New Zealand BioSecure

BORDER HEALTH NEWSLETTER

November 2024

NAU MAI, HAERE MAI - WELCOME!

Kia ora koutou katoa,

Summer is here and as the weather warms up the mosquito numbers are increasing. Have a look below to see how they are looking for this month.

In the news this month, read about how a mosquito's immune system may assist in anti-malarial strategies, along with a potential new way to deliver a malaria vaccination using the mosquito itself. Then read about the discovery of a bacteria that may increase the speed of mosquito larvae development, which could make mass-rearing schemes for mosquito control more efficient. Then have a look at the alarming spread of dengue in Bangladesh which has medics and the WHO concerned.

Having accurate GPS coordinates for samples is important as it allows everyone to see where traps are set up, the location that has been sampled, and where treatments have been applied. Take a look at this month's Bite of Information to learn how to take and enter coordinates correctly for the online mosquito database.

Happy reading!

SURVEILLANCE

During November a total of 1340 routine and enhanced surveillance, and various survey samples were collected by staff from 12 PHUs (Figure 1). The samples included 101 positive larval samples and 36 positive adult samples, leading to a total of 3743 larvae and 41 adults identified over the past month (Table 1).

Aedes notoscriptus is the dominant larval species this month, which is the same as last month and this month last year (Table 1).

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

Compared to this same month last year, the total number of larvae have shown a decrease (47%) and the total number of adults have shown an increase (81%) (Table 1).

Compared to the previous month, the total numbers of larvae and adults have shown an increase (75% and 71% respectively).

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

Species (common name)	Adults		Larvae	
	Nov 24	Nov 23	Nov 24	Nov 23
Aedes antipodeus (winter mosquito)	6	1	-	-
Ae notoscriptus (striped mosquito)	2	2	1616	2658
Coquillettidia iracunda (no common name)	-	1	-	-
Culex asteliae (no common name)	-	-	-	1
Cx pervigilans (vigilant mosquito)	12	4	1563	2495
Cx quinquefasciatus (southern house mosquito)	18	11	533	1808
Culex sp.	3	2	-	-
Opifex fuscus (rock pool mosquito)	-	-	31	153
Total	**41**	**21**	**3743**	**7115**

The highest number of larvae sampled this month was obtained in Northland (2562 larvae) followed by Midcentral (469 larvae) (Figure 1).

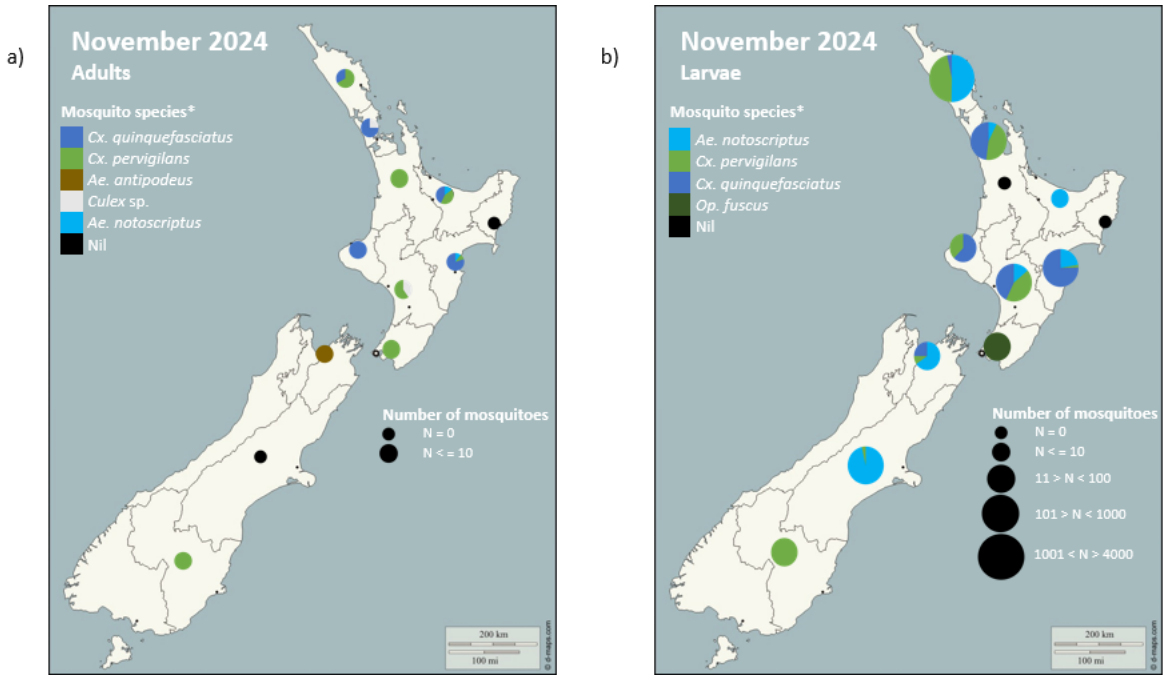


Figure 1. Total mosquito adults (a) and larvae (b) sampled in New Zealand during November 2024 surveillance period. Please note that the markers represent the PHUs and not the specific sites where the samples have been taken.
* The mosquito species are listed in order from the most abundant to the least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

Aedes notoscriptus larval numbers have shown an increase in three PHUs, a decrease in six, 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 four PHUs, a decrease in three PHUs, and remained absent in five 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).

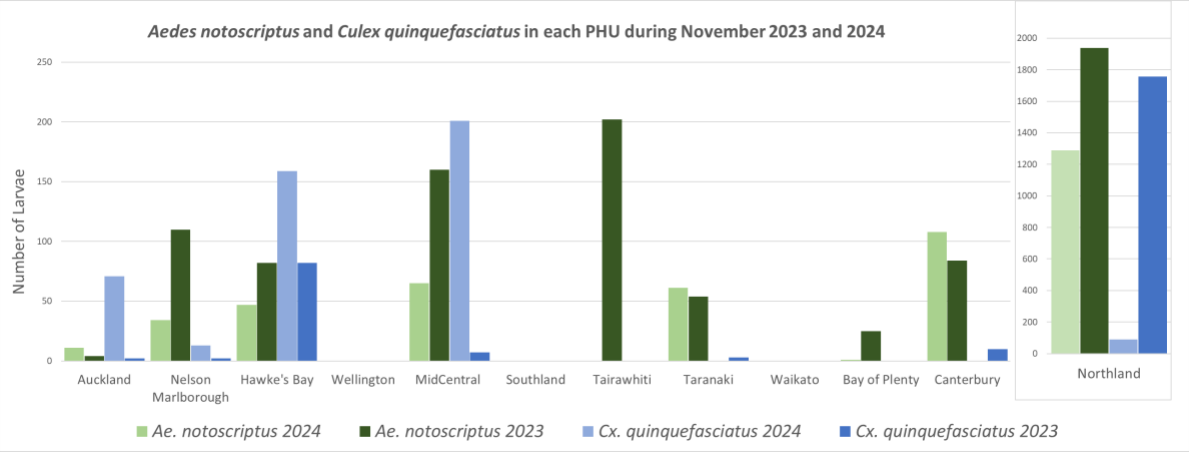


Figure 2. Comparison between introduced mosquito species sampled in each PHU during November 2023 and 2024. *Please note the different scale for the number of larvae present in Northland in comparison to the other PHUs.

INCURSIONS AND INTERCEPTIONS

During November, HPOs responded to five 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 11 samples. These included 7 *Culex pipiens* sp, 4 *Culex quinquefasciatus*, and 2 non mosquitoes.
The response in Nelson Marlborough following the *Culex pipiens* f. *molestus* found in a routine sample at Nelson Port in May has been stood down.

Table 2. Suspected interception during November 2024

Date	Species	Location	Circumstances
04.11.2024	9 non-mosquitoes (crane flies, chironomids, gnats)	Port Otago TF - Dunedin Depot	Found in a 20ft dry container from Malaysia and (cargo from Oman) that had previously contained a consignment of sulphur bentonite (fertilizer).
07.11.2024	1 non-mosquito (gnat)	Freight Direct Ltd Auckland	Found alive by MPI in the shrink wrapping of manufactured wooden product in a container from China.
18.11.2024	non-mosquito (chironomid)	Market Gardeners, Auckland	Found dead on a pallet in a container of watermelon from Australia. The consignment arrived in New Zealand on the 17/11/24 and had been fumigated in Brisbane.
23.11.2024	1 Female *Culex pervigilans*	Wellington International Airport	Caught by MPI flying around Wellington airport, international terminal.
29.11.2024	1 Male *Culex pervigilans*	Wellington International Airport	Found alive on a wall in the international arrival hall at Wellington airport.

NEWS ARTICLES FROM AROUND THE WORLD

Understanding mosquitoes' immune system to adapt anti-malaria strategies.

Plasmodium parasites cause malaria, which remains the deadliest of mosquito-transmitted diseases. For successful transmission, the malaria parasite must complete a complex infection cycle in the mosquito vector and survive attack from the insect's innate immune system. Victor M. Cardoso-Jaime, Ph. D, studied the role of the African malaria vector *Anopheles gambiae*' hemocytes (mosquito immune cells) when infected by *P. falciparum.* The results showed that after a bloodmeal, the hemocytes of the mosquito are involved in other functions than just immunity. While these cells are occupied with their new job (gut health mainly), the human malaria pathogen takes the opportunity to evade the mosquito's immune system and complete its life cycle. In contrast, the rodent malaria parasite *Plasmodium berghei* seems to be accurately targeted by its mosquito-vector's (*Anopheles dureni*) hemocytes. This suggests the necessity of considering the differences in mosquito immune responses against different *Plasmodium* parasites to generate better strategies for malaria control.
Read more about this topic here or about Victor Cardoso-Jaime's project here.

Bacteria breakthrough could accelerate mosquito control schemes.

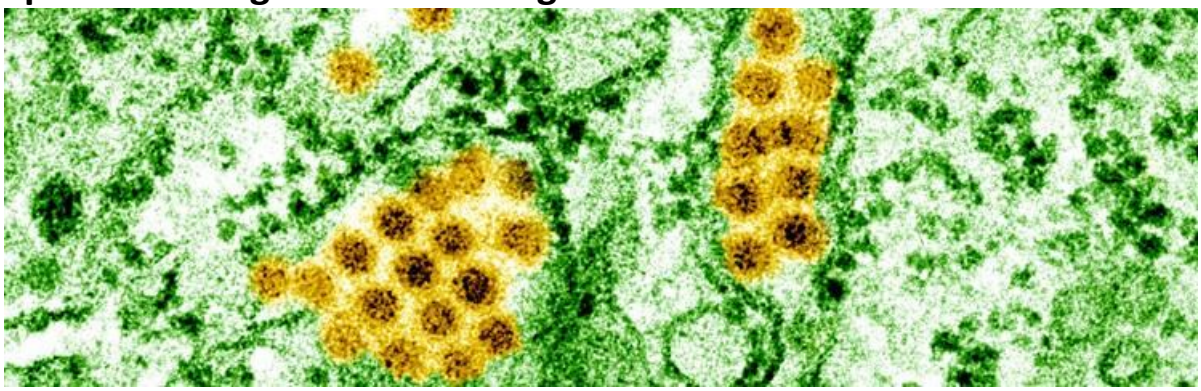
As mosquitoes are becoming resistant to many commonly used insecticides, new control methods have been put in place in countries where mosquito-borne diseases are a real threat. One method is the release of non-biting male mosquitoes that are either sterile or

prevent transmission of diseases. It does however require rearing large populations of mosquitoes in the lab, a time-consuming step of the process.
A new study, by the universities of Exeter and Wageningen, examined the microbiome of the water in which mosquito larvae develop (*Aedes aegypti*) and the effect of *Asaia* bacteria. The results show that two particular species of *Asaia* played a beneficial role by allowing mosquito larvae to develop one day quicker. Although the mechanisms are still under study, reducing the larval development time by one day is a huge victory for such mass-rearing schemes, in which time is of the essence.
Read more on this topic here.

Delivering a malaria vaccine through a mosquito's bite.

Scientists may have found a promising new way of protecting people against malaria, by genetically modifying the malaria parasite (*Plasmodium falciparum*) to trigger immunity rather than cause disease when it enters our bloodstream.
P. falciparum parasite is a tricky enemy: it first invades the liver and then infects the blood cells potentially causing deadly symptoms. Two vaccines for malaria are available but vaccines prime the immune system to recognise parts of infectious pathogens (often proteins found on the surface). However, parasites change form frequently as they move through their life cycle. In a new study by Lamers *et al.*, the team focused on the parasite first life-stage. They genetically modified the pathogen so that it dies six days after a mosquito bite sends it into the body, when it has not yet infected the bloodstream, priming the immune system, as a vaccination usually would.
The study requires further investigation, but the results showed an increased in antibody levels and strong immune protection with minor side effects (itching from the mosquito bites).
Read more about it here or discover the full scientific journal article here.

Spread of dengue fever in Bangladesh worries medics.



Bangladesh is battling its worst outbreak of dengue in years: at least 488 people have died from related complications in 2024, with 84,948 patients admitted to hospital nationwide. Cases are lower than last year, when more than 1,000 died, but dengue deaths are now being recorded nearly every month. The World Health Organization has warned of the "alarming" spread of the virus, with reported cases worldwide approximately doubling each year since 2021.

Dense populations in cities exacerbate the spread of the disease, usually more common in the monsoon season from June to September though it has spilled beyond that window this year. These shifting weather patterns caused by climate change provided optimal breeding conditions for the *Aedes aegypti* mosquito, the primary carrier of the disease.

The growing frequency and severity of outbreaks strains Bangladesh's already overwhelmed healthcare system, as hospitals battle to treat thousands of patients. Health officials have urged precautions against mosquito bites, such as mosquito repellents and bed nets, while experts want tougher measures to eliminate the stagnant waters where mosquitoes breed. Read more here or here. Check the updated Bangladesh dengue dashboard here.

A BITE OF INFORMATION

BORDER HEALTH NEWSLETTER

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