MARITIMES FOREST RESEARCH CENTRE
TECHNICAL NOTE NO. 44

# OVERVIEW OF FOREST PROTECTION OPERATIONS AND SPRUCE BUDWORM SURVEYS IN NEW BRUNSWICK, 1981

This report reviews the efficacy of spray operations conducted by Forest Protection Ltd. in 1981 to provide foliage protection from spruce budworm feeding in selected areas of forest in New Brunswick and forecasts spruce budworm infestation levels and tree hazard for 1982.

Treatment areas were selected by the Department of Natural Resources of New Brunswick, using the egg-mass infestation and hazard map (Figure 1) as a guide, in consultation with the forest industry, Forest Protection Ltd. and the Canadian Forestry Service. Assessments of the results of spraying and forecasts of infestations and hazard are based on information gathered by field and laboratory personnel of Forest Protection Ltd. under the supervision of the Author.

## AREA SPRAYED

Spray operations (Figure 2) conducted by Forest Protection Ltd. covered some 1 900 000 hectares. Included were 30 000 hectares of private woodlots in what was once referred to as the "one mile set-back zone". Spraying in this area was limited to only small agricultural type aircraft. A synopsis of all the areas treated by dosage and aircraft type is shown in Table 1. A new type of aircraft, the M-18 (manufactured in Poland) was used on the project and the small area treated by them was listed in areas treated by TBM's. The insecticide Fenitrothion was used at a dosage of 210 g/ha per application.



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ENVIRONMENT CANADA

MARITIMES

Spray operations commenced on May 19 and ended on June 20. Some 116 000 hectares in the large scale operation received only one application because of low budworm populations remaining after the first application. Some 3 000 hectares in private woodlot operation received only one application because the second application would have been too late to provide any further foliage protection.

## RESULTS OF SPRAYING

The effectiveness of spraying is evaluated from:

1) extensive aerial surveys of current defoliation and,
2) from intensive surveys for pre-spray larvae, post-spray pupae and defoliation in treated and control plots.

The results of egg-mass surveys are not used to evaluate spray efficacy because such surveys reflect the population level of next year's infestation. This population is usually the result of many factors other than spraying. Spray operations, such as the one in New Brunswick, are only crop protection tools conducted to save foliage (not eradicate insects) and are carried out over only a portion of the general area infested by the pest insect. As a result they have little influence over the general population trends of widespread infestations such as the present budworm epidemic.

## LARGE SCALE OPERATIONAL SPRAYING

Operations were affected to some degree by "bad" spray weather, particularly in north-western New Brunswick. Nevertheless, protection was generally good to excellent with an average of 50% of the foliage crop saved, and survival of budworms was generally low (less than 5%) compared to a survival rate of 25% in the non-treated areas. Analysis of aerial surveys of defoliation show that only 17% of the treated area received a detectable level of defoliation (Table 2). A significant portion of this defoliation coincided with areas along water courses over which aircraft were required to shut off the spray booms. No differences in spray efficacy were detected between aircraft type, and in general, areas treated twice had a higher level of protection than areas treated once.

The 1981 results are very similar to those obtained over the past six years and confirm the effectiveness of fenitrothion in such a crop protection program.

## PROTECTION TO PRIVATE WOODLOTS

The spraying of small woodlots was also affected by bad spray weather, but assessment of 29 of the 105 woodlots treated in the 1 mile buffer zone showed acceptable levels of protection in 26 (or 90%) of the woodlots sampled. However, in two areas of the province, one west of Fredericton, the other in Madawaska County, the level of foliage protection was somewhat less because of the lateness of the second application of insecticide.

## RESULTS OF DEFOLIATION SURVEYS

An aerial survey to map the nature and extent of spruce budworm defoliation (Figure 3) was conducted with personnel of Forest Protection Ltd., Dept. Natural Resources, and the Maritimes Forest Research Centre. Some 1 221 000 hectares outside and within the treated areas were classified as moderate to severe defoliation, which is an increase over 1980 when 673 000 hectares of moderate to severe defoliation were detected. This increase in defoliation was predicted from 1980 egg-mass survey.

Only 268 000 hectares of the moderate to severe defoliation were recorded inside the general boundary of the 1981 spray program.

## FORECAST OF INFESTATIONS AND HAZARD FOR 1982

In 1981, 1 722 locations in New Brunswick were sampled for spruce budworm egg-masses and hazard. This was a significant increase in the level of sampling over 1980 when 1 200 locations were sampled.

The results of the egg-mass survey (Figure 4) show that there are moderate to high infestations in all sectors of the Province (Table 3) and that in five of the six regions egg-mass infestations are higher in the "buffer" zone than in the protection zone. Further, 1981 infestation levels in the "Protection Zone" compared to 1980 are significantly higher in the eastern half of the province, about the same in the north and central west sectors, and substantially lower in the south west sector (Figure 5). Continuing moderate to severe budworm infestations over most of the forest area of New Brunswick are forecast for 1982. Hazard ratings are based on forecasts of infestations and on the past and current history of tree damage. The map (Figure 4) is based on information gathered during egg-mass surveys and aerial surveys of defoliation. Most of the forest in the protection and buffer zones are generally in moderate to high hazard due primarily to the increase of infestations and the amount of defoliation in 1981.

In many respects the current situation in the forest parallels that of 1974. An insufficient control effort the following year resulted in a very serious decline in the health of the forest. Similarly, if the forest is allowed to deteriorate in 1982 because of budworm feeding, a crisis situation is a probability in 1983.

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* Presented by Mr. Kettela to the 9th session of the Forest Pest Control Forum, 1 December 1981, Ottawa.

Table 1. A synopsis of the area sprayed in 1981 by Forest Protection Ltd., hectares and acres, dosage, application rate, aircraft type and carrier.

| Operational | Hectares Thousands | Acres Thousands | Aircraft Type |
|---|---|---|---|
| **One application** | | | |
| (a) 210 g/ha Fenitrothion in 1.46 ℓ/ha - Water base | 70 | 174 | TMB-3 |
| (b) 210 g/ha Fenitrothion in 1.46 ℓ/ha - Oil base | 46 | 113 | DC-6 |
| **Two Applications** | | | |
| (c) 210 g/ha Fenitrothion in 1.46 ℓ/ha + 210 g/ha Fenitrothion in 1.46 ℓ/ha - Water base | 1 481 | 3 659 | TMB-3 |
| (d) 210 g/ha Fenitrothion in 1.46 ℓ/ha + 210 g/ha Fenitrothion in 1.40 ℓ/ha - Oil base | 222 | 549 | DC-6 |
| (e) 210 g/ha Fenitrothion in .73 ℓ/ha + 210 g/ha Fenitrothion in .73 ℓ/ha - Oil base | 51 | 125 | Thrush[1] |
| TOTAL | 1 870 | 4 620 | |

| Private Woodlots | Hectares Thousands | Acres Thousands | Aircraft Type |
|---|---|---|---|
| **One Application** | | | |
| 210 g/ha Fenitrothion in 1.46 ℓ/ha - Oil base | 3 | 8 | Ag-Cat<br>Ag-Truck<br>Pawnee |
| **Two applications** | | | |
| 210 g/ha Fenitrothion in 1.46 ℓ/ha + 210 g/ha Fenitrothion in 1.46 ℓ/ha - Oil base | 27 | 66 | Ag-Cat<br>Ag-Truck<br>Pawnee |
| TOTAL | 30 | 74 | |
| GRAND TOTAL | 1 900 | 4 694 | |

[1]Thrush areas were sprayed by Forest Patrol Limited under contract to Forest Protection Limited.

Table 2. Spruce Budworm Defoliation in New Brunswick From 1978 to 1981 (hectares x 1000)

| Defoliation Category | 1978 | 1979 | 1980 | 1981 Total Province | 1981 In Sprayed Area* |
|---|---|---|---|---|---|
| Light | 141 | 105 | 176 | 135 | 52 (38%) |
| Moderate | 219 | 235 | 226 | 382 | 104 (27%) |
| Severe | 450 | 1085 | 447 | 839 | 164 (19%) |
| TOTAL ALL CATEGORIES | 810 | 1425 | 849 | 1356 | 320 |

* The area treated in 1981 by Forest Protection Limited was 4.690 million acres or 1.9 million hectares. Some 320 000 hectares of defoliation were detected in the treated area which means that 83% of the area treated had no detectable level of defoliation.

Table 3. Summary of Mean Spruce Budworm Egg-mass Infestations in Six Regions of New Brunswick

| Region | 1981 Mean Egg-Mass Infestation (egg-masses/10m$^2$) | | 1980** |
|---|---|---|---|
| | Set Back Zone | Protection Zone | |
| North West | 429 (46)* | 245 (358) | 223 |
| North East | 457 (55) | 361 (155) | 168 |
| Central West | 278 (93) | 220 (222) | 234 |
| Central East | 409 (113) | 302 (206) | 197 |
| South West | 211 (149) | 142 (115) | 215 |
| South East | 187 (128) | 251 (81) | 155 |

* no. of sample points ( )

** set back zone - not sampled in 1980, so 1980 figures apply to protection zone only.

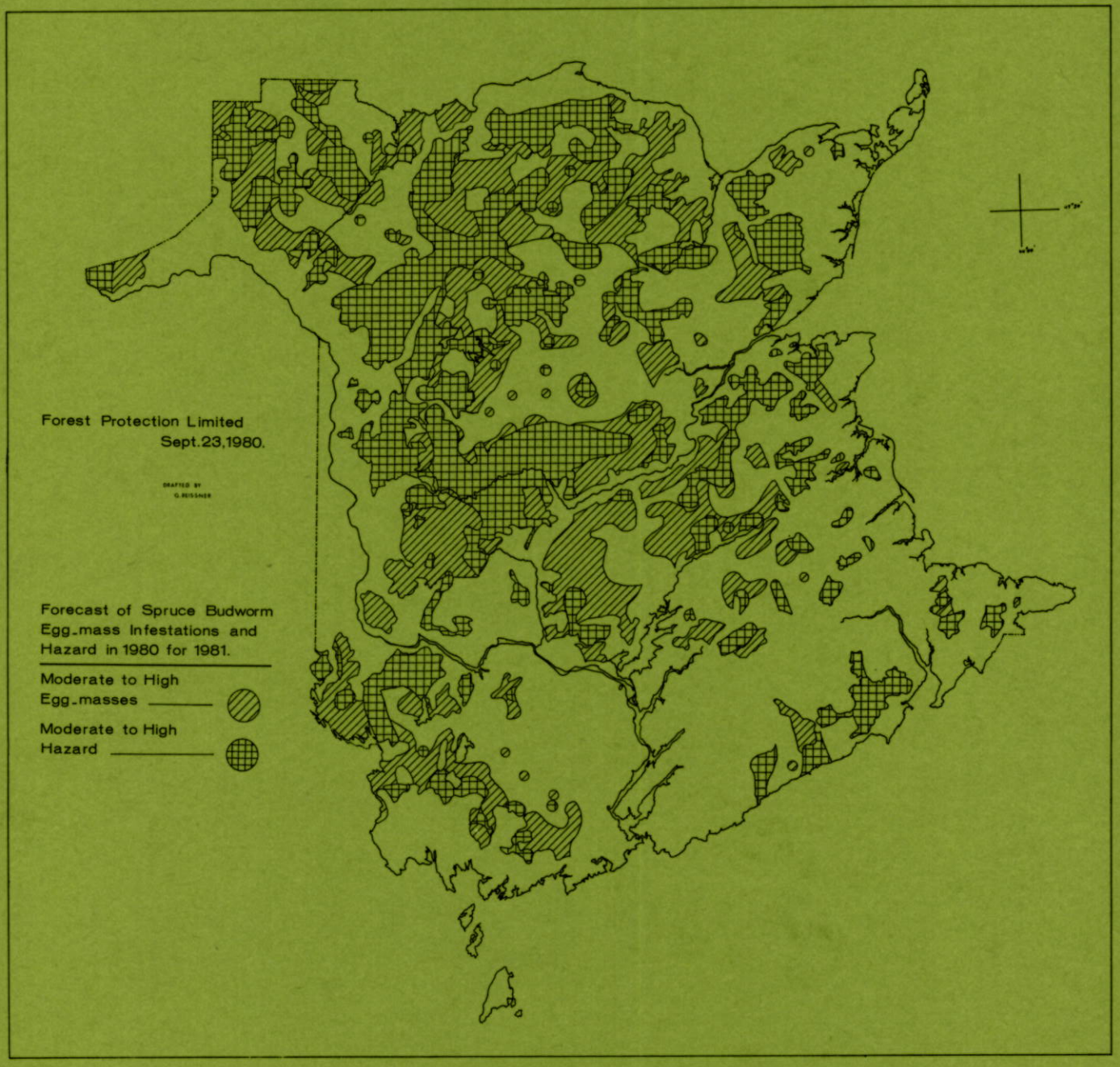
Forest Protection Limited
Sept.23,1980.
Forecast of Spruce Budworm
Egg-mass Infestations and
Hazard in 1980 for 1981.
Moderate to High
Egg-masses
Moderate to High
Hazard

**Figure 1**

ACTUAL AREA SPRAYED IN 1981


**Figure 2**


FOREST PROTECTION LIMITED
AERIAL SURVEY FOR CURRENT DEFOLIATION–1981
LEGEND
MODERATE TO SEVERE
LIGHT TO MODERATE
LIGHT & PATCHES OF LIGHT
NO DETECTABLE DAMAGE
AUGUST 5, 1981 D. Henry

FORECAST OF SPRUCE BUDWORM EGG MASS INFESTATIONS

AND HAZARD IN 1981 FOR 1982

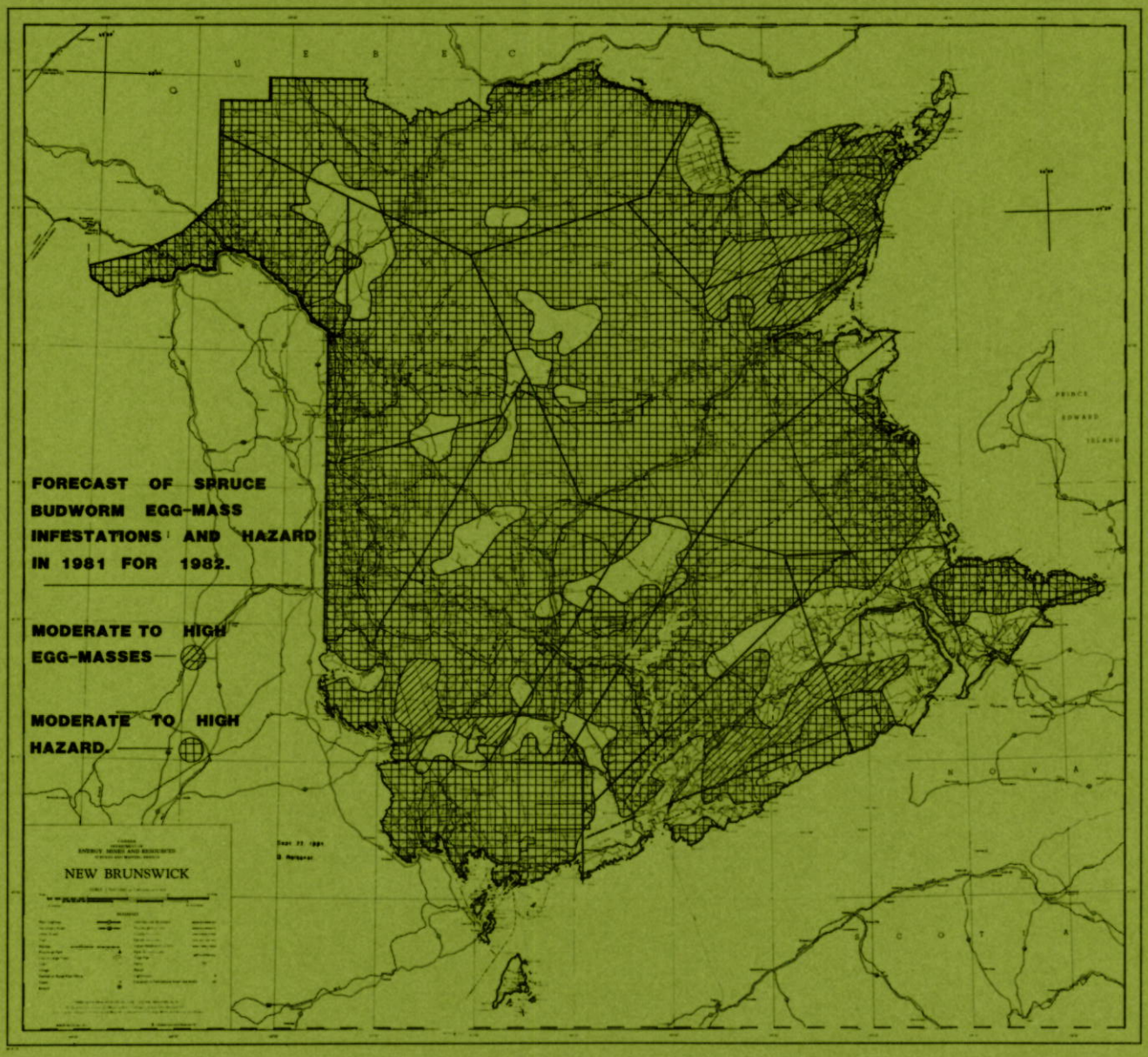


**Figure 4**


**Figure 5** Sectors of New Brunswick.