Exotic mosquito species established in New Zealand

This factsheet presents the exotic mosquito species established in New Zealand and their geographic distribution.

Key facts

- As of 2019, there are three long-established exotic mosquito species in New Zealand
- A fourth exotic mosquito species, the Southern Saltmarsh mosquito *(Aedes camptorhynchus)*, first discovered in New Zealand in 1998, was eradicated in 2010
- In 2018 *Culex sitiens* was detected in Kaipara Harbour through the National Saltmarsh mosquito surveillance programme

Exotic mosquitoes can be bad for our health

Exotic mosquitoes can spread mosquito-borne diseases between humans (e.g. dengue fever, malaria) by biting infected people and then biting other susceptible individuals. These diseases are a major cause of illness and death overseas. International travel and climate change enable exotic mosquitoes to inhabit new territories.

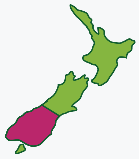
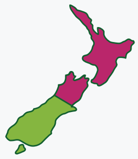
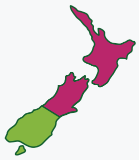
Mosquito-borne diseases are spreading globally, including to the Pacific where the warm, wet and humid climate is favourable for exotic mosquitoes. The introduction of high-risk exotic mosquitoes to New Zealand's environment would increase the risk of mosquito-borne disease outbreaks occurring here. 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. Monitoring the types and distribution of exotic mosquitoes which have been introduced to New Zealand is, therefore, important.

No new exotic mosquito species were introduced to New Zealand in 2019

No new exotic mosquito species were introduced in 2019. There are currently three long-established exotic species present in New Zealand (Table 1).

Table 1: New Zealand's history of exotic mosquito introductions

Exotic mosquito species known to have established in New Zealand	Time period	New Zealand distribution
Aedes australis	1961 - present	 Southern South Island
Aedes notoscriptus	1916 - present	 North Island and South Island from Lyttelton north
Culex quinquefasciatus	1830 - present	 North Island and northern South Island
Southern saltmarsh mosquito *(Aedes camptorhynchus)*	1998 - 2010	Eradicated

Source: NZ BioSecure 2020

What happened recently?

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 (Table 1).

New Zealand has an ongoing saltmarsh mosquito surveillance programme as a result of the Southern Saltmarsh Mosquito *(Aedes camptorhynchus)* mosquito's previous establishment. In March 2018, the Ministry for Primary Industries (MPI) first reported finding Saltmarsh Culex *(Culex sitiens)* larvae in the Kawau Parua Inlet, Kaipara Harbour (Auckland Region) through the National Saltmarsh Mosquito Surveillance Programme.

As of November 2018, MPI has reported finding no adults during surveillance and determined the mosquito species has not spread outside the Kawau Parua Inlet. An aerial spraying eradication programme around Kawau Parua Inlet began on 13 November 2018. *Culex sitiens* is a vector of Ross River virus and possibly Japanese encephalitis (MPI 2019).

While remaining exotic introduced species in New Zealand have the potential to carry mosquito-borne diseases (e.g. *Culex quinquefasciatus* can spread diseases such as Japanese encephalitis), the absence of locally-acquired mosquito-borne disease outbreaks in New Zealand suggests that they are not high-risk vectors of these diseases at present (Kramer et al 2011).

Climate change will make New Zealand more vulnerable to mosquito-borne diseases

Climate change is likely to make New Zealand's environment increasingly favourable for the survival and spread of mosquito species and mosquito-borne diseases (Tompkins et al 2012). Environmental factors which determine how well mosquito-borne diseases spread include (Weinstein et al 1997; Kramer et al 2011):

Disease characteristics
Some disease agents (viruses, bacteria, parasites) are faster at incubating within mosquitoes, and are therefore more readily spread. A warmer New Zealand climate could also increase the ability of mosquitoes already established in New Zealand to spread diseases, by shortening incubation times.

Human population density
How closely people live together and the extent of mosquito prevention measures nearby (e.g. insecticide sprays, mosquito nets).

Climate and geography
For example, temperature, rainfall, humidity, vegetation and water can determine whether mosquitoes survive long enough to reproduce, bite an infected human and/or incubate the disease before biting someone else.

The presence of particular mosquito species
Specific high-risk species are efficient at spreading different diseases.

Mapping the distribution of New Zealand's changing environment (e.g. climate and population distribution) for suitability, mosquito establishment and mosquito-borne disease transmission is complex.

Data modelling is also necessary to address data uncertainties. 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, Auckland and Northland regions in the northern North Island have the greatest outbreak potential

Maps of potential dengue fever and Ross River virus distributions in New Zealand (published in 2011) can be explored online here (Tompkins et al 2012):
http://haifa.esr1.cwp.govt.nz/modelling-and-map-portal/modelling-map/

Data for this indicator

Data comes from New Zealand BioSecure Entolomogy Laboratory (NZ BioSecure) online reporting of endemic New Zealand mosquitoes (NZ BioSecure 2020). For additional information, see the metadata link below.

References

De Wet N, Slaney D, Ye W, Warrick R, Hales S. 2005. H*otspots: Modelling capacity for vector-borne disease risk analysis in New Zealand.* Waikato: International Global Change Institute, and Wellington: Ecology and Health Research Centre.

Kramer LD, Chin P, Cane RP, Kauffman EB, Mackereth G. 2011. Vector Competence of New Zealand Mosquitoes for Selected Arboviruses. *Am J Trop Med Hyg* 85(1): 182 – 9.

MPI (Ministry for Primary Industries). 2019. Alerts: Culex sitiens. URL: **https://www.mpi.govt.nz/protection-and-response/responding/alerts/culex-sitiens** (accessed May 2020).

New Zealand BioSecure Entomology Laboratory (NZ BioSecure). 2020. *New Zealand Mosquitoes.* Southern Monitoring Services Limited. URL: **www.smsl.co.nz** (accessed May 2020).

Tompkins D, Brock A, Jones G, et al. 2012. *Modelling the Impacts of Climate Change on Infectious Diseases in New Zealand.* Porirua: Institute of Environmental Science and Research Limited.

Weinstein P, Laird M, Browne G. 1997. *Exotic and endemic mosquitoes in New Zealand as potential arbovirus vectors.* Wellington: Ministry of Health.

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Further information

For descriptive information about the data **Metadata Sheet**

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