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Train noise mapping

Sound in the landscape and implications for wildlife

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Noise pollution is a concern both to wildlife conservation and to human health. Much research has been done on the effects of road noise on breeding birds in the adjacent landscape (e.g. Reijnen et al. 1995; Slabbekoorn & Ripmeester 2008), but the effects of train noise have not yet been studied.

I determined the pattern of amplitude decay of train noise in the natural environment. Full spectrum sound was recorded at 25, 50, 100 and 200 m intervals on transects perpendicular to a major railway line in the North of England (Fig. 1, 2). Recordings were made of a range of train models passing through woodland and open ground. Decay curves were determined using Audacity (http://audacity.sourceforge.net/) for full spectrum noise, and specifically over the frequency range of bird calls, to assess the potential for call masking and other auditory interference for birds.

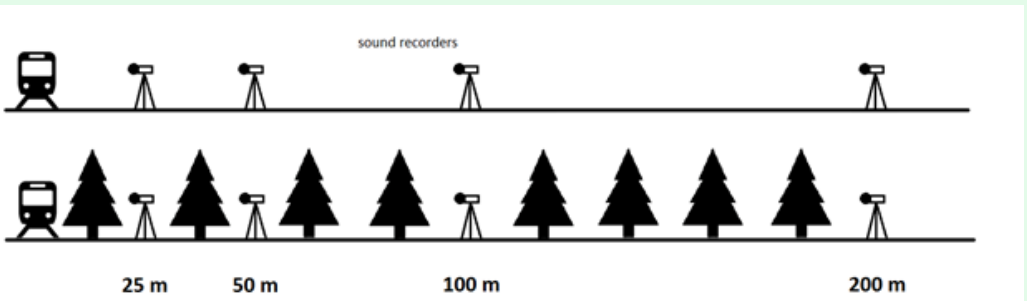

Fig. 2 – Experimental set up of microphones positioned on a transect perpendicular to the train track. Recorders were placed at a height of 1 m from the ground.

There was no significant difference in the amplitude decay curve between woodland and open ground. Some small differences (<10%) were found between some train models at some sites. Sound in the higher frequency bird call band deteriorated with a steeper curve than full frequency spectrum sound (Fig. 3, 4). This is consistent with the findings of previous studies on sound in the outdoors (e.g. Marten & Marler, 1977).

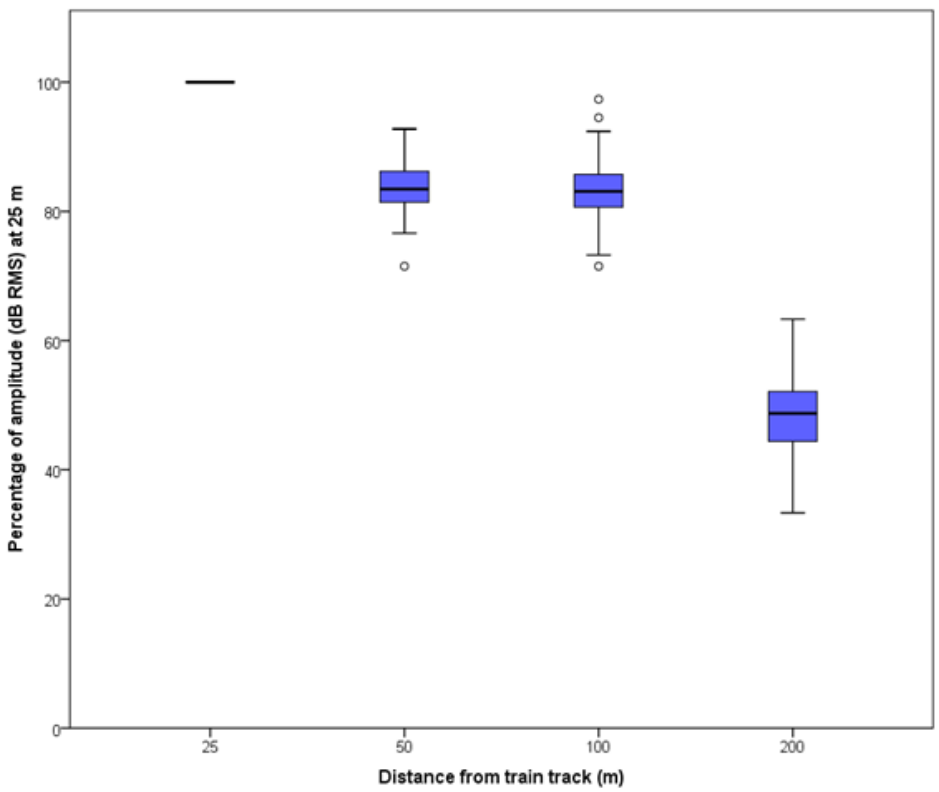

Fig. 3 – Means and interquartile ranges of peak amplitude above background of full spectrum train noise at increasing distance from a train line. Expressed as percentage of the peak (dB RMS) amplitude at 25 m from the track. Circular points signify outliers.

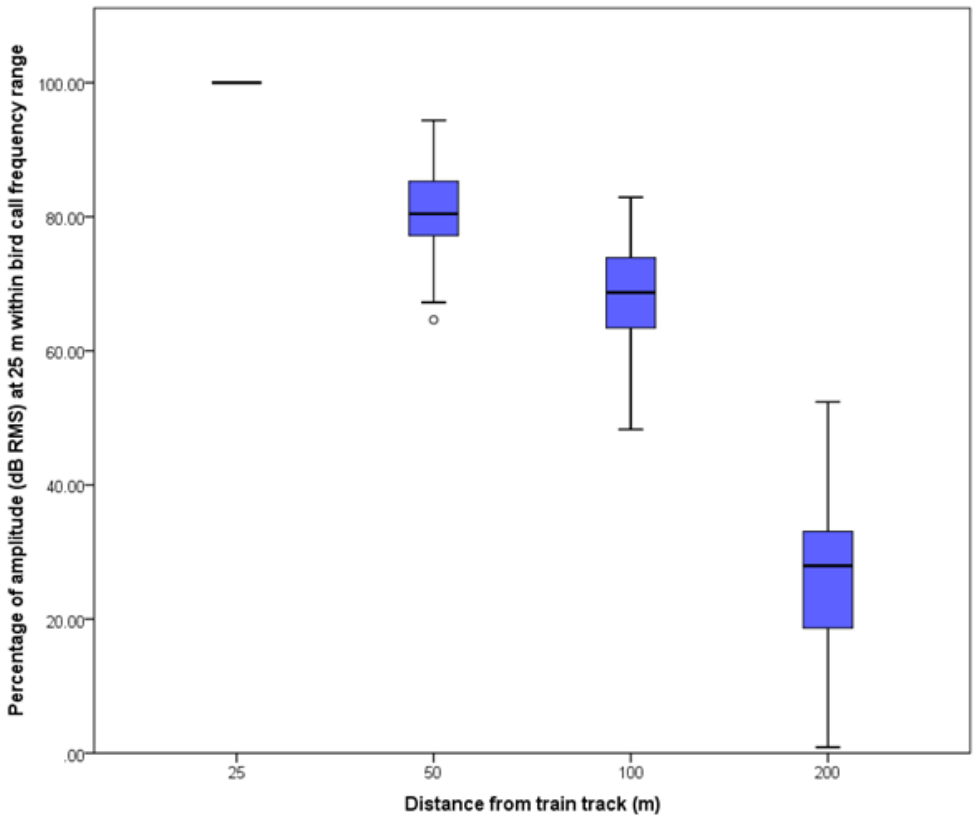

Fig. 4 – Means and interquartile ranges of peak amplitude above background, within the frequency range of typical bird calls, of train noise at increasing distance from a train line. Expressed as percentage of the peak (dB RMS) amplitude at 25 m from the track. Circular points signify outliers.

Rail noise amplitude (relative to that at 25 m) deteriorated to 50% at 200 m for full spectrum and to 30% in the bird call frequency band.

The road network in England is not only more extensive than the rail network, but generates almost continuous noise pollution over a much greater distance (amplitude falls to 50% at 900 m) relative to the intermittent noise of rail (Fig. 5, 6).

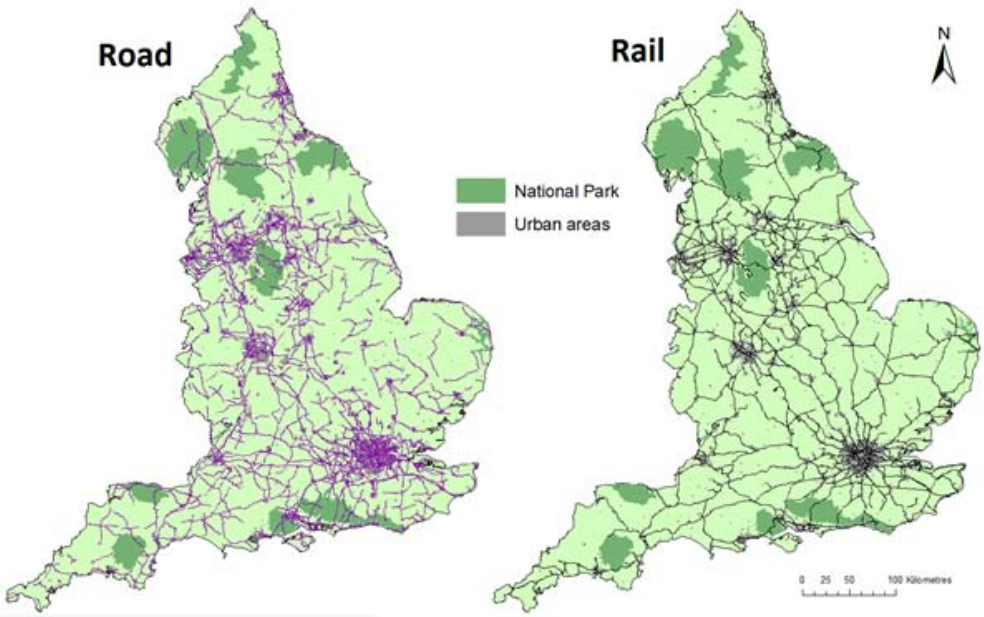

Fig. 5 – Map showing the rail and major road network in England, along with locations of National Parks and large urban areas.

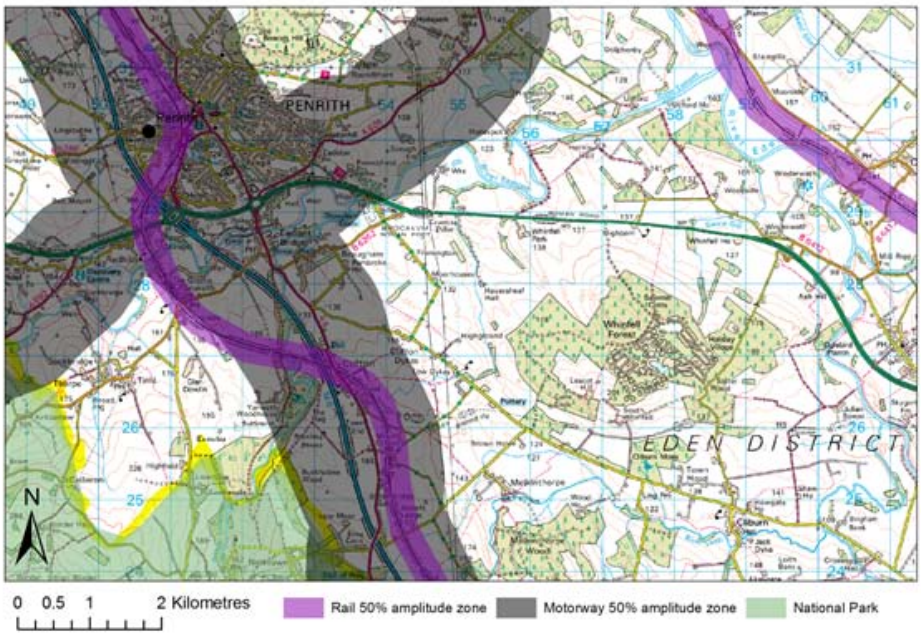

Fig. 6– Example of the differing size in 50% amplitude zone (area in which train or traffic noise is over 50% of the dB RMS amplitude directly adjacent to the source) for rail and major road networks in England. Location shown is Penrith, Cumbria in the North of England and shows the M6 motorway. Using: EDINA Digimap Ordnance Survey Service (http://edina.ac.uk/digimap). Downloaded: Jul 2012.

This study highlights a previously unforeseen environmental benefit of rail over road.

References

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