Appendix I. Habitat Suitability Modelling

Habitat Suitability Modelling (HSM) is a statistical technique that predicts the distribution of a species from environmental data and occurrence records. Geographic Information Systems (GIS) are used to combine records of echolocation calls with environmental variables, such as habitat and topography. These data are then entered into the program MaxEnt, which generates single or multiple variable models at one or more spatial scales appropriate to the species. The models tell us which variables (including features such as roads) affect the distribution of a species. Fine resolution maps can also be produced which show the interaction between a species and the environment. This method is particularly useful for species-specific analysis as it is possible to produce accurate HSMs from small datasets with relatively few presence points, unlike the GEE models above which require far more data to make robust predictions.

We used the M5 transect data to create species-specific multivariate, multiscale HSMs 4 km either side of the M5 motorway. Examples of response curves (Figure 1) and habitat suitability maps (Figures H2 and H3) from HSMs for two of the species (*M. nattereri* and *Nyctalus*/*Eptesicus* species group), and species richness maps (Figure H4) are given below.

Myotis nattereri had a strong negative association with proximity to the motorway, and positive associations with proximity to water and woodland edge, and deciduous woodland cover (Figures H1 a-d and H2). The NSL species group (*N. noctula, E. serotinus* and *N. leisleri*) was not found to have a significant association with proximity to the motorway, but had positive associations with the cover of C-roads and small woodland patches, and a negative association with large woodland patches (Figures H1 e-g and H3). There is a low probability of presence of most species (except NSL) within several hundred metres of the motorway (Figure H4). The Somerset Levels to the north, with extensive waterways and small woodland patches, are preferred (by all except NSL) to the higher ground in the south (Figure H4).

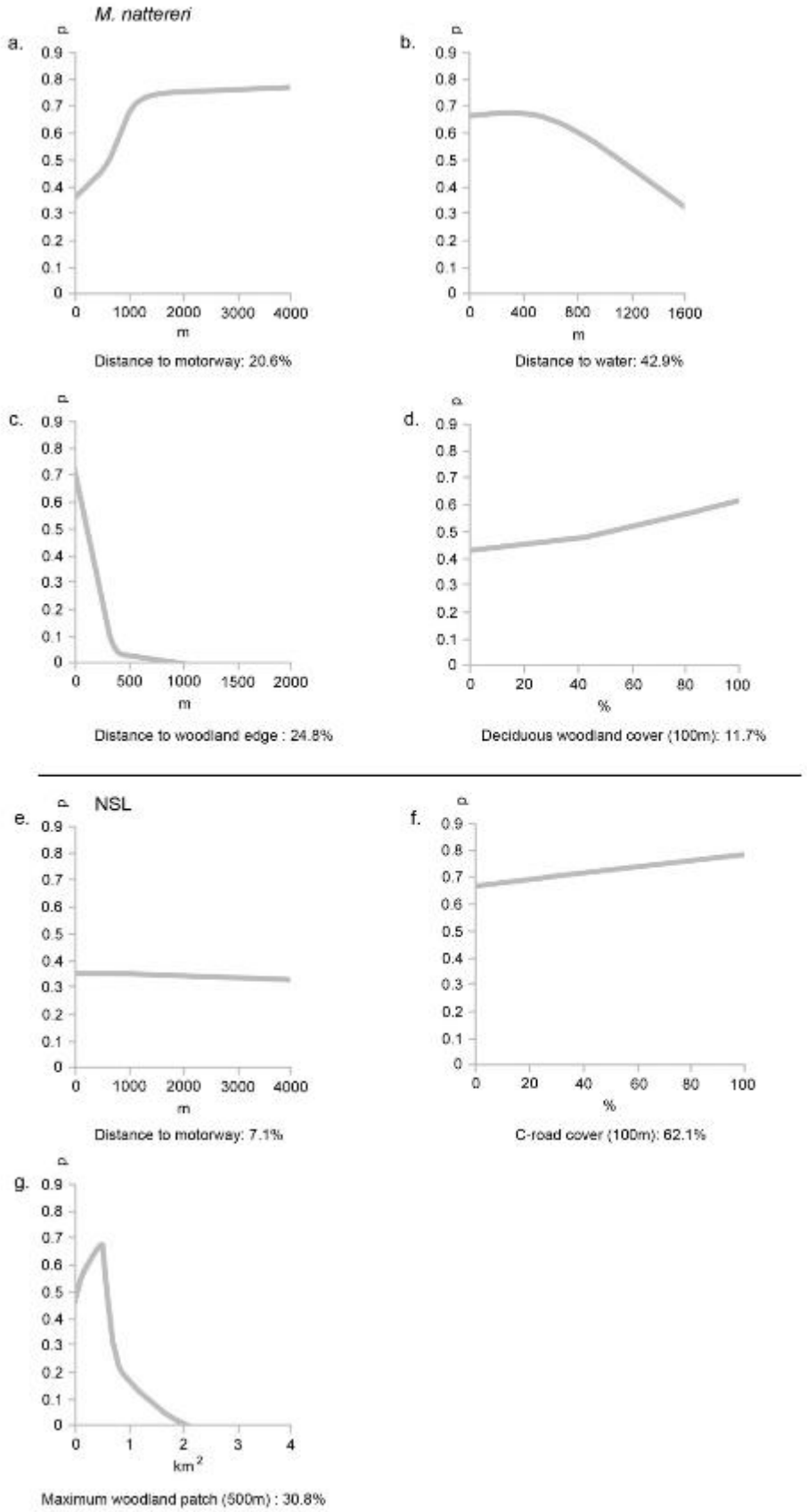

Figure H1. Response curves for *Myotis nattereri* and NSL group (*Nyctalus noctula, Eptesicus serotinus* and *Nyctalus leisleri)* from the multivariate HSM models. Graphs show the probability of a species presence (p) over the range of a variable, when other variables are held constant. The percentage contribution to the model for each environmental variable is given. The spatial scale at which each environmental variable was measured is shown in brackets.

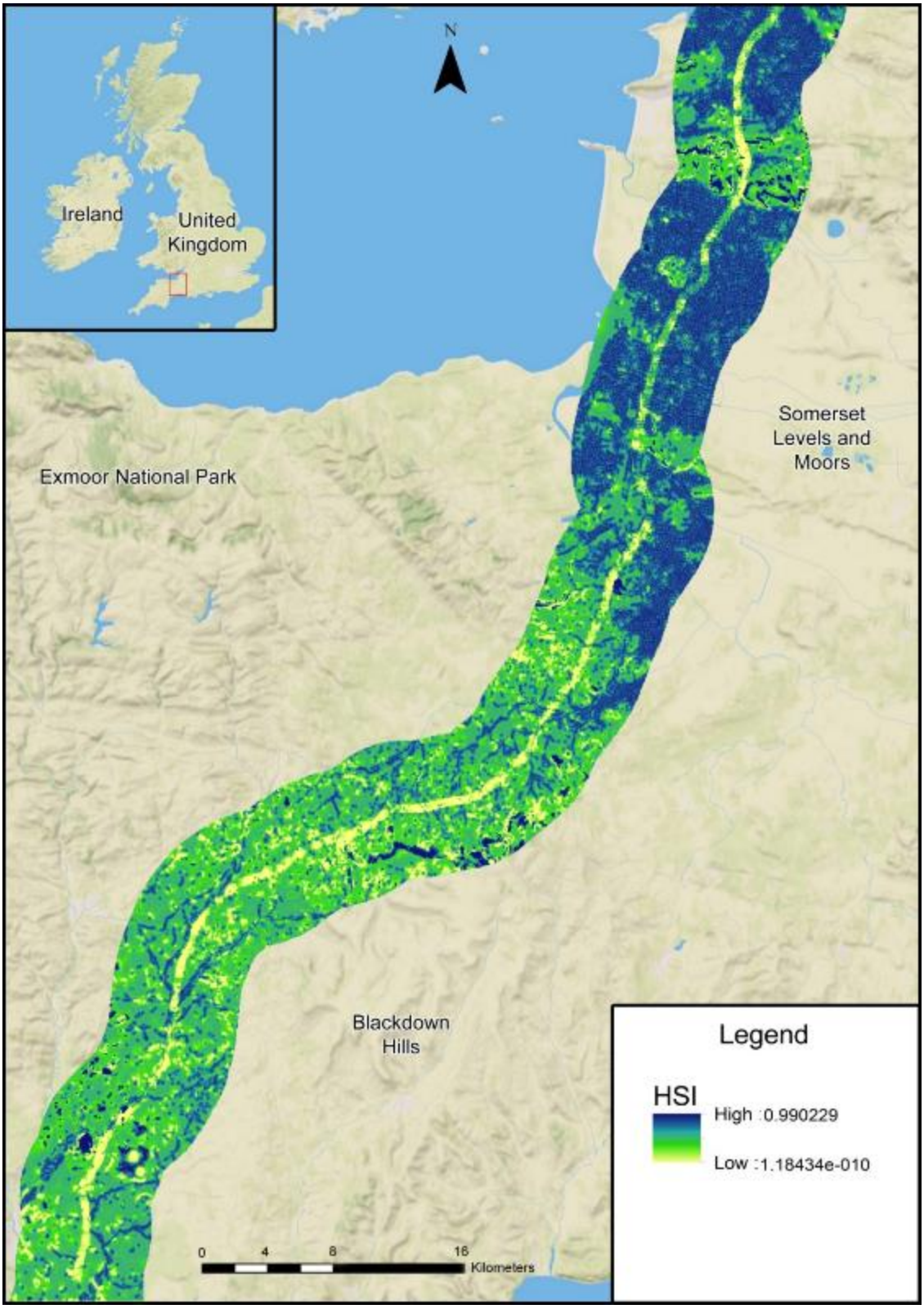

Figure H2. *Myotis nattereri* habitat suitability map (4 km either side of the M5 motorway) generated from a multivariate model. HSI = Habitat Suitability Index (0=unsuitable, 1=highly suitable).

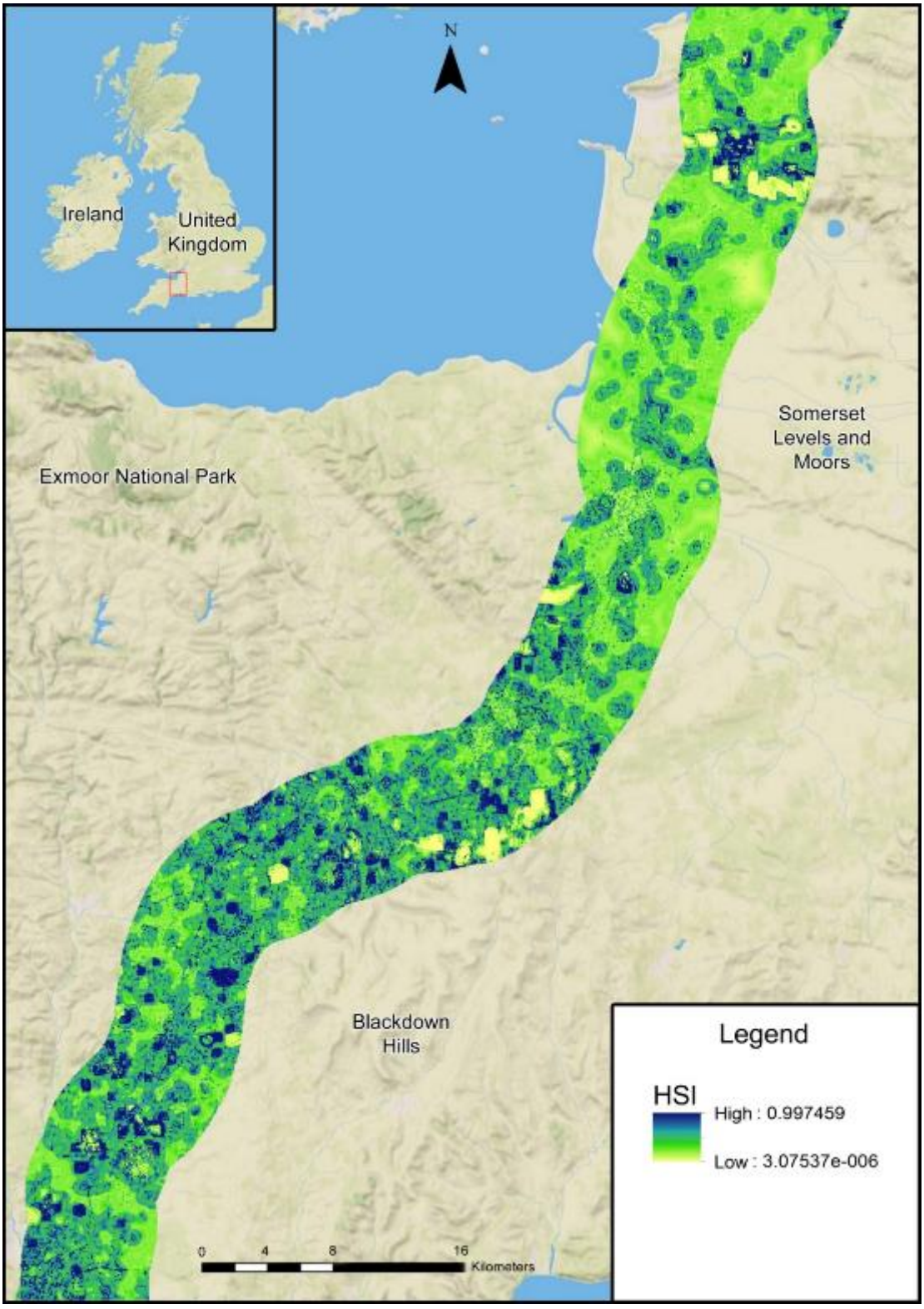

Figure H3. NSL (*Nyctalus noctula, Eptesicus serotinus* and *Nyctalus leisleri)* habitat suitability map (4 km either side of the M5 motorway) generated from a multivariate model. HSI = Habitat Suitability Index (0=unsuitable, 1=highly suitable).

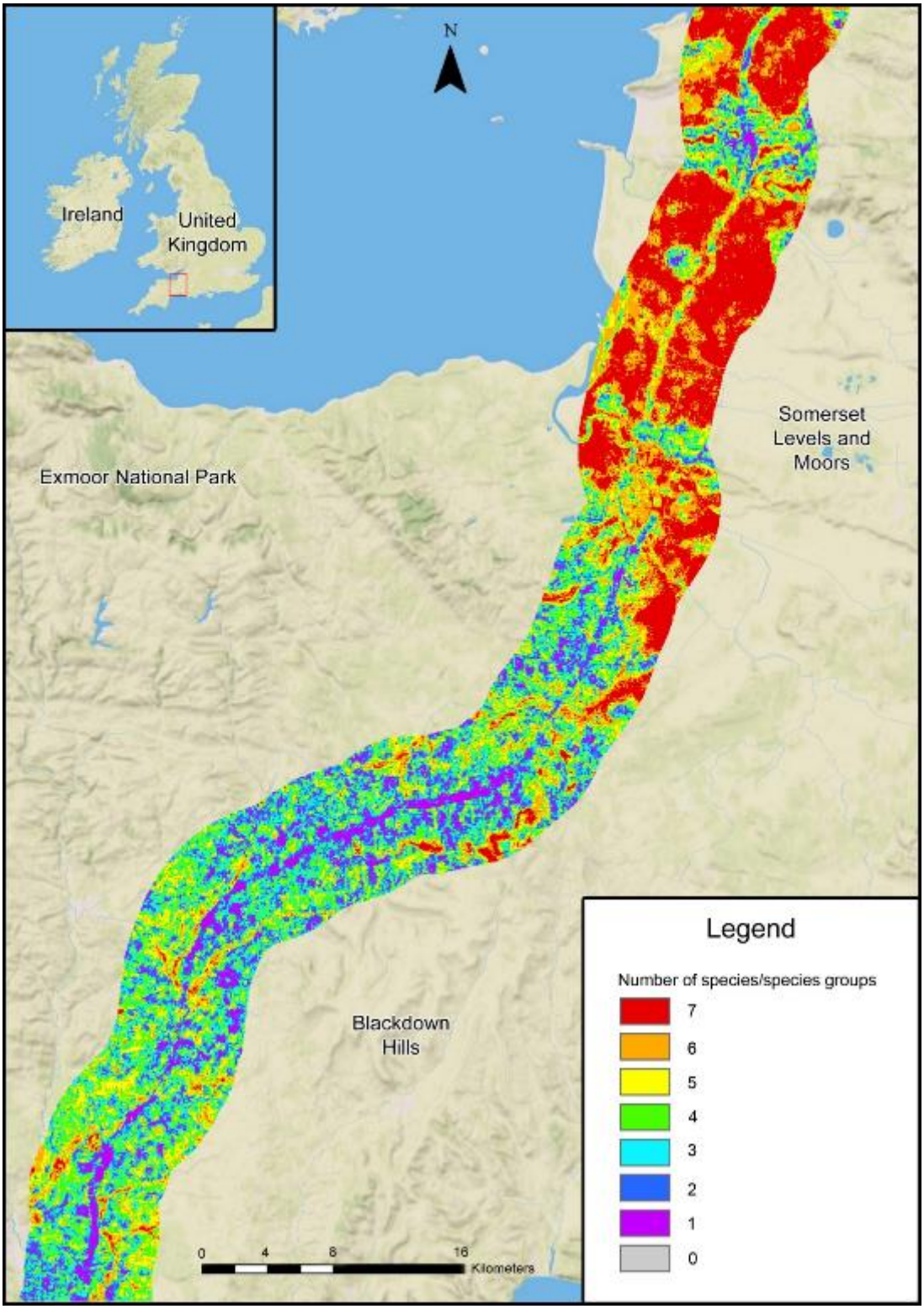

Figure H4. Species richness map showing the number of species/groups per 50x50m cell.