High-risk insects caught at the border

This report presents data from 2001–22 on exotic mosquitoes and other insects caught at our border (international airports and seaports) by Aotearoa New Zealand's mosquito surveillance programme.

Key facts

- Interceptions potentially originating from Australia and China accounted for roughly half of all interceptions from 2018–22.
- There were just seven interceptions of potentially international origin in 2022, compared to an average of 39 per year over the previous 10 years.
- Most interceptions from 2019–22 were in Auckland and Christchurch. Prior to 2019, Auckland had the overwhelming majority of interceptions.
- Intercepted insects were mainly found in common cargo, primarily vehicle and machinery parts or household goods, from 2018–22.

Insects, especially exotic mosquitoes, pose an immediate threat to New Zealand's health

Exotic mosquitoes are considered high-risk insects in New Zealand due to their ability to spread serious infectious diseases such as Dengue Fever and Malaria. Insects are able to travel internationally through multiple pathways.

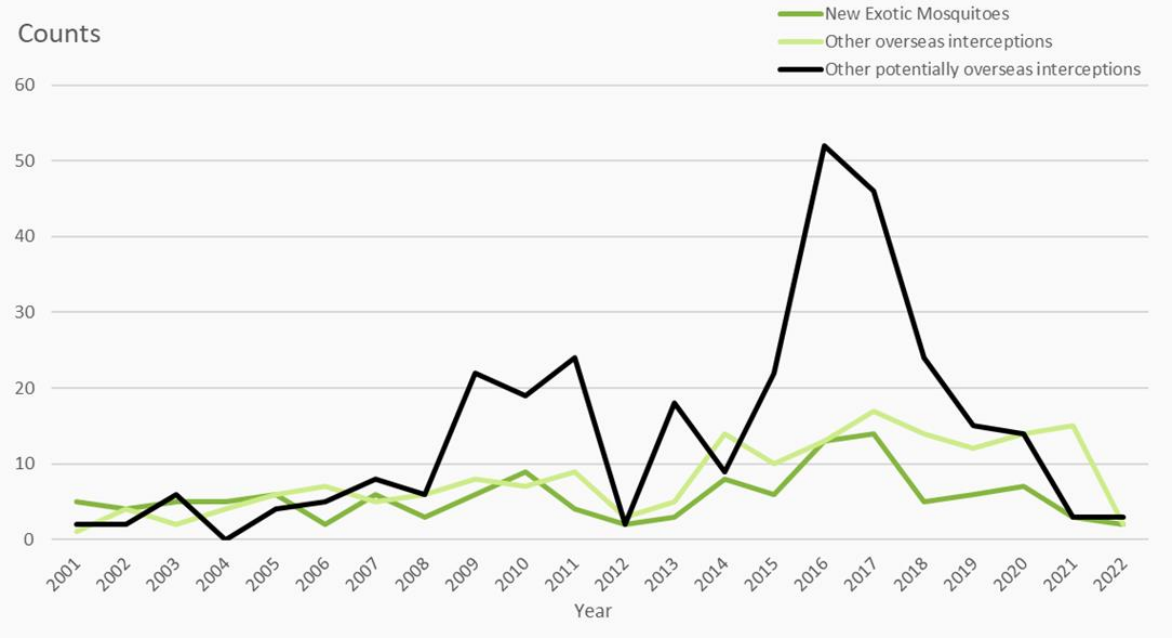
Common practices for preventing the spread of insects include aircraft being sprayed with insecticide, and freight cargo being sealed until entering inspection zones. Mosquito surveillance takes place at New Zealand's international airports and seaports. This prevents exotic mosquitoes from establishing in New Zealand while telling us which species are arriving, where they are from, and how they are travelling.

From 2001 to 2022 over 99% of international travellers arrived in New Zealand by air. In comparison, roughly 99% of all imported goods, based on mass, arrived by sea. While COVID-19 restrictions caused a roughly ten-fold decrease in incoming travellers in 2021 and 2022 compared to 2020 and prior, incoming cargo remained steady over this time (Statistics NZ 2023a, 2023b).

Interceptions of international insects declined in 2022

From 2014–21 there were an average of 11 interceptions of definite overseas origin (green lines in Figure 1) and a further 23 interceptions of potential overseas origin (black line in Figure 1). In 2022, there were just seven interceptions, three of which were potentially from overseas.

Figure 1: Number of high-risk insect interceptions, 2001–22



Note 1: One interception may include several insects which fall into different categories. Therefore, the sum of all categories may be higher than the total number of interceptions for that year.
Note 2: 'Other overseas interceptions' is a combination of exotic mosquitoes already in New Zealand, New Zealand native mosquitoes which also exist overseas and non-mosquitoes which have an overseas origin.
Note 3: 'Other potentially overseas interceptions' includes all the categories listed in Note 2 but cannot be confirmed to be from overseas. It is possible that some of these were local insects that were trapped during routine surveillance.
Note 4: Two notifications in 2022 and one notification in 2021 were excluded due to being eDNA samples from water samples in areas unrelated to major ports. These notifications are discussed further at the end of this factsheet.
Source: NZBioSecure 2023

When an interception is made, the species and likely origin are recorded. Any interception where the origin is unknown is considered potentially international. Species are classified as:

- Non-mosquitoes: Any insect that is not a mosquito, such as crane flies.
- Exotic mosquitoes already in New Zealand: An international mosquito species that is established in New Zealand, such as C. quinquefasciatus or A. notoscriptus.
- Unidentifiable exotic: The specimen has been lost or damaged beyond recognition.
- New exotic species[1]: Mosquitoes that are not established in New Zealand.

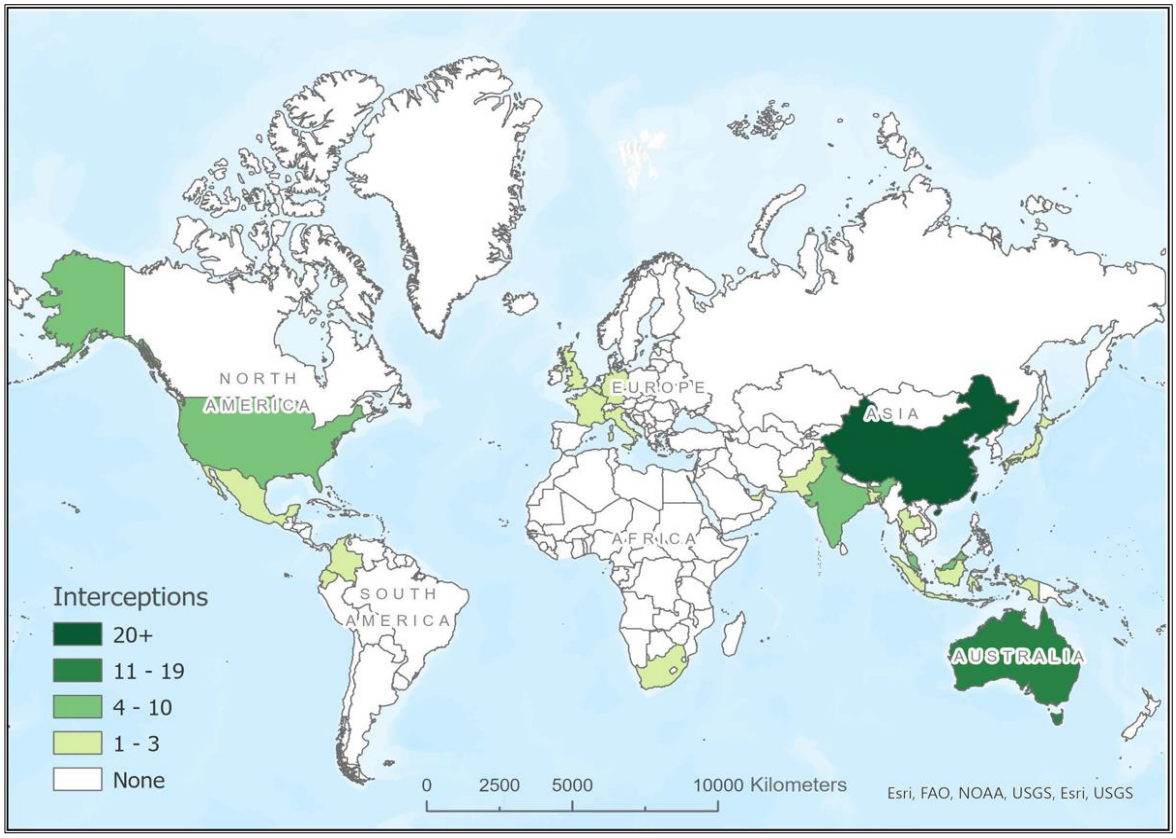
While new exotic species are a direct threat to New Zealanders' health, the categories described as "Other" in Figure 1 can assist in identifying routes that high-risk insects could use to cross our borders.

[1] New exotic species are the only category where the species definitively originated outside New Zealand. With all other interceptions, there is a chance the specimen originated in New Zealand and was trapped unintentionally.

China and Australia are the most common origins of potentially foreign interceptions

Of the 136 potentially international interceptions from 2018–22, China and Australia were the most common origins listed, with 23 and 19 interceptions, respectively. Figure 2 presents all the potential origins of these interceptions.

Figure 2: High-risk insect interceptions of potential international origin, by country, 2018–22



Note 1: An interception can be listed as having more than one potential origin. All potential origins are included here so the sum of the interceptions may be greater than the total interceptions for this time period.
Note 2: Potential foreign origin notifications without a listed country are not included (36 notifications for 2018–22).
Source: NZBioSecure 2023

Some key observations include:

- Australia has been a consistently common potential origin of interceptions since 2001.
- There were no new exotic mosquitoes intercepted from Australia from 2018–22. However, from 2001–17 Australia was the most common origin with 22 interceptions.
- Interceptions potentially from China increased, with 15 interceptions from 2001–17.
- Interceptions potentially from Singapore, India and the US increased from 2003–12 (3, 1 and 5 respectively) to 2013–22 (14, 11 and 22 respectively).
- From 2018–22, there were 22 interceptions involving new exotic mosquitoes from 12 different countries, including China, the US, Fiji, Singapore and Malaysia (5, 3, 2, 2 and 2 interceptions respectively).

If you would like to view a time series map of interceptions globally, please visit the High-risk insects caught at New Zealand's border page, on the EHINZ website.

The rest of this report relates to interceptions which have a high likelihood of being of overseas origin. This includes *New Exotic Mosquitoes* and *Other Overseas Interceptions*. *Other Potentially Overseas Interceptions* will not be discussed due to the uncertainty of their origin.

Christchurch has experienced increasing interceptions in recent years

Since 2001, 68% of all international interceptions occurred in areas overseen by Auckland Regional Public Health Service (ARPHS). However, interceptions originating from Te Mana Ora (Christchurch and surrounds) have become increasingly common, accounting for half of all interceptions from 2019–21. Given there were only four interceptions of international origin in 2022, this trend was not reflected in the most recent data.

The cause of this increase in Te Mana Ora and the drop in ARPHS interceptions is unknown. Given that the increase began in 2019, it is unlikely that COVID-19 disruptions were the primary cause.

Table 1: High-risk insect interceptions of international origin, by PHU, 2001–22

Year	ARPHS	Te Mana Ora	RPH	Toi Te Ora	Nelson-Marlborough	MidCentral	Southern	Tairawhiti	Taranaki	Waikato
2001	4	1	0	1	0	0	0	0	0	0
2002	6	1	0	0	0	1	0	0	0	0
2003	5	1	0	0	0	0	0	0	0	0
2004	4	2	1	0	1	0	0	0	0	0
2005	9	2	0	0	0	0	1	0	0	0
2006	7	0	1	0	0	0	1	0	0	0
2007	6	5	0	0	0	0	0	0	0	0
2008	8	0	0	0	0	0	0	0	0	0
2009	11	0	0	0	1	0	0	0	0	0
2010	10	0	3	0	0	0	0	0	0	0
2011	10	1	0	1	0	0	0	0	0	0
2012	1	1	1	1	1	0	0	0	0	0
2013	3	3	1	0	0	0	0	0	0	0
2014	19	1	1	0	0	0	0	0	0	0
2015	13	2	0	0	0	0	0	0	0	0
2016	20	1	3	0	0	0	0	0	0	0
2017	23	1	2	2	0	1	0	0	0	0
2018	16	1	2	0	0	0	0	0	0	0
2019	8	7	1	0	0	1	0	0	0	0
2020	6	8	2	2	0	0	1	0	1	0
2021	3	9	0	1	1	1	0	1	0	1
2022	1	0	0	2	1	0	0	0	0	0
Total	**193**	**47**	**18**	**10**	**5**	**4**	**3**	**1**	**1**	**1**

Source: NZBioSecure 2023

There were no identifiable changes in imported goods or incoming travellers which describe the change in interceptions beginning in 2019. Table 2 below presents the busiest PHUs based on these metrics. Auckland (ARPHS), along with Northland and Tauranga (Te Toi Ora) receive high volumes of goods consistently as well as Auckland having the busiest international airport. Similarly, Christchurch and surrounds (Te Mana Ora) also has a busy airport and multiple busy seaports.

Table 2: Top 3 busiest ports by mass of goods and total travellers, by PHU, 2014–22

PHU	Ports included	Mass of goods (Tonnes)	PHU	Ports included	Total traveller arrivals
ARPHS	Auckland Airport Auckland Seaport	46,939,670	ARPHS	Auckland Airport	32,360,646
Northland	Whāngarei Seaport	46,642,769	Te Mana Ora	Christchurch Airport	5,529,614
Toi Te Ora	Tauranga Seaport	46,562,407	RPH	Wellington Airport	3,034,110
Te Mana Ora	Christchurch Airport Lyttleton Seaport Timaru Seaport		Southern	Dunedin Airport	166,226
Southern	Dunedin Airport Bluff Seaport Port Chalmers Seaport	26,663,774	Toi Te Ora	Rotorua Airport	17,744

Sources: Statistics NZ 2023a, 2023b

The majority of recent intercepted insects have been found dead in various types of cargo

Of the 77 high-risk interceptions recorded from 2018–22, 51 were found in various types of cargo, including ten which had living specimens (Table 3). Alive specimens are a greater concern, as it suggests the insect has survived procedures intended to prevent an incursion.

Table 3: High-risk insect interceptions of international origin, by location and living status, 2018–22

Location found	Alive	Dead	Unrecorded	Total
Cargo	10	40	1	51
Non-fruit organic juice	1	9	0	10
Fruit	1	8	0	9
Surveillance traps	3	0	0	3
Tyres	2	0	0	2
Baggage or luggage	0	1	0	1
Transitional facilities	0	1	0	1

Source: NZBioSecure 2023

Table 4 breaks down the five most common forms of "cargo" in which the insects were found. The most common were "Vehicles, machinery and its parts", and "Household items" (21 and 15 interceptions, respectively).

Table 4: Top 5 types of "cargo" containing high-risk insects of international origin, 2018–22

Type of cargo	Interceptions
Vehicles, machinery and its parts	21
Household items	10
Packaging materials	9
Empty shipping containers	3
Building equipment/materials	2

Source: NZBioSecure 2023

Data for this indicator

This indicator is an analysis of the most recent data available from the New Zealand BioSecure Entomology Laboratory (NZBioSecure), provided to EHINZ by NZBioSecure in June 2023.

For additional information, see the Metadata sheet.

References

Statistics New Zealand (Statistics NZ). 2023a. *Infoshare. Overseas Cargo Statistics: Total imports by New Zealand port. (Annual-Jun)*. URL: www.stats.govt.nz (accessed August 2023).

Statistics New Zealand (Statistics NZ). 2023b. *Infoshare. International Travel and Migration: Total passenger movements by NZ port and selected overseas ports. (Annual-Jun)*. URL: www.stats.govt.nz (accessed August 2023)

Explore geographic data on interactive dashboards:

Border Health dashboard

EHINZ dashboard

Previous surveillance reports:

2022

2019

2018

Other related topics include:

Mosquito-borne disease

Exotic mosquito species

Overseas infectious diseases of concern to NZ

Disclaimer

Author

The author of this report is Liam Kelly, ehinz@massey.ac.nz

Citation

Environmental Health Intelligence. 2023. *High-risk insects caught at the border*. [Surveillance Report]. Wellington: Environmental Health Intelligence NZ, Massey University.

Visit the EHINZ website

Subscribe to our newsletter