

Risk of airborne introduction of BTV and EHDV to Great Britain from the near Continent.

Time period: 28 August to 03 September 2024.

This report describes the retrospective risk of entry of bluetongue virus (BTV)- or epizootic haemorrhagic disease virus (EHDV)- infected midges into Great Britain (GB) from the near Continent over the previous week. It does not attempt to predict the future risk of virus entry or consider the historical risk earlier than the time period stated above.

We estimate the overall risk of airborne introduction of infectious BTV-infected midges to GB from the near Continent over the last week to have been “High”, meaning it is very likely that infectious BTV-infected midges have been blown into GB over the previous week. We consider there to have been a non-negligible risk of incursion of infectious BTV-infected midges (meaning that the risk cannot be discounted) from French, Belgian, Dutch, and German sources over the last week.

Counties in the South West and South East regions (Appendix C) were identified as being at potential risk of incursions from French sources (High risk). Our estimate of the risk from French sources considers both the potential for incursions of BTV-3 and incursions of BTV-8 – the latter of which remains uncertain due to limited knowledge of the current infection status of midges and susceptible livestock in the high-risk area of France. The current restricted reported distribution of BTV-3 in France means that the risk of incursions of this strain of virus specifically may be lower than that reported here, with counties in the South East region most at risk of incursions.

Counties in East Anglia and the South East were identified as being at potential risk of incursions from Belgian sources (Medium risk). Counties in East Anglia, the South East and the North East were identified as being at potential risk of incursions from Dutch sources (Low risk). Counties in East Anglia and the North East were identified as being at potential risk of incursions from German Sources (Very Low risk).

We estimate the overall risk of airborne introduction of infectious EHDV-infected midges to GB from the near Continent over the last week to have been “Negligible”, meaning that the risk was low enough to not merit consideration.

We also consider vector activity and temperatures in coastal and near-coastal areas in the south and east of England (the areas of GB most at risk of airborne virus incursions) over the previous two weeks to estimate the potential risk of onwards spread of BTV within these areas should an incursion have occurred.

We estimate that the risk of spread of BTV over the last two weeks if incursions did occur was “Very High” in the South East and East Anglia (meaning that conditions were almost certain to have been suitable for onwards transmission in these regions); “High” in the South West (meaning that conditions were very likely to have been suitable for onwards transmission in these regions); and “Medium in the North East (meaning that temperatures were likely to have been suitable for onwards transmission in these regions).

Preliminary outbreak assessments of the BTV and EHDV situation in Europe are available, which also consider other potential routes of virus entry.

Read about [Bluetongue virus in Europe \(GOV.UK\)](#)

Read about [Epizootic haemorrhagic disease in Europe \(GOV.UK\)](#)

More details on our risk estimates and the evidence underlying these are provided in the seven tables in the report below. For each of BTV and EHDV, we provide three tables which describe the risk of airborne incursions. These represent:

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- Our estimate of the risk of incursion of midge vectors (regardless of infection status) from each high-risk source country (with this risk shown in the top row of the table).
- Our estimate of the risk of incursion of infectious midge vectors from each high-risk source country (with this risk shown in the top row of the table).
- Our estimate of the uncertainty surrounding the country-specific risk of incursion of infectious vectors, accounting for our knowledge of relevant processes and the available data (with this uncertainty shown as the top row of the table).

We also provide a table showing our estimates of the risk of virus spread within high-risk areas of GB (which considers both vector feeding behaviour and temperature suitability for virus replication and spread).

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1. Risk of airborne BTV incursion into GB from high-risk countries on the Continent.

	France	Belgium	Netherlands	Germany	Denmark
Risk of vector incursion into GB from source country	High: It is very likely that midges have been blown into GB over the previous week.	Medium: It is likely that midges have been blown into GB over the previous week.	Low: It is unlikely that midges have been blown into GB over the previous week.	Very Low: It is very unlikely but not impossible that midges have been blown into GB over the previous week.	Negligible: No midges are expected to have been blown into GB over the previous week.
Incursion risk distribution	Potential risk of vector incursions into South West and South East regions.	Potential risk of vector incursions into East Anglia and South East regions.	Potential risk of vector incursions into the North East, East Anglia and South East regions.	Potential risk of vector incursions into the East Anglia and North East regions.	Not Applicable

	France	Belgium	Netherlands	Germany	Denmark
Risk of incursion of infectious BTV-infected vectors into GB from source country	High: It is very likely that infectious BTV-infected midges have been blown into GB over the previous week.	Medium: It is likely that infectious BTV-infected midges have been blown into GB over the previous week.	Low: It is unlikely that infectious BTV-infected midges have been blown into GB over the previous week.	Very Low: It is very unlikely but not impossible that BTV-infected midges have been blown into GB over the previous week.	Negligible: No infectious BTV-infected midges are expected to have been blown into GB over the previous week.
Vector activity in source country	Thought to be active and feeding in source country.	Thought to be active and feeding in source country.	Thought to be active and feeding in source country.	Thought to be active and feeding in source country.	Thought to be active and feeding in source country.
Temperatures in source country	Suitable for BTV spread.	Suitable for BTV spread.	Suitable for BTV spread.	Suitable for BTV spread.	Suitable for BTV spread.
Current BTV status of source country	Country considered endemic for BTV-4 and BTV-8 (but BTV-4 not currently thought to be present in the mainland).	1,985 BTV-3 cases reported in country between 01 June and 02 September, including in the high-risk area.	6,384 BTV-3 outbreaks (1,767 clinical and 4,617 PCR-confirmed) reported in country between 01 June and 29 August, including in the high-risk area.	7,002 BTV-3 outbreaks reported in country between 01 June and 04 September, including in the high-risk area.	65 reports of BTV-3 in country between 01 June and 03 September, including in the high-risk area.

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	342 BTV-3 outbreaks reported in country between 01 June and 30 August, including around nine within high-risk area (all in the east).				
Livestock immunity in the source country	Some immunity to BTV-8 expected due to natural infection and vaccination. No immunity to BTV-3 expected before the current outbreak. Voluntary BTV-3 vaccination recently implemented in the North of the country.	Some immunity to BTV-3 expected due to natural infection and vaccination.	Some immunity to BTV-3 expected due to natural infection and vaccination.	Some immunity to BTV-3 expected due to natural infection and vaccination.	No immunity to BTV expected before the current outbreak as no natural spread or vaccination in recent years. Voluntary BTV-3 vaccination recently implemented in the country.

	France	Belgium	Netherlands	Germany	Denmark
Uncertainty in BTV incursion risk estimate	Moderate: Some information or data are lacking or incomplete. Subjective judgement is introduced with supporting evidence.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.
Knowledge of current livestock infection in high-risk area of source country	Moderate uncertainty. A total of 152 new reports of BTV-3 infection in the country between 23 and 30 August, including five additional reports in the east of the high-risk area. Reports of infection with new strain of BTV-8 continue to spread, but this strain has	Low uncertainty. A total of 733 new reports of BTV-3 infection in the country between 26 August and 02 September, including in the high-risk area. Level of surveillance activities is unknown.	Low uncertainty. In total 1,149 new outbreaks of BTV-3 in country reported between 23 and 28 August, including in the high-risk area. Vaccine efficacy is unclear. Current level of immunity is unknown (although average seroprevalence in	Low uncertainty. A total of 1,560 new outbreaks of BTV-3 in the country have been reported between 29 August and 04 September. Vaccine efficacy is unclear. Current level of immunity is also unknown.	Low uncertainty. There have been 41 new outbreaks of BTV-3 reported in the high-risk area of the country, between 28 August and 03 September.

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	not yet been detected in the high-risk area. The exact number of cases is unknown. Level of surveillance activities is unknown. Current level of immunity also unknown. Vaccine coverage or efficacy remains unclear.	Vaccine coverage has been reported as high, but vaccine efficacy is unclear. Current level of immunity is also unknown.	unvaccinated dairy cattle and immediately after the 2023 transmission season has been estimated as 23% and 10%, respectively – but considerable variation between regions).		
Knowledge of current vector infection in high-risk area of source country	Moderate uncertainty. Livestock infection BTV-8 status in high-risk area unknown, confirmed cases of BTV-3 and new cases of the new strain of BTV-8 in the country are being reported.	Low uncertainty. Knowledge of recent livestock infection in high-risk area.	Low uncertainty. Knowledge of recent livestock infection in high-risk area.	Low uncertainty. Knowledge of recent livestock infection in high-risk area.	Low uncertainty. Knowledge of recent livestock infection in high-risk area.
Other comments on uncertainty	Uncertainty remains Moderate despite confirmation of BTV-3 in the high-risk area due to continued uncertainty around BTV-8 infection in this area. The risk of BTV incursion therefore considers the whole high-risk area of France (not just the eastern area where BTV-3 has been detected).	None	None	None	None

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2. Risk of airborne EHDV incursion into GB from high-risk countries on the Continent.

	France	Belgium	Netherlands	Germany	Denmark
Risk of vector incursion into GB from source country	High: It is very likely that midges have been blown into GB over the previous week.	Medium: It is likely that midges have been blown into GB over the previous week.	Low: It is unlikely that midges have been blown into GB over the previous week.	Very Low: It is very unlikely but not impossible that midges have been blown into GB over the previous week.	Negligible: No midges are expected to have been blown into GB over the previous week.
Incursion risk distribution	Potential risk of vector incursions into South West and South East regions.	Potential risk of vector incursions into East Anglia and South East regions.	Potential risk of vector incursions into the North East, East Anglia and South East regions.	Potential risk of vector incursions into the East Anglia and North East regions.	Not Applicable

	France	Belgium	Netherlands	Germany	Denmark
Risk of incursion of infectious EHDV-infected vectors into GB from source country	Negligible: No infectious EHDV-infected midges are expected to have been blown into GB over the previous week.	Negligible: No infectious EHDV-infected midges are expected to have been blown into GB over the previous week.	Negligible: No infectious EHDV-infected midges are expected to have been blown into GB over the previous week.	Negligible: No infectious EHDV-infected midges are expected to have been blown into GB over the previous week.	Negligible: No infectious EHDV-infected midges are expected to have been blown into GB over the previous week.
Vector activity in source country	Thought to be active and feeding in source country.	Thought to be active and feeding in source country.	Thought to be active and feeding in source country.	Thought to be active and feeding in source country.	Thought to be active and feeding in source country.
Temperatures in source country	Recent temperatures in high-risk area considered suitable for virus transmission.	Recent temperatures in high-risk area considered suitable for virus transmission.	Recent temperatures in high-risk area considered suitable for virus transmission.	Recent temperatures in high-risk area considered suitable for virus transmission.	Recent temperatures in high-risk area considered suitable for virus transmission.
Current EHDV status of source country	344 EHDV outbreaks have been reported in the country between 01 June and 02 September (all located outside the high-risk area).	Country considered free of EHDV.	Country considered free of EHDV.	Country considered free of EHDV.	Country considered free of EHDV.

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Livestock immunity in the source country	No known immunity in the high-risk area.	No immunity to EHDV expected as no natural spread or vaccination.	No immunity to EHDV expected as no natural spread or vaccination.	No immunity to EHDV expected as no natural spread or vaccination.	No immunity to EHDV expected as no natural spread or vaccination.
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	France	Belgium	Netherlands	Germany	Denmark
Uncertainty in EHDV incursion risk estimate	Moderate: Lack of knowledge and/ or data. Subjective judgement is introduced with supporting evidence.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.
Knowledge of current livestock infection in high-risk area of source country	Moderate uncertainty. Infection was reported last season. All outside high-risk area but some close to this area. 136 new EHDV outbreaks between 23 August and 02 September, including additional cases in the Maine-et-Loire department in the northwest of the country (around 100km from the border of the high-risk area). Level of surveillance activities unknown. Level of immunity unknown.	Low uncertainty. No reports and no suspicion of virus presence in country.	Low uncertainty. No reports and no suspicion of virus presence in country.	Low uncertainty. No reports and no suspicion of virus presence in country.	Low uncertainty. No reports and no suspicion of virus presence in country.
Knowledge of current vector infection in high-risk area of source country	Moderate uncertainty. Uncertainty in livestock infection status. Overwintering in vectors unknown.	Low uncertainty. No reports and no suspicion of virus presence in country.	Low uncertainty. No reports and no suspicion of virus presence in country.	Low uncertainty. No reports and no suspicion of virus presence in country.	Low: Relevant knowledge good and most/ all data are complete. No subjective judgement is introduced.

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Other comments on uncertainty	None	None	None	None	None
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3. BTV spread risk within GB.

High risk region	Counties in region	Estimated number of cattle in region	Estimated number of sheep in region	Vector feeding levels	Temperature suitability for virus spread
South West	Cornwall Devon Dorset Somerset Wiltshire	1,533,622	1,540,170	Vectors are known to have been feeding on livestock over the last two weeks.	High: Temperatures in the high risk region of GB were very likely to have been suitable for BTV transmission by vectors over the previous week.
South East	Hampshire Isle of Wight East Sussex West Sussex Kent	204,573	434,680	Vectors are known to have been feeding on livestock over the last two weeks.	Very High: Temperatures in the high risk region of GB were almost certainly suitable for BTV transmission by vectors over the previous week.
East Anglia	Essex Suffolk Norfolk	133,490	145,925	Vectors are known to have been feeding on livestock over the last two weeks.	Very High: Temperatures in the high risk region of GB were almost certainly suitable for BTV transmission by vectors over the previous week.
North East	Lincolnshire East Riding of Yorkshire North Yorkshire Durham Tyne & Wear Northumberland	764,208	2,044,607	Vectors are known to have been feeding on livestock over the last two weeks.	Medium: Temperatures in the high risk region of GB were likely to have been suitable for BTV transmission by vectors over the previous week.

Estimates of numbers of cattle and sheep in the different regions as shown in the table above are taken from recent LDDG reports:

- [Livestock Demographic Data Group: Cattle population report 2023](#)
- [Livestock Demographic Data Group: Sheep population report 2023](#)

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Appendix A: Risk and uncertainty levels used in the assessment.

Risk level	Probability range	Likelihood statement
Negligible	Less than 1 in 1 million	So rare that it does not merit to be considered
Very Low	Between 1 in one million and 1 in one thousand	Very unlikely but cannot be excluded
Low	Between 1 in one thousand and 0.05	Unlikely but could occur
Medium	Between 0.05 and 0.50	Likely
High	Between 0.50 and 0.90	Very likely but not certain
Very High	Over 0.90	Almost certain

Uncertainty level	Explanation
Low	Knowledge of the relevant processes is considered good and most/ all information or data are complete. No subjective judgement is introduced.
Moderate	There is a lack of knowledge of the relevant processes and/ or some information or data are lacking or incomplete. Subjective/ expert judgement is introduced with supporting evidence.
High	There is a lack of knowledge of the relevant processes and/ or most information or data are lacking or incomplete. Subjective/ expert judgement may be introduced without supporting evidence.

Appendix B: Modelling overview.

The Met Office Numerical Atmospheric-dispersion Modelling Environment (NAME) is run twice a day to estimate the likely transport of any infected midges.

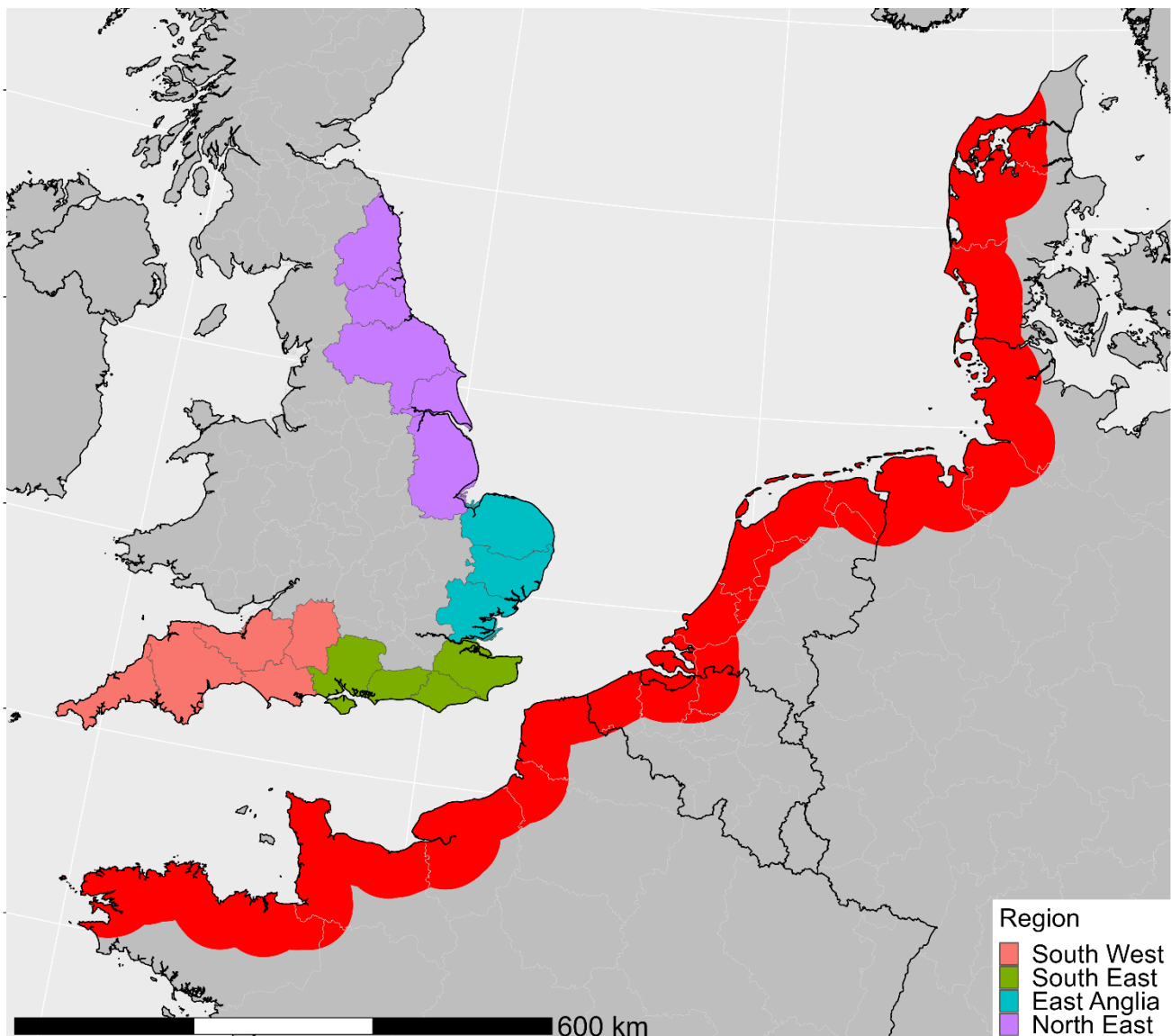
NAME is run using meteorological data from the Met Office's numerical weather prediction (NWP) model output with 1.5 km horizontal spatial resolution and hourly time resolution. Modelled particles are released over a 2-hour period at sunrise and over a 3-hour period at sunset to represent the diel periodicity of midge activity. The model particles are released from 10 m above ground level. This height is assumed to be above the normal flight boundary layer of midges, where wind speed is greater than midge flight speed, and therefore excludes midges undertaking active local-scale flight. Particles are then dispersed for 12 hours, reflecting wind-tunnel experiments on the flight duration of midges.

Particles are released from nine hypothetical source locations on the near Continent, located from north west France to western Denmark. These nine sites do not represent current observed locations of high midge activity or disease presence, but are used to give broad coverage of the coastline of the near Continent. The particles released are the NAME "midge" species, for which the particle release rate is a function of the day of the year and the local temperature, wind speed and precipitation at the source location. These midge species particles are also removed from the atmosphere either if they encounter rain rates in excess of 1 mm per hour, to represent the washout of midges, or if they pass over land any time after their first 2 hours of flight, to represent the small distances midges travel over land. The NAME midge species represents the most likely scenario for midges active on the Continent, as it takes into account the effects of seasonality and the meteorology on both take-off and survivability along the flight trajectory.

The resulting midge plumes do not represent the spread of disease, rather the spread of midges (which may or may not be infected) had they been present at the source location. The risk of airborne incursion from a particular source into mainland GB coastal counties and the Channel Islands is based upon the total number of incursions by midge plumes from that source over the previous week.

Appendix C: High risk areas in Continental Europe and GB.

We consider the 50km wide area of continental Europe shown in red below to represent the area of main interest with regards to livestock infection and temperature suitability for onwards virus spread. The coloured areas in GB represent ceremonial counties at risk of airborne virus entry and/or potential subsequent onwards spread within GB, grouped into regions as described in the report. Note that although Somerset and Wiltshire are not coastal (and are therefore not considered counties of potential incursion), they are included as counties of interest for onwards spread within GB.



This image shows a map of GB and the adjacent portion of continental Europe. Within GB, four coastal and near-coastal regions in the south and east of England are indicated. These are named as follows (and composed of the listed ceremonial counties): the South West (Cornwall, Devon, Somerset, Dorset, Wiltshire), South East (Hampshire, Isle of Wight, West Sussex, East Sussex, Kent), East Anglia (Essex, Suffolk, Norfolk), and the North East (Lincolnshire, East Riding of Yorkshire, North Yorkshire, Durham, Tyne & Wear, Northumberland). Within continental Europe, a 50km band along the coast adjacent to GB is indicated in red. This runs from western France (Brittany), through north and northwestern Belgium, Netherlands, and Germany, through western Denmark to the north of the Jutland peninsula.