1.0 INTRODUCTION

The western blackheaded budworm, *Acleris gloverana* (Walsingham) (Lepidoptera:Tortricidae), in 1986 defoliated an estimated 44 300 ha of western hemlock on the Queen Charlotte Islands (Unger 1986). Of this, approximately 13 800 ha was in second-growth timber less than 100 years of age. Depending on the duration of the attack, from 1 to 3 years, trees have been severely weakened or top-killed, and mortality has been reported as high as 12 percent in 1985 (Unger 1986).
The damage inflicted by the blackheaded budworm can have significant implications for future timber supplies in the Queen Charlottes. Past outbreaks on QCI have occurred every 10 to 12 years and the potential for reoccurring epidemics in the rapidly expanding immature area is great.

Very little information is available on the quantitative losses associated with blackheaded budworm outbreaks. This project attempts to assess these losses through the establishment and remeasurements of permanent sample plots in moderate to severely infested immature stands over a range of age classes. This data will then be evaluated to determine the impact of blackheaded budworm epidemics.

2.0 OBJECTIVES

The overall objectives of this proposal are to quantitatively determine the immediate and long-term impacts of blackheaded budworm infestations on immature stands of various age classes.

The field objectives are the following:

- Establishment, measurement and assessment of up to 14 permanent sample plots in moderate or severely infested western hemlock stands in growth type group F. A breakdown is provided in Table 1.

- Establishment, measurement and assessment of up to 12 permanent sample plots in moderate or severely infested western hemlock-Sitka
spruce stands in growth type group G. A breakdown is shown in Table 1.

Table 1. Breakdown of proposed plot establishment.

<table>
<thead>
<tr>
<th>Growth Type Group</th>
<th>Stratum</th>
<th>Age Class</th>
<th>Site Class</th>
<th># of Plots</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>2</td>
<td>medium</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>3</td>
<td>medium</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>medium</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>2</td>
<td>medium</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>3</td>
<td>medium</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>4</td>
<td>medium</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

- Establishment, measurement and assessment of up to 26 subplots to be used later for destructive sampling.
- Collection of ecological site information on all newly established plots.
- Assessment of MacMillan Bloedel's 22 permanent sample plots for damage by the blackheaded budworm.

3.0 METHODS

3.1 Plot Establishment

3.1.1 Stand selection. Stands were selected from the forest cover maps in conjunction with the maps produced by the Pacific Forestry Centre, Forest Insect and Disease Survey 1986, showing the defoliation ratings
for the particular areas. This proposal includes a reconnaissance flight of these areas to verify their suitability and criteria for plot establishment.

An effort will be made in establishing only one plot for each inventory polygon. However, growth type group F is not as common, and it will be necessary to select pure western hemlock areas within GTG-G stands to cover this group. Also, in GTG-G it may become necessary, although less likely, to establish more than one plot per inventory polygon. This way, the minimum sample size requirements will be met with only slightly less representative data.

3.1.2 Stand location. The stands are located on the Queen Charlotte Islands on lands managed by MacMillan Bloedel, Crown Forest and Western Forest Products. Generally, age class 4 stands are located on MB's holdings, age class 2 stands on CF's holdings, and age class 3 stands on WFP's holdings. Some minor deviations for the final plot locations can be expected after the reconnaissance flight.

3.1.3 Plot installation. The plots will be installed to the standards described in the MoFL Inventory Manual, Chapter 8, Section 8.11, "Establishment of Permanent Growth Samples in Natural Stand, 1985 — Special Version for Pest Management." Those plots established on MB's TFL 39 will have all living trees, with a dbh of 4.0 cm or greater, tagged and measured in order to incorporate these plots in the MB growth and yield data base.
A subplot, consisting of 10 trees that can later be used for destructive sampling, will be established outside each plot. The subplot is to be located at least 20 meters away from the main plot.

3.1.4 Plot measurement. All measurements on the plots and subplots will take place according to the standards outlined in Section 8.11 of the MoFL Inventory Manual. Additional data will be collected on:

- number and diameters of dead trees in each plot, including an assessment if they recently died
- defoliation rating (3-4 classes) on every third tree in the plot*
- extent of top kill on every third tree in the plot.

3.1.5 Environmental analysis. Ecological classification will take place on all plots and site information will be recorded.

3.2 Control Plots

MacMillan Bloedel has 18 existing permanent sample plots in place on QCI that fit the same stratum as outlined in Table 1 of section 2.0 of this proposal. These can possibly be used as control plots, except for

* Leo Unger (CFS) has agreed to assist us with the defoliation class ratings and training. He will visit and rate MB's 22 permanent sample plots that are possibly infested, and assist in selecting the stands for plot establishment. Up to 10 mandays of his time will be covered by the CFS. His expenses, however, are included in the budget of this proposal.
the ones being assessed as moderate to severely defoliated under section 3.3. These plots are all 0.04 ha in size and have been measured anywhere from 6 to 28 years. The MoFL has previously received data on these plots. Table 2 provides a breakdown of these plots.

<table>
<thead>
<tr>
<th>Growth Type Group</th>
<th>Age Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 3 4</td>
</tr>
<tr>
<td>F</td>
<td>2 3 2</td>
</tr>
<tr>
<td>G</td>
<td>5 1 5</td>
</tr>
</tbody>
</table>

3.3 Existing Permanent Sample Plot Assessment

A total of 22 permanent sample plots of MacMillan Bloedel are in areas of light to moderate infestation according to the map produced by the Forest Insect and Disease Survey of the CFS, 1986. They will be assessed for damage and rated for degree of defoliation by MB staff and Leo Unger of the CFS.

Of these plots, 20 have been established between 1958 and 1967, and the MoFL has previously received data on these plots. It is, therefore, of interest to both the MoFL and MB that this assessment takes place. This is a unique opportunity to collect blackheaded budworm impact data on plots that have been measured over a period of 20 years or longer. The other 2 plots are a spaced plot and a control plot established in 1980.
It will probably be unnecessary to alter the remeasurement schedule of these plots as the bulk will be remeasured after the 1987 growing season. *Great!*

4.0 **TIMING**

Field work is to commence May 19, 1987, and to be completed on or before June 26, 1987.

5.0 **REPORT**

A final report will be submitted by December 31, 1987.

6.0 **REFERENCES**


7.0 BUDGET

- **Mondays**
  - Professional 11 MD @ $252  $2,772.00
  - Technical 82 MD @ $200 16,400.00  **$19,172.00**

- **Expenses**
  - Supplies: 800.00
    - stakes, paint, flagging,
      tags, nails
  - Travel:
    - Floatplane 6 HR @ $400 2,400.00
    - Helicopter 8 HR @ $550 4,400.00
    - Boats 600.00
    - Ferries:
      - Prince Rupert 2 @ $57 114.00
      - Alliford Bay 40.00
    - Flights 3 @ $447.60 1,342.80
      (Nanaimo-OCI-Nanaimo)
    - Vehicle 34 FD @ $50 1,700.00 10,596.80
  - Accommodation: 62 FD @ $100 6,200.00

Sub-Total  $36,768.80*

18% OVERHEAD  6,618.38

**TOTAL**  **$43,387.18**

* The contract price will be reduced by $1260.00 for each plot less established due to inavailability of suitable stands.