BOVINE EPHEMERAL FEVER VIRUS DISTRIBUTION

In the Northern Territory, BEF virus activity was very widespread, with seroconversions beginning in October in the most northerly sites and continuing through to April–May. There was activity at Alice Springs from January to April. Serosurvey data showed extensive activity in the Victoria River district and Barkly Tableland, and confirmed the southern extension, with activity along the Northern Territory – Queensland border. BEF virus was widespread throughout Queensland (as in previous years) and was detected at one site in the Kimberley, Western Australia.

In New South Wales, BEF virus transmission was detected on the North West Slopes and west to Bourke from April to June. Cases of BEF were also confirmed in the region from early March. A single seroconversion was detected in the sentinel herd at Dubbo, although no clinical cases were reported. On the North Coast, activity was detected in the sentinel herds from Casino south to Paterson from March to June, with cases also reported in the Hunter Valley region during April.

BEF virus was not detected in the southern states of Tasmania, Victoria or South Australia (Figure 4).

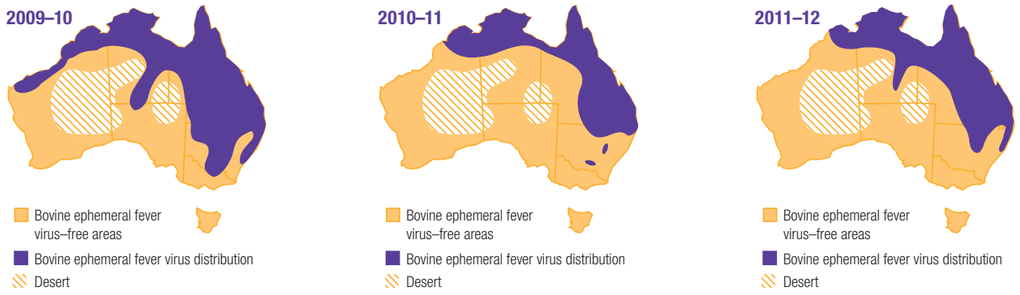


Figure 4 Distribution of bovine ephemeral fever virus in Australia, 2009–10 to 2011–12

CONTACT OFFICERS

If you would like more information about the National Arbovirus Monitoring Program, please contact the relevant officer listed below:

NAME	ORGANISATION	NUMBER
Ian Langstaff	Animal Health Australia (Program Manager)	02 6203 3909
Calista O'Neil	Australian Government Department of Agriculture, Fisheries and Forestry	02 6272 3009
Belinda Wright	Australian Government Department of Agriculture, Fisheries and Forestry	02 6272 3640
Peter Daniels	Australian Animal Health Laboratory	03 5227 5014
Peter Kirkland	New South Wales Department of Primary Industries	02 4640 6331
Lorna Melville	Northern Territory Department of Primary Industry and Fisheries	08 8999 2251
Lawrence Gavey	Department of Agriculture, Fisheries and Forestry, Queensland	07 4688 1303
Trent Scholz	Primary Industries and Regions South Australia	08 8648 5166
Mary Lou Conway	Tasmanian Department of Primary Industries, Parks, Water and Environment	03 6233 6330
Cameron Bell	Victorian Department of Primary Industries	03 5430 4545
Marion Seymour	Western Australia Department of Agriculture and Food	08 9651 0555

Further information, including the current bluetongue zoning map and previous annual reports, is available on the NAMP page of the Animal Health Australia website:

www.animalhealthaustralia.com.au/programs/disease-surveillance/national-arbovirus-monitoring-program

ISBN 978-1-921958-10-6
ISSN 1836-5418

Animal Health Australia
Australian Animal Health Council Ltd ACN 071 890 956

NAMP

OBJECTIVES OF NAMP

NAMP has three specific objectives:

- **trade support —** to facilitate the export of live sheep, cattle and goats, and ruminant genetic material to countries with concerns about bluetongue, Akabane and bovine ephemeral fever (BEF) viruses by providing scientific information for developing animal health requirements and to meet export certification requirements
- **bluetongue early warning —** to detect incursions into Australia of exotic strains of bluetongue virus (BTV) and *Culicoides* midge species (the vectors of BTV in Australia) by surveillance of the northern BTV endemic area
- **risk management —** to detect changes in the seasonal distribution of endemic bluetongue, Akabane and BEF viruses and their vectors in Australia, in support of livestock exporters and producers.

The National Arbovirus Monitoring Program (NAMP) monitors the distribution of economically important arboviruses (insect-borne viruses) of livestock and their insect vectors in Australia. Important arboviruses 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 ruminants (for both slaughter and breeding) and their semen and embryos. This trade depends on a shared confidence between Australia and its trading partners that any risks to the animal health status of the importing country can be accurately assessed and properly managed. NAMP was established to provide credible data on the nature and distribution of important arboviral infections in Australia, for use by regulatory agencies in Australia and overseas, and by livestock exporters. The program enables the Australian Government to certify to trading partners that ruminants are sourced from areas that are free from important arboviruses. In addition, NAMP data assist overseas countries to develop animal health requirements for the importation of Australian livestock and livestock semen and embryos.

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, strategic serological surveys of cattle herds and trapping of insect vectors. Blood samples from groups of young cattle that have not previously been exposed to arboviral 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* survival. This increases the likelihood of detection.

The number and locations of herds are selected to enable the distribution of important 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 assess the seasonal intensity of infection with each arbovirus. The location of monitoring sites in 2011–12 is shown in Figure 1.

To detect incursions of arboviruses from overseas, virus isolation is routinely undertaken on blood samples from one herd in the Northern Territory and four herds in northern Queensland. Virus isolation and molecular testing are also 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, Fisheries and Forestry in remote coastal regions of northern Australia, including Torres Strait.

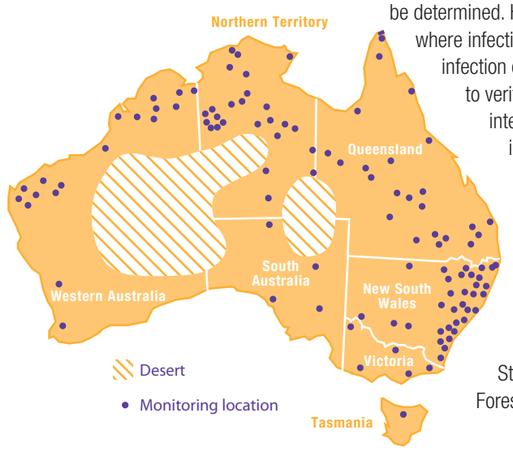


Figure 1 Location of NAMP monitoring sites in Australia, 2011–12

NAMP 2011–12

MONITORING DATA FOR 2011–12

This report describes the limits of vector and virus distribution, and the areas free from bluetongue, Akabane and BEF viruses in the 2011–12 arbovirus transmission season.

VECTOR DISTRIBUTION AND CLIMATE

The distribution of bluetongue, Akabane and BEF viruses across the Australian continent is determined by the distribution of their insect vectors. Complex interactions with geography, climate and vectors prevent the viruses from becoming established in the southern and inland areas of Australia. Consequently, these areas are continuously free from these arboviruses. In the north, and in some of the eastern and western coastal areas, the distribution of arboviruses fluctuates from year to year, depending on the distribution of their insect vectors. The principal climatic factors influencing vector distribution are rainfall and temperature.

BTV is biologically transmitted by a limited number of species of *Culicoides* midges. The important vector species in Australia feed on cattle and have all arrived in Australia on air currents from neighbouring countries. The biting midge *C. brevitarsis* is the main vector of BTV and Akabane virus in Australia. There is a close relationship 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, include *C. actoni, C. dumdumi, C. fulvus* and *C. wadai*. The main vector of BEF virus is believed to be the mosquito *Culex annulirostris*. This mosquito is less susceptible to climatic extremes than *Culicoides brevitarsis*, and often has a wider distribution.

In Western Australia, during the 2011–12 arbovirus season, rainfall was average to above average for almost all of the state. Both maximum and minimum temperatures were higher than average in the south-west and lower than average in the Kimberley. *Culicoides* trapping occurred across the state. The first Australian detection of the potential vector *Culicoides nudipalpis* was a single specimen collected in March at Kalumburu, the most northerly community in Western Australia. *C. nudipalpis* is known to occur in South-East Asia. Subsequent Kalumburu collections have contained no further specimens. The other vectors collected were *C. actoni, C. brevitarsis, C. fulvus* and *C. wadai*; these were only trapped in the north-east Kimberley, well within their usual distribution.

In the Northern Territory, rainfall in the wet season was slightly above average across the northern regions. The season was characterised by long dry periods, interspersed with short but very wet bursts. Central Australia experienced slightly above-average rainfall. In general, there were below-average maximum and minimum temperatures across all regions. *C. brevitarsis* was widespread in the north, being found at all sites and as far south as the Barkly Tableland. Its numbers were generally very low. *C. actoni* and *C. fulvus* were found only in low numbers, at all the most northerly sites. *C. wadai* was found at three of the most northerly sites, also in very low numbers. No exotic species of *Culicoides* were found.

In Queensland, above-average summer rainfall was received for the second successive year, resulting in flooding in some areas. The distribution of *C. brevitarsis* was again extensive, spreading well into western Queensland. *C. actoni* and *C. wadai* were restricted to the east coast and Cape York, as in previous years. *C. dumdumi* was not collected. *C. fulvus* was collected again on Cape York, as in the previous year, but not elsewhere. Genetic analyses indicate that the population in Queensland came from New Guinea rather than from the Northern Territory. *C. flavipunctatus* (a single specimen of which was collected the previous year in Torres Strait) was not detected. *C. oxystoma* was again collected on Cape York, but not elsewhere. Genetic analyses indicate that this population probably originated in the Northern Territory.

New South Wales experienced higher than average rainfall and lower than average temperatures in January, which resulted in some localised flooding in the north and far west of the state. This weather pattern suppressed the vector populations, compared with the previous three seasons. The annual southerly migration of *C. brevitarsis* extended into the Hunter Valley and as far south as Cattai (near Windsor). In north-west New South Wales, *C. brevitarsis* (usually limited to the Inverell and Wallangra districts) was detected in Moree, with very low numbers trapped in February, March and April. The vector *C. wadai* was not detected in New South Wales in the 2011–12 season.

Victoria experienced a warmer than average start to the monitoring season, followed by a slightly warmer, wetter and more humid summer than usual, and a wet autumn in the eastern half of the state. South Australia experienced above-average rainfall for the second half of 2011. No vectors of BTV were detected in Victoria, South Australia or Tasmania.

BLUETONGUE VIRUS DISTRIBUTION

Clinical bluetongue disease has not been observed in commercial flocks and 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.

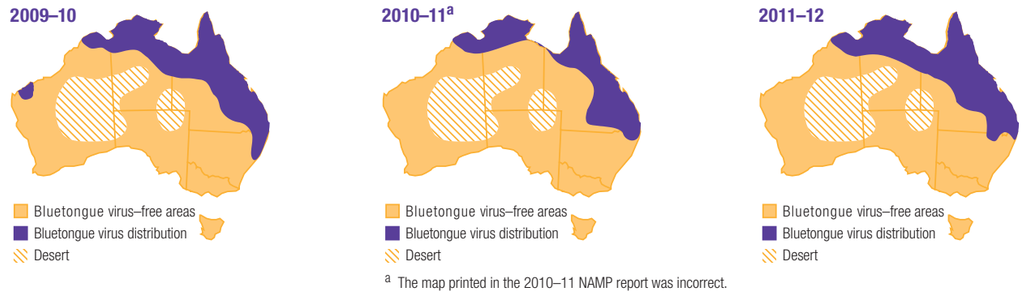
Monitoring data showed that BTV continued to be endemic in far northern Australia, including the Kimberley region of Western Australia, where serotypes BTV-1, BTV-20 and BTV-21 were detected. BTV also occurred within its usual limits in the Northern Territory, Queensland and New South Wales (Figure 2).

In the Northern Territory, activity was detected in all northern sentinel sites except Garrithiya and Victoria River. There was a single BTV-1 conversion at Beatrice Hill in July 2011, a spillover from the previous season, and it did not persist. At Beatrice Hill, new conversions began in November 2011 and continued through to May 2012. Serotyping and virus isolation showed that BTV-1 was active from November to April, and BTV-20 in April and May. BTV-1 and BTV-20 were also detected at other northern sites, with most seroconversions in April and May. Serosurvey data showed BTV-1 activity in the Victoria River district and the Barkly Tableland, and a single focus of BTV-21 in the lower eastern Barkly.

Most of the Queensland sites showed evidence of BTV transmission in March through to June 2012. BTV-1, BTV-15 and BTV-21 were detected, by serology and virus isolation, in Queensland, with BTV-21 being more active. This is the first time that BTV-15 has been detected in Queensland. BTV-21 was not detected in Queensland from July 2011 to July 2012.

In New South Wales, BTV transmission was detected in herds in the North West Slopes region from April to June 2012. This resulted in the expansion of the zone of possible bluetongue transmission to the south and west in north-east New South Wales and into southern Queensland. Transmission of BTV-21 was confirmed by type-specific PCR (polymerase chain reaction) and VNT (viral neutralisation testing). There was no evidence of clinical disease. BTV transmission was also detected on the far North Coast at Casino in June 2012. BTV-1 was detected by VNT.

All regions in southern Australia and most pastoral regions in eastern Australia remain BTV free.



[a] The map printed in the 2010–11 NAMP report was incorrect.

Figure 2 Distribution of bluetongue virus in Australia, 2009–10 to 2011–12

AKABANE VIRUS DISTRIBUTION

Monitoring data continued to show Akabane virus transmission in the Kimberley region of Western Australia, throughout the north of the Northern Territory and throughout Queensland, where distribution of the virus was similar to that of BTV.

In New South Wales, Akabane virus was detected over a greater area than in 2010–11. Within the known endemic range, transmission was detected on the coastal plain south to Camden, on the eastern ranges at Armidale and extending west along the Hunter Valley to Singleton. There was also transmission across the North West Slopes region. Transmission was detected from December 2011, commencing on the far North Coast, through to June in the south.

Akabane virus was not detected in the southern states of South Australia, Victoria or Tasmania (Figure 3).

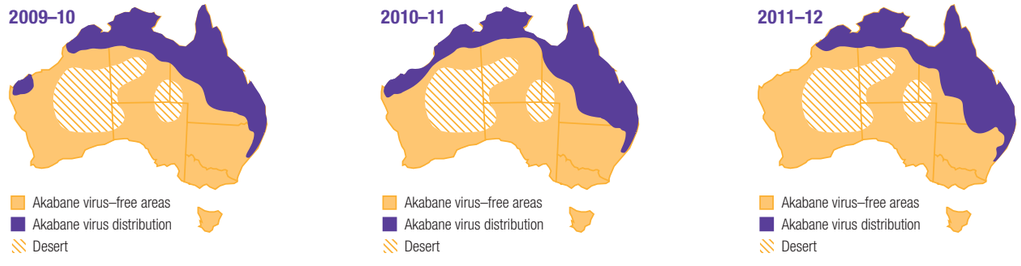


Figure 3 Distribution of Akabane virus in Australia, 2009–10 to 2011–12

[1] www.animalhealthaustralia.com.au/programs/disease-surveillance/national-arbovirus-monitoring-program
[2] Viral transmission is defined as detection or evidence of viral infection based on serological monitoring of sentinel cattle.