & Severe***	Total
7	3 600	-	3 600
14	3 345	4 374	7 719
Total	6 945	4 374	11 319

- * Light = 6-25 %
- Moderate = 26-75 %
- Severe = 76-100 %

** Areas with low egg density (6-20 eggs/branch)

*** Areas with moderate and high egg density (21 or more eggs/branch)

forests. Moderate and severe defoliation occurred mainly in overmature stands, with some light defoliation in pre-commercially thinned stands. In several areas of the outbreak, blackheaded budworm feeding in association with the hemlock looper contributed to tree mortality. However, since the collapse of hemlock looper populations on the Northern Peninsula this year tree mortality should be reduced considerably, as blackheaded budworm defoliation by itself rarely causes tree mortality.

In 1992 the outbreak continued on the Northern Peninsula but moderate and severe defoliation in all forested areas decreased from 12 400 ha in 1991 to 3 757 ha in 1992. Also, areas of light defoliation decreased from 4 000 ha in 1991 to 2 955 ha in 1992 (Table 7, Fig. 14). Scattered pockets of high blackheaded budworm populations were present on the Avalon Peninsula and in Jonathan's Pond Provincial Park in central Newfoundland, but no significant defoliation occurred. The area of productive forests infested encompassed 1 900 ha of moderate and severe defoliation and 2 637 ha of light defoliation (Table 7).

In 1992, larval populations of blackheaded budworm were sampled for biological mortality factors throughout the Island. The overall incidence of larval parasitism was 20%. Within the outbreak area near Brig Bay, 19% of developing larvae (n = 560) were parasitized. The principle parasite responsible for mortality was the braconid wasp, *Ascogaster argentifrons*. In addition, 50% of blackheaded budworm larvae were killed by disease. The primary diseases included the protozoan, *Nosema* sp., bacteria and yeast-like organisms.

Overwintering egg numbers were sampled at 68 locations. Eggs extracted from these samples were used to forecast the categories of defoliation for 1993. In the moderate and severe category, defoliation is forecast to occur on only 600 ha (MD 17) with an additional 4 348 ha of light defoliation in Management Districts 16, 17 and 18 (Table 8, Fig. 15). Populations on the Avalon Peninsula and in central Newfoundland are expected to remain sporadic with no significant defoliation.

Table 7. Areas (ha) of defoliation and gross merchantable volume (m³) of stands defoliated by the blackheaded budworm in productive forests and total area of infestations in Newfoundland in 1992.**

Mgmt. Unit	Productive Forest*								Total Infestation (ha)			
	Light		Moderate		Severe		Total					
	Area	Vol. (x 000)	Area	Vol. (x 000)	Area	Vol. (x 000)	Area	Vol. (x 000)	Light	Mod.	Sev.	Total
17	2 341	256.3	988	120.7	911	10.8	4 240	387.8	2 758	1 698	2 059	6 515
18	296	21.4	-	-	-	-	296	21.4	197			197
Totals	2 637	277.7	988	120.7	911	10.8	4 536	409.2	2955	1 698	2 059	6 712

* Provided by the Forest Management Division, Dept. of Forestry & Agriculture.

** Light = 6-25 %
 Moderate = 26-75 %
 Severe = 76-100 %

Table 8. Areas (ha) of defoliation by the blackheaded budworm forecast in forested areas of Newfoundland for 1993.

Management District No.	Defoliation Class*		
	Light**	Moderate & Severe***	Total
16	600	-	600
17	3 151	600	4 151
18	197	-	197
Total	4 348	600	4 948

* Light = 6-25 %
 Moderate = 26-75 %
 Severe = 76-100 %

** Areas with low egg density (50-400 eggs/10 m foliage)

*** Areas with moderate and high egg density (401 + eggs/10 m foliage)

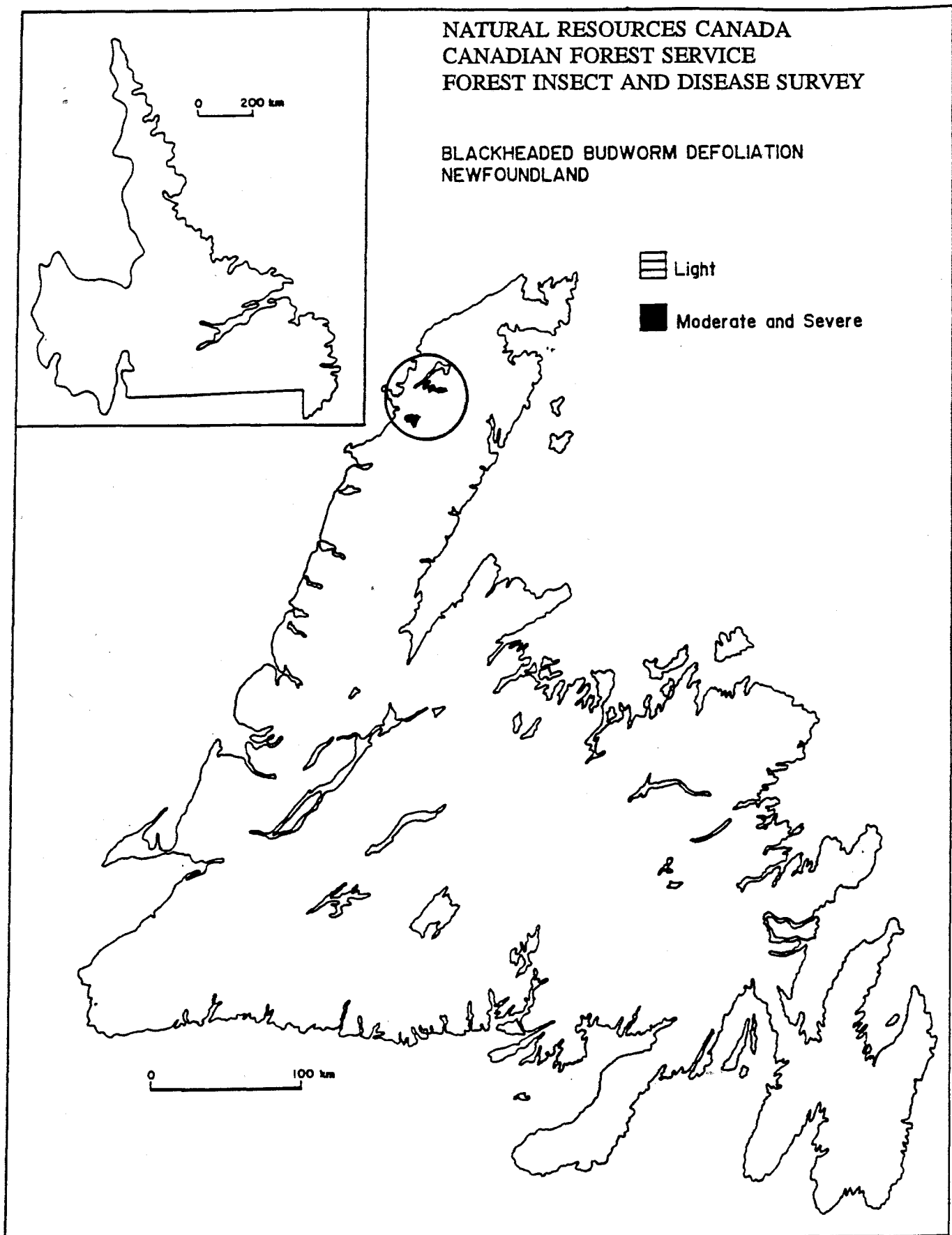


Figure 14. Areas of defoliation by the blackheaded budworm in forested areas of Newfoundland in 1992.

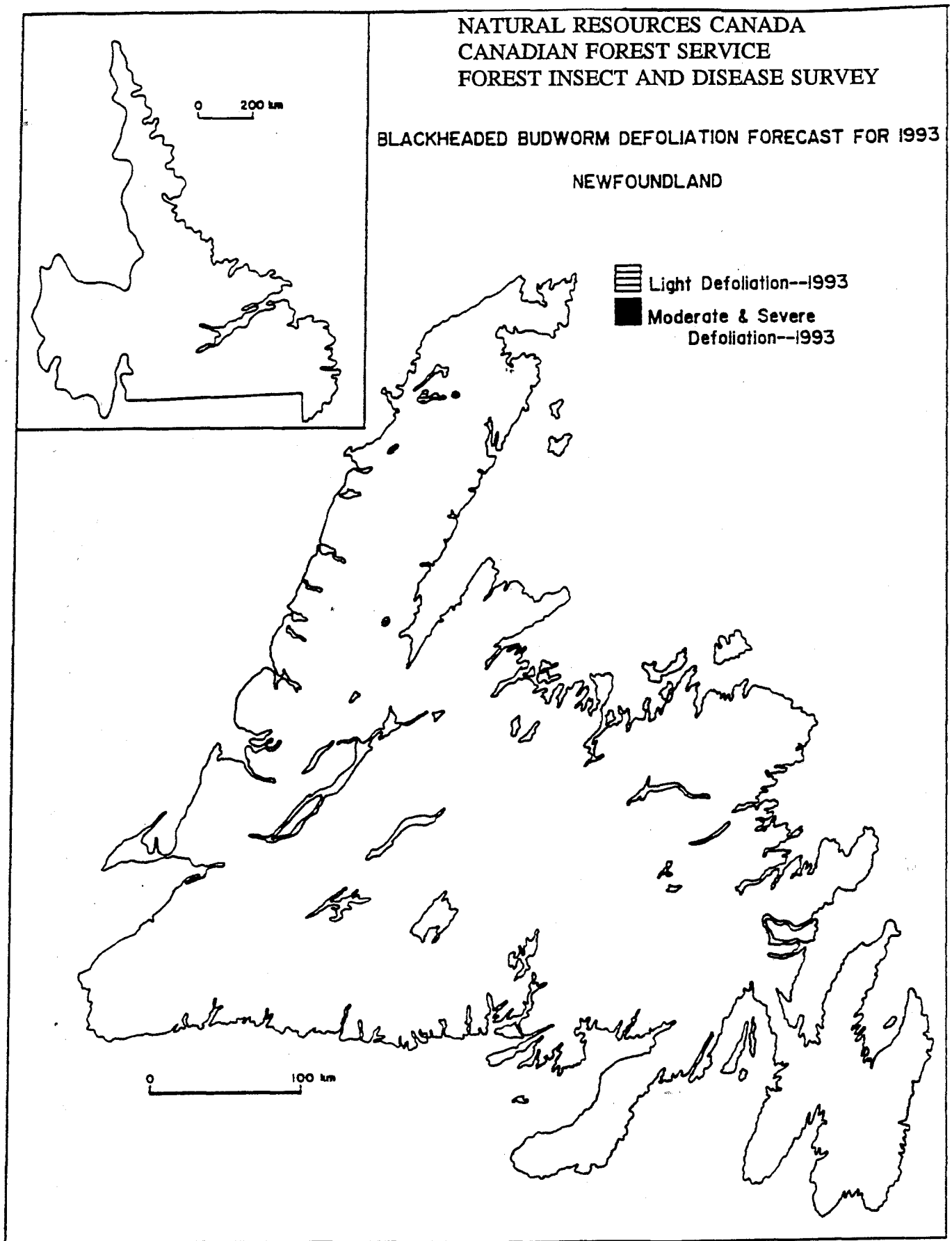


Figure 15. Areas of defoliation by the blackheaded budworm forecast in forested areas of Newfoundland in 1993.

Black Army Cutworm
Actebia fennica

Populations of black army cutworm virtually collapsed in 1992 near Bellburns and Northeast Pond in wildfire and prescribed burn areas on the Northern Peninsula and in a wildfire area along the Cat Arm Road near Jackson's Arm. Low numbers were recorded from both areas and only a trace of bud mining was observed on seedlings. A few trap catches from pheromone traps placed in these areas in July suggest that larval numbers will be very low again in 1993. Two locations in western Newfoundland were monitored for black army cutworm populations: a 1991 prescribed burn area near South Branch and a 1991 wildfire near Doyles. At South Branch low numbers of larvae caused moderate damage to spruce seedlings planted in spring 1992. Fewer than one larva per square metre was found at Doyles. Pheromone traps were placed at each location in early July, and also at two new prescribed burns near Flat Bay. Most of the traps were vandalized; however, two traps retrieved at South Branch averaged 160 adults per trap.

Spruce Budmoth
Zeiraphera canadensis

High populations of spruce budmoth were recorded in several hectares of white spruce in the Arches Provincial Park area near Daniels Harbour with up to 50% of the shoots affected. Defoliation was generally light. Also up to 30% of the new shoots on white spruce were affected at Torbay on the Avalon Peninsula. This pest was also recorded in the Goulds and at St. John's, however, populations were low and damage was light. European Pine Sawfly
Neodiprion sertifer

This sawfly, first discovered in Newfoundland in 1974 in a scots pine plantation near Windsor Lake, is now infesting two needle pines in the city of St. John's and was also recorded at other locations on the Avalon Peninsula, viz: Logy Bay, Mount Pearl,

Torbay, Portugal Cove, Foxtrap, Paradise and Carbonear. Larvae of this pest were found at Whitbourne in 1991 and again in 1992 on the same ornamental pine trees. Sertifer virus spray was applied at numerous infestations to minimize the damage and subsequent dispersal of the sawfly. Defoliation by the sawfly was minimal where Sertifer virus sprays were applied but severe defoliation occurred at all other sites.

Warren's Collar Weevil
Hylobius warreni

This collar weevil caused severe damage and some mortality to ornamental pines in the Logy Bay area and to pine plantations on the Salmonier Line. Light damage occurred in a red pine plantation at Pine Acres near Glovertown. This weevil is active wherever the host tree occurs on moist site conditions.

Spruce Beetle
Dendroctonus rufipennis

Mortality occurred in mature white spruce stands in the Humber Valley and Bay of Islands areas in recent years. Population levels of the spruce beetle appear to be on the increase as evidenced by the number of recently dead and dying trees observed in the Lower Humber Valley. Beetle infested trees were recorded between Little Rapids and Little Harbour and near South Branch and River Brook. High numbers of recently dead white spruce trees were observed from Wiltondale to Glenburnie in Gros Morne National Park. Several observations of white spruce mortality were also made near Villa Marie in Placentia Bay and near Blaketown in Trinity Bay.

Balsam Gall Midge
Dasineura balsamicola

This pest of balsam fir attacks new foliage of young and semi-mature balsam fir, and damage is usually of a temporary nature. This gall midge has been recorded and observed in numerous areas in western Newfoundland.

Moderate to severe damage occurred to stands in the South Brook Valley, Old Man's Pond, North Lake, McIvers, Bonne Bay Pond, Daniel's Harbour and Hawkes Bay areas. Pockets of light defoliation were also recorded at East Arm in Gros Morne National Park and at widely scattered locations throughout the western region.

Larch Sawfly
Pristiphora erichsonii

No infestations of this sawfly were recorded in natural stands in insular Newfoundland in 1992, but high populations caused moderate to severe defoliation on ornamental larch trees in the Pasadena area. Severe defoliation was recorded in the Labrador City - Wabush area in 1991. Provincial forestry personnel in Wabush reported a continuation of this infestation in 1992.

Results of the annual fall shrew trapping program in the four permanent shrew plots across the Island showed a marked decrease in populations in three of the four plots as compared to 1991 (Table 9).

Birch Casebearer
Coleophora serratella

Defoliation was generally light throughout most of the Northern Peninsula. Small outbreaks occurred near Reidville, Adies Pond,

Wiltondale and North Lake on Goose Arm Road. In western Newfoundland defoliation was generally light with some moderate browning recorded along the north shore of the Bay of Islands, Camp 180 Road and between Crabbes River and Highlands River. Light to moderate casebearer damage was common throughout central Newfoundland with severe pockets of up to 90% defoliation recorded near Boyd's Cove in Notre Dame Bay and at Great Rattling Brook south of Grand Fall's. No birch casebearer was found in the Bay d'Espoir area in 1992.

Poplar Serpentine Leafminer
Phyllocnistis populiella

Moderate and severe defoliation of aspen stands by the serpentine leafminer occurred for the tenth consecutive year in the Churchill River Valley from the mouth of the Minipi River to Muskrat Falls including the Pinus River Valley in Labrador. Severe defoliation also occurred at the south end of Dominion Lake and along Goose River. Light to moderate damage was recorded near the west end of Grand Lake at the mouth of the Susan and Naskaupi Rivers, and small areas of moderate and severe defoliation were common from Happy Valley north to Northwest River.

In insular Newfoundland this leafminer caused mostly light damage to trembling aspen throughout north-central Newfoundland from Indian River Provincial Park east to Jonathan's

Table 9. Estimated number of shrews per hectare from 1987 - 1992 in Newfoundland.

Location	1987	1988	1989	1990	1991	1992
St. Georges	1.09	6.44	4.30	1.09	14.01	4.30
Hall's Bay	2.15	5.73	3.21	0.97	8.60	4.30
Terra Nova National Park	3.24	5.73	6.44	0.97	8.60	4.30
Paddy's Pond	4.30	--	8.60	0.00	5.36	5.36

Pond Provincial Park. Moderate defoliation ranging from 40% to 60% was recorded near Point Leamington, Northern Arm and near Aspen Brook Provincial Park.

Uglynest Caterpillar
Archips cerasivoranus

Defoliation of choke cherry and other hardwoods by this pest was common along the south shore of Deer Lake in the vicinity of South Brook and Pasadena. A reduction in the number of nests was observed from 1991, possibly due to high larval parasitism. However, severe defoliation did occur on scattered clumps of choke cherry on abandoned agriculture land at South Brook. This is the fifth consecutive year this insect has occurred in this area.

Gypsy Moth
Lymantria dispar

The annual program for monitoring accidental introduction of gypsy moth to this Province was implemented by deploying 250 delta traps baited with disparlure in July 1992. Generally, sites chosen were Provincial and Federal campgrounds, urban and suburban recreational sites, tourist chalets and wooded areas frequented by visitors and travellers. Agriculture Canada distributed 200 traps throughout Newfoundland from the Avalon Peninsula to Port aux Basques to Plum Point on the Northern Peninsula. Distribution of traps (50) by Forestry Canada is shown in Figure 16.

Traps were collected and examined in September and only one male moth was found in a trap located at Eastern Brook in western Newfoundland.

Forest Tent Caterpillar
Malacosoma disstria

A total of 100 baited pherocon III traps were used to detect the accidental introduction of forest tent caterpillar in 1992 in Newfoundland.

Traps were placed throughout the Province near major urban centres and in national and provincial parks (Fig. 17). Traps were collected and examined in September with negative results.

Larch Casebearer
Coleophora laricella

Two localized infestations of larch casebearer were observed, one along the Millertown Junction Road and the other near Northwest Gander River on the Bay d'Espoir Road. Defoliation at both localities was estimated at 80% and 90% respectively.

DISEASES

Scleroderris Canker
Gremmeniella abietina &
Gremmeniella abietina var. *balsamea*

Scleroderris canker continued to infect Austrian pine in the St. John's area where three new infection sites were recorded. New sites included the grounds of Memorial University near Prince Philip Drive where up to 10% of the shoots were infected, Portugal Cove Road with up to 50% of the shoots infected and Strawberry Marsh Road where a low incidence of the disease was recorded. The disease still persisted in other previously infected areas of the city with the highest incidence at Rennie's Mill Road. On Austrian pine trees that were pruned to a height of approximately 5 metres, up to 15% of the shoots were infected. Scots pine in the old abandoned nursery on Salmonier Line continued to show foliar damage but mortality remained minimal. Sitka spruce in a plantation on the Northern Peninsula near Roddickton remains infected and dieback symptoms were apparent.

Armillaria Root Rot
Armillaria species

Young regenerating white spruce and balsam fir trees near Torbay were infected with

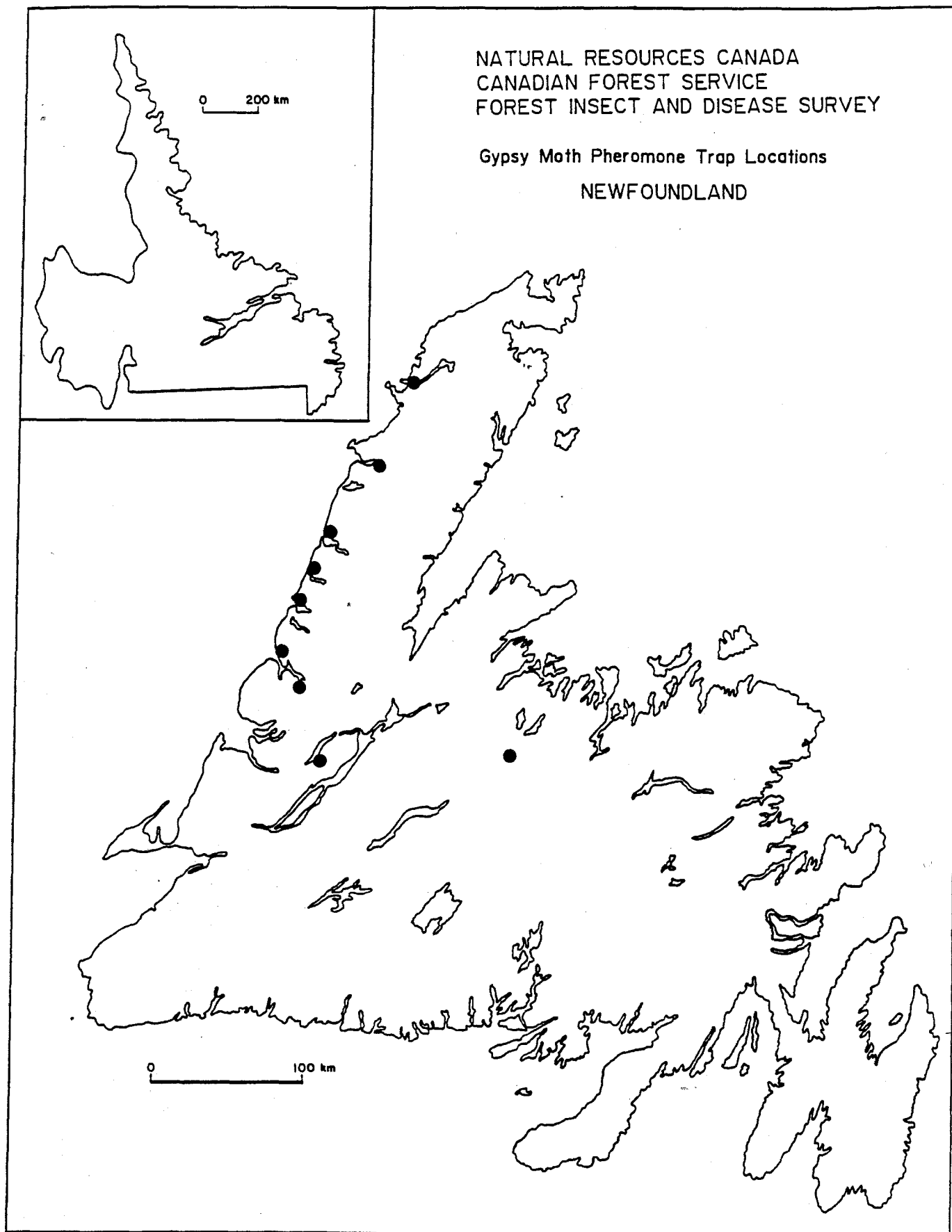


Figure 16. Gypsy moth pheromone trap locations (placed by Forestry Canada).

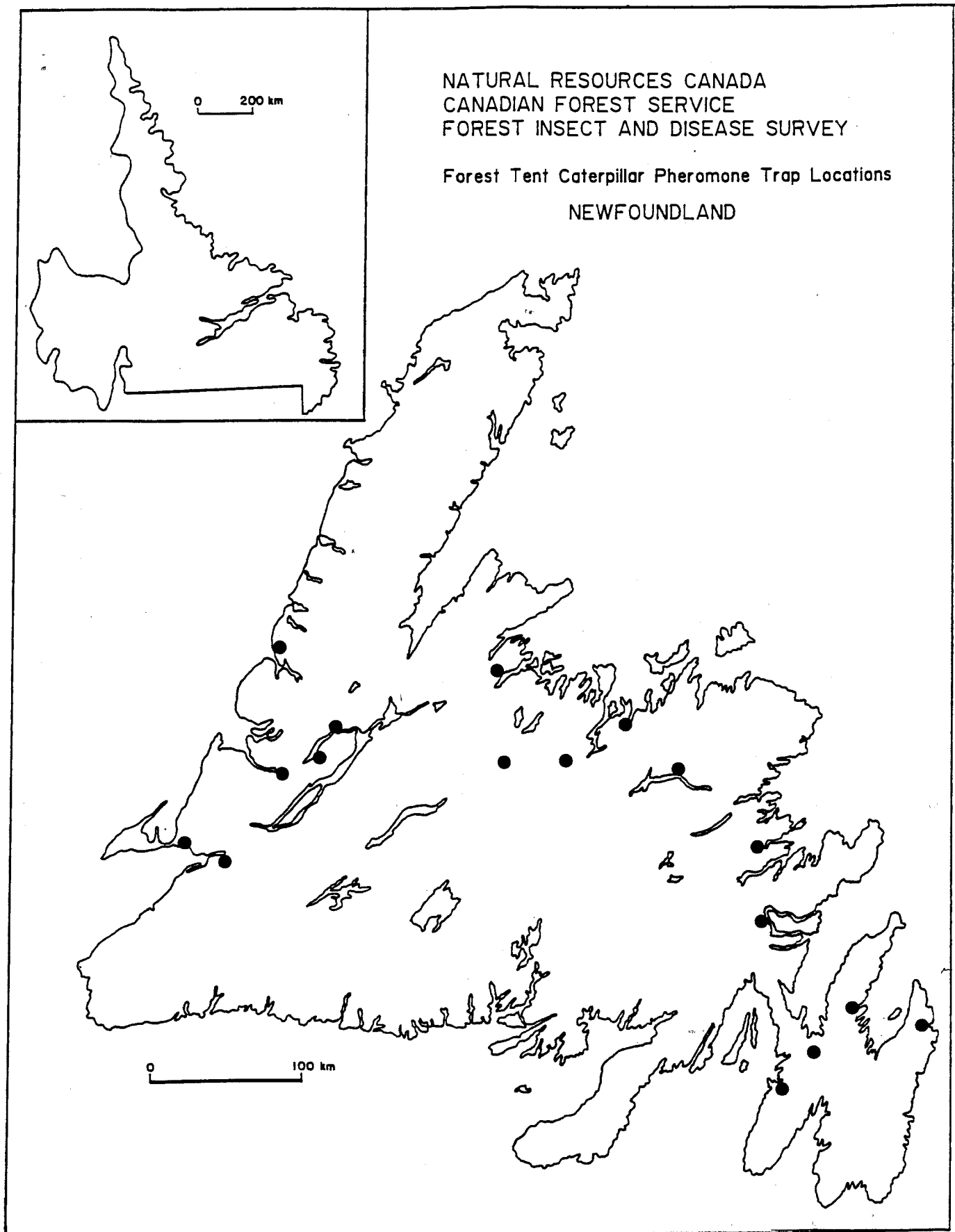


Figure 17. Forest tent caterpillar pheromone trap locations.

Armillaria root rot and some mortality was evident. Fir trees in the area were infested with the balsam woolly adelgid. The root rot was also recorded on red pine near Alexander Bay where some mortality resulted. The disease was also recorded on scots pine in Pasadena. A low incidence of this disease has been recorded in Labrador in previous years. Plantations in Labrador in 1992 did not show any increase in the number or size of areas infected with this fungus.

Needle Rusts

Chrysomyxa ledicola &
Pucciniastrum epilobii

Needle rust on spruce trees was extremely common and a high incidence was recorded in eastern Newfoundland. Up to 80% of the new foliage on black, white and blue spruce was infected. A high incidence of rust on black spruce was also recorded near La Scie and Pacquet on the Baie Verte Peninsula where 1 ha of scrub spruce was infected. A low incidence of the disease was observed on balsam fir near Colliers and St. John's. In Labrador a low incidence was recorded on black spruce along the South Branch Road.

Snow Blight on Conifers

Phacidium infestans

This disease was recorded on fir in an urban garden in St. John's where 10% of the lower foliage was infected. Snow blight infected up to 20% of the foliage on 10% of the black spruce trees on the South Branch Road in Labrador. On trees along the Grand Lake Road up to 30% of the lower crowns was infected. Near Caribou River up to 20% of the lower crown of balsam fir showed symptoms of the disease. This is the third year that a high incidence of damage has occurred in eastern Labrador.

Leaf and Shoot Blight of Poplars

Venturia macularis &
Pollaccia elegans

Leaf and shoot blight of trembling aspen was common throughout Newfoundland and Labrador. In insular Newfoundland 40% of the aspen regeneration east of Aspen Brook Park was affected. The disease was also observed south of Boyd's Cove Junction, Jonathan's Pond Provincial Park and near Alexander Bay Station. In Labrador it was recorded on aspen in a plantation at Muskrat Lake, on roadside trembling aspen along the Churchill River Road and on balsam poplar in Forteau.

White Pine Blister Rust

Cronartium ribicola

Up to 5% of young white pine in the Little Barachois Brook Valley are affected by this disease. A few scattered trees have been recently killed in the Southwest Brook Valley.

Shoot Blight of Jack Pine

Hormonema sp.

In 1991, shoot blight caused the death of approximately 20% of the terminal shoots and affected a few lateral shoots in 2 jack pine plantations near Peters River, Labrador. These plantations, located 27 km in South Branch Road, were thinned in recent years and are now approximately 15 years old and 3-4 m high. During the annual plantation inspection in July 1992, it was observed that a high percentage of the leaders and some of the laterals on at least 50% of the trees were affected by heavy resinosis. Further investigation in September showed that those shoots had developed blight-like symptoms and were severely damaged or dying. At this time, infection had spread to 60-70% of the plantation, damaging the leaders and 20-70% of the lateral shoots. Leaders and a few

shoots were also affected on 5-10% of the trees in younger jack pine plantations along Churchill River Road. Samples collected from these plantations disclosed a pathogen tentatively identified as a black yeast (*Hormonema* sp.). Black yeast infections generally occur after trees have been stressed for other reasons, in this case probably from damage caused by a late frost. No control measures have been proposed for this disease as records indicate that generally, damage does not persist for extended periods of time.

Sirococcus Shoot Blight
Sirococcus strobilinus

Young blue spruce trees in Mount Pearl had up to 5% of the shoots affected with Sirococcus shoot blight. Thirty percent of the shoots were infected on an urban blue spruce tree in Corner Brook.

Scab and Black Canker of Willow
Fusicladium saliciperduum &
Glomerella miyabeana

Scab and black canker infected willows in the Carbonear area as up to 50% of the foliage showed symptoms of the disease. Willows in Gander, Marystown, Goulds, Topsail and St. John's were also infected.

European Poplar Canker
Dothichiza populea

European poplar canker has destroyed most older lombardy poplar trees throughout Newfoundland. Mortality continues to be recorded in younger trees in and around St. John's and Robinsons.

Didymascella Leaf Blight
Didymascella thujina

Didymascella leaf blight first recorded from Pasadena in western Newfoundland in 1987 was observed for the first time in St. John's on the Avalon Peninsula. Thirty percent of the foliage

of northern white cedars in localized areas was infected.

Needle Cast of Larch
Hypodermella laricis

A high incidence of needle cast of larch was recorded at Saltons Brook, Terra Nova National Park. Up to 40% of the foliage was infected on a 1 km stretch along the old Goose Arm Road in western Newfoundland. Approximately 1 ha of larch near McIsaac's Brook had severe damage. Light damage was observed from Deer Lake to Birchy Lake.

Cone Rust
Chrysomyxa pirolata

Cone rust of white spruce was observed near Torbay where less than 5% of the cones were infected on some trees.

Boom Rusts
Melampsorella caryophyllacearum &
Pucciniastrum goeppertianum

Broom rust of balsam fir was common around North Lake in western Newfoundland and near Torbay on the Avalon Peninsula. Stem cankers caused by broom rust of balsam fir affected 24% of the trees in a thinned stand near Back River. Broom rust of English blueberry was common in the Outer Cove area on the Avalon Peninsula.

Black Knot
Apiosporina morbosa

Black knot continued to infect cherry and plum trees wherever host trees occurred. The disease was severe on urban trees in Lewisporte, Gander, Long Pond, Mount Pearl and St. John's.

Ink Spot
Ciborinia whetzelii

Trembling aspen stands growing along the

Churchill River Road near Happy Valley and in the Goose Bay to Otter Creek area were affected by this disease. Damage was generally light, however some moderate damage was recorded on aspen on Churchill Road where symptoms appeared on as high as 50% of the foliage of a few trees. No damage was observed in young trembling aspen near Naskaupi and Red Wine Rivers where an outbreak of this disease was recorded in 1991.

Fire Blight

Moderate damage was observed and recorded throughout eastern and central Newfoundland. A light incidence was also found at Jonathan's Pond Provincial Park in central Newfoundland.

Taphrina Witches' Broom

Taphrina cerasi

This disease of pin cherry has been common in the Happy Valley - Goose Bay area for the past few years. In many locations in 1992 up to 20% of the foliage of scattered trees was affected causing the leaves to turn reddish brown and subsequently die.

ABIOTIC DAMAGE

Winter Drying

This condition occurs when sun and wind combine to overheat portions of the tree above the snow line. Winter drying was common and wide-spread throughout much of the Province in 1992. Conifers were mostly affected. Pines in the Bay Roberts, Spaniard's Bay and Tilton Barrens areas were severely affected with up to 80% of the foliage turning red. Severe winter drying of black spruce occurred in the Hogan's Pond area near St. Phillip's where up to 80% of last year's foliage was affected and on the Mount Scio Road where 70% of the foliage was affected on 10% of the trees. A high incidence

of winter drying of balsam fir occurred on the Northern Peninsula from Sally's Cove to Daniel's Harbour and near St. Anthony where moderate damage occurred on a few hectares of regeneration. In a plantation near Stag Lake in western Newfoundland 30% of the foliage was affected on 70% of the sitka spruce trees. Dead tops and stunted growth were present. Winter drying affected 15% of the trees on most balsam fir regeneration in a 70 ha area near Highlands River. In Labrador a high incidence of this condition affected 50% of the foliage on 25% of the young jack pine in a plantation near Big Rock Junction on the South Branch Road. Some evidence of this condition was also observed in plantations near Echo Lake, Peters River and on Churchill Road; however, damage was recorded as light. Light damage also occurred on scattered balsam fir growing along many of the river banks and lakeshores in eastern Labrador, and was especially noticeable along Paradise River near Paradise and west of Beaver Brook on Churchill River.

Frost Damage

Frost damage occurred on black spruce trees in the Hogans Pond Road area near St. Phillip's with up to 80% of the new foliage affected. Up to 70% of the new shoots on some trees in the Blue Gulch Pond Road area near Pasadena were also damaged by frost. Damage was also observed on trees at the junction of Noel Paul's and Lake Ambrose Roads in central Newfoundland where the incidence of damage was 100% and 40% on balsam fir and black spruce, respectively. The total area affected was approximately 4 ha. Light damage to black spruce was observed near Rocky Harbour and South East Arm on the Northern Peninsula and Thorburn Lake Provincial Park in eastern Newfoundland. Frost damage on balsam fir was recorded on 30% of trees examined on Swanger Cove Road, Bay d'Espoir and up to 40% of the trees examined North of Bernard's Brook near Head of Bay d'Espoir. Severe frost damage

occurred on current foliage of approximately 50 ha of balsam fir and black spruce regeneration and saplings near Lloyds Lake in western Newfoundland. A late spring frost killed the majority of eastern larch seedlings growing at the Provincial Forestry Nursery at Happy Valley, Labrador. Frost also damaged 25% of the current foliage on 90% of the Japanese larch in a small plantation near Muskrat Lake. A low incidence of frost damage was found in most of the jack pine plantations on South Branch and Churchill River Roads causing leader mortality on a few trees. Frost was also responsible for some light damage to the current foliage of balsam fir regeneration along Caribou River and Grand Lake Roads.

Wind Damage

A wind storm with gusts up to 120 km per hour occurred in eastern Newfoundland in early October causing severe damage to urban, ornamental and forest trees. Valuable ornamental and native trees in and around the St. John's area with diameters up to 75 cm and heights up to 15 m were blown down. It is estimated that during the 1992 wind storm, 4000 trees toppled. Some of the trees were estimated to be over 200 years old. Previous storms of this magnitude have occurred but usually much later in the year when the ground was frozen and the trees had shed their foliage resulting in little or no damage.

OTHER INSECTS, DISEASES OR DAMAGE

Insect, disease or damage	Host(s)	Location	Remarks
Alder leaf beetle <i>Chrysomela mainensis</i> <i>mainensis</i> Bech.	Speckled alder	Eastern Labrador	Low numbers. Light defoliation.
Animal damage	Balsam fir	Avalon Peninsula	Severe moose browse.
Anthracnose <i>Kabatiella apocrypta</i> (Ell. and Ev.) Arx	Maple	Central Newfoundland	Low incidence.
Apple scab <i>Venturia inaequalis</i> (Cke.)	Flowering crab Crab Apple	Avalon Peninsula	Low incidence.
Aspen leaf roller <i>Pseudexentera oregonana</i> (Walshm.)	Trembling aspen	Western and central Newfoundland Avalon Peninsula	Populations low in western and central Newfoundland. High numbers on one ornamental on Avalon Peninsula.
Bagworms <i>Solenobia walshella</i> Clem.	Balsam fir	Western and northern Newfoundland	Low populations.
Balsam twig aphid <i>Mindarus abietinus</i> Koch	Balsam fir	Eastern, central and northern Newfoundland Eastern Labrador	Populations low.
Birch-aspen leaf-roller <i>Epinotia solandriana</i> (Linn.)	Trembling aspen	Eastern and central Newfoundland	Moderate populations. Light defoliation.
Black knot <i>Apiosporina morbosa</i> (Schw.) Arx	Pin cherry Plum	Throughout Newfoundland	Damage ranges from light to severe.
Broom rust <i>Melampsorella caryophyllacearum</i> Schroet	Balsam fir	Western Newfoundland Avalon Peninsula	Brooms common in western Newfoundland.
Canker and dieback <i>Nectria galligena</i> Bres.	Norway maple Sycamore maple	Avalon Peninsula	High incidence on one ornamental Norway maple.

OTHER INSECTS, DISEASES OR DAMAGE (Cont'd.)

Insect, disease or damage	Host(s)	Location	Remarks
Claycolored root weevil <i>Otiorhynchus singularis</i> (Linn.)	Balsam fir	Western Newfoundland	High numbers on one tree at Pasadena field station.
Collar weevil <i>Hylobius</i> sp.	Jack pine White pine Scots pine Balsam fir Red pine	Eastern, central and northern Newfoundland	Severe damage and some mortality.
Cone rust <i>Chrysomyxa pirolata</i> Wint.	White spruce	Avalon Peninsula	Low incidence.
Eastern dwarf mistletoe <i>Arceuthobium pusillum</i> Peck.	Black spruce	Central Newfoundland	Highest incidence since 1989.
European poplar canker <i>Dothichiza populea</i> Sacc.	Lombardy poplar Hybrid poplar	Western Newfoundland Avalon Peninsula	Mortality of lombardy poplar recorded on Avalon Peninsula. Moderate incidence to hybrid poplar in western Newfoundland.
European spruce sawfly <i>Gilpinia hercyniae</i> (Htg.)	Black spruce White spruce	Central, western and northern Newfoundland Eastern Labrador	Low populations.
Green balsam looper <i>Cladara limitaria</i> Wlk.	Balsam fir Black spruce	Throughout Newfoundland	Low numbers.
Greenheaded spruce sawfly <i>Pikonema dimmockii</i> Cress	Black spruce White spruce	Western and northern Newfoundland Eastern Labrador	Low populations.
Heat injury	Japanese maple	Avalon Peninsula	Low incidence.
Ink spot of aspen <i>Ciborinia whetzellii</i> (Seav.) Seav.	Trembling aspen	Eastern Labrador	Generally light. About 50% damage on few trees.
Larch casebearer <i>Coleophora laricella</i> (Hbn.)	Tamarack	Central Newfoundland	High populations. Up to 90% defoliation on few clumps of trees.

OTHER INSECTS, DISEASES OR DAMAGE (Cont'd.)

Insect, disease or damage	Host(s)	Location	Remarks
Leaf blister <i>Taphrina carnea</i> Johans.	White birch	Central Newfoundland	Moderate incidence on one tree.
Leaf rust <i>Gymnosporangium cornutum</i> Arth. and Kern.	American mountain-ash	Avalon Peninsula	Low incidence.
<i>Melamosora abietis-capraearum</i> Tub.	Willow	Northern Peninsula	About 5% of the foliage infected.
Leaf and shoot blight <i>Pollacia elegans</i> Serv.	Balsam poplar	Eastern Labrador	Low incidence.
<i>Venturia macularis</i> (Fr.) Mull. and Arx	Trembling aspen	Throughout Newfoundland Eastern Labrador	Damage varied from a trace to severe on the Island. Low in Labrador.
Leaf spot <i>Entomosporium mespili</i> (DC. ex Duby) Sacc.	Hawthorn	Central Newfoundland Avalon Peninsula	High incidence on one tree in central Newfoundland. Up to 50% damage to urban trees on Avalon Peninsula.
<i>Marssonina brunnea</i> (Ell. and Ev.)	Hybrid poplar	Avalon Peninsula	Low incidence. 10% of the foliage affected.
<i>Septoria betulae</i> (Lib.) West.	White birch	Central Newfoundland	Light damage.
Mountain ash sawfly <i>Pristiphora geniculata</i> (Htg.)	Ash	Central Newfoundland	Light defoliation.
Nectria dieback and canker <i>Nectria cinnabarina</i> Tode ex Fr.	Sycamore maple Horse chesnut Golden elderberry	Western Newfoundland Avalon Peninsula	Low incidence.
Needle blight <i>Didymascella thujina</i> (Durand) Marie	Northern white cedar Techney cedar	Western Newfoundland Avalon Peninsula	Foliage damage ranged from 20% to 30%.
Needle cast <i>Hypodermella laricis</i> Tub.	Tamarack-larch	Eastern and western Newfoundland	Moderate to high incidences.

OTHER INSECTS, DISEASES OR DAMAGE (Cont'd.)

Insect, disease or damage	Host(s)	Location	Remarks
Needle rust <i>Melampsora medusae</i> Thum.	Tamarack-larch	Eastern Newfoundland	Moderate incidence.
<i>Pucciniastrum epilobii</i> Oth.	Balsam fir	Northern Peninsula	Less than 5% of the foliage affected.
Northern spruce engraver <i>Ips perturbatus</i> (Eichoff)	Black spruce	Eastern Labrador	High populations on a few recent dead and dying trees.
Orange spruce needle miner <i>Coleotechnites piceaella</i> (Kraft)	Balsam fir Black spruce	Eastern, central and western Newfoundland	Low populations throughout.
Pineapple gall <i>Pineus similis</i> (Gillette)	Black spruce	Eastern Labrador	High populations in a black spruce plantation.
Redlined conifer caterpillar <i>Feralia jocosa</i> Gn.	Balsam fir	Throughout Newfoundland	Low numbers.
Rusty tussock moth <i>Orgyia antiqua</i> (Linn.)	Balsam fir Speckled alder	Eastern, central and western Newfoundland	Low numbers.
Scab and black canker <i>Fusicladium saliciperdatum</i> (All. and Tub.) Lind., and <i>Glomerella miyabeana</i> (Fukushi) v. Arx and Muller	Alberta willow Laurel willow Willow	Central Newfoundland Avalon, Burin and Northern Peninsulas	High incidence occurred on ornamentals at one location on the Avalon Peninsula.
Shot hole <i>Coccomyces hiemalis</i> Higgins	Pin cherry	Avalon Peninsula	Low incidence. Up to 30% of the foliage affected.
Sirococcus shoot blight <i>Sirococcus strobilinus</i> Preuss.	Blue spruce	Western Newfoundland Avalon Peninsula	Medium incidence in western Newfoundland.
Snow blight <i>Phacidium infestans</i> Karst.	Balsam fir Black spruce	Avalon Peninsula Eastern Labrador	Low to medium incidences recorded along Goose River and Grand Lake roads.

OTHER INSECTS, DISEASES OR DAMAGE (Concl'd.)

Insect, disease or damage	Host(s)	Location	Remarks
Striped alder sawfly <i>Hemichroa crocea</i> (Geof.)	Speckled alder	Central Newfoundland	Light defoliation recorded in Bay d'Espoir area.
Tip blight <i>Diplodia pinea</i> (Desm.) Kickx	Austrian pine	Western Newfoundland	Low incidence. Only a few shoots affected.
Webspinning sawfly <i>Cephalcia</i> sp.	Scots pine	Avalon Peninsula	Low populations on ornamentals.
Yellowheaded spruce sawfly <i>Pikonema alaskensis</i> Roh.	Black spruce	Central Newfoundland	Low populations found on few trees in black spruce plantation.

APPENDIX

Locations of pheromone-baited* traps in Newfoundland in 1992, and the total number of larvae (per 3 tree samples) in June the total number of male moths (per 3 traps) and the total number of overwintering larvae (per 3 branches) in October.

Plot No.	Location	No. Larvae	No. Adults	No. Overwintering Larvae
1	Overfalls Brook	0	53	1
2	Codroy Pond	48	11	41
3	Mitchells Pond	0	16	0
4	Fischells River	0	8	0
5	Barachois Brook	0	52	2
6	Trout Brook	0	85	0
7	Campbells Creek	0	25	80
8	Gallants Road	0	8	0
9	George's Lake	0	18	0
10	Pinchgut Lake Road	0	40	0
11	Corner Brook Stream	0	11	1
12	South Brook Valley	0	29	0
13	Bay of Islands	32	0	74
14	Goose Arm Road	0	13	1
15	Big Bonne Bay Pond	0	4	0
16	Lomond	0	28	0
17	East Arm, Bonne Bay	0	21	0

Plot No.	Location	No. Larvae	No. Adults	No. Overwintering Larvae
18	Sally's Cove	0	91	0
19	Daniel's Harbour	1	0	0
20	Hawkes Bay	1	21	0
21	Ten Mile Lake	0	5	0
22	Birchy Lake	0	22	0
23	Black Brook	0	58	0
24	Burlington Road	0	41	0
25	LaScie Road	1	13	0
26	West Brook Road	0	24	0
27	Gullbridge Mines Road	0	63	0
28	6.3 km W of Catamaran Park	0	14	1
29	Aspen Brook Road	0	14	3
30	Buchans Highway	0	25	-
31	5.3 km S of Exploits Dam	0	50	1
32	Quinn Lake	0	12	0
33	New Bay Pond Road	0	25	0
34	1.4 km E of Exploits River, Grand Falls	0	75	0
35	Tote Brook	0	49	0
36	Bay d'Espoir Highway, 9.1 km S, Northwest Gander River Bridge	0	75	2

Plot No.	Location	No. Larvae	No. Adults	No. Overwintering Larvae
37	Bay d'Espoir Highway at Gull Pond	0	9	1
38	Twillick Brook	0	84	2
39	St. Joseph's	0	21	0
40	Burnt Woods Road, Bay d'Espoir	4	65	4
41	Gander Bay Road	0	-	0
42	Glenwood	0	41	1
43	Gambo	0	1	1
44	4.5 km W Dunphy's Pond Rd., TNNP	0	7	
45	Thorburn Lake	0	5	0
46	TCH, 1.2 km W Hillview Jct.	0	9	1
47	Whitbourne	0	1	2
48	Heart's Content	1	8	0
49	Salmonier Line	0	4	0
50	Torbay	0	4	0

* "Biolure" used in 1990