



Department  
for Environment  
Food & Rural Affairs

# Setting the minimum and maximum number in badger cull areas in 2019

## **Advice to Natural England**

September 2019



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## Overview

1. Natural England is the competent authority for badger control licensing for the purpose of preventing the spread of bovine TB. It is a requirement of the Guidance and the licences to set a minimum number in advance of each year's cull in an authorisation letter that is issued to each cull company once the licensing authority is satisfied that the cull company's preparations, planning and funding are sufficient to deliver a successful cull. The purpose of setting a minimum number under the current licence is to ensure that the cull company delivers the required level of population reduction in order to achieve the expected benefits in controlling bovine TB.
2. This advice to Natural England sets out the approach for estimating the badger population in the cull areas in 2019 and the minimum number of badgers to be removed.
3. The minimum number is intended to achieve a 70% reduction of the population relative to the initial starting population. The culling objective is for no more than 30% of the starting population to remain on conclusion of the cull. The 70% target is derived from the Randomised Badger Control Trial (RBCT) where it was estimated that the culls achieved a mean of 70% control of the starting populations across the 10 areas<sup>1</sup>, which resulted in disease reduction benefits for the cattle herds in those areas.
4. Culling also needs to "*not be detrimental to the survival of the population concerned*" within the meaning of Article 9 of the Bern Convention on the Conservation of European Wildlife and Natural Habitats. For that purpose Natural England set a maximum number of badgers to be removed from the licensed area.
5. The approach to setting the minimum and maximum numbers was published by Defra in 2014 to 2018, in advice to Natural England.<sup>2 3 4 5 6 7</sup>

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<sup>1</sup> Woodroffe, R., Gilks, P., Johnston, W. T., Le Fevre, A. M., Cox, D. R., Donnelly, C. A., Bourne, F. J., Cheeseman, C. L., Gettinby, G., McInerney, J. P. and Morrison, W. I. (2008), Effects of culling on badger abundance: implications for tuberculosis control. *Journal of Zoology*, 274: 28–37. doi:10.1111/j.1469-7998.2007.00353.x

<sup>2</sup> Setting the minimum and maximum numbers for Year 2 of the badger culls. Advice to Natural England. August 2014  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/347536/badger-cull-setting-min-max-numbers-2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/347536/badger-cull-setting-min-max-numbers-2014.pdf)

6. The estimate of population size must relate to the whole culling area, including any land within that area on which no culling is planned to take place. Any population estimate will have some degree of uncertainty which leads to an interval around the population estimate within which the true population is likely to lie. However, operating with uncertainty does not prevent an effective cull from being carried out, as shown during the RBCT culls, where no minimum numbers or targets were set.
7. This advice is divided into four sections.
  - Section A covers the three areas where Supplementary Badger Culling is taking place in 2019.
  - Section B covers the areas where culling began in 2016 to 2018.
  - Section C covers the new areas that will begin culling in 2019.
  - Section D covers concluding remarks affecting all of the areas.

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<sup>3</sup> Setting the minimum and maximum numbers for Year 3 of the badger culls. Advice to Natural England. August 2015. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/456777/bovinetb-min-max-advice-glos-somerset.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/456777/bovinetb-min-max-advice-glos-somerset.pdf)

<sup>4</sup> Setting the minimum and maximum numbers in Dorset for Year 1 of the badger cull. Advice to Natural England. August 2015. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/456776/bovinetb-min-max-advice-dorset.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/456776/bovinetb-min-max-advice-dorset.pdf)

<sup>5</sup> Setting the minimum and maximum numbers in licensed badger control areas. Advice to Natural England. August 2016. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/548562/min-max-licensed-badger-control-areas-160824.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/548562/min-max-licensed-badger-control-areas-160824.pdf)

<sup>6</sup> Advice to Natural England on setting the minimum and maximum numbers in licensed badger control areas in 2017. <https://www.gov.uk/government/publications/advice-to-natural-england-on-setting-minimum-and-maximum-numbers-of-badgers-to-be-controlled-in-2017>

<sup>7</sup> Setting minimum and maximum numbers of badgers to be controlled in 2018: Advice to Natural England. <https://www.gov.uk/government/publications/advice-to-natural-england-on-setting-minimum-and-maximum-numbers-of-badgers-to-be-controlled-in-2018>

8. Areas will be ordered for numbering firstly by starting year, secondly by TB risk area with High Risk Area and Edge areas coming before Low Risk Area, thirdly by alphabetical order of the county<sup>8</sup> and fourthly by decreasing area size.
9. This year culling will continue in Area-32 in the Low Risk Area. Although the area will not have minimum and maximum numbers issued as part of their licence due to the different objective of a cull in this area, it is included here for completeness.

## Section A: Areas 1 to 3

10. In 2019, Area 1-Gloucestershire and Area 2-Somerset will continue supplementary badger control Area 3-Dorset will be Supplementary badger culling.
11. Both minimum and maximum numbers of badgers to be removed are required in order to sustain the benefits of licensed badger control while avoiding local extinction. As in 2018, for SBC areas 36% of the year one cull total is set as the baseline and the minimum and maximum numbers are set equidistant above and below the baseline so that the difference between them is equivalent to 25% of the pre-cull population. **For Area 1-Gloucestershire the minimum is therefore 125 and the maximum is 540, for Area 2-Somerset the minimum is 109 and the maximum is 578, for Area 3-Dorset the minimum is 163 and the maximum is 383.**
12. This approach will be kept under review as culling in contiguous areas and the larger size of the cull areas could affect the relative levels of immigration and reduce the comparability of cull returns to those in the RBCT. Therefore the amount of effort deployed by the cull companies and its spatial distribution will continue to be monitored given the uncertainty in the size of the remaining badger population.

## Section B: Areas 4 to 32

13. As several hundred badgers have been removed from these areas in previous culls, methods based solely on an un-culled population are no longer

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<sup>8</sup> Where an area spans county borders, the county comprising the highest proportion of an area will be used to name the area.

appropriate. Instead, as in previous years, surveys of the number of active setts were used to estimate the current population.

14. In order to ensure that accurate assessments of sett activity were available to provide robust evidence to inform an estimate of the population and minimum numbers, all cull companies were instructed to carry out a thorough sett survey programme. APHA surveyors carried out a Quality Assurance check in sample parcels across the whole of the cull areas in year two areas.
15. As described in detail in the 2015 advice to Natural England, the population can be estimated by multiplying the number of active setts by the number of badgers per active sett.
16. As described in 2017, the starting population is estimated by reducing the estimate of the population at the start of year two by one-sixth, to account for 20% population growth in the intervening period, and adding the number culled in year one. The minimum and maximum numbers are then calculated as in previous years, see Table 1 in Annex A. Given the overall uncertainty associated with the methods and the range (lower to upper limits), we consider that it is still more prudent to manage the uncertainty by defining a realistic minimum number that aims to achieve the desired level of population reduction to secure the anticipated disease control benefits than to define it too high, with a risk of removing too many badgers.
17. Areas 4,5,7 and 12 have no minimum number, this is because the population estimates indicate a population below 30% of the pre-cull population.
18. In 2018 a cull was licensed in the Low Risk Area for the first time. As explained in the December 2017 consultation document<sup>9</sup> and the Government's subsequent response<sup>10</sup>, minimum and maximum numbers are of less utility in the Low Risk Area given the different aim of the cull. However the area, Area 32-Cumbria, is included in this paper for completeness. Further details on the area and the evidence supporting a cull there is set out in Annex B.

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<sup>9</sup> Bovine TB: consultation on proposals to introduce licensed badger control to prevent the spread of bovine tuberculosis in the Low Risk Area (England)

[https://consult.defra.gov.uk/bovine-tb/badger-control-in-low-risk-area-england/supporting\\_documents/bovinetbconsultlicensecontrolraengland.pdf](https://consult.defra.gov.uk/bovine-tb/badger-control-in-low-risk-area-england/supporting_documents/bovinetbconsultlicensecontrolraengland.pdf)

<sup>10</sup> Summary of responses to the consultation on proposals to introduce licensed badger control to prevent the spread of bovine tuberculosis in the Low Risk Area (England)

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/736059/bovine-tb-lra-consult-sum-resp-updated.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/736059/bovine-tb-lra-consult-sum-resp-updated.pdf)

## Section C: New areas for 2019

19. Over the last four years, 29 successful first year culls have been carried out, these have taken place across the High Risk and the Edge Area, all taking place in the autumn and all using similarly trained contractors putting in similar levels of effort and using a mixture of controlled shooting and cage trapping. Therefore, we have a better picture of what success looks like and draw on the experience of previous culls and take the average number of badgers culled per km<sup>2</sup> in previous first year culls as the anticipated cull and set the minimum and maximum numbers equidistant around that value.
20. Using the same method as in 2018 the average number of badgers culled was taken as 3.18<sup>11</sup> badgers per km<sup>2</sup>. The minimum and maximum numbers are therefore set at 2.70 and 3.66 per km<sup>2</sup> which are equidistant about the average and maintains the 70%:95% ratio between the minimum and maximum number.
21. Given the overall uncertainty associated with all methods and the range (lower to upper limits), we consider that it is still more prudent to manage the uncertainty this year by defining a realistic minimum number that can be revised in the light of new data, than to define it too high, with a risk of removing too many badgers.
22. The minimum and maximum numbers of badgers for the new areas in 2019 are shown in table 2 of Annex A. This approach simplifies the process of setting the minimum and maximum numbers and allows companies to plan earlier without the need for complex calculations. As with previous years this range may prove too high for some areas and too low for others, but provided sufficient effort is expended the minimum and maximum numbers can be updated for a given area in the light of the experience in the field following the methodology used in previous years.

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<sup>11</sup> Standard deviation 1.18, range 1.81-7.21



## Section D: Conclusions

23. As badger culling continues we have learnt that we were often dealing with more uncertainty than we anticipated, and therefore in defining minimum numbers in subsequent years we needed to avoid false levels of confidence. As with previous years, we need to consider two realistic scenarios:
- a) that during the cull, there is accumulating evidence that the number of badgers in the cull area is low, and that the number of badgers removed, despite a high level of contractor effort sustained across the whole cull area, is towards the lower end of our estimates. In this scenario, if the minimum and maximum numbers were set too high, Natural England would need to consider adjusting the numbers down to bring them in line with the actual circumstances being observed in the cull, so as to manage the risk of too many badgers being removed; OR
  - b) that during the cull, there is accumulating evidence that the number of badgers is higher than the minimum and maximum numbers suggest, either because the cull company quickly exceeds the minimum number, or because feedback from observations suggests there is a higher level of activity observed than expected. In these circumstances, Natural England would need to consider the need to compel the cull company to continue the cull by revising the minimum and maximum numbers upwards to ensure that the optimum disease benefits can be secured.
24. Daily data collected through the course of the cull about the level of effort being applied across the cull area, and locations of badgers removed, will enable Natural England to build an assessment of progress towards the cull total. This will allow Natural England to assess whether the estimated population was a reasonable reflection of the true population.
25. If the evidence suggests that there are more badgers than the estimates indicated (e.g. because the number of badgers killed per unit effort is relatively high), Natural England will have the ability to revise the number upwards at an appropriate point, to ensure that the cull company is required to carry on the cull in order to achieve effective disease control.
26. Conversely, if the estimates are too high there will be a risk of removing too many badgers. In these circumstances, Natural England could, on the basis of careful consideration of the evidence and provided that the level of effort applied by the cull company has been sufficient, adjust the maximum number downwards at an appropriate point.

## Annex A: Minimum and maximum numbers

Table 1 Minimum and maximum numbers for cull areas in their second, third and fourth years of badger control.

Area	Minimum number	Maximum number
Area 4-Cornwall	none	142
Area 5-Cornwall	none	276
Area 6-Devon	208	1087
Area 7-Devon	none	290
Area 8-Dorset	377	1586
Area 9-Gloucestershire	282	1181
Area 10-Herefordshire	94	362
Area 11-Cheshire	701	988
Area 12-Devon	none	863
Area 13-Devon	598	1128
Area 14-Devon	268	608
Area 15-Devon	420	656
Area 16-Dorset	2205	3835
Area 17-Somerset	777	1414
Area 18-Somerset	323	575
Area 19-Wiltshire	1220	2237
Area 20-Wiltshire	593	1034
Area 21-Wiltshire	793	1434
Area 22-Cornwall	1250	2706
Area 23-Devon	1798	3043
Area 24-Devon	223	536
Area 25-Devon	827	1322
Area 26-Devon	479	901
Area 27-Devon	107	225
Area 28-Devon	392	658
Area 29-Gloucestershire	1455	2346
Area 30-Somerset	2505	4158
Area 31-Staffordshire	433	1880
Area-32 Cumbria	N/A	N/A

Table 2 Size, and minimum and maximum numbers for new areas for 2019

Area	Size (km <sup>2</sup> )	Minimum number	Maximum number
Area 33-Avon	480	1297	1758
Area 34-Cheshire	515	1389	1883
Area 35-Cornwall	1021	2756	3736
Area 36-Staffordshire	289	780	1058
Area 37-Devon	548	1479	2005
Area 38-Devon	509	1374	1863
Area 39-Dorset	390	1052	1426
Area 40-Herefordshire	1119	3020	4094
Area 41-Staffordshire	455	1228	1665
Area 42-Wiltshire	1076	2906	3939
Area 43-Wiltshire	547	1476	2001

## Annex B: Summary of Area 32-Cumbria

To ensure that the special status of the LRA remains, it is vital that we deal swiftly and decisively with any incursion of TB which involves both cattle and badgers. As such adaptive management, where assessment of the evidence and consideration of a range of options takes place annually, is required. This is so that the most effective course of action is taken to enable eradication within the shortest timescale. The Chief Veterinary Officer (CVO) advises that eradication can only be achieved in the area if infection in the badger population is addressed alongside the cattle population.

In 2018<sup>7</sup>, a simulation model was used to predict the potential epidemic length in badgers in HS21 as there was little information on the level of infection in badgers. Culling was found to be the intervention most likely to result in the removal of infection from the badger population within an acceptable timescale. This year, the results from the surveillance carried out on culled badgers<sup>12</sup> were considered by epidemiologists and ecologists to make recommendations for intervention measures in 2019.

In the central minimum infected area (MIA)<sup>13</sup>, the prevalence level in sampled badgers is similar to infection levels found in the Randomised Badger Culling Trial (RBCT) in the west and midlands of England where there is a known reservoir of disease. The prevalence in the outer cull area<sup>14</sup> was low. This confirmed that whilst the majority of infection is located in the MIA, it has spread a little further and is higher than initially estimated.

As infection was found in the outer cull area, APHA ecologists and epidemiologists advised that the boundaries of the cull area should change to take this into account. Therefore, the MIA has changed to encompass known infection in the badger population and the outer cull boundary to ensure that infection has not extended further. This has resulted in a 24km<sup>2</sup> increase in the area size.

The information from the surveillance of culled badgers was also used to update the simulation model. As was the case in 2018, the model results indicated that culling was the intervention most likely result in eradication of disease from the badger population within an appropriate timescale.

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<sup>12</sup> <https://www.gov.uk/government/publications/bovine-tb-surveillance-in-wildlife-in-england>

<sup>13</sup> Based on the infected badgers, associated farms and contiguous breakdown areas, plus a radius of the estimated average social group territory based on main sett distribution

<sup>14</sup> Based on estimated average badger social group territory size surrounding the minimum infected area, to take into account the possibility that infection may have already spread in the badger population.

The aim of badger control within the LRA is disease eradication. The CVO has considered the results and her advice is that a second year of badger culling is the most appropriate measure if we are to eradicate disease in HS21 in the shortest timeframe.