NEW ZEALAND BIOSECURE
Entomology Laboratory

A DIVISION OF SMS SOUTHERN MONITORING SERVICES LIMITED

Culex (Culex) quinquefasciatus (Say)

southern house or brown mosquito

NZ status: Introduced

Vector and Pest Status

Culex quinquefasciatus is an important vector of periodic filariasis in some parts of the world (Belkin, 1968), and is known to carry and transmit *Wuchereria bancrofti* to some degree of efficacy in many regions of the globe. It is also an important vector of West Nile Virus (WNV) in some areas of the world. Studies in the United States have isolated WNV from populations of *Cx. quinquefasciatus* and found some populations to be efficient vectors in the laboratory (Goddard *et al.*, 2002). There appear to be regional differences in vector competence of this species which range from some populations which are very poor and improbable vectors in nature, to good vectors with excellent transmitting capabilities (Sardelis *et al.*, 2001). There is also some thought that the populations that vector well may have interbred with a related species and known vector of WNV, *Culex pipiens* (Goddard *et al.*, 2002).

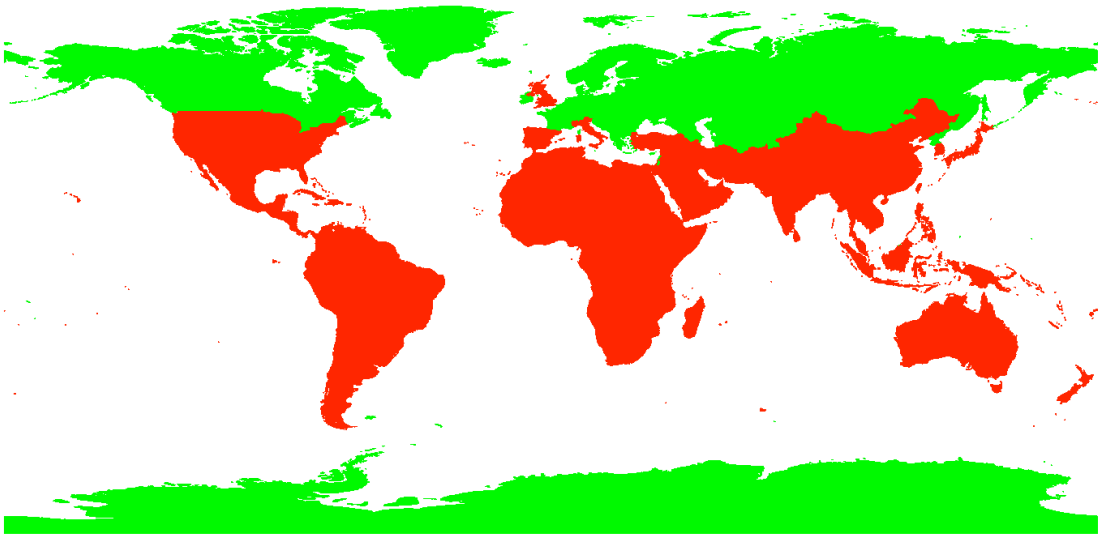
Culex quinquefasciatus is able to transmit Ross River Virus, Alfuy, Almpiwar, Corriparta, Dengue, Sindbis, Japanese Encephalitis virus (Reuben *et al.,* 1994), Reticuloendotheliosis virus (Holder *et al*., 1999) and the protozoan *Hepatozoon breinli* within the laboratory (Lee *et al.*, 1989) and may yet be seen as a vector of these in nature. As well as these, *Cx. quinquefasciatus* is a laboratory host to a wide variety of other arboviruses including Murray Valley Encephalitis (Weinstein *et al.*, 1997), Edge Hill, Eubenangee, Getah, Kokobera, Koongol, Kowanyama, Kunjin, Mapputta, Stratford, Trubanaman, Wongal, Reovirus type 3 and Chikungunya viruses (Holder *et al*., 1999; Lee *et al.,* 1989). It is a domestic pest in many urban areas and often comes indoors at night to bite (Holder *et al*., 1999).

It is also a major vector of bird pox and the avian malaria-causing protozoa (Derraik, 2004; Derraik and Slaney, 2005), *Plasmodium relictum* (Laird, 1996) and *Plasmodium cathemerium* (Lee *et al.,* 1989). This species is also able to transmit *Dirofilaria immitis* (dog heartworm), *Saurofilaria sp*. and *Oswaldofilaria sp*., which affect two Australian lizards (Holder *et al*., 1999). *Cx. quinquefasciatus* may play an important role in transmitting *Myxomatosis* over some areas of Australia (Lee *et al.,* 1984).

Geographic Distribution

Culex quinquefasciatus is one of the most widespread mosquitoes in the world. It is found throughout most of pan and subtropical Americas (Weinstein *et al.*, 1997) (Barr, 1957), the Neotropics, Afrotropics (White, 1975), Indomalayan, Australasian (Lee *et al.,* 1989) and Eastern Asian regions of the world (Bram, 1967). It is also present in the United Kingdom and parts of the Middle East.

Culex quinquefasciatus is an introduced species to New Zealand and is now one of the most commonly occurring mosquitoes after *Culex pervigilans* and *Aedes notoscriptus* (MoH, 1998). Believed to have been first introduced in the 1830's (Sandlant, 2002), it was likely carried to our ports aboard American whaling ships (Weinstein *et al.*, 1997) or via Australian populations in open water storage tanks to ports at the Bay of Islands and Auckland (Laird, 1996).



NB. This map denotes the general areas where this species has been recorded, not actual distribution.

Originally this species range was restricted to areas around ports of entry through which it was introduced, but this range has expanded inland and also shows a southward movement (Weinstein *et al.,* 1997; Holder *et al*., 1999; Laird, 1995). *Cx. quinquefasciatus* is now found throughout much of the North Island and northern parts of the South Island including Marlborough, Picton and Nelson (Weinstein *et al.,* 1997). It has also been detected in traps in Christchurch and Queenstown, however it does not appear to have established in either area, possibly due to longer colder winters (M. Disbury, pers. com., 2007).

Incursions and Interceptions

Since its likely arrival in the 1830's (Sandlant, 2002), *Culex quinquefasciatus* has been intercepted at the border on many occasions, and during the 1950's was regularly discovered on flights from Australia and Fiji (Laird, 1996; Laird, 1995). Dead individuals have been discovered a number of times on flights from all across the Pacific (Farr, 2000).

It has also been intercepted breeding in gully traps near Auckland international airport (Weinstein *et al.,* 1997), containers at Ports of Auckland and the Devonport Naval Base (Laird, 1990; New Zealand BioSecure, unpub. data).

With live samples it may be difficult to ascertain whether or not the mosquito originated from within New Zealand or from elsewhere.

Taxonomy

Culex quinquefasciatus is part of group b of the Pipiens group and belongs to the subgenus *Culex* (Dobrotworsky, 1965). In 1823 Say named the species *Culex quinquefasciatus* but in 1828 the name *Culex fatigans* was introduced by Weidmann (Dobrotworsky, 1965; Stone, 1956). The names were applied to what appears to be the same species and both names have been used as synonyms since they arose (Stone, 1956). Until recently this species has been regarded as a subspecies of *Culex pipiens* and was called *Culex pipiens fatigans* or *Cx. pipiens quinquefasciatus*. Because of the inherent confusion this variable naming causes, there is a movement towards returning to use the original naming of *Culex quinquefasciatus* (Stone, 1956).

A medium, light brown mosquito, the abdominal sternites of females of *Cx. quinquefasciatus* are pale scaled with a few dark scaled patches medially (Belkin, 1968), although in New Zealand specimens, these dark scaled patches are frequently absent (R. Cane, New Zealand BioSecure, pers. com., 2008).

Larvae may be differentiated from *Culex pervigilans* in having comb scales in a patch of 30-40, 10-12 teeth on each side of the mental plate and a siphon which is widest about one third from its base (Belkin, 1968).

Habits and Habitat

Culex quinquefasciatus usually breeds in organically rich and polluted surface waters or artificial containers (Weinstein *et al.,* 1997). It has been found breeding in shallow ponds within streams, phytotelmata (Derraik, 2005), and artificial habitats such as drains and drain sumps, wells, oxidation ponds at sewage treatment plants (Derraik and Slaney, 2005), stock drinking troughs, septic tanks, rain water containers, tyres and various other small containers (Lee *et al.* 1989; Laird, 1995). It may also be found utilising the same container for breeding as other species (Lee *et al.* 1989).

The eggs of *Culex quinquefasciatus* are not desiccation resistant and are laid as rafts on the water surface (Weinstein *et al.,* 1997). Once hatched the larvae are able to overwinter in the cooler months of July to September, while adult activity ceases (Lee *et al.* 1989; Weinstein *et al.,* 1997).

Culex quinquefasciatus adults do not usually disperse greater than one kilometre from a release or hatching point and remain close to breeding habitat and host sources (Schreiber *et al*., 1988; Reisen *et al.,* 1991). Adult females are anautogenous and so must consume a blood meal before laying the first batch of eggs (Oda *et al.,* 2002).

When breeding, Australian *Cx. quinquefasciatus* has been known to swarm in large numbers (Lee *et al.* 1989). Males initiate swarming, which stimulates non-inseminated females to fly through the swarm. Even one male in a swarming pattern will stimulate flight in females (Williams and Patterson, 1969)

Culex quinquefasciatus is a domesticated species which is often found living in close proximity to humans. Nocturnal biters, the females will readily bite man indoors and out (Weinstein *et al.,* 1997), but will also bite birds, pigs, horses, cattle, sheep, dogs, rabbits (Holder *et al*., 1999) and even amphibians (Lee *et al.,* 1989).

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