

# Is There Potential For Zika Virus Transmission in South Dakota?

Zika virus has been a major topic of conversation over the past few months as reports of its association with birth defects in Brazil have been prominent in the media. Because of this, many questions have been posed about its potential spread throughout the United States. Currently, the South Dakota Department of Health (SDDOH) and their many partners from across the state are looking to answer the question: Can the Zika virus make its way to South Dakota?

Since West Nile virus was able to quickly spread across the United States after its arrival in North America, any newly emerging mosquito borne virus demands our attention. According to SDDOH state epidemiologist, Dr. Lon Kightlinger, Zika virus is a Flavivirus that has milder symptoms to WNV, but also has the potential to cause birth defects and fetal death. Another difference between the two viruses is that WNV primarily uses birds to complete its life cycle, whereas Zika primarily uses humans and other primates. Its transmission potential is much more similar to dengue virus than WNV. While the vast majority of Zika virus transmissions result from infected mosquitoes, it may also be sexually transmitted which would facilitate its spread in the United States.

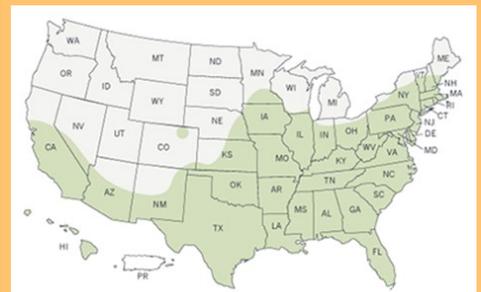
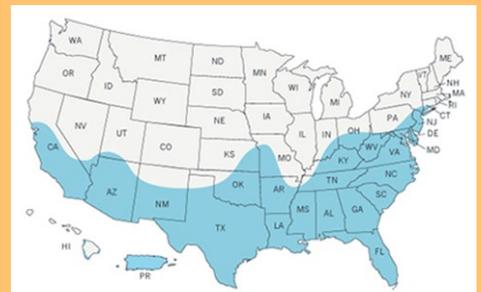
To assess the potential mosquito transmission of Zika in South Dakota, we must first determine if the mosquitoes responsible for transmission are even present in the state. The virus currently relies on *Aedes aegypti* to maintain its presence in an area, and this species has a very low probability of existing in South Dakota due to its intolerance to colder climates. However, they are being found further north than expected, possibly overwintering in sewers and basements. Even though the northern boundary appears to be Missouri and Kansas, we must still be on the lookout for it. A close relative, *Aedes albopictus*, has been experimentally shown to transmit Zika virus, and has been detected in low numbers in Nebraska, Iowa, and Minnesota. Modeling has also shown that a small part of South Dakota may be suitable for this species to live (Fig. 1).

Figure 1:

Top: *Aedes aegypti* range.

Bottom: *Aedes albopictus* range.

Credit: Centers for Disease Control and Prevention



While these maps show only a sliver of South Dakota within its range, some species known to share habitat with *Ae. albopictus* have been found in Sioux Falls.



So while *Ae. albopictus* has the potential to be present in South Dakota, it has not yet been found within the state, but it could in the future. One issue is that our current trapping methods, designed for collecting the night-feeding vector for WNV, do not target this particular mosquito's daytime-feeding life style.

*Aedes albopictus* shares some similarities in its life style to our most abundant nuisance mosquito, *Aedes vexans*. Both of these species can survive winters by lying dormant in the egg stage, though *Ae. albopictus* eggs are less cold tolerant.



Figure 2: Left: *Aedes aegypti*, Photo credit CDC/ Paul I. Howell, MPH; Prof. Frank Hadley Collins. Right: *Aedes albopictus*, Photo credit CDC/ James Gathany

Both species, as well as *Ae. aegypti*, are floodwater mosquitoes that lay their eggs above the waterline and wait until water levels rise to hatch. These three species are opportunistic feeders that have a preference for mammals, including humans. However, the differences between these mosquitoes are very important. While *Ae. vexans* prefers feeding at dusk, *Ae. albopictus* and *Ae. aegypti* have been shown to feed during the day with peak feeding times being dusk and dawn. Also, *Ae. vexans* prefers to lay its eggs in open and partially unshaded areas while *Ae. albopictus* and *Ae. aegypti* prefer the shade.

Visually, the three mosquitoes can be distinguished by looking at the stripes that run across their back. *Aedes vexans* has no real pattern along its back while *Ae. aegypti* has a white violin pattern. *Aedes albopictus* has one single white line that runs lengthwise down its back (Fig. 2).

A new type of mosquito trap has become available that targets *Ae. albopictus* and *Ae. aegypti*. Currently we use the CDC miniature light trap which utilizes light and CO<sub>2</sub> to attract mosquitoes, and this excels in capturing the WNV vector mosquitoes. The new trap, BG Sentinel 2, uses more visual cues and odors that *Ae. albopictus* and *Ae. aegypti* find appealing, such as artificial skin emanations and convection currents. These traps will be placed in Pierre, Brookings, Yankton, and Sioux Falls.

There currently is no need for immediate alarm when it comes to the Zika virus in South Dakota, but it is something that needs to be monitored carefully. The addition of BG Sentinel 2 traps in the most strategic areas will be the first step in surveillance. This will help us determine if either species has established a foothold in our state. If *Ae. albopictus* or *Ae. aegypti* are found, then it will be important to assess the risk to human health by evaluating the presence of the virus in the region. At the present time, there has been no evidence for mosquito transmission of the Zika virus anywhere in the contiguous United States.

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