Biting midges: an increasing biosecurity risk under a changing climate

A warmer climate is likely to increase the occurrence and expand the distribution of biting midges in some areas of NSW. This poses a threat to the state's livestock industries.

Developing industry-informed climate planning information

Climate change is altering the biosecurity risks for many agricultural commodities across NSW. Primary producers need evidence-based information about the changing climate, and the risks and opportunities it may bring.

Through its Climate Vulnerability Assessment, the NSW Department of Primary Industries is increasing the resilience of our primary industries by providing information and data to help the sector better plan for, and respond to, climate change. The project has determined climate change impacts for extensive livestock, broadacre cropping, marine fisheries, forestry, horticulture and viticulture, and important cross-cutting biosecurity risks to inform sound planning, risk management and adaptation decisions.

Biting midges in NSW

Culicoides brevitarsis are small parasitic biting midges that affect ruminating livestock. The biting midges are invasive to Australia but are endemic (occur permanently) to regions from the mid-north coast and upward in NSW (Figure 1) continuing past the Queensland border. The distribution of the biting midges relies on the presence of cattle and warm temperatures, and they can be spread over vast distances by wind.

Biting midges are the main vector of arboviruses, such as Blue Tongue Virus (BTV) and Akabane viruses in Australia. This is due to tolerance of tropical and subtropical regions, increasing their abundance, when compared with other *Culicoides* species present in Australia. These viruses affect livestock production, yield and may cause animal fatalities. Stock movement restrictions may also be placed upon regions known to be infected by these viruses.

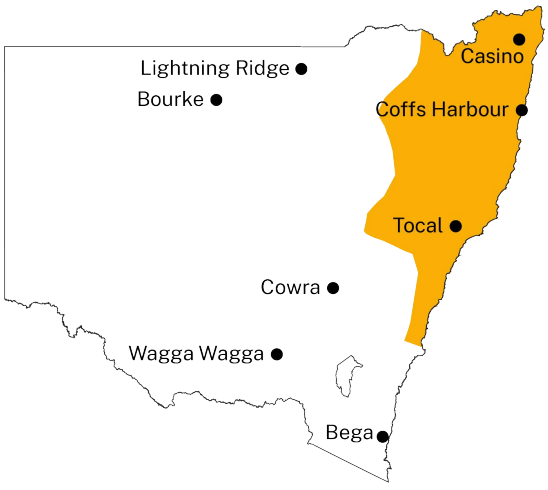

Figure 1: Endemic (yellow) distribution of *C. brevitarsis* midges across NSW. Casino, Coffs Harbour and Tocal are sites where *C. brevitarsis* is known to occur and Lightning Ridge, Bourke, Wagga Wagga and Cowra are sites where *C. brevitarsis* do not normally reside.

Climate and biting midges

Overall, the impacts of biting midges in NSW are projected to increase in autumn, spring and winter in 2050. Changes in climate suitability are likely to occur across the immature and adult stages of the life cycle.

Climate risks likely to increase the occurrence and distribution of biting midges include:

Warmer temperatures: Increased temperatures are favourable for biting midges. At temperatures below 20°C, the midges are unable to fly or reproduce.

Climate impacts: what to expect

Immature stage

- **Increased climate suitability** in the endemic region from April to October.
- **Decreased climate suitability** in the endemic region from November to February (low to high confidence).
- **Maintained historical climate suitability** in the endemic region in March.

Adult stage

- **Increased climate suitability** in the endemic region from March to November.
- **Maintained historical climate suitability** in the endemic region from December to February.

Impact on key NSW primary industries

Increased climate suitability under a warmer climate will likely lead to increased numbers and expanded distribution of the midges, extending beyond their historically endemic region in NSW. This may increase the risk of transmission of arboviruses, leading to the need to decrease stock movement and increase quarantine practices. As a result, biting midges may have economic impacts on the NSW livestock industry, especially as their occurrence and distribution increase.

Methodology and data

Climate projections were sourced from Climate Change in Australia's 'Application Ready Data'. This dataset is comprised of projections from an ensemble of 8 global climate models, each presenting a plausible future climate. The models differ in their projections, giving rise to uncertainty in our modelling. Low confidence in the projected changes due to differences between the models is noted in the text. Care should be taken when interpreting these results.

The Climate Vulnerability Assessment is intended to highlight potential industry- or regional-level changes. Intermediate and high emissions scenarios were used in the assessments (RCP4.5 and RCP8.5), but these are not the only future scenarios possible. The inclusion of climate variables important to each biosecurity risk was based on published research, expert knowledge and data quality and availability.

FOR MORE INFORMATION
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