



# National Fruit Fly Surveillance: 2013 – 2014

Statement of Work 12045

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Prepared for MPI

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## Executive Summary

New Zealand's National Fruit Fly Surveillance Programme consists of seasonal monitoring for the presence of fruit fly through the use of lure traps placed at high risk locations throughout the North and South Islands of New Zealand. A total of 7,572 fruit fly traps are serviced fortnightly by AsureQuality personnel.

After inspection by a trained trapper, flies are collected and submitted to MPI's Investigation and Diagnostic Centre & Response, Plant Health and Environment Laboratories (IDC& R PHEL) in Christchurch and Auckland to be screened for economically important fruit flies. The traps target different fruit fly species dependant on the lure type used in the trap.

The finding of Queensland fruit fly (*Bactrocera tryoni*), an exotic pest of economic significance, in a Whangarei trap in January 2014 and again in April 2014 confirmed that the current trapping programme is working and allowed for early intervention measures to be immediately put in place. A response programme was initiated by MPI and one outcome of this has been the establishment of a Whangarei run to be monitored over the winter months. Of note, no further Queensland fruit flies have been detected as of the end of June 2014.

A total of 2789 routine submission events occurred with a total of 3595 vial submissions made. Trappers forwarded an additional 123 submission events due to the 2 Whangarei Fruit Fly responses and additional runs established resulting in an additional 43 vial submissions.

Trappers also forwarded an additional 7 specimens as a result of passive surveillance.

In the 2013-2014 season, 81% of the vial submissions were made between October and April with 57% of the vials being submitted between November and February. The peak in the number of vials submitted occurred in December, with numbers reducing until June. It is worth noting that traps were removed in all areas except Auckland/Northland in May. Traps were removed in Auckland/Northland on or after the 16 June 2014. The pattern of submissions is similar to those observed in other seasons. It is however, noted that in general the number of vial submissions was much higher in 2012-2013 season compared with this season (5,833 versus 3,595 respectively). The reason for the decreased submissions is not clear.

Operationally the national Fruit Fly Surveillance Programme is generally considered a success.



# Definitions

**Area Coordinator** – The person responsible for the management and servicing of all trap runs in their respective area. This person may not service the trap runs but coordinates the trappers who do service the runs.

**AsureQuality** – A commercial company that is 100 percent owned by the New Zealand Government. The Company provides food safety and biosecurity services to the food and primary production sectors.

**Fruit fly** – Economically important fruit fly belonging to the family Tephritidae. The targeted species are Mediterranean fruit fly *Ceratitidis capitata*, Oriental fruit fly *Bactrocera dorsalis* and Queensland fruit fly *Bactrocera tryoni*.

**IDC & R-PHEL** – MPI's Investigation and Diagnostic Centres and Response, Plant Health and Environment Laboratories based in Christchurch and Auckland.

**MPI** – Ministry for Primary Industries.

**NIL return** – A type of submission used when no flies are found in the traps for the run/s serviced on that day.

**Passive Surveillance** – Specimens collected which do not fit the criteria for fruit flies and are not necessarily found inside a trap.

**Screening** – Visual inspection by IDC & R PHEL Entomology staff of the contents of the vials to ascertain whether economically important fruit flies are present.

**Submission** – Notification from the trapper to the IDC & R PHEL Laboratories of trap runs inspected on a particular day. If flies (or fly-like insects) are found this is called a Vial submission. If flies are not found this is called a Nil return.

**Trap Run** – The number of traps in a particular area that are serviced on the same day. Each run has a unique letter run code.

**Trap Servicing** – The inspection by a trained trapper of fruit fly traps placed in the field and the submission of any flies (or fly-like insects) found in the traps and Nil returns. Servicing traps includes replacing lures and DDVP strips at required times and replacing traps as necessary.

**Trapper** – The staff member assigned to inspect the traps on a given run.

**Vial submission** – A type of submission used when flies (or fly-like insects) are found in the traps. The flies are collected and submitted in labelled vials.

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# Introduction

New Zealand's national Fruit Fly Surveillance Programme consists of seasonal monitoring for the presence of economically important fruit flies (Diptera: Tephritidae) through the use of lure traps placed at high risk locations throughout the country. This includes the installation and servicing of traps, collection and transporting fly specimens to the diagnostic laboratory for identification, maintenance of stores and data for the programme, operating a suitable communication strategy, ensuring competent personnel, and providing accurate and timely reporting to the Ministry for Primary Industries, (MPI, formerly the Ministry for Agriculture and Forestry).

This programme was initiated in the mid 1970's to assist with providing assurance of country freedom from economically important fruit flies and early warning of fruit fly incursions to facilitate eradication. AsureQuality has delivered fruit fly surveillance both as part of MPI and for MPI for almost 20 years.

The key objective for the fruit fly programme is to provide early detection of fruit fly incursions to facilitate eradication and support country freedom. Fruit flies (Diptera: Tephritidae) represent a major biosecurity threat to New Zealand's horticultural sector, which in 2012 was worth in excess of NZ \$3.6 billion in exports.

Over 250 species of fruit flies present varying degrees of risk to New Zealand. The absence of economically important fruit flies in New Zealand allows for the export of fresh produce to markets without the need for fruit fly treatments to be applied, thus facilitating trade. This also allows for fruit fly susceptible crops to be produced in New Zealand without the need for the management of fruit fly populations and the associated damage that they cause.

The main target species include:

- Mediterranean fruit fly, *Ceratitis capitata* Weid.,
- Queensland fruit fly, *Bactrocera tryoni* Froggatt, (and other flies within this complex)
- Melon fly, *B. cucurbitae* (Coquillett),
- Oriental fruit fly, *B. dorsalis* (Hendel), (and other flies within this complex)
- and other male lure responsive species.

The three biological factors most important for fruit fly survival, development and reproduction are:

1. temperature - exposure to prolonged and continuous sub-zero temperatures means survival is unlikely;
2. moisture – pupal emergence is favoured by moisture availability in the air and soil; and
3. host availability – availability of fruit impacts on survival and reproductive success.

In New Zealand the months of January to May offer the best opportunity to trap fruit fly as host fruit has been available for female oviposition and warmer temperatures prevail which facilitates development of immature stages to adulthood. It can be assumed that ideal soil conditions would prevail particularly in home irrigated gardens.

Since 1989 there have been eight recorded interceptions of exotic, economically important fruit flies: five in Auckland and three in Northland. Four of these incursions involved three

separate species of fruit flies of the genus *Bactrocera*, while the incursion in May 1996 involved *Ceratitidis capitata*. The May 1996 find resulted in an eradication programme being initiated, whereas the previous finds were found not to be an established breeding population, (as determined from heightened surveillance). The latest incursions in January and April 2014 involved *Bactrocera tryoni* and resulted in an extensive trapping programme for two weeks each time. Additional trap inspections will be carried out between June 2014 and November 2014 in a 400 metre area from the April 2014 find.

This document provides a report to MPI on the National Fruit Fly Surveillance Programme for the 2013 – 2014 season.

## Methodology

The field operations of the Fruit Fly Surveillance Programme are delivered for MPI by AsureQuality. They are managed for AsureQuality by the Surveillance Coordinator, Biosecurity Services. Operationally, the programme is divided into multiple Programme Regions each with an AsureQuality Area Coordinator (reporting to the Surveillance Coordinator) responsible for trappers and trapping work within their region.

AsureQuality trappers attend refresher training courses on trap servicing procedures as well as any changes to servicing or sample submission procedures at the start of each season.

AsureQuality has developed significant processes for operating this programme

The MPI Standard and procedures for FF Surveillance are:

- *Standard: Specification for Surveillance for Fruit Flies: Field Operation of traps and specimen submission July 2009.*
- *MPI IDC & R Standard Operating Procedures SP-05 Fruit Fly Laboratory Screening of trap submissions*
- *SP-01 Surveillance Reporting Flowchart*
- *Test Method and TM-94 Fruit Fly Identification of Adults (Morphological)*
- *Biosecurity Response Knowledge Base*

These documents can be regarded as Standard Operating Procedures for all staff engaged with this programme and include a range of topics from professional service delivery, critical delivery specifications through to task specific instructions for the field. In particular the procedures document key staff and their roles, health and safety requirements and responsibilities in the programme. They provide specific instructions on installation and servicing of fruit fly traps, maintenance of stores and data for the surveillance programme and ensuring competent personnel are fully trained to undertake the tasks. Instructions for transferring fly specimens rapidly to the diagnostic laboratory and providing accurate and timely reports to MPI are also documented. The insect identification is carried out by IDC & R PHEL in accordance with MPI standards and procedures.

Submissions must be screened by MPI Entomology staff within 8 working hours and submission replies are returned to AsureQuality Area Coordinators within five working days. Compliance checks are carried out to ensure trap service requirements are met. Marked specimens are provided on request to Area Coordinators. Records of submissions and reports are kept on file. Positive finds of exotic economically significant fruit flies must be confirmed within 10 working hours of initial identification and reported within 15 minutes of confirmation to the Initial Investigating Case Manager.

## TRAP RUNS

There are a total of 149 individual trap runs used to service 7,572 traps across the North Island and the South Island of New Zealand (Appendix 2). An indication of the coverage of the fruit fly surveillance programme is provided in Figure 1. Each trap run services a number of traps located within specified grid cells used for fruit fly surveillance.

Each trap run is serviced fortnightly during the trapping season, with each trap on each run inspected for the presence of fruit flies.

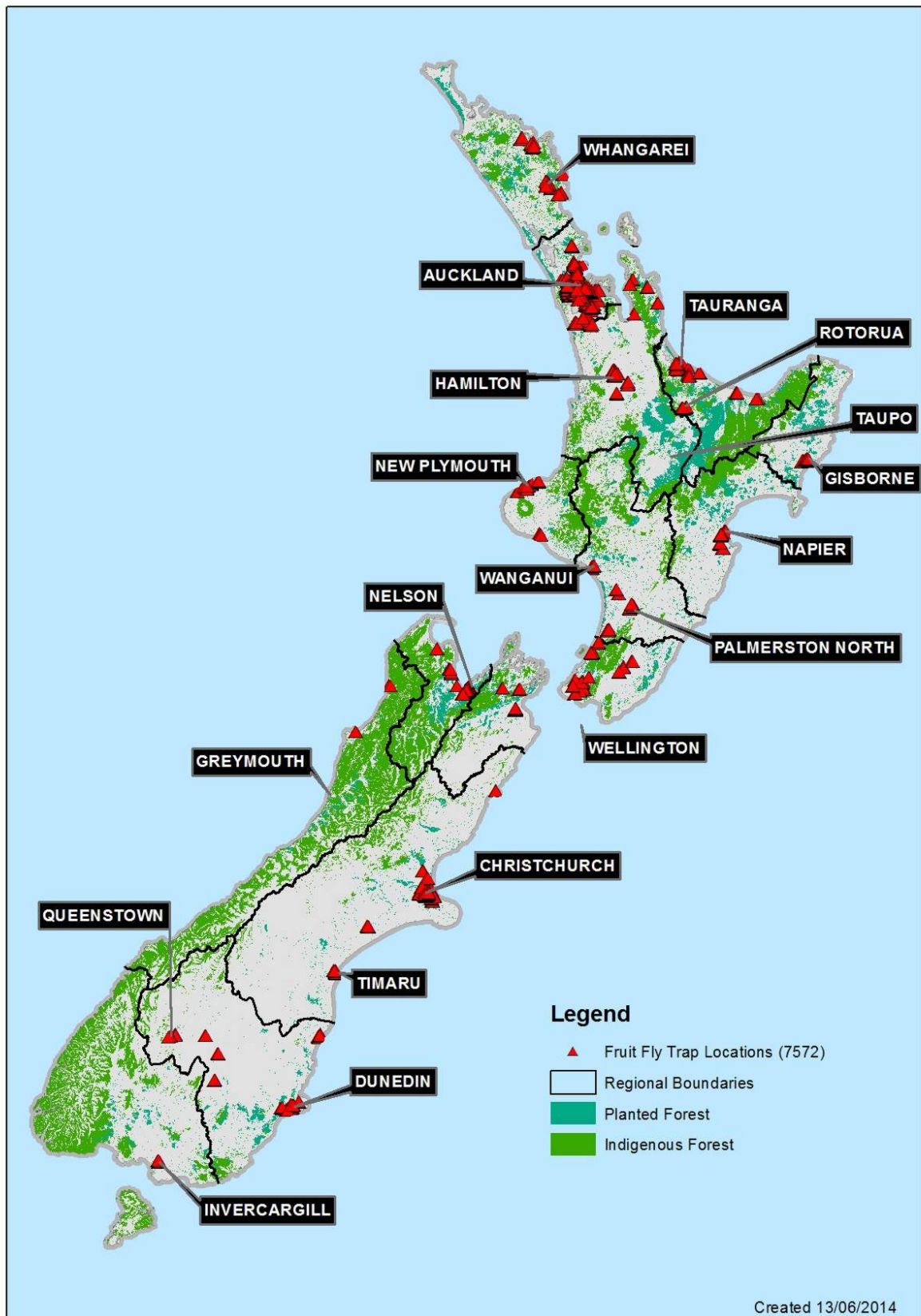
## TIMING

Although the overall Fruit Fly Surveillance Programme season operates from September 2013 until June 2014, each region has its own start and stop dates (See Table 1). The commencement and finish trapping dates are based on estimates derived from bioclimatic modelling completed for several economic fruit fly species which includes minimum temperatures at which a fruit fly species can survive, and the potential risk of fruit fly entry into New Zealand

**Table 1: Start and end dates for fruit fly trapping operations by location within New Zealand**

Region	All traps established by	Removed*
Auckland/Northland (Trimedlure and Cuelure)	16 September 2013	16 June 2014
Auckland/Northland (Methyl Eugenol)	30 September 2013	16 June 2014
Waikato/Bay of Plenty	16 September 2013	12 May 2014
Lower North Island (excluding Wellington but including Nelson)	16 September 2013	12 May 2014
South Island and Wellington	7 October 2013	12 May 2014

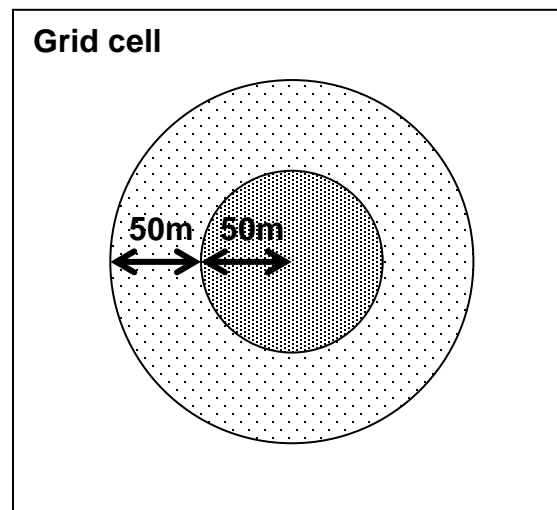
\*Note: Traps are to be removed on or within 10 working days after the specified date.



**Figure 1: Map of New Zealand showing trap locations for fruit fly.**

## GRID CELLS

Surveillance trapping is carried out in a square grid system (grid cells) with a trap in the centre (grid centre) (Figure 2). Traps are placed strategically in areas designated as high risk for an incursion of fruit fly (see Figure 1). However, as the grid system was introduced relatively recently, the grids have been developed over pre-existing trap locations. As such, the grids are not always aligned in a typical systematic grid formation, as shown in Figure 3. The availability of fruit fly hosts to hang traps in also has a bearing on the grid formation.

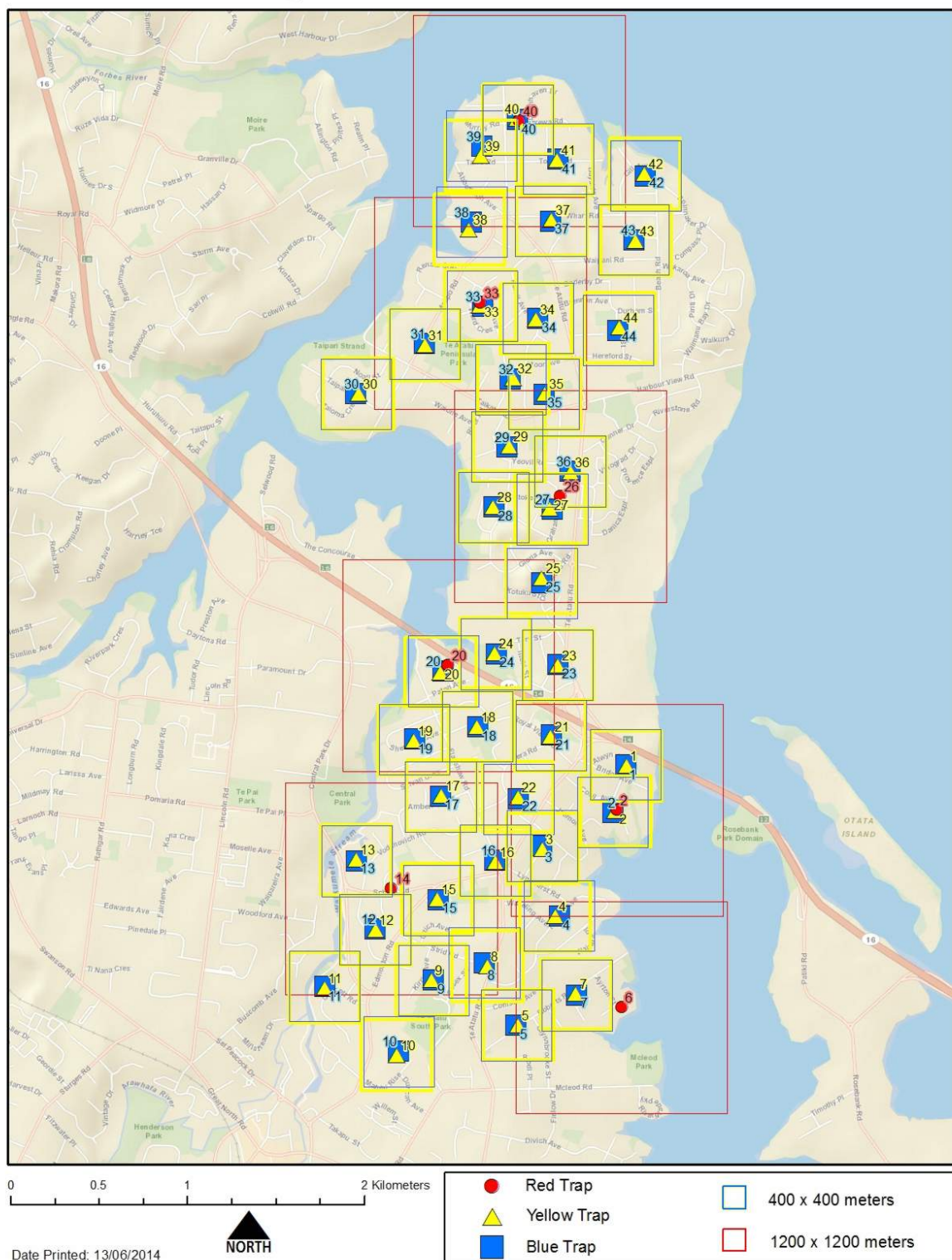


**Figure 2: Stylistic image of grid cell with prime area radius areas for trap locations.**

Surveillance trapping in a grid relies on the attraction of fruit flies to the trap vicinity and then local capture of the highest proportion of insects present. The required spacing between grid cells is based on the efficacy of each lure and biology of targeted species.

Grid cells containing trimedlure and cuelure traps are 400m x 400m while grid cells containing methyl eugenol traps are 1200m x 1200m. The minimum size of the trapping network is two adjacent grid cells and both cells are located so as not to overlap where possible. An example of the grid cell prime area radius is provided in Figure 2. Detailed maps of the grid cells with trap locations are contained in the trappers' run folders.

Traps are placed in historical grid centres at the commencement of the surveillance season unless agreement has been reached between MPI andASUREQuality to relocate the traps to different areas.



**Figure 3:** Image of grid cells overlaid on a street map showing the grid network (based on historic trap locations) for trimedlure (blue), cuelure (yellow) and methyl eugenol (red) traps.



## HOST TREES

Within each grid cell host trees are selected for trap placement based on a hierarchical ranking. Priority for host trees is given to trees as close to the grid centre as possible (i.e., 50 m from the grid centre), then between 50 – 100 m from the grid centre. The trees themselves are ranked based on four host preference types. These are

1. Evergreen fruit trees;
2. Deciduous fruit trees;
3. New Zealand native evergreen trees with fleshy fruit;
4. Gooseberry (*Physalis peruviana*)

Traps are placed so that they are protected from environmental conditions (e.g., direct sunlight, wind and dust); are located typically no lower than 1.3 m above the ground; within the foliage canopy but not beneath the canopy; and within an area of dappled light. These factors increase the chance of usage by the target fruit fly species.

## FRUIT FLY PHEROMONE TRAPS

All fruit fly traps used are of the *Lynfield Trap* design (Figure 5). Lure-impregnated polymer plugs and a Dichlorvos (DDVP) insecticide-impregnated plastic strip are placed in the Lynfield traps to attract and kill males of the targeted fruit fly species. Each trap is clearly labelled with 'Fruit Fly Trap' displaying the MPI and AsureQuality logos, a free-phone contact telephone number and a warning "Danger-Contains a DDVP insecticide strip with 188g/kg dichlorvos. Keep out of reach of children".



**Figure 4:** Lynfield trap

The following three internationally standard lures or para-pheromones, each attracting a different target species, are used in fruit fly surveillance in New Zealand:

- Trimedlure
- Cuelure
- Methyl eugenol

Trimedlure plugs are replaced at intervals of eight weeks or less, whereas cuelure plugs and methyl eugenol lure plugs are replaced at intervals of 12 weeks or less according to the manufacturers' recommendations. Traps and lures are colour coded for each of the three types of lure to avoid confusion and simplify the servicing. Trimedlure traps are rotated every 8 weeks or less to the fruiting host tree with the most ripening fruit on the property.

The DDVP strip is placed in the bottom of each trap to ensure any insects entering the trap are killed rapidly. DDVP insecticide strips are replaced at intervals of eight weeks or less (see Table 2).

**Table 2: Servicing requirements by lure type for fruit fly surveillance.**

Lure type	Colour code	Lures per trap	Servicing frequency
Cuelure	Yellow	2	Every 12 weeks
Methyl Eugenol	Red	2	Every 12 weeks
Trimedlure	Blue	1	Every 8 weeks
DDVP insecticide strip	Black	1	Every 8 weeks

Traps are located in approved host trees and within a 100m radius of the grid centres. To avoid cross contamination between lures the traps are placed at least 3 m apart, and also at least 3 m from any other insect trap (e.g., codling moth or gypsy moth). Fruit fly traps are hung in trees positioned so that entrances are clear of debris and materials that would obstruct easy fruit fly access or give access to predators and scavengers. The wire hanger has a barrier of tangletrap to help prevent other destructive invertebrates such as ants, from crawling inside.

To ensure the programme is robust, new traps are used at the start of each survey season and all traps and lures are destroyed within two weeks of the surveillance season completion. DDVP is a tracked hazardous substance only used for fruit fly surveillance and is removed and disposed of by an approved hazardous waste operator.

Trap locations (GPS coordinates) are recorded in the fruit fly database to provide for easy relocation, mapping for reports, generation of trap servicing cards, as well as a reference in case of an incursion. Traps are replaced immediately if they are recorded as missing or deemed by the trapper to be significantly damaged. Trap servicing data is collected electronically and stored in the Fruit Fly database. Prior to the surveillance season beginning, supplies are purchased in June with the pheromone lures being calibrated at theASUREQuality laboratory in Auckland.

## COLLECTION AND SUBMISSION OF SAMPLES

Traps are inspected every 14 days ( $\pm 1$  day) by a trained trapper and suspect flies submitted to either the Auckland (Upper North Island traps) or Christchurch (Lower North Island and South Island traps) IDC & R PHEL diagnostic laboratory. Trappers place in vials and submit



any insect resembling a fly which is between 3 – 15 mm in body length (i.e., measured from the front of the head to the tip of the abdomen). Submissions are submitted to the diagnostic laboratory within two working days of trap servicing.

All Diptera submitted from fruit fly traps are screened for exotic Tephritidae. If exotic Tephritidae are found in the samples they are identified to species level by an IDC & R PHEL fruit fly entomologist internationally trained in fruit fly identification. IDC & R PHEL laboratories are well equipped for diagnosis of fruit fly with reference collections, reference material and molecular capacity to identify most exotic economically important species of fruit fly. IDC & R PHEL also implements annual fruit fly competency testing programmes.

Occasionally native flies in the family Tephritidae such as *Sphenella facigera* (of no economic significance), or species introduced to New Zealand for biological control, e.g., *Urophora cardui* (nodding thistle gall fly) are found in the fruit fly traps. Any specimens of any insect group identified from the vials as new to New Zealand or extension to distribution, are reported through to the appropriate IDC & R PHEL personnel.

Trappers are also asked to collect or forward additional specimens, which do not fit the fruit fly collection criteria. They are insects or other invertebrates deemed to be unusual or possibly new to New Zealand. If they are found in the traps, they are referred to as 'Specimens of Interest' and indicated as such on the Fruit Fly submission forms. Other unusual specimens found by property owners where traps are placed, or by the trappers themselves which were not inside the traps, are referred to as 'passive surveillance'. These samples are forwarded to the appropriate IDC & R PHEL diagnostic laboratory with a 'Fruit Fly Trappers Passive Surveillance' submission form for identification.

Collection and submission details are recorded in an AsureQuality database and IDC & R PHEL's Laboratory Information Management System (LIMS) database.

# Results

## SAMPLE SUBMISSIONS

This season's sampling effort occurred from 16<sup>th</sup> September 2013 (when the first traps were inspected) until 27<sup>th</sup> June 2014. All suspect flies submitted to IDC & R PHEL were identified to rule out or find any exotic Tephritidae.

During the 2013 - 2014 season 2789 submissions (including NIL returns) were made, with a total of 3595 vials submitted. 64% of trap run submissions and correspondingly 42% of vial submissions were processed through the Auckland IDC & R-PHEL (Table 3).

Table 3: Total number of trap run submissions and vials by IDC centre and month

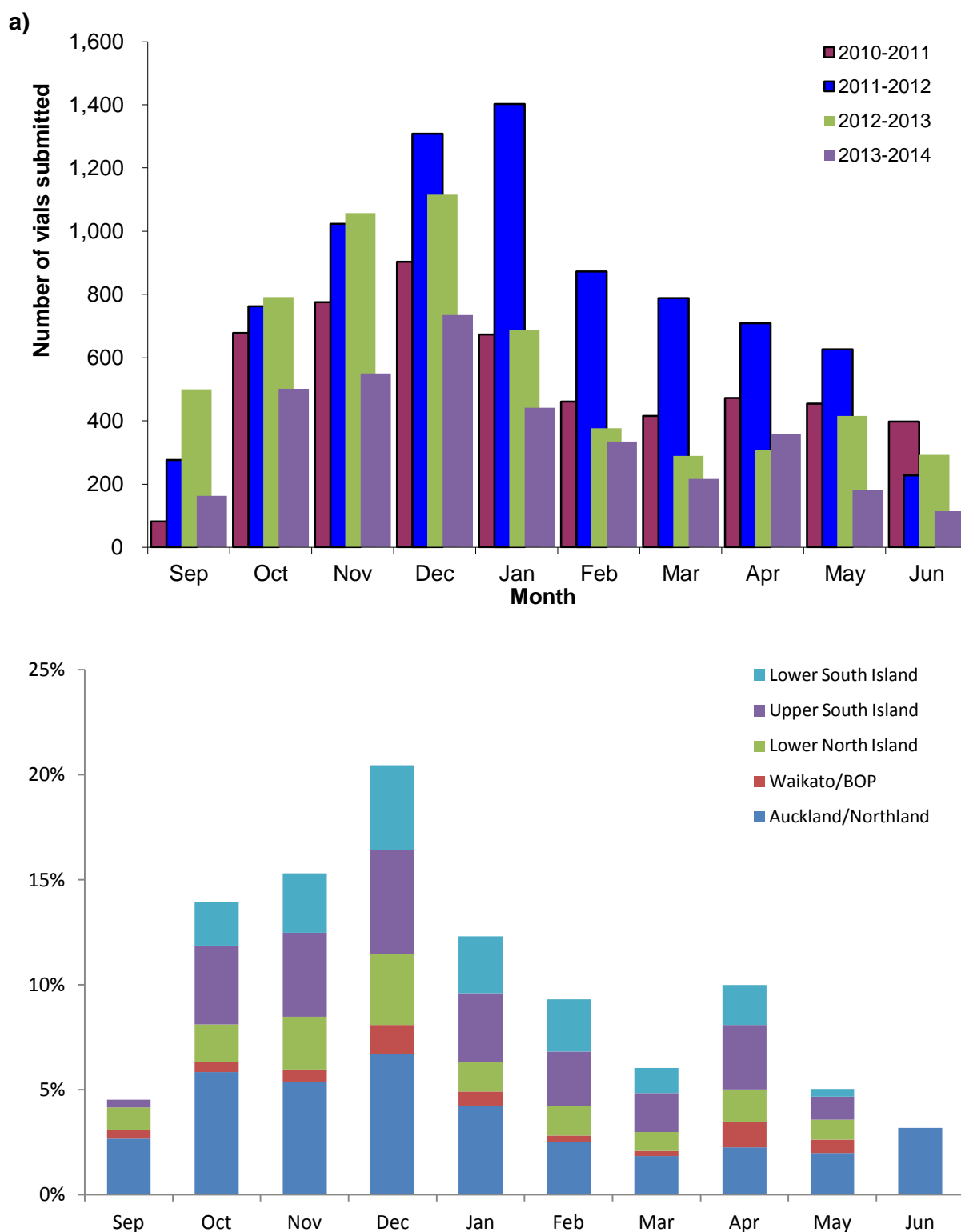
Month	Trap run submissions			Number of vial submissions		
	Christchurch	Auckland	Total	Christchurch	Auckland	Total
September 2013	26	94	120	51	111	162
October 2013	125	202	327	274	227	501
November 2013	120	181	301	336	214	550
December 2013	139	201	340	445	290	735
January 2014	123	207	330	266	176	442
February 2014	120	178	298	233	101	334
March 2014	121	183	304	142	75	217
April 2014	148	199	347	234	125	359
May 2014	91	187	278	87	94	181
June 2014		144	144		114	114
Total	1013	1776	2789	2068	1527	3595

The above table shows the trap run submissions and vial submissions for the 7572 routine surveillance traps. Auckland IDC & R Laboratory also received additional submissions during the 2 Fruit Fly Whangarei responses and from the additional runs set up as a result of these responses (these figures are not included in Table 3). Additional trap run submissions totalled 123 resulting in an additional 43 vial submissions and 98 nil returns.

Across time 81% of the vial submissions are made from October to April with 71% of vials being submitted between October and February. The modal peak for submissions during the 2013-2014 season is in December 2013 (Figure 6a), the same as in the 2012-2013 season.

The number of vial submissions in 2013-2014 was 38% lower than it was in 2012-2013 (3,595 total submissions compared with 5,833, respectively). Similarly, the number of vial submissions in 2011-2012 (7,996 vials) was higher than in 2012-2013. Not including the vials submitted as part of the Whangarei responses in early 2014, the number of vial submissions in 2013-2014 was approximately half of what it was in 2011-2012.

Figure 6b shows the proportion of vials submitted each month by region for the 2013-2014 season. Auckland/Northland provides the majority of submissions each month, while the Waikato / Bay of Plenty regions submit the least.



**Figure 5: Relative percentage of monthly fruit fly vial submissions: a) by trapping season; 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 and that Auckland/Northland is the only region inspecting traps in June.**

Table 4 shows the regional breakdown of sampling. Combining the trap run data across the entire trapping season gives a total of 146,114 trap servicing/inspection events.

For details of trap placement, number of traps, runs and number of lure types, see Appendix 1.

The number of vials submitted monthly from each run code is shown in Appendix 2.

**Table 4: Total number of traps and trap runs by region for fruit fly surveillance**

Programme Region	Number of trap runs	Total number of traps
Auckland/Northland	71	4 841
Waikato/Bay of Plenty	18	672
Lower North Island	28	928
Upper South Island	20	757
Lower South Island	12	374
<b>Total</b>	<b>149</b>	<b>7 572</b>

## FRUIT FLY TRAPPER PASSIVE SURVEILLANCE

A total of 7 additional specimens were submitted by the Fruit Fly trappers for identification during the 2013 – 2014 trapping season. These specimens of interest (SOI) are listed in Appendix 3.

A further 14 non-trap submissions other than routine fly samples were forwarded for identification through the passive surveillance programme. These are listed in Appendix 4.

## LURE CALIBRATION

Calibration of the fruit fly lures was undertaken during the season when new stock was purchased from the supplier. Every batch of lures received from the manufacturer is calibrated for quantity of active ingredient prior to use. Field checks were also made to ensure that the batch of lures sent to trappers had been calibrated within 12 months prior to placement.

These calibrations were undertaken by theASUREQuality Laboratory in Auckland and consisted of testing three randomly selected sachets from each batch type. The minimum acceptable level of 90% of the manufactures declared content of 2000mg active ingredient per sachet was met for each batch type.

## Discussion

Two fruit flies were detected during the 2013 – 2014 season with subsequent incursion response activities ensuing. Response activities are documented within the MPI response group.

IDC & R PHEL Entomologists note that there were some non-target or by-catch specimens collected that were of scientific interest to the laboratories. Details of these are listed in Appendix 3 and 4.

The number of vials submitted (3595) generally followed a similar pattern to last season, with the highest proportion of submissions made between November and February. This indicates that a trapping season from September to May (June in Auckland/Northland) sufficiently spans the period insects are most likely to be captured. However, the results for May are likely to be somewhat skewed due to the removal of traps during this month (i.e. the number of inspections appears less than it may actually be).

IDC & R PHEL reported no significant changes in quality of samples received from previous years and this provides some confidence that quality is maintained between years.

## Appendix 1: Trap Placement and Lure Types by Run Code

Region	Trapper Run code	No. of Grid Centres	Total number of traps	No. of methyl eugenol traps	No. of trimeclure traps	No. of Cuelure traps
Auckland/Northland	A	19	44	6	19	19
	BO	8	18	2	8	8
	BP	10	23	3	10	10
	CO	3	7	1	3	3
	CR	5	12	2	5	5
	DC	23	47	5	21	21
	DK	13	27	3	12	12
	DM	5	12	2	5	5
	DO	20	45	5	20	20
	DP	5	12	2	5	5
	DR	24	50	6	22	22
	DT	5	12	2	5	5
	EA	32	69	5	32	32
	EAA	40	84	4	40	40
	EB	33	69	5	32	32
	EBB	34	72	6	33	33
	EC	36	76	6	35	35
	ECC	39	83	5	39	39
	ED	43	88	8	40	40
	EDA	33	68	4	32	32
	EDD	32	67	5	31	31
	EDE	43	90	8	41	41
	EEE	28	63	7	28	28
	EF	40	84	4	40	40
	EFF	41	87	5	41	41
	EG	40	86	6	40	40
	EGG	44	92	6	43	43
	EH	37	77	5	36	36
	EHA	37	77	5	36	36
	EHH	33	72	6	33	33
	EI	33	65	3	31	31
	EIA	39	86	10	38	38
	EII	43	88	6	41	41
	EJ	27	54	4	25	25
	EJJ	43	90	6	42	42
	EK	42	85	5	40	40
	EKK	46	98	8	45	45
	EL	44	89	7	41	41
	ELL	27	59	5	27	27
	EM	35	75	5	35	35
	EMA	42	91	7	42	42
	EMM	41	84	4	40	40
	EN	37	78	4	37	37
	ENN	39	85	9	38	38
	EO	44	90	6	42	42
	EOA	34	70	4	33	33
	EOO	38	77	5	36	36
	EP	38	78	8	35	35
	EQ	45	95	7	44	44
	ER	44	92	6	43	43
	ES	35	70	4	33	33
	ESA	33	70	4	33	33
	ET	44	90	8	41	41

Region	Trapper Run code	No. of Grid Centres	Total number of traps	No. of methyl eugenol traps	No. of trimedlure traps	No. of Cuelure traps
	ETA	38	79	7	36	36
	EU	42	89	5	42	42
	EUA	37	77	5	36	36
	EV	39	79	5	37	37
	EVA	39	78	6	36	36
	EW	42	85	5	40	40
	EX	37	79	5	37	37
	EY	44	92	6	43	43
	EYA	35	72	4	34	34
	EZ	45	92	4	44	44
	FA	13	27	3	12	12
	FB	15	32	2	15	15
	GA	24	52	4	24	24
	GB	37	75	5	35	35
	IA	16	36	4	16	16
	JA	37	78	6	36	36
	JB	36	78	6	36	36
	JC	31	69	7	31	31
<b>Sub-total for area</b>		<b>2 305</b>	<b>4 841</b>	<b>363</b>	<b>2 239</b>	<b>2 239</b>
Waikato/Bay of Plenty	KB	45	98	8	45	45
	KP	25	55	5	25	25
	KS	29	63	5	29	29
	LC	10	24	4	10	10
	LT	10	23	3	10	10
	M	5	11	1	5	5
	N	5	12	2	5	5
	NA	3	7	1	3	3
	O	5	12	2	5	5
	OA	5	12	2	5	5
	P	27	61	7	27	27
	PO	23	51	5	23	23
	Q	20	48	8	20	20
	QT	21	47	5	21	21
	R	20	47	7	20	20
	S	11	26	4	11	11
	T	11	26	4	11	11
	U	21	49	7	21	21
<b>Sub-total for area</b>		<b>296</b>	<b>672</b>	<b>80</b>	<b>296</b>	<b>296</b>
Lower North Island	AA	16	37	5	16	16
	BB	25	57	7	25	25
	BBB	6	14	2	6	6
	BBS	4	9	1	4	4
	CC	20	47	7	20	20
	DD	5	12	2	5	5
	EEC	6	14	2	6	6
	EEG	8	18	2	8	8
	EEM	6	14	2	6	6
	VA	29	66	8	29	29
	VB	21	51	9	21	21
	WA	29	64	6	29	29
	WB	32	70	6	32	32
	XA	18	40	4	18	18
	XB	12	26	2	12	12
	YM	25	59	9	25	25
	YT	25	58	8	25	25
	Z	20	47	7	20	20

Region	Trapper Run code	No. of Grid Centres	Total number of traps	No. of methyl eugenol traps	No. of trimedlure traps	No. of Cuelure traps
	FFAP	6	13	1	6	6
	FFBE	5	11	1	5	5
	FFCH	32	70	6	32	32
	FFEA	5	11	1	5	5
	FFHE	5	11	1	5	5
	FFKH	5	11	1	5	5
	FFKO	5	11	1	5	5
	FFTA	5	12	2	5	5
	FFWA	10	21	1	10	10
	FFWK	24	54	6	24	24
<b>Sub-total for area</b>		<b>409</b>	<b>928</b>	<b>110</b>	<b>409</b>	<b>409</b>
Upper South Island	GGA	12	27	3	12	12
	GGB	9	21	3	9	9
	GGC	3	7	1	3	3
	IIA	32	71	7	32	32
	IIB	6	14	2	6	6
	IIC	11	24	2	11	11
	JJB	16	38	6	16	16
	JJH	4	9	1	4	4
	JJP	7	16	2	7	7
	LL	4	10	2	4	4
	MM	4	10	2	4	4
	HH	5	12	2	5	5
	KK	4	9	1	4	4
	OO	16	36	4	16	16
	PPL	13	29	3	13	13
	PPN	42	93	9	42	42
	PPNE	39	87	9	39	39
	PPS	42	92	8	42	42
	PPSU	24	54	6	24	24
	PPW	44	98	10	44	44
<b>Sub-total for area</b>		<b>337</b>	<b>757</b>	<b>83</b>	<b>337</b>	<b>337</b>
Lower South Island	QQ	10	24	4	10	10
	RR	29	64	6	29	29
	SSA	12	28	4	12	12
	SSB	14	31	3	14	14
	TT	10	24	4	10	10
	UU	5	12	2	5	5
	VV	5	12	2	5	5
	WWF	5	12	2	5	5
	WWQ	4	10	2	4	4
	XXA	23	51	5	23	23
	XXB	35	82	12	35	35
	ZZ	10	24	4	10	10
<b>Sub-total for area</b>		<b>163</b>	<b>374</b>	<b>50</b>	<b>162</b>	<b>162</b>
<b>Total</b>		<b>3 510</b>	<b>7 572</b>	<b>686</b>	<b>3 443</b>	<b>3 443</b>



## Appendix 2: Vial Submissions by run by month

Region	Run ID	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Auckland /Northland	A	1	0	0	0	2	0	5	2	0	6	16
	BO	0	0	0	0	0	0	0	0	0	0	0
	BP	0	0	0	0	2	0	1	0	0	0	3
	CO	0	0	0	0	0	0	0	0	0	0	0
	CR	0	0	0	0	0	0	0	0	0	0	0
	DC	0	0	1	2	1	0	1	2	1	0	8
	DK	0	2	1	5	1	0	0	0	0	2	11
	DM	0	0	0	1	0	0	0	0	2	1	4
	DO	0	2	1	1	3	2	0	5	1	4	19
	DP	0	0	0	0	0	0	1	0	0	0	1
	DR	0	1	2	4	2	1	2	2	0	1	15
	DT	0	0	0	0	0	0	0	1	0	1	2
	EA	0	0	0	3	1	1	1	0	1	0	7
	EAA	0	1	5	2	1	0	0	0	2	1	12
	EB	1	0	2	1	1	0	0	0	0	0	5
	EBB	0	1	1	7	0	2	0	0	1	1	13
	EC	0	1	0	4	3	3	1	2	1	1	16
	ECC	0	3	4	6	2	0	0	3	2	3	23
	ED	1	3	5	1	0	0	1	1	1	2	15
	EDA	1	0	0	0	2	1	1	0	0	0	5
	EDD	0	0	0	0	1	1	0	1	1	1	5
	EDE	3	1	3	0	2	0	1	1	0	0	11
	EEE	0	10	2	7	4	1	5	2	1	0	32
	EF	0	1	3	4	3	1	0	0	0	0	12
	EFF	1	1	0	2	1	4	0	1	2	0	12
	EG	0	2	6	3	3	0	0	1	1	2	18
	EGG	0	1	0	5	1	1	0	4	1	5	18
	EH	0	2	1	3	3	0	0	1	2	7	19
	EHA	1	9	18	6	5	4	3	1	1	2	50
	EHH	1	19	8	8	2	7	4	3	0	3	55
	EI	2	5	2	7	3	2	0	2	2	1	26
	EIA	2	3	4	2	0	1	1	1	0	0	14
	EII	2	12	7	4	8	5	4	1	3	0	46
	EJ	0	3	4	2	3	1	0	3	1	0	17
	EJJ	2	2	6	5	3	0	0	2	2	7	29
	EK	5	10	6	8	4	2	0	0	1	0	36
	EKK	3	6	3	23	3	3	0	1	3	12	57
	EL	0	1	2	4	0	0	0	0	2	0	9
	ELL	4	7	9	8	10	2	4	2	0	2	48
	EM	0	2	3	1	3	0	0	3	0	3	15
	EMA	6	1	2	3	1	1	2	0	2	1	19
	EMM	1	4	4	7	3	1	0	3	3	3	29
	EN	5	7	5	4	1	2	1	0	0	0	25
	ENN	0	3	0	4	2	1	0	2	0	0	12
	EO	2	0	0	0	0	1	0	0	1	0	4
	EOA	3	16	8	9	5	3	6	2	2	0	54

Region	Run ID	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
	EOO	1	11	17	6	8	3	0	2	0	1	49
	EP	5	2	1	0	1	0	0	0	0	0	9
	EQ	1	0	1	1	0	3	0	2	0	1	9
	ER	4	1	1	2	4	4	2	2	0	1	21
	ES	2	1	0	0	1	0	0	0	1	0	5
	ESA	2	3	1	3	1	0	2	0	2	0	14
	ET	2	2	2	4	1	1	0	3	2	3	20
	ETA	0	3	2	9	2	1	2	0	3	7	29
	EU	2	2	1	0	5	1	1	1	1	3	17
	EUA	9	1	3	3	0	5	1	1	0	0	23
	EV	1	9	7	11	7	2	3	1	2	0	43
	EVA	0	9	6	13	4	4	6	0	0	0	42
	EW	4	1	5	0	2	0	0	1	0	0	13
	EX	4	4	3	1	1	0	1	1	2	0	17
	EY	2	2	0	2	1	0	0	1	1	2	11
	EYA	0	1	2	0	1	0	1	0	1	1	7
	EZ	3	0	3	4	3	1	0	1	0	4	19
	FA	0	0	0	0	2	1	0	0	0	0	3
	FB	0	1	0	1	1	0	0	0	0	1	4
	GA	3	1	1	1	1	1	0	1	0	1	10
	GB	0	0	2	2	1	0	0	0	0	0	5
	IA	0	0	1	0	1	1	0	3	1	1	8
	JA	2	7	2	5	1	1	0	3	2	1	24
	JB	2	5	2	4	4	2	0	1	8	8	36
	JC	0	2	1	3	3	5	2	2	2	7	27
TOTAL		96	210	192	241	151	90	66	81	71	114	1312
Waikato / BOP	KB	2	1	1	6	4	0	1	1	2		18
	KP	0	0	0	3	0	0	1	8	1		13
	KS	0	0	0	4	4	2	0	8	0		18
	LC	0	0	0	1	0	1	1	1	0		4
	LT	0	0	1	2	2	2	1	0	3		11
	M	1	1	1	2	0	1	0	1	0		7
	N	2	1	1	1	0	1	1	2	1		10
	NA	1	0	1	0	0	0	1	0	0		3
	O	2	2	7	0	2	0	0	2	1		16
	OA	1	0	1	1	0	1	0	2	0		6
	P	3	3	0	9	1	1	0	1	3		21
	PO	0	0	0	2	1	0	1	2	1		7
	Q	0	2	0	4	2	1	1	9	1		20
	QT	0	1	1	2	0	0	1	1	2		8
	R	1	0	2	3	1	1	0	3	1		12
	S	0	0	1	0	1	0	0	0	4		6
	T	0	0	3	1	7	0	0	1	1		13
	U	2	6	2	8	0	0	0	2	2		22
TOTAL		15	17	22	49	25	11	9	44	23	0	215
Lower North Island	AA	0	2	2	3	1	2	3	0	0		13
	BB	3	7	2	10	4	3	0	1	4		34
	BBB	1	1	2	2	1	0	0	2	1		10
	BBS	0	0	0	2	0	1	0	0	0		3
	CC	3	3	2	2	4	0	0	0	0		14

Region	Run ID	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
	DD	1	0	1	0	0	0	0	0	0		2
	EEC	0	0	0	2	0	2	0	1	0		5
	EEG	0	0	1	1	0	0	2	4	0		8
	EEM	0	0	1	1	0	4	0	1	0		7
	FFAP		1	0	1	0	0	0	0	0		2
	FFBE		0	0	1	0	0	0	1	0		2
	FFCH		5	3	1	0	5	4	6	3		27
	FFEA		0	0	0	0	2	1	0	1		4
	FFHE		1	0	1	0	0	1	0	0		3
	FFKH		0	0	2	2	0	1	0	0		5
	FFKO		1	0	0	0	0	3	0	0		4
	FFTA		0	2	1	1	0	0	0	0		4
	FFWA		0	0	1	0	1	1	1	0		4
	FFWK	3	2	2	1	3	2	0	1	6		20
	VA	1	2	0	11	0	1	0	4	6		25
	VB	1	0	0	1	1	0	0	0	1		4
	WA	8	6	10	15	3	0	2	8	2		54
	WB	6	6	16	16	6	0	2	7	3		62
	XA	5	7	11	10	3	1	2	3	0		42
	XB	3	3	3	6	1	0	0	0	0		16
	YM	2	5	13	8	7	4	2	1	3		45
	YT	1	7	8	14	9	10	1	5	3		58
	Z	0	5	11	8	5	12	7	9	1		58
<b>TOTAL</b>		<b>38</b>	<b>64</b>	<b>90</b>	<b>121</b>	<b>51</b>	<b>50</b>	<b>32</b>	<b>55</b>	<b>34</b>	<b>0</b>	<b>535</b>
Upper South Island	GGA	2	7	14	4	9	3	0	8	1		48
	GGB	1	1	4	3	1	2	0	5	1		18
	GGC	1	1	3	4	0	1	0	0	0		10
	HH	0	3	1	3	1	1	1	2	0		12
	IIA	6	9	10	12	3	1	4	3	2		50
	IIB	1	0	1	1	2	0	0	2	1		8
	IIC	2	0	2	2	2	1	0	0	3		12
	JJB		5	8	6	1	1	6	12	1		40
	JJH		0	1	1	2	0	1	2	0		7
	JJP		1	1	3	1	1	0	3	1		11
	KK		1	5	5	3	3	0	1	1		19
	LL		1	1	1	1	3	0	0	1		8
	MM		1	0	2	0	1	0	0	0		4
	OO		8	8	7	7	9	1	8	0		48
	PPL		7	10	15	9	10	7	5	5		68
	PPN		16	9	23	11	8	13	6	1		87
	PPNE		23	21	17	19	8	9	17	8		122
	PPS		26	20	25	23	16	9	17	4		140
	PPSU		17	7	12	7	9	4	8	1		65
	PPW		8	18	32	16	16	12	11	9		122
<b>TOTAL</b>		<b>13</b>	<b>135</b>	<b>144</b>	<b>178</b>	<b>118</b>	<b>94</b>	<b>67</b>	<b>110</b>	<b>40</b>	<b>0</b>	<b>899</b>
Lower South Island	QQ		14	19	13	5	2	1	14	3		71
	RR		9	20	33	24	18	5	9	3		121
	SSA		8	6	23	9	11	11	8	0		76
	SSB		16	16	28	20	14	5	11	0		110

Region	Run ID	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
	TT		1	3	3	3	2	0	1	0		13
	UU		2	1	4	6	4	1	4	0		22
	VV		3	0	3	0	2	0	1	0		9
	WWF		1	1	1	1	2	0	0	0		6
	WWQ		2	1	2	0	1	2	0	0		8
	XXA		3	6	4	10	10	5	13	5		56
	XXB		7	8	12	5	10	10	6	0		58
	ZZ		9	21	20	14	13	3	2	2		84
TOTAL		0	75	102	146	97	89	43	69	13	0	634
Grand Total		162	501	550	735	442	334	217	359	181	114	3595

Total number of nil returns for the 2013/14 trapping season was 1415. 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.

## Appendix 3: Fruit Fly Trapper Specimens of Interest

Clearance Date	Trapper	Run Code	Identification	Common Name
14-01-2014	G McPhee	EDA	<i>Hemiandrus sp. (Orthoptera: Stenopelmatidae)</i>	Ground weta
17-01-2014	W Grant	ELL	<i>Xyridacma ustaria (Lepidoptera: Geometridae)</i>	
21-01-2014	Penny Britton	DO	<i>Bactrocera tryoni (Diptera: Tephritidae)</i>	Queensland fruit fly
06-03-2014	W Grant	EII	<i>Xyridacma ustaria (Lepidoptera: Geometridae)</i>	
24-03-2014	W Grant	EEE	<i>Meterana alcyone (Lepidoptera: Noctuidae)</i>	Native moth
01-04-2014	Penny Britton	DO	<i>Bactrocera tryoni (Diptera: Tephritidae)</i>	Queensland fruit fly
13-06-2014	G McPhee	JC	<i>Indet. indet. (Lepidoptera: Undetermined)</i>	No common name

This information is not always recorded by IDC & R PHEL unless it has been a new record. There were no new records this season.

## Appendix 4: Passive Surveillance Specimens of Interest

Clearance Date	Trapper	Identification	Common Name
25-09-2013	J Scott	<i>Latrodectus hasselti</i> (Araneae: Theridiidae)	Redback spider
17-10-2013	Selma Joines	<i>Iridomyrmex</i> sp. (Hymenoptera: Formicidae)	Meat ant
28-11-2013	John Tully	<i>Diaea</i> sp. (Araneae: Thomisidae)	Green crab spider, flower spider
28-11-2013	John Tully	<i>Bethelium signiferum</i> (Coleoptera: Cerambycidae)	Wattle longhorn
06-01-2014	Craig Trim	<i>Ochetellus glaber</i> (Hymenoptera: Formicidae)	Black house ant
19-03-2014	G.S Hurley	Indet. indet. (Pseudoscorpionida: Cheliferoidea: Chernetidae)	Pseudoscorpion
09-04-2014	Barbara Cummings	<i>Bethelium signiferum</i> (Coleoptera: Cerambycidae)	Wattle longhorn
12-04-2014	G Hoppe	Indet. Indet. (Coleoptera: Scarabaeidae)	Scarab beetle
28-10-2013	Leo Cooney	<i>Fannia canicularis</i> (Diptera: Fanniidae)	Lesser housefly
01-01-2014	Penny Britton	<i>Tuberolachnus salignus</i> (Hemiptera: Aphididae)	Giant willow aphid
03-02-2014	Mary Goodhew	<i>Saropogon</i> sp. (Diptera: Asilidae)	Robber fly
12-03-2014	Penny Britton	<i>Ancistrocerus gazella</i> (Hymenoptera: Eumenidae)	Eumenid wasp, European tube wasp, Potter wasp
12-03-2014	Gary Coutes	<i>Heterochnes novaezealandiae</i> (Pseudoscorpionida: Cheliferoidea: Chernetidae)	Pseudoscorpion
24-04-2014	Alfred	<i>Anthidium manicatum</i> (Hymenoptera: Megachilidae)	Wool carder bee