



# National Gypsy Moth Surveillance: 2013 -2014

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Prepared for MPI

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# Executive Summary

Gypsy moth (*Lymantria dispar*) is a defoliator of trees and has been rated as one of the world's worst 100 invasive species. It is described as both an economic and environmental high impact pest. A major outbreak of gypsy moth in New Zealand could severely impact the horticulture, forestry and tourism industries and also affect the indigenous flora of New Zealand. The Ministry for Primary Industries, therefore, implements an annual surveillance programme for Gypsy moth to ensure early detection and provide the best opportunity for eradication should this pest arrive in New Zealand. This report summarises the results for the 2013-14 surveillance season.

In the most recent season, gypsy moth trapping occurred between 4th November 2013 and 16th May 2014. This finish date is one week later than normal due to a misinterpretation of the trapping calendar in the Auckland region. A total of 1,525 individual traps are dispersed around high risk entry sites throughout the North and South Islands, with particular focus on airports, ports and large population centres. Traps are inspected every 14 days by a trained trapper resulting in a total of 20,998 trap inspections during the 2013 - 2014 season.

All samples collected and submitted for the 2013 - 2014 season were negative for gypsy moth identification. Moths submitted were mainly of the family Noctuidae.

All trap servicing inspections were able to be undertaken during the 2013 - 2014 season with the exception of one trap in Northland which was inaccessible due to major earth works in the area just prior to the end of the season. This grid will be assessed again at the start of next season to ascertain if a trap can still be safely placed within it.

Overall the Gypsy Moth Surveillance Programme was implemented according to the required specifications and timelines for the 2013 - 2014 trapping season. While there were a few minor issues associated with traps needing to be relocated to different sites for various reasons, these are not considered to have compromised the effectiveness of the programme.

## Definitions

**AsureQuality** –AsureQuality Limited (previously AgriQuality) is a commercial company that is 100% owned by the New Zealand Government. The company provides food safety and biosecurity services to the food and primary production sectors.

**Scion** – A crown research institute contracted to deliver diagnostic services for suspect gypsy moth samples and also report on nil returns and planted moths received.

**SPS Biosecurity** – A commercial company that AsureQuality has subcontracted to deliver trapping services in the South Island.

**Submission** – The collection of any suspect specimens from the trap and submitted to the Scion laboratory for identification. A submission equals one sample or one specimen.

**Submission event** – The inspection of the trap with one or more samples being found and submitted for identification.

**Trap Run** – A series of traps in a particular area that are serviced on the same day.

**Trap Servicing** – The inspection by a trained trapper of gypsy moth traps placed in locations and the submission of any suspect samples found in the traps. Trap servicing also includes replacement of lures and traps as required.

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## Introduction

Gypsy moth, *Lymantria dispar*, is a severe defoliator of trees and is described as both an economic and environmental high impact pest. A major outbreak of gypsy moth in New Zealand could severely impact the horticulture, forest and tourism industries and may also have an effect on the indigenous flora of New Zealand.

It was recognised that high risk pathways exist for the accidental importation of gypsy moth from other countries such as: international shipping vessels; imported used vehicles; and shipping containers. Thus in 1992 the Gypsy Moth Surveillance Programme was developed to provide early warning of gypsy moth incursions to facilitate eradication and assist with assurance of New Zealand's freedom from gypsy moth status.

The objectives of the programme are “to provide a comprehensive, scientifically justifiable, surveillance programme to provide early detection of gypsy moth incursions to facilitate eradication and support country freedom”. To achieve this the Gypsy Moth Surveillance Programme consists of seasonal monitoring for the presence of gypsy moth through the use of pheromone traps placed on specific hosts at strategic locations throughout New Zealand, and a communication programme including letters, leaflets, cards and reports to promote the biosecurity message about this unwanted species.

This report summarises the 2013 - 2014 Gypsy Moth Surveillance Programme. The report provides specific details regarding the methodology used for the field surveillance, outlines the communication programme, and provides the 2013 – 2014 results and a discussion about the findings.

## Methodology

AsureQuality has developed significant processes for operating the Gypsy Moth Surveillance programme.

Technical methods for the programme are outlined in the following sections.

### TIMING AND LOCATION

The 2013 – 2014 Gypsy Moth Surveillance season operates from the 4<sup>th</sup> of November 2013 until the 16<sup>th</sup> of May 2014.

Surveillance traps are strategically located throughout New Zealand in areas designated as high risk for an incursion of gypsy moth (see Figure 1). For instance, a location that imports large quantities of cargo from a location where gypsy moth are prevalent may have a proportionally higher trapping density than a larger town or city. Trapping areas are periodically reviewed to ensure that traps continue to be located in the current high risk locations.

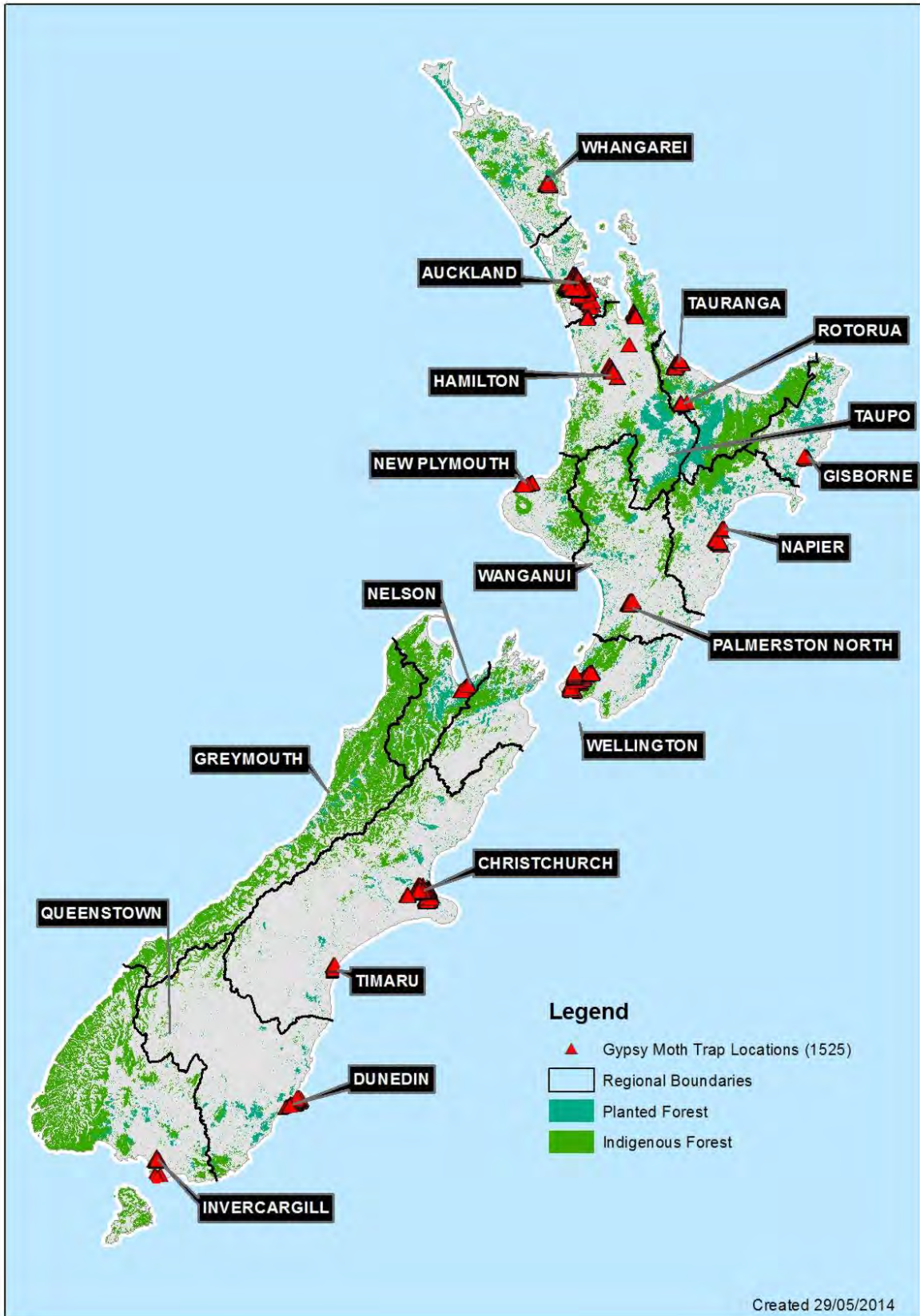


Figure 1: Map of New Zealand showing trap distribution for gypsy moth.

## TRAP RUNS

A total of 35 trap runs are used to service the Gypsy Moth Surveillance traps, with 25 runs in the North Island and 10 runs in the South Island. Trap runs comprise between 4 and 81 traps and are generally allocated based on access and time to complete the servicing. Each trap is located within a specified gypsy moth surveillance grid cell.

A total of 1,525 gypsy moth traps are placed throughout New Zealand and are serviced by AsureQuality (North Island) and SPS Biosecurity (South Island) personnel.

Trap runs are allocated to four regional management areas, with the following breakdown: 10 runs in Auckland/Northland; 6 runs in Waikato/Bay of Plenty; 9 runs in the lower North Island; and 10 runs in the South Island. Traps runs and their respective codes are provided in Appendix 2.

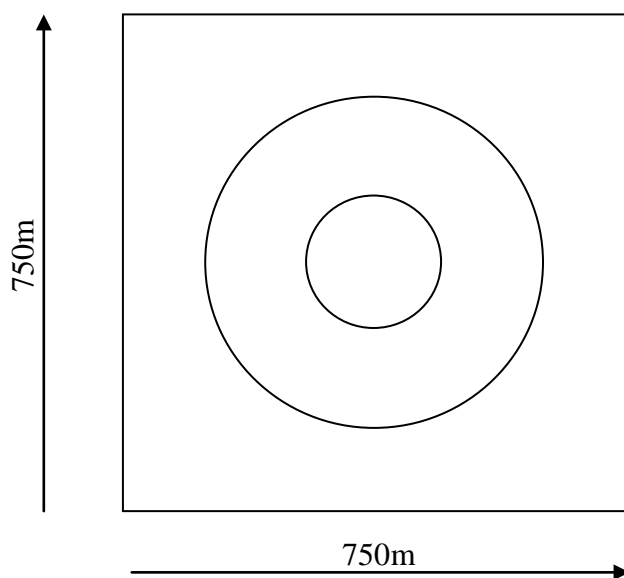
All trappers attend refresher training courses every year on the trap servicing procedures as well as any changes to servicing or sample submission procedures.

## GRID CELLS

The grid centres used for the 2013 – 2014 season are the same as in previous seasons.

Specifically, the grid cells correspond to MPI designated high risk sites, transitional facilities and coastal buffer zones. Each grid cell is a 750 m square (Figure 2) and contains one pheromone trap for the duration of the survey season. The minimum size of the trapping network is two adjacent grid cells and both cells are selected not to overlap. A coastal buffer is used in coastal areas and is only one grid cell in width.

An example of the grid cell is provided in Figure 2. An overlay of the grid cells on a topographic map are displayed in Figure 3, detailed maps of the grid cells with trap locations are contained in the trappers' run folders.



**Figure 2: Stylistic image of grid cell with prime area radius areas for trap locations.**

# Gypsy Moth MG



**Figure 3: Image of grid cells overlaid on street map and aerial imagery showing the systematic grid network.**

## HOST TREES

Within each grid cell host trees are selected for trap placement based on a hierarchical ranking of most suitable host trees, less suitable host trees, and finally poor quality host trees, trees with easy access and adequate security or in large group plantings. Priority for host trees is given to trees as close to the grid centre as possible. Host trees within 100 m from the grid centre are chosen first. If no host trees are available within the 100m zone, then the most desirable host trees moving out from the centre are selected.

## PHEROMONE TRAPS

Gypsy moth surveillance traps are green delta traps with two sticky internal sides. Each trap is clearly labelled with 'Gypsy Moth Trap' displaying both MPI and AsureQuality logos, and a free-phone contact telephone number. A commercially available pheromone lure (specifically a (+) Disparlure) is placed inside each trap to attract the male gypsy moth. Lures are replaced once during the trapping cycle after they have been in the field for 12 to 14 weeks after initial establishment and luring.

To ensure programme robustness new traps are used at the start of each survey season and all used traps and lures are commercially destroyed within two weeks of the surveillance season being completed. Trap locations (GPS coordinates) are recorded in the gypsy moth traps database to provide for easy relocation, mapping for reports, generation of trap location lists, as well as a mitigation in case of an incursion. The traps themselves are attached to a tree trunk or branch of a suitable host tree (or rarely an artificial structure) and are suspended 1.3 - 2 m above the ground. The traps are positioned to minimise soil and debris contamination and positioned so that both entrances are clear of debris and materials that would obstruct easy gypsy moth access. To ensure there is no undue bias in sampling for gypsy moth, the traps are not placed in trees with other pheromone traps in them.

Traps are replaced immediately if they are recorded as missing or deemed by the trapper to be significantly damaged.

Trap servicing records are kept by the trappers with trap locations stored in a secure AsureQuality database. Prior to the surveillance season beginning, supplies are purchased in June with pheromone lures being sent for independent calibration at *Plant & Food Research Limited*.

## COLLECTION AND SUBMISSION OF SAMPLES

Traps are inspected every 14 days ( $\pm 1$  day) by a trained trapper and suspect specimen moths are submitted to the Scion diagnostic laboratory for identification down to family level where possible. Suspect moths are determined as being any moth greater than 1 cm in body length. Taxonomically all moths of the genus *Lymantria* are identified to species level where possible. Suspect submissions and nil returns are submitted to the diagnostic laboratory within two working days of trap servicing.

## Results

All samples that were collected and submitted during the 2013 - 2014 Gypsy Moth Surveillance season were negative for gypsy moth.

## SAMPLE SUBMISSIONS

A total of 20,998 trap inspections occurred during the 2013 - 2014 trapping season. Specimens were collected from 142 traps and resulted in 148 suspect moth submissions (Table 1).

Moths submitted were mainly of the family Noctuidae. (64% of the total number submitted, Appendix 3). Other moth families represented in the samples collected included: Tortricidae (<1%); Geometridae (9%); Oecophoridae (<1%); Crambidae (8%); Hepialidae (5%); and miscellaneous (13%) (see Appendix 3 for further detail).

For the 2013 - 2014 season the lower North Island recorded the highest number of submission events (46% of the total, Table 2) and the highest number of suspect moths submitted by the trappers (~45%, Table 2). A breakdown of the number of moths submitted per run is attached as Appendix 3.

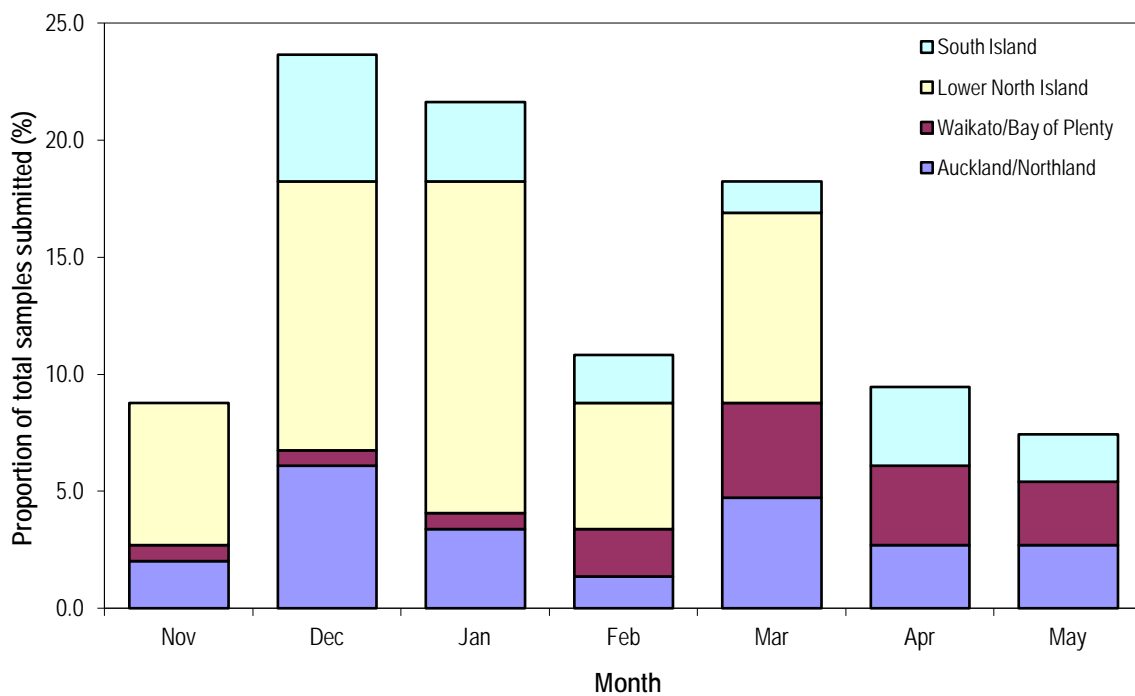
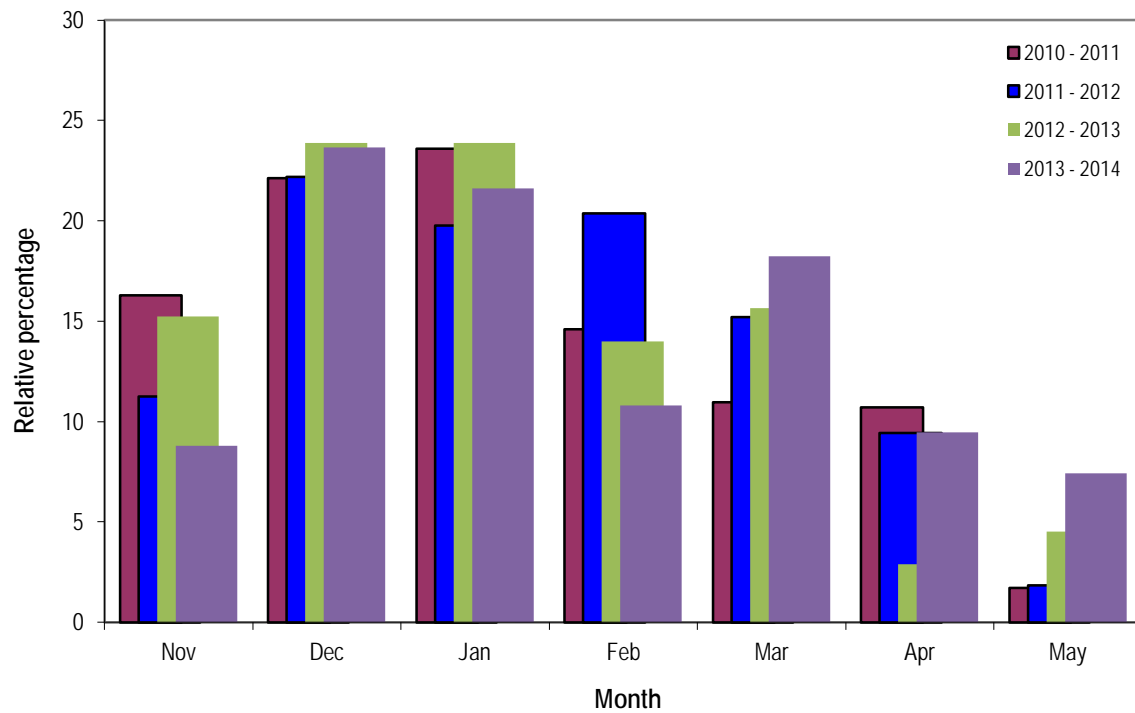
*Table 1: Totals for submission events and combined number of submissions by region for gypsy moth surveillance 2013 - 2014.*

| Region                | Number of submission events | Total number of submissions |
|-----------------------|-----------------------------|-----------------------------|
| Auckland/Northland    | 32                          | 34                          |
| Waikato/Bay of Plenty | 20                          | 21                          |
| Lower North Island    | 65                          | 67                          |
| South Island          | 25                          | 26                          |
| <b>Total</b>          | <b>142</b>                  | <b>148</b>                  |

The relative percentage of sample submission events made per month over the trapping season is displayed in Figure 5. The majority of submissions are between December and January, with approximately 23% of the total sample submissions made in each of those months. The number of samples submitted reduces going into the autumn months (April and May). Figure 5b shows the proportion of samples submitted each month by region. The lower North Island appears to consistently make the most submissions almost every month. Moths collected in May in the Waikato/Bay of Plenty region were mainly due to marked specimen collections.

*Table 2: Total number of submissions made across 2013 – 2014 surveillance season by region*

| Region                | Nov       | Dec       | Jan       | Feb       | Mar       | Apr       | May       | Grand Total |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| Auckland/Northland    | 3         | 9         | 5         | 2         | 7         | 4         | 4         | 34          |
| Waikato/Bay of Plenty | 1         | 1         | 1         | 3         | 6         | 5         | 4         | 21          |
| Lower North Island    | 9         | 17        | 21        | 8         | 12        | 0         | 0         | 67          |
| South Island          | 0         | 8         | 5         | 3         | 2         | 5         | 3         | 26          |
| <b>Grand Total</b>    | <b>13</b> | <b>35</b> | <b>32</b> | <b>16</b> | <b>27</b> | <b>14</b> | <b>11</b> | <b>148</b>  |



**Figure 4: Relative percentage of monthly gypsy moth sample submissions: a) by trapping season (2010-2011, 2011-12, 2012-13 and 2013-14); and b) by region for the 2013-14 season. Note that the value for each month / region is indicated as a proportion of the total submissions for the whole trapping season.**

Traps themselves were inspected on average every 14 days. .

Samples were submitted to the laboratory on time.

No suspect samples were forwarded for taxonomic determination as a result of calls made to the 0800 number.

## CALIBRATION

Calibration of the gypsy moth lures for the 2013 – 2014 season was undertaken in June 2013 by *Plant and Food Research*. Three lures were randomly selected from the new batch received in May 2013. Analysis of the gypsy moth lures indicated the presence of disparlure, the major sex pheromone of the gypsy moth. The lures contained 351, 362 and 363 µg respectively which is well above the 100 µg trapping threshold indicated by Leonhardt *et al.* (1990). Therefore, it was concluded that these lures would be adequate for monitoring male gypsy moth.

## Discussion

Scion reported a decrease in the number of samples received from previous years, as a result of details on moth specifications given at trapper training sessions (i.e. less undersized moths were submitted)..

Based on the information presented in this report, it is considered that the 2013 - 2014 gypsy moth surveillance season has met the objectives of the programme. No new incursions of gypsy moth were recorded and the process for making this determination was systematically audited to confirm that the system was effective. Samples were collected across time and submitted for taxonomic determination and the samples were obtained by a scientifically robust grid based sampling process.

## Recommendations

Work to improve the Gypsy Moth programme and find efficiencies and innovations continues to be on-going. The use of new technology is being refined and improvements to this system will be an ongoing process.

## References

Leonhardt, B.A.; Mastro, V.C.; Paszek, E.C.; Schwalbe, C.P.; Devilbiss, E.D. 1990: Dependence of gypsy moth (Lepidoptera: Lymantriidae) capture on pheromone release rate from laminate and other dispensers. *Journal of Economic Entomology*. 83(5): 1977-1981



## Appendix 1: Trap numbers by run code

| Region                  | Run Code  | Number of traps |             |
|-------------------------|---|-----------------|-------------|
| Auckland/Northland      | AKA (North Shore City)                                | 81              |             |
|                         | AKC (Auckland)  | 58              |             |
|                         | AKD (Auckland)  | 67              |             |
|                         | AKE (Manukau)   | 71              |             |
|                         | AKF (Manukau)   | 58              |             |
|                         | AKG (Auckland)  | 79              |             |
|                         | AKH (Auckland)  | 74              |             |
|                         | AKP (Papakura)  | 55              |             |
|                         | AKZ (Pukekohe)  | 11              |             |
|                         | ND (Northland)  | 29              |             |
| <b>Total for region</b> |   | <b>583</b>      |             |
| Waikato/Bay of Plenty   | HN (Hamilton)   | 55              |             |
|                         | MG (Mt Maunganui)                                     | 30              |             |
|                         | MO (Tahuna)   | 4               |             |
|                         | ROT (Rotorua)   | 19              |             |
|                         | TH (Thames)   | 21              |             |
|                         | TG (Tauranga)   | 34              |             |
| <b>Total for region</b> |   | <b>163</b>      |             |
| Lower North Island      | HBA (Napier)  | 59              |             |
|                         | NPA (New Plymouth)                                    | 57              |             |
|                         | PNA (Palmerston North)                                | 50              |             |
|                         | VCA (Gisborne)  | 30              |             |
|                         | WNA (Lower Hutt)                                      | 46              |             |
|                         | WNN (Wellington)                                      | 30              |             |
|                         | WNP (Porirua)   | 25              |             |
|                         | WNS (Wellington)                                      | 33              |             |
|                         | WNU (Upper Hutt)                                      | 28              |             |
| <b>Total for region</b> |   | <b>358</b>      |             |
| South Island            | GMNN (Nelson)   | 41              |             |
|                         | CHD (Lyttleton/Diamond Harbour/Woolston Christchurch) | 51              |             |
|                         | CHQ (Rolleston Christchurch)                          | 11              |             |
|                         | CHX (Upper Riccarton/Hei Hei Christchurch)            | 51              |             |
|                         | CHY (Aranui/Bromley/Woolston Christchurch)            | 51              |             |
|                         | CHZ (Northcote/Airport/Riccarton Christchurch)        | 48              |             |
|                         | TU (Timaru)   | 31              |             |
|                         | DNPB (Dunedin)  | 48              |             |
|                         | DNPC (Dunedin)  | 43              |             |
|                         | IN (Invercargill)                                     | 46              |             |
|                         | <b>Total for region</b>                               |                 | <b>421</b>  |
|                         | <b>Grand Total</b>                                    |                 | <b>1525</b> |

## Appendix 2: Scion samples received by trap run and moth type

|              | Noctuidae | Tortricidae | Geometridae | Oecophoridae | Crambidae | Tineidae | Arctiidae | Pyralidae | Hepialidae | Miscellaneous | TOTAL      |
|--------------|-----------|-------------|-------------|--------------|-----------|----------|-----------|-----------|------------|---------------|------------|
| AKA          | 2         | 1           |             | 1            |           |          |           |           |            | 1             | 5          |
| AKC          |           |             |             |              | 1         |          |           |           |            |               | 1          |
| AKD          | 2         |             |             |              |           |          |           |           |            |               | 2          |
| AKE          | 3         |             |             |              |           |          |           |           |            | 1             | 4          |
| AKF          | 1         |             |             |              |           |          |           |           |            |               | 1          |
| AKG          | 1         |             |             |              |           |          |           |           |            |               | 1          |
| AKH          | 7         |             | 1           |              |           |          |           |           |            |               | 8          |
| AKP          | 1         |             |             |              |           |          |           |           |            | 1             | 2          |
| AKZ          | 1         |             |             |              |           |          |           |           | 1          | 2             | 4          |
| ND           | 2         |             |             |              | 2         |          |           |           |            | 2             | 6          |
| HN           | 2         |             | 1           |              |           |          |           |           |            | 1             | 4          |
| MO           | 1         |             |             |              |           |          |           |           |            |               | 1          |
| TH           | 4         |             |             |              |           |          |           |           |            |               | 4          |
| TG           | 2         |             | 2           |              |           |          |           |           |            |               | 4          |
| MG           | 2         |             |             |              | 1         |          |           |           |            | 1             | 4          |
| ROT          | 2         |             |             |              |           |          |           |           | 1          | 1             | 4          |
| VCA          | 2         |             |             |              |           |          |           |           |            | 1             | 3          |
| HBA          | 7         |             |             |              | 4         |          |           |           |            | 1             | 12         |
| NPA          | 6         |             |             |              |           |          |           |           |            | 1             | 7          |
| PNA          | 6         |             | 2           |              | 1         |          |           |           | 1          |               | 10         |
| WNA          | 10        |             | 1           |              |           |          |           |           |            | 3             | 14         |
| WNN          | 2         |             | 2           |              |           |          |           |           |            |               | 4          |
| WNP          | 5         |             | 1           |              | 1         |          |           |           |            | 2             | 9          |
| WNS          | 3         |             |             |              | 1         |          |           |           |            | 1             | 5          |
| WNU          | 2         |             | 1           |              |           |          |           |           |            |               | 3          |
| GMNN         | 3         |             | 1           |              |           |          |           |           | 1          |               | 5          |
| CHD          | 2         |             |             |              | 1         |          |           |           |            |               | 3          |
| CHQ          |           |             |             |              |           |          |           |           | 1          |               | 1          |
| CHX          |           |             |             |              |           |          |           |           | 1          |               | 1          |
| CHY          |           |             |             |              |           |          |           |           |            |               | 0          |
| CHZ          | 2         |             | 1           |              |           |          |           |           |            |               | 3          |
| TU           | 2         |             |             |              |           |          |           |           |            |               | 2          |
| DNPB         | 2         |             |             |              |           |          |           |           | 1          |               | 3          |
| DNPC         | 1         |             |             |              |           |          |           |           |            |               | 1          |
| IN           | 6         |             |             |              |           |          |           |           | 1          |               | 7          |
| <b>TOTAL</b> | <b>94</b> | <b>1</b>    | <b>13</b>   | <b>1</b>     | <b>12</b> | <b>0</b> | <b>0</b>  | <b>0</b>  | <b>8</b>   | <b>19</b>     | <b>148</b> |

## Appendix 3: Sample submissions by run by month

| Region                             | Run ID | Nov       | Dec       | Jan       | Feb       | Mar       | Apr       | May       | Grand Total |
|------------------------------------|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| Auckland/Northland                 | AKE    | 0         | 2         | 0         | 1         | 0         | 1         | 0         | 4           |
|                                    | AKF    | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 1           |
|                                    | AKG    | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 1           |
|                                    | AKA    | 1         | 1         | 0         | 0         | 2         | 1         | 0         | 5           |
|                                    | AKC    | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 1           |
|                                    | AKD    | 1         | 0         | 0         | 0         | 0         | 0         | 1         | 2           |
|                                    | AKH    | 0         | 1         | 3         | 1         | 1         | 2         | 0         | 8           |
|                                    | AKP    | 0         | 1         | 0         | 0         | 1         | 0         | 0         | 2           |
|                                    | AKZ    | 0         | 0         | 0         | 0         | 1         | 0         | 3         | 4           |
|                                    | ND     | 1         | 2         | 2         | 0         | 1         | 0         | 0         | 6           |
| <b>Auckland/Northland Total</b>    |        | <b>3</b>  | <b>9</b>  | <b>5</b>  | <b>2</b>  | <b>7</b>  | <b>4</b>  | <b>4</b>  | <b>34</b>   |
| Waikato/Bay of Plenty              | HN     | 0         | 0         | 1         | 0         | 1         | 2         | 0         | 4           |
|                                    | MG     | 0         | 0         | 0         | 1         | 1         | 0         | 2         | 4           |
|                                    | TG     | 1         | 1         | 0         | 0         | 0         | 2         | 0         | 4           |
|                                    | MO     | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 1           |
|                                    | ROT    | 0         | 0         | 0         | 1         | 0         | 1         | 2         | 4           |
|                                    | TH     | 0         | 0         | 0         | 1         | 3         | 0         | 0         | 4           |
| <b>Waikato/Bay of Plenty Total</b> |        | <b>1</b>  | <b>1</b>  | <b>1</b>  | <b>3</b>  | <b>6</b>  | <b>5</b>  | <b>4</b>  | <b>21</b>   |
| Lower North Island                 | HBA    | 3         | 3         | 3         | 1         | 2         | 0         | 0         | 12          |
|                                    | PNA    | 2         | 4         | 4         | 0         | 0         | 0         | 0         | 10          |
|                                    | WNA    | 2         | 4         | 3         | 3         | 2         | 0         | 0         | 14          |
|                                    | WNN    | 0         | 2         | 1         | 0         | 1         | 0         | 0         | 4           |
|                                    | WNP    | 2         | 0         | 4         | 0         | 3         | 0         | 0         | 9           |
|                                    | NPA    | 0         | 2         | 3         | 1         | 1         | 0         | 0         | 7           |
|                                    | VCA    | 0         | 1         | 1         | 0         | 1         | 0         | 0         | 3           |
|                                    | WNS    | 0         | 1         | 2         | 2         | 0         | 0         | 0         | 5           |
|                                    | WNU    | 0         | 0         | 0         | 1         | 2         | 0         | 0         | 3           |
| <b>Lower North Island Total</b>    |        | <b>9</b>  | <b>17</b> | <b>21</b> | <b>8</b>  | <b>12</b> | <b>0</b>  | <b>0</b>  | <b>67</b>   |
| South Island                       | GMNN   | 0         | 2         | 3         | 0         | 0         | 0         | 0         | 5           |
|                                    | CHD    | 0         | 0         | 0         | 0         | 0         | 2         | 1         | 3           |
|                                    | CHQ    | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 1           |
|                                    | CHX    | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 1           |
|                                    | CHY    | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0           |
|                                    | CHZ    | 0         | 1         | 0         | 0         | 0         | 2         | 0         | 3           |
|                                    | TU     | 0         | 0         | 0         | 2         | 0         | 0         | 0         | 2           |
|                                    | DNPB   | 0         | 2         | 0         | 0         | 1         | 0         | 0         | 3           |
|                                    | DNPC   | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 1           |
|                                    | IN     | 0         | 3         | 1         | 1         | 0         | 0         | 2         | 7           |
| <b>South Island Total</b>          |        | <b>0</b>  | <b>8</b>  | <b>5</b>  | <b>3</b>  | <b>2</b>  | <b>5</b>  | <b>3</b>  | <b>26</b>   |
| <b>GRAND TOTAL</b>                 |        | <b>13</b> | <b>35</b> | <b>32</b> | <b>16</b> | <b>27</b> | <b>14</b> | <b>11</b> | <b>148</b>  |

The total number of nil returns for the 2013-2014 trapping season was 371. This table shows sample submissions by month but traps are checked fortnightly. For example; if there is a nil return in the first fortnight but 3 samples submitted from the same run in the 2nd fortnight the month is calculated as 3 sample submissions in the above table although there was a nil return in the first fortnight.