animalhealth AUSTRALIA

NAMP

2014 – 15 REPORT

NATIONAL • ARBOVIRUS • MONITORING • PROGRAM

OBJECTIVES OF NAMP

NAMP has three specific objectives:

- **market access –** to facilitate the export of live cattle, sheep and goats, and ruminant genetic material to countries with concerns about bluetongue, Akabane and bovine ephemeral fever (BEF) viruses
- **bluetongue early warning –** to detect incursions of exotic strains of bluetongue virus (BTV) and vectors (*Culicoides* species – midges) into Australia by surveillance of the northern BTV endemic area
- **risk management –** to detect changes in the seasonal distribution in Australia of endemic bluetongue, Akabane and BEF viruses and their vectors, in support of livestock exporters and producers.

THE NATIONAL ARBOVIRUS MONITORING PROGRAM (NAMP) monitors the distribution of economically important arboviruses (insect-borne viruses) of ruminant livestock and associated insect vectors in Australia. Arboviruses monitored by NAMP include bluetongue, Akabane and bovine ephemeral fever (BEF) viruses. Clinical bluetongue disease has not been observed in commercial livestock flocks and herds in Australia.

Australia's economy benefits from the export of ruminant livestock and their genetic material (semen and embryos). This trade depends on a shared confidence between Australia and its trading partners that risks to the animal health status of the importing country can be accurately assessed and properly managed. NAMP provides credible data on the nature and distribution of important, specific arbovirus infections in Australia for use by the Australian Government and livestock exporters. NAMP enables the Australian Government to certify to trading partners that ruminants are sourced from areas that are free from these specified arboviruses. In addition, NAMP data are available for overseas countries to use when developing animal health requirements for the importation of Australian ruminant livestock and their genetic material.

NAMP is jointly funded by its primary beneficiaries: the cattle, sheep and goat industries; the livestock export industry; and the state, territory and Australian governments.

OPERATION OF NAMP

NAMP data are gathered throughout Australia by serological monitoring of cattle in sentinel herds and strategic serological surveys of cattle herds (virology), and trapping of insect vectors (entomology).

Blood samples from groups of young cattle that have not previously been exposed to arbovirus infection are tested at regular intervals for evidence of new infection with bluetongue, Akabane and BEF viruses. The frequency of blood sampling relates to the probability of arbovirus transmission – that is, the greater the likelihood of virus transmission, the more frequent the sampling. Insect traps to detect *Culicoides* species are positioned near the monitored herds during the period of testing or near herds where conditions are favourable for *Culicoides* species survival.

The number and locations of herds (Figure 1) are selected to enable the distribution of the specified arboviruses to be determined. Hence, most sentinel sites are located either along the border between the zone where infection is expected and the zone where infection is not expected, or in areas where infection occurs sporadically. In addition, areas expected to be arbovirus-free are monitored to verify their freedom, and known infected areas are sampled to detect new strains of virus and to assess the seasonal intensity of infection with each arbovirus.

Beatrice Hill in the far north of the Northern Territory is a focus for exotic BTV surveillance – virus isolation is routinely undertaken on blood samples collected at this location. Serotyping, virus isolation and molecular testing are applied strategically in other herds in the Northern Territory, Queensland, Western Australia and New South Wales after seroconversions are detected. NAMP surveillance data relating to bluetongue early warning are supplemented by targeted surveillance activities conducted by the Northern Australia Quarantine Strategy of the Australian Government Department of Agriculture and Water Resources in remote coastal regions of northern Australia, including the Torres Strait islands.

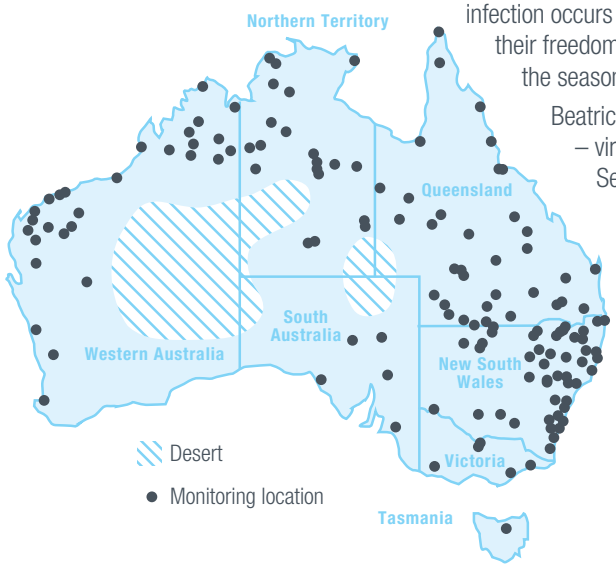


Figure 1 Locations of NAMP virology monitoring sites, 2014–15 arbovirus transmission season

The NAMP management, partners and coordinators would like to thank everyone who assisted in gathering the valuable monitoring data that underpins this report. This assistance is critical in maintaining and developing market access.

NAMP 2014–15

EPIDEMIOLOGY

Bluetongue, Akabane and BEF viruses are noncontagious and are biologically transmitted by their insect vectors. Climatic factors – rainfall and temperature – determine the distribution of potential vectors, and complex interactions between the virus, vector and environment limit the number of efficient vector species within an endemic vector environment.

The arboviruses are transmitted only if vectors are present; consequently, southern and central Australia are always free from these arboviruses. In northern Australia, and eastern and western coastal areas, arbovirus distribution changes within and between years based on seasonal climatic conditions.

Research in Australia since the mid-1970s has provided a detailed understanding of the epidemiology of Australian BTV strains and their *Culicoides* midge vectors. The important vector species in Australia are likely to have all originally arrived on air currents from neighbouring countries; *C. brevitarsis* is the main vector of both BTV and Akabane virus. A close correlation exists between the southern limits of *C. brevitarsis* and the distribution of the two viruses, although the viruses are less widely distributed than their vectors. Other vectors of BTV in Australia, which are less widely distributed than *C. brevitarsis*, are *C. actoni*, *C. dumdumi*, *C. fulvus* and *C. wadai*.

The main vector of BEF virus in Australia is putatively the mosquito *Culex annulirostris*. *C. annulirostris* has different ecological thresholds from *C. brevitarsis*, particularly its tolerance to lower temperatures, which accounts for its wider distribution and its occurrence in regions not affected by BTV or Akabane virus.

MONITORING RESULTS FOR 2014–15

This section summarises and explains the results of vector and virus monitoring and describes the limits of distribution of bluetongue, Akabane and BEF viruses in the 2014–15 arbovirus transmission season (September 2014 – August 2015).

The numbers of virology and entomology sites in each state and territory are shown in Table 1.

Table 1 Number of virology and entomology sites, by state and territory, 2014–15

	Sentinel herds	Serosurveys	Insect traps
New South Wales	40	3	34
Queensland	18	9	18
Western Australia	14	9	17
Northern Territory	7	10	10
Victoria	5	0	3
South Australia	5	0	3
Tasmania	1	0	1

BLUETONGUE VIRUS DISTRIBUTION

Clinical bluetongue disease has not been observed in commercial flocks or herds of any susceptible species in Australia. The limits of BTV transmission in Australia are shown on the interactive BTV zone map[1], which defines areas in which no viral transmission[2] has been detected for the past two years.

BTV is endemic in northern and north-eastern Australia (Western Australia, Northern Territory, Queensland and New South Wales), and remains undetected in South Australia, Tasmania and Victoria (Figure 2).

Virology testing in the Northern Territory showed that BTV activity was widespread in the north from September, when BTV-1 was first detected. The distribution of BTV remained largely stable, with the exception of evidence of BTV in a serosurvey herd near Tennant Creek in the centre of the Territory, resulting in a small expansion to the BTV zone. This was despite average rainfall but above-average temperatures across the Territory. Two serotypes were detected in Australia for the first time: BTV-5 and BTV-12. Both were detected in the Beatrice Hill sentinel herd, and were isolated from cattle without clinical signs.

In Western Australia, virology tests showed that BTV distribution remained stable, occurring only in the Kimberley region. Absence of BTV in the Pilbara region was despite above-average rainfall and temperature – conditions favourable to vectors. BTV-5 was detected in two northern sentinel herds, at Kalumburu and Kununurra, and retrospective testing indicated that this new serotype was present in Western Australia before the Northern Territory. Again, no disease was associated with this serotype. The zone of BTV transmission was expanded slightly to the south in July 2014, following the detection of virus in a serosurvey herd at Fitzroy Crossing in the southern Kimberley region.

[1] http://namp.animalhealthaustralia.com.au

[2] Viral transmission is defined as detection of evidence of viral infection based on serological monitoring of cattle

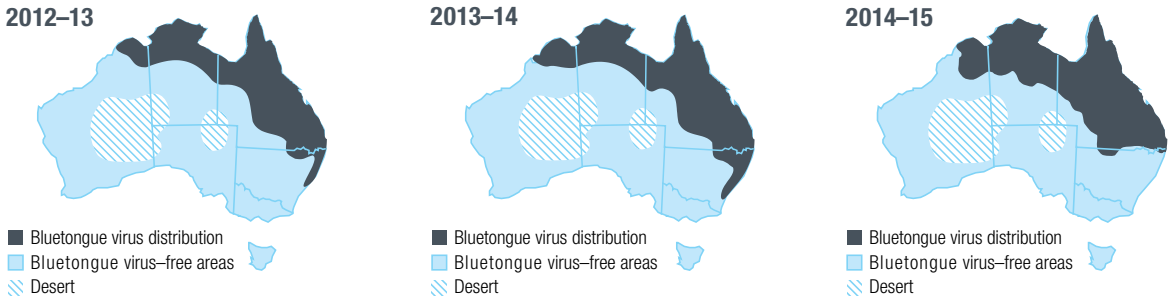
In Queensland, drought was declared across 80% of the state by the end of the arbovirus transmission season. Although rainfall was significantly below average and temperatures were above average across the state, virology work near the BTV zone boundary detected evidence of BTV, prompting four expansions of the BTV zone to the south. Zone changes occurred in central, southern and south-west Queensland between October 2014 and April 2015. The BTV zone of possible activity now comprises the vast majority of Queensland, with only arid south-western regions in the BTV-free zone. Only the endemic serotypes BTV-1 and BTV-21 were detected in Queensland.

In New South Wales, rainfall was above average along the coastal plain; however, only a single BTV seroconversion, of serotype BTV-21, was detected. This occurred in the Lismore sentinel herd on the far north coast.

C. brevitarsis, the only vector detected in New South Wales this year, was restricted to the wetter coastal regions and the Hunter Valley, which is consistent with the only occurrence of BTV. In warmer conditions near the end of the season, a few individual specimens were detected briefly at sites on the Great Dividing Range before the onset of cooler conditions.

No competent vector species were detected in South Australia, Tasmania or Victoria, consistent with the serological evidence of virus absence.

Figure 2 Distribution of bluetongue virus in Australia, 2012–13 to 2014–15



AKABANE VIRUS DISTRIBUTION

The distribution of Akabane virus (Figure 3) varies within the limits of its presumed vector, *C. brevitarsis*, occurring endemically in northern Australia (Western Australia, Northern Territory and northern Queensland) and showing a distinct seasonal spread in southern parts of Queensland and New South Wales.

In Western Australia, Akabane virus was detected at all monitoring sites (six) in the Kimberley region, except Broome in the west, and was not detected south of the Kimberley.

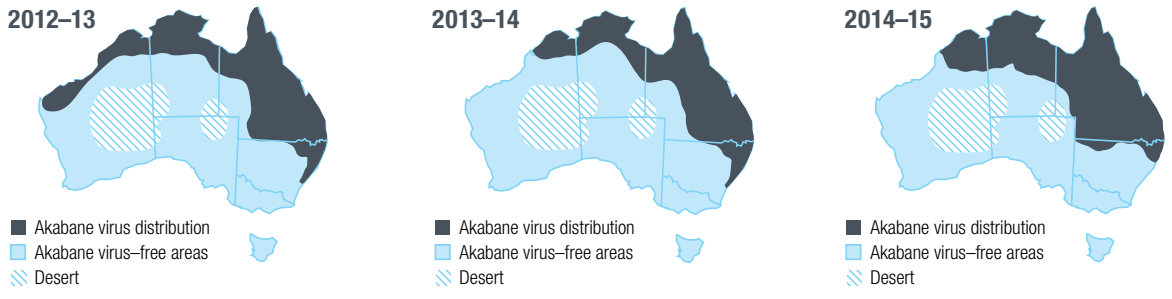
In the Northern Territory, limited virology detected Akabane virus in the central region from April 2015 to June 2015, but it was not detected in the south at Alice Springs. Sentinel herds in the northern Akabane virus endemic area were not tested.

In Queensland, Akabane virus was detected widely across the state, extending to the far south-east and far south-west.

In New South Wales, Akabane virus detection was limited to the northern coastal region between Lismore and Kempsey. This is consistent with the season's distribution of the vector *C. brevitarsis*. This region is considered endemic for Akabane virus.

Akabane virus remains undetected in South Australia, Tasmania and Victoria.

Figure 3 Distribution of Akabane virus in Australia, 2012–13 to 2014–15



BOVINE EPHEMERAL FEVER VIRUS DISTRIBUTION

BEF virus is endemic in northern Australia (Western Australia, Northern Territory and Queensland), where fever can occur in both the dry and wet seasons (spring, summer or autumn). In New South Wales and parts of southern Queensland, virus occurrence is limited by the effect of cold winters, restricting the distribution of its mosquito vector.

In Western Australia, BEF virus was detected by serology of sentinel herds in the Kimberley (from September 2014), the Pilbara (June 2015) and the Murchison regions (January 2015). Clinical signs of BEF were reported from the latter two regions. No serological or clinical evidence was detected in south-west Western Australia.

In the Northern Territory, BEF virus was first detected in September 2014 at Beatrice Hill in the north, where numerous clinical cases were also observed, and later at other northern sites and Alice Springs (January–March 2015).

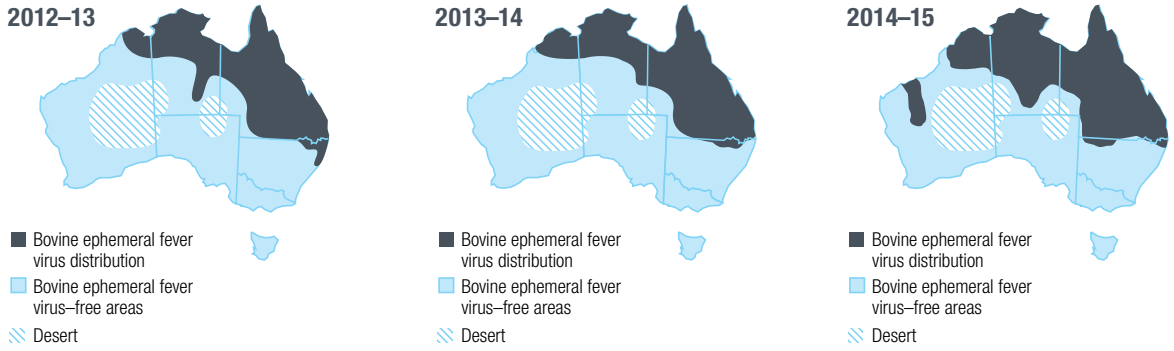
In Queensland, BEF virus was detected widely across the state, extending to the far south-east and far south-west.

In New South Wales, no BEF virology was conducted on samples from sentinel herds. Monitoring for BEF virus was dependent on investigation of suspected clinical cases and samples sent to the Virology Laboratory, Elizabeth Macarthur Agricultural Institute. One clinical case was confirmed on the far North Coast in March 2015. To support market access to North America, BEF testing will resume in 2015–16.

BEF virus was not detected in South Australia, Tasmania or Victoria.

The distribution of BEF virus is shown in Figure 4.

Figure 4 Distribution of bovine ephemeral fever virus in Australia, 2012–13 to 2014–15



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Previous annual reports are from the NAMP page of the Animal Health Australia website:
www.animalhealthaustralia.com.au/programs/disease-surveillance/national-arbovirus-monitoring-program

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