

Exotic mosquito species established in New Zealand

This factsheet presents information on exotic mosquito species established in Aotearoa New Zealand and their geographic distribution. It also includes a brief summary of exotic mosquitos of high concern, that could become established.



No new exotic mosquito species have become established in New Zealand since the discovery of *Culex sitiens* in Kaipara Harbour in 2018.



At the end of 2022, three established exotic mosquito species remain in New Zealand: *Aedes australis*, *Aedes notoscriptus* and *Culex quinquefasciatus*.



The mosquito *Culex sitiens* was eradicated in 2020.



***Aedes notoscriptus* mosquitos have been found as far south as Timaru port as of 2022, having previously been identified only as far south as Lyttelton North in 2020.**



If *Aedes albopictus* established in New Zealand, it presents a significant risk to public health as it can transmit multiple mosquito-borne diseases and survive in a wide range of temperatures.

Exotic mosquitoes present an ongoing risk to New Zealand's health

Exotic mosquitoes can spread mosquito-borne viruses (eg, Dengue Fever, Chikungunya) and parasitic diseases (eg, Malaria) from infected people to the broader population. These diseases are a major cause of illness and death globally, with Malaria alone causing over 400,000 deaths annually (WHO 2020). International travel and climate change enable exotic mosquitoes to spread to new territories. Mosquito-borne diseases (MBDs) are spreading globally, with a wet, humid, warmer climate enabling new regions to be established with various mosquito species (Rocklöv & Dubrow 2020). Establishment of high-risk exotic mosquitoes in New Zealand would increase the risk of MBD outbreaks occurring. New Zealand's native mosquitoes tend to bite birds and are considered less likely to spread serious diseases to humans. Different types of exotic mosquitoes have varied abilities to spread different diseases. So, monitoring the types and distribution of exotic mosquitoes which have been introduced to New Zealand is important.

Two exotic mosquito species have been eradicated since 2010

The eradication of the Southern saltmarsh mosquito (*Aedes camptorhynchus*) in 2010 has been the most important change to New Zealand's mosquito profile in recent years, due to its establishment in coastal regions across the North Island and top of the South Island. This species is also a prominent vector of multiple MBD's (Table 1). The eradication program cost around 70 million dollars (MAF Biosecurity New Zealand 2011). As a result, New Zealand has an ongoing saltmarsh surveillance programme to try and prevent re-establishment of this and similar species.

The last exotic mosquito species to establish in to New Zealand was the Saltmarsh Culex (*Culex sitiens*), with larvae identified in the Kawau Parua Inlet, at the bottom of Kaipara Harbour (Auckland region) in 2018. This species was announced as eradicated by Ministry of Primary Industry (MPI) in 2020 (MPI 2020). This species was a vector of both Ross River and Japanese Encephalitis Virus (Table 1), which have been prominent in Australia for many years (Furlong et al 2022). These are the only two instances on earth where a saltmarsh mosquito has been successfully eradicated (MPI 2020).

At the end of 2022, three exotic mosquito species, *Aedes australis*, *Aedes notoscriptus* and *Culex quinquefasciatus*, remain established in New Zealand (Table 1).

Table 1 New Zealand's history of exotic mosquito introductions

Species	Time period	Risk factors of species	New Zealand distribution
<i>Aedes australis</i> (Saltwater mosquito)	1961 – present	A relatively low risk species which does not live near, or commonly bite humans. Shown to have a low capability to transmit Ross River Virus and Dengue Fever in laboratory settings.	 Southern half of South Island
<i>Aedes notoscritpus</i> (Ankle biting mosquito)	1916 – present	Capable carrier of Ross River Virus and Barmah Forest Virus and potential carrier of Murray Valley Encephalitis. Able to transmit Dengue Fever and Chikungunya Virus in laboratory settings.	 Entire North Island and North of Timaru Port in the South Island
<i>Culex quinquefasciatus</i> (Southern house mosquito)	1830 – present	Capable carrier of Dengue Fever and Ross River Virus among other MBDs with variable efficacy in different parts of the world. These are common household pest, biting primarily at dusk and dawn.	 Entire North Island and North of Timaru Port in the South Island
<i>Aedes camptorhynchus</i> (Southern salt marsh mosquito)	1998 – 2010	A coastal pest found in the south half of Australia. It is a major vector of Ross River Virus and potential Murray Valley Encephalitis vector. It's a common biter of humans, livestock and birds.	Eradicated
<i>Culex sitiens</i> (Salt marsh culex)	2018 – 2020	A potential vector of Ross River Virus and Japanese Encephalitis. It is a vicious biter of humans in the South Pacific and South-East Asia.	Eradicated

Sources: NZ BioSecure personal contact 2023, NZ BioSecure 2023, Walter Reid Biosystematics Unit 2023

Three high-risk mosquitos that could establish in New Zealand

Across the world there are a number of mosquito species which are capable of establishing in New Zealand and spreading disease, creating a public health risk. A few New Zealand projects have modelled the potential distribution of specific mosquito-borne diseases under different environmental conditions (De Wet et al 2005; Tompkins et al 2012). In general, the Auckland and Northland regions in the North Island have the greatest outbreak potential.

Three mosquito species which are considered exceptionally 'high-risk' are *Aedes aegypti*, *Aedes albopictus* and *Culex annulirostris*. Table 2 describes their ability to impact the health of New Zealand's population as well as their global distribution. Table 3 provides details on the number interceptions recorded at ports across New Zealand from 2001–21 with both *Aedes* species being extremely common. For more details on interceptions, there is a separate [factsheet](#) on this topic on the EHINZ website.

Species	Global distribution	Diseases transmitted	Affinity for humans and environment
Aedes aegypti	All major continents including Australia, South-East Asia and most Pacific Island Countries.	Dengue and Yellow Fever, Zika and multiple other MBDs.	Feeds on humans rather than other animals when possible. Thrives in urban environments.
Aedes albopictus	Many South-East Asian and Pacific Island countries, the Americas and Europe	Dengue and Yellow Fever, Japanese Encephalitis, Ross River Virus, Chikungunya.	Feeds on humans rather than other animals when possible. Common in urban environments.
Culex annulirostris	Australia and many South-East Asian and Pacific Island Countries.	Murray Valley and Japanese Encephalitis. Capable vector for multiple other MBDs.	Opportunistic feeder on mammals. Breeds in both urban and rural settings.

Sources: NZ BioSecure 2023, Walter Reid Biosystematics Unit 2023

Species	Number of mosquitos intercepted	Number of interception events
Aedes aegypti	53	31
Aedes albopictus	151	21
Culex annulirostris	2	2

Sources: NZ BioSecure 2022

Given the broad temperature ranges *Aedes albopictus* is capable of surviving (Reinhold, Lazzari, Lahondère 2018), the frequency it is intercepted at New Zealand's border and the efficiency it can transmit some MBDs, this species poses a major threat to New Zealand's public health. This was also the conclusion of researchers within New Zealand during an assessment of border interceptions from 2001 to 2018 (Anmar et al 2019).

Data for this indicator

This factsheet reports primarily on the distribution of exotic mosquito species in New Zealand from personal communications with the team at NZ BioSecure. It is supplemented by literature on the topic from government agencies and peer reviewed journals.

For descriptive information about the data, see the [Metadata Sheet](#)

References

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