New Zealand BioSecure

BORDER HEALTH NEWSLETTER

December 2024

NAU MAI, HAERE MAI - WELCOME!

Kia ora koutou katoa,

We hope everyone had a safe and happy holiday period! December was quite the busy month here in the lab with a notable jump in the number of mosquitoes being identified compared to last month. Take a look at the numbers below to see how the numbers for this month compare to November. This month you can also check out the mosquito numbers for 2024 and see which month had the highest number of specimens collected and how it compared to 2023!

In the news this month, have a look at a new biocontrol technique called Toxic Male Technique (TMT) that uses male mosquitoes to decrease the lifespan of a female mosquito. Then take a look at some early-stage research about a Cholesterol managing protein that may have potential as a malaria treatment, and how deforestation has decreased the relative efficiency of bed nets, one of the main tools against malaria. Finally have a learn about a disease that has started to increase its range in Australia called Buruli Ulcer, which has increasing evidence of being spread by mosquitoes.

Happy reading!

SURVEILLANCE

During November a total of 1688 routine and enhanced surveillance, and various survey samples were collected by staff from 12 PHUs (Figure 1). The samples included 250 positive larval samples and 94 positive adult samples, leading to a total of 17847 larvae and 232 adults identified over the past month (Table 1).
Culex quinquefasciatus is the dominant larval species this month, which is the same as this month last year (Table 1) and different to last month where *Aedes notoscriptus* was the dominant species.

In total, five mosquito species have been collected this month (Table 1), the same as last month.

Compared to the previous month, the total numbers of larvae and adults have shown an increase (377% and 451% respectively).

Compared to this same month last year, the total numbers of larvae and adults have shown an increase (88% and 43% respectively) (Table 1).

Table 1. Adult and larvae sampled by the New Zealand surveillance program during December 2023 & 2024

Species (common name)	Adults		Larvae	
	Dec 24	Dec 23	Dec 24	Dec 23
Aedes antipodeus (winter mosquito)	2	1	-	-
Ae notoscriptus (striped mosquito)	15	32	3299	2842
Culex asteliae (no common name)	-	-	-	78
Cx pervigilans (vigilant mosquito)	24	21	3434	2880
Cx quinquefasciatus (southern house mosquito)	176	98	11082	3642
Culex sp.	15	6	-	-
Opifex fuscus (rock pool mosquito)	-	-	32	67
Total	**232**	**158**	**17847**	**9509**

The highest number of larvae sampled this month was obtained in Northland (6753 larvae) followed by Canterbury (4315 larvae) (Figure 1).

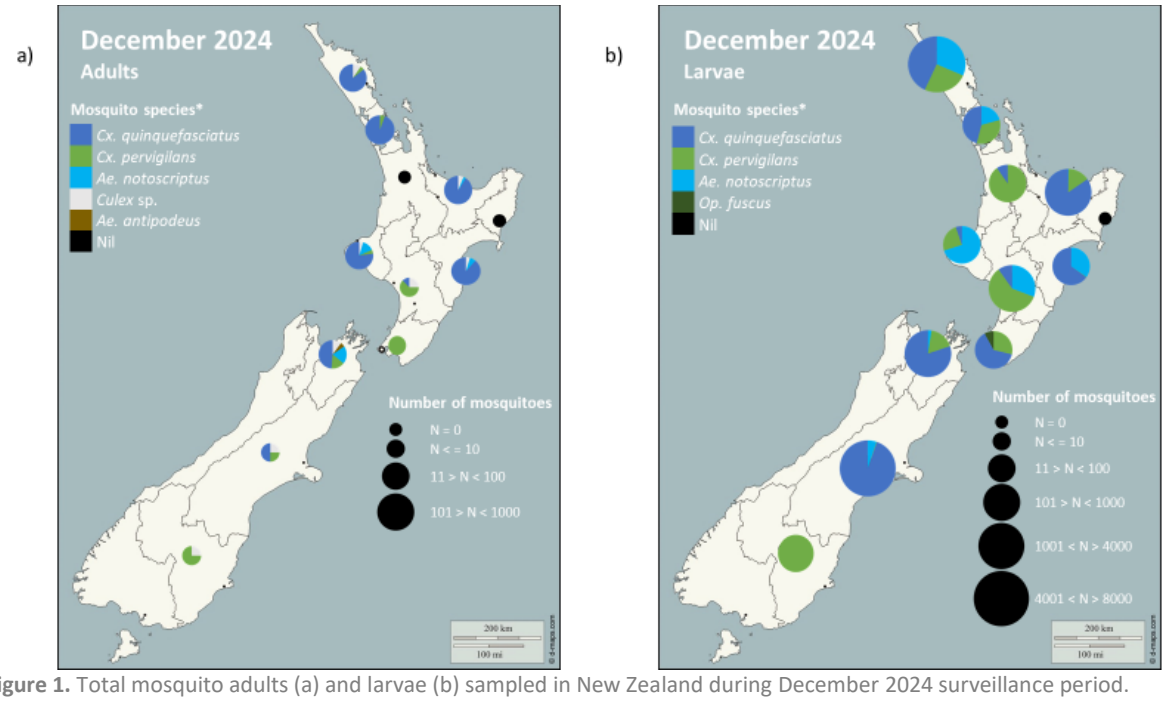


Figure 1. Total mosquito adults (a) and larvae (b) sampled in New Zealand during December 2024 surveillance period. Please note that the markers represent the PHUs and not the specific sites where the samples have been taken.
* The mosquito species are listed in order from the most abundant to the least abundant.

Aedes notoscriptus larval numbers have shown an increase in five PHUs, a decrease in four, and remained absent in three compared to the same month last year (Figure 2).

As expected, *Aedes notoscriptus* has not been recorded this month, this year, or last year in Southland (Figure 2).

Culex quinquefasciatus larval numbers have shown an increase in nine PHUs, a decrease in one PHU, and remained absent in two compared to the same month last year (Figure 2).

As expected, *Culex quinquefasciatus* larvae have not been recorded this year in Southland (Figures 1 and 2).

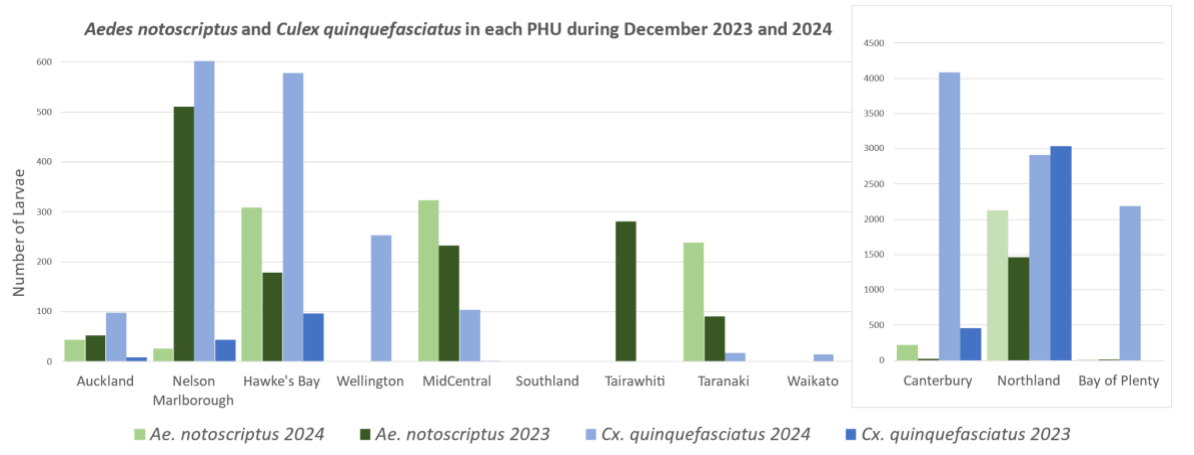


Figure 2. Comparison between introduced mosquito species sampled in each PHU during December 2023 and 2024. *Please note the different scale for the number of larvae present in Northland, Canterbury, and Bay of Plenty in comparison to the other PHUs.

MOZZIE NUMBERS FOR THE YEAR 2024

During 2024, a total of 122,244 larvae (Figure 3) and 3779 adults (Figure 4) were collected by Public Health Units and identified in the NZ BioSecure Entomology Laboratory, that is 39% more larvae and 75% less adults than last year.

A total of 8 locally occurring species of mosquitoes were collected this year (4 less than last year). *Culex quinquefasciatus* the best represented with 64% of the larvae and 82% of the adults, followed by *Aedes notoscriptus* with 24% of the larvae and 9% of the adults, and *Culex pervigilans* with 11% of the larvae. The least represented mosquitoes were the two endemic species *Aedes antipodeus* with 11 adults collected and *Culex asteliae* with 12 larvae collected.

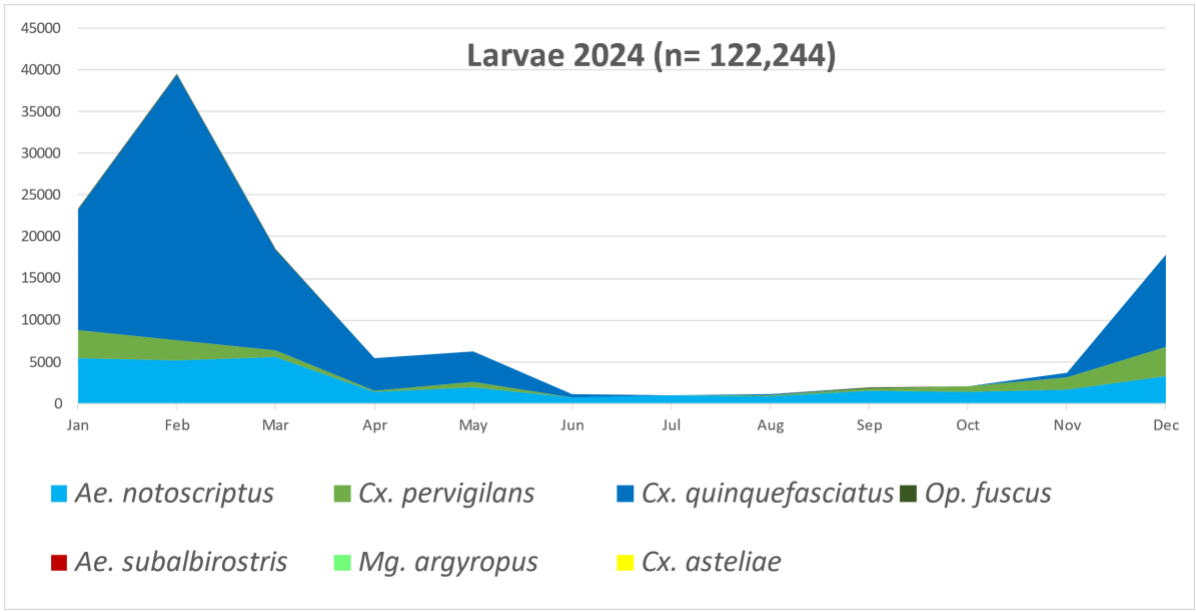


Figure 3. Variation in total mosquito larvae numbers throughout 2024.

The highest number of mosquitoes collected (larvae plus adults) in 2024 was in March (40,362) followed by January (24,273) while in 2023 the highest number was in March (23,115) followed by February (21,412). During 2024 the highest number of species was recorded in the months of January, February, March, and September (6 species) and the least was recorded in the months of April, May, June, July, and August (4 species).

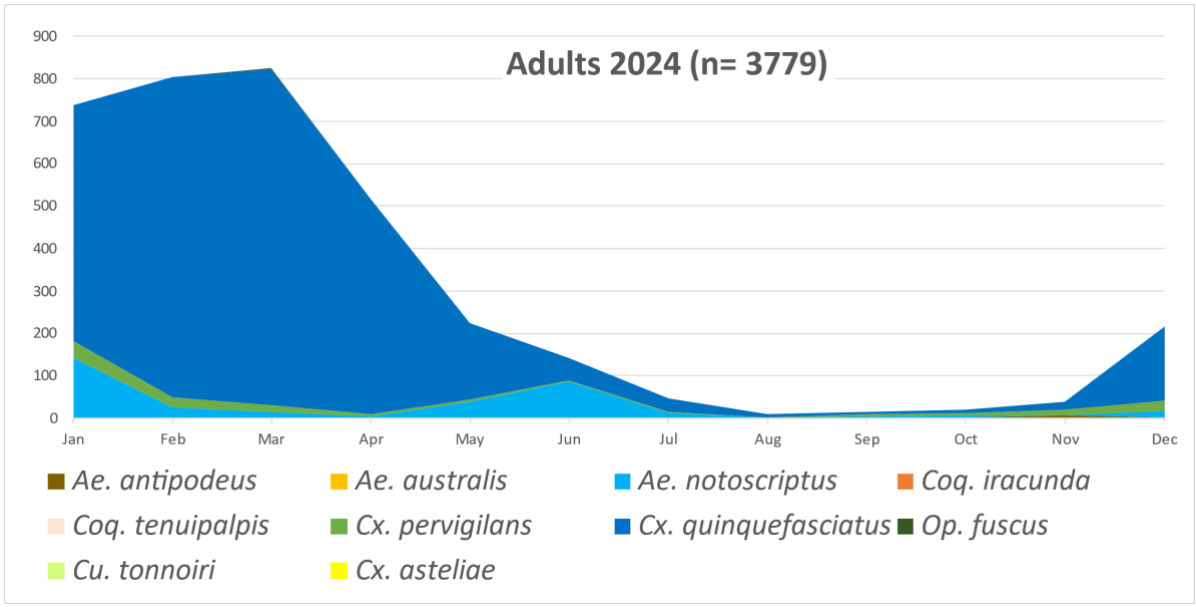


Figure 4. Variation in total mosquito adult numbers throughout 2024.

INCURSIONS AND INTERCEPTIONS

During December, HPOs responded to three suspected interceptions (Table 2).

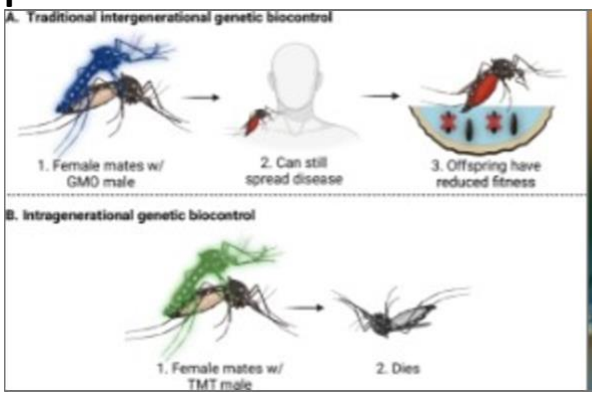
Northern Region – Auckland have also continued to respond to mosquitoes collected in air cans at Auckland International Airport, with a total of 8 samples. These included 7 *Culex pipiens* sp, and 1 *Culex quinquefasciatus*.

Table 2. Suspected interception during December 2024

Date	Species	Location	Circumstances
04.12.2024	Non-mosquitoes (beetles)	Smail & Company, Christchurch	Multiple flying insects spotted in a container of bathroom/plumbing supplies and other building materials from China. The container was closed and fumigated. Precautionary traps were put in place.
13.12.2024	2 female and 1 male *Culex quinquefasciatus* 1 female *Culex annulitrostris*	TF Conroy Removals, Auckland	Found dead inside an imported vehicle from Australia.
30.12.2024	1 Female *Culex quinquefasciatus*	Auckland International Airport	Found in the MPI Lab in the ITB not associated with any luggage/cargo/flights.

NEWS ARTICLES FROM AROUND THE WORLD

Genetically engineered males with venom used as an alternative to pesticide



Researchers at Macquarie University, Australia developed a new biocontrol technique to reduce mosquito borne disease through genetic engineering of male mosquitoes. This technique is called Toxic Male Technique (TMT). Males were genetically modified to express proteins with insecticidal properties in their reproductive tract. When these infected males mate, the female's life span is greatly reduced.

Traditional biocontrol methods focus on females producing offspring with reduced fitness. However, this method still involves female mosquito feeding, potentially still spreading disease. With this new TMT method, the control is induced after mating, therefore reducing the risk of disease through mosquito bites. Read more here.

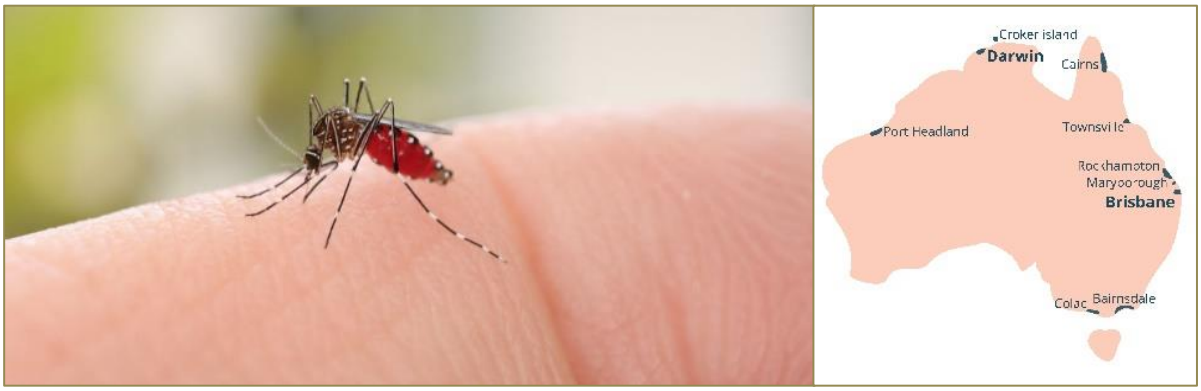
Bed net effectiveness decreases with deforestation

In a recent study, deforestation has been found to have a relation to the effectiveness of bed nets. Bed nets have an effectiveness of reducing malaria risks up to 32% in children with forests that are at least 50% intact. In areas with forests that are less than 50% intact, bed nets have no effect on malaria cases. This in turn results in an increase of malaria cases.
Why does deforestation increase malaria risk? There are probably several interacting reasons, noted Taylor Ricketts (Gund Institute Director), but one of them is that deforestation creates ideal habitat for malaria-carrying mosquitoes, leaving puddles of sun-warmed water in which the insects breed and thrive. Read more here.

Cholesterol control for managing malaria

A new potential malaria treatment had been discovered by researchers at Case Western Reserve University. Malaria is caused by a parasite called *Plasmodium*, these parasites require a specific level of cholesterol to survive and grow. This potential new treatment is a Cholesterol managing protein called PfNCR1. The protein is still a very new discovery and still requires more research. Read more here.

Flesh eating bacteria spreads in Victoria, Australia



Buruli Ulcer (also known as Flesh eating bacteria) is a skin disease bacterium *Mycobacterium ulcerans.* There is strong evidence that possums and mosquitoes have a role in spreading this disease. Early signs of this disease include a spot like a mosquito bite which then grows into a generally painless ulcer. Usually, there is greatest risk around the coastal Australia. However, the Victoria's chief health officer, Prof Ben Cowie announced "The disease is spreading geographically across Victoria and is no longer restricted to specific coastal locations". Hence it is important to stay protected no matter the location. Read more about this disease in Australia here. Learn more about Buruli ulcer here.

RISK MAPS

Dengue Map – Centres for Disease Control and Prevention
Zika Map – Centres for Disease Control and Prevention
Malaria – Centres for Disease Control and Prevention
Malaria – World Health Organisation

DISEASE OUTBREAKS

To find out where the latest disease outbreaks have occurred visit:

Epidemic and emerging disease alerts in the Pacific region - Produced by the Pacific Community (SPC) for the Pacific Public Health Surveillance Network (PPHSN).

Disease Outbreak News - World Health Organization.

Public Health Surveillance - Institute of Environmental Science and Research (ESR) - Information for New Zealand Public Health Action.

Communicable disease threats report - European Centre for Disease Prevention and Control