



Road testing

Sophia Cooke explains the findings of her PhD, undertaken in partnership with BTO, looking at the potential impacts of roads on birds in Great Britain.

▲ Oystercatcher abundance and that of other waders was found to be negatively associated with roads.

Great Britain has one of the densest road networks in the world with a total road length of 247,000 miles, almost ten times the Earth's circumference. Millions of vehicles utilise these roads and traffic levels in Britain have increased by over 160% in the past half-century. Air pollution from combustion engines is a source of greenhouse gas emissions and a threat to human health, which has led the UK government to pledge a ban on the sale of petrol and diesel cars by 2035. However, humans are not the only species affected by roads, and emissions are not the only problem.

When considering wildlife in the context of roads, it is easy to conjure up images of dead animals on roadsides (Cardiff University's aptly-named Project Splatter is attempting to understand patterns of road-kill around Britain – www.projectsplatter.co.uk). However, whilst mortality from collisions can affect some wildlife populations, including birds, it is not the only impact, and possibly not even the most important. Frequently overlooked, ubiquitous and invisible, noise pollution is potentially a major threat to our bird populations.

The noise levels alongside a busy road are deafening, and not only for humans.

Road noise can affect birds' abilities to communicate and to detect prey or predators. As a result, birds often avoid areas around roads, sometimes up to distances of over 1 km away. Birds that remain around roads can also suffer increased stress and reduced health – impacts that are mirrored in humans.

As well as noise and collisions, air, chemical and light pollution can also affect birds. However, the impacts of roads are not necessarily wholly negative. Roadsides often contain heterogeneous habitat, including trees and hedgerows, which can benefit some species. Roads also provide food in the form of road-kill, and perches in the form of powerlines and fences. As a result, some bird populations can exhibit higher densities near roads.

ROADS AND BIRDS IN BRITAIN

Studies on the impacts of roads on birds and other wildlife have mostly been small scale and the potential role of roads as drivers of population change at national scales has not been well studied. In Britain, we have seen substantial and widespread declines in populations of many bird species over the past 50 years, mostly attributed to changes in

agricultural practices, land use and the climate. However, these declines are also correlated with the increase in traffic volume, leading to the obvious question – is there a link?

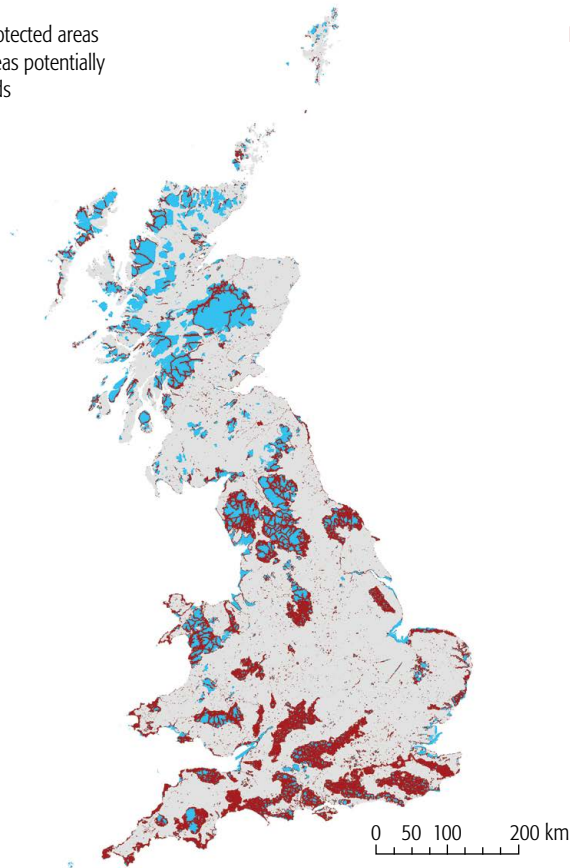
We set out to explore this possibility, by considering spatial associations between roads and bird populations across Britain. Using data from the Breeding Bird Survey (BBS), we modelled the abundance of 75 species in relation to the locations of nearby roads as well as other factors known to affect bird populations, such as habitat and climate. We then analysed patterns in these results with respect to various species characteristics, such as body mass and national population size.

▼ Yellow Wagtail numbers have declined rapidly across Britain since the 1980s.

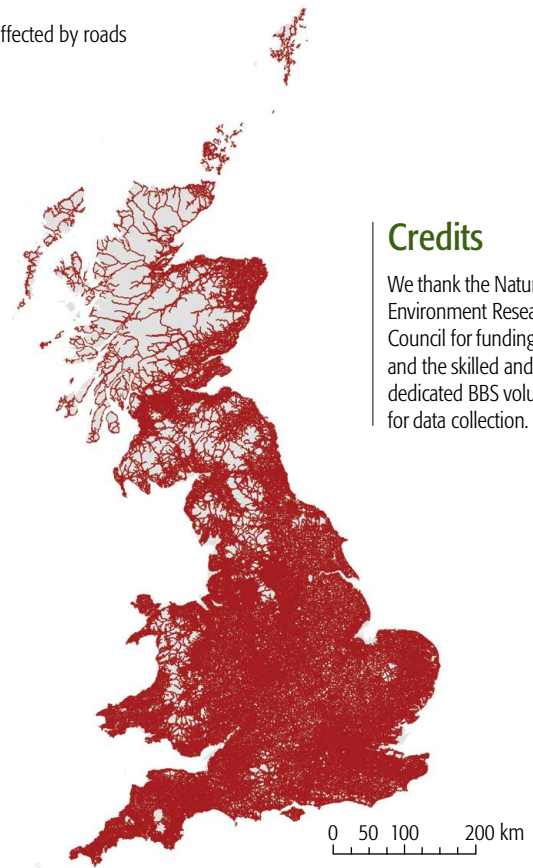


AREAS OF GREAT BRITAIN WITHIN 700 M OF A ROAD

■ Terrestrial protected areas
 ■ Protected areas potentially affected by roads



■ Potentially affected by roads

**Credits**

We thank the Natural Environment Research Council for funding and the skilled and dedicated BBS volunteers for data collection.

As part of this, we also considered the impact of roads on the ability of BBS volunteers to detect birds.

Considering detectability, we found that some species are harder to detect around roads, while others are easier. This is likely due to a combination of road noise, visibility and changes in bird behaviour. It is therefore important to consider this, where possible, in studies involving bird counts around roads, to avoid under- or over-estimation of abundance.

Moving on to populations, of the 75 species tested, 77% varied significantly in abundance around roads, with just over half showing lower relative abundance near roads, and the rest showing the opposite trend. Strikingly, for those species found in low abundance, this effect could be

detected up to an average of 700 m from a road, which represents over 70% of Britain and over 40% of the total area of terrestrial protected sites. Species with smaller national populations (e.g. Yellow Wagtail) generally had lower relative abundance around roads, whilst the opposite was true for more common species (e.g. Blackbird). Smaller-bodied and migratory species (e.g. Chiffchaff) were also found in lower relative abundance around roads.

With some species appearing to tolerate road disturbance better than others, it is possible that roads may be leading to simplification of avian communities – causing reductions of already rare species and replacement by more common ones. This phenomenon has been identified in both urban and agricultural environments, and in response to climate change, but this is the first evidence to suggest parallel impacts of roads.

LOOKING FORWARD

We need urgent mitigation of roads, in Britain and globally. The government's planned

switch to electric vehicles by 2035 will help but is not a complete solution. Road noise does not arise from engines only, but also the interaction between tyres and the road surface. Therefore, additional methods to reduce noise impacts, such as changes in road materials, and means to lessen the use of private vehicles altogether, will also be important. The COVID-19 pandemic has given us a taste of a quieter world, with the lowest levels of transport-related noise pollution in decades. I hope this aspect of the crisis can provide an incentive for change and be a preview of the future, rather than merely a glimpse of the past. ■

**Find out more**

Cooke, S. C. et al. 2019. *Ibis* **162**: 885–901.

Cooke, S. C. et al. 2020. *Journal of Applied Ecology* **57**: 1271–1282.

Cooke, S. C. et al. 2020. *Nature Communications* **11**: 3125.

◀ Many thousand Barn Owls die on Britain's roads each year.

Birds that remain around roads can also suffer increased stress and reduced health – impacts that are mirrored in humans