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Agri-Environment Schemes and Farmland Bird Populations: Is the Glass Half-Full or Half-Empty?

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European farmland biodiversity has shown dramatic declines since the second half of the 20th century (Donald *et al*., 2001). There is little doubt that for the most part, this has been driven by intensification of agricultural practices. Birds have been particularly well-studied, and year-to-year trends in farmland bird populations are used as indicators of the general health of the environment (Defra, 2015).

Agri-environment schemes (AES), whereby farmers receive payment for 'stewardship' of the countryside via various management options designed to promote biodiversity, form the main policy instrument within the European Union to address declining farmland biodiversity. In England, the main AES are based on a two-level programme of broader management practices (Entry Level Scheme or ELS), and more targeted management options (Higher Level Scheme or HLS). A huge amount of research has underpinned the precise requirements of the various options within these schemes (Newton, 2017). However, whilst some effects have been detected (Davey *et al*., 2010, Baker *et al*., 2012), there appears to have been little, if any, impact on overall farmland bird population trends, which are still in long-term decline (Hayhow *et al*., 2017).

The findings of Walker *et al.* (2018) provide the most powerful assessment to date of the efficacy of HLS on bird populations. Importantly, the study was undertaken over a relatively long-time span, and included differences between geographic regions, enabling an assessment of impacts over relatively broad spatial and temporal scales. Encouragingly, of the 17 species considered, 12 showed a significantly more positive change in abundance on HLS relative to control farms, in at least one region or period. Furthermore, on HLS farms, there was a sustained increase in the combined abundance of the 19 species which contribute to the Farmland Bird Indicator (FBI), the main monitoring tool of the state of farmland biodiversity in the UK (Defra, 2015), and as such a key contributor to environmental policy. Therefore, in general, the HLS does indeed provide a benefit to farmland bird populations, at least in the studied regions, and is therefore achieving its goal of increasing farmland bird populations.

However, the results are not all good news. The specific options of HLS are tailored to particular target species. Whilst the majority of species showed positive effects of HLS, four out of the six target species considered showed no effects whatsoever. This suggests that specific targeted options are not working, are not being adopted at a sufficiently high rate, or are being implemented erroneously. Moreover, among the species showing positive effects, there was much spatial and temporal variation. The efficacy of HLS therefore in part depends on the landscape context (each region being characterised by different predominant farming types), and also on the particular weather conditions in any given period. Crucially, Walker *et al*. (2018) used their results to make quantitative predictions about the scale of AES deployment needed in the

wider countryside to halt population declines. Despite the generally positive effects, the predictions indicated that HLS coverage was substantially less than that needed to reverse population declines: a much larger proportion of farmland bird populations needs to benefit from HLS in order to see a change in the FBI.

It should be acknowledged that HLS is not the only AES operating in England. The ELS has more generic, easily implemented, options which are designed to encourage a wider uptake. Indeed, 72% of English farmland was operating under ELS in 2013 (Walker *et al*., 2018). Similar to HLS, the efficacy of ELS shows strong regional variations (Davey *et al*., 2010). Furthermore, Baker *et al.* (2012) considered the effects of a range of AES options (largely from ELS) on farmland bird population growth rates and found mixed results. Whilst options promoting winter stubbles had consistent positive effects on granivorous species, Baker *et al.* (2012) reported that for Yellowhammer *Emberiza cirlus* at least, the area of stubble options under AES were insufficient to reverse population declines. It would be interesting to extend the approach of Walker *et al.* (2018) to make quantitative predictions on the scale of all AES (i.e. HLS, ELS and other schemes such as those involving organic farms) needed to affect the FBI. However, given the generally less marked response of farmland bird populations to the 'broad-and-shallow' approach of the ELS, it seems unlikely that increasing the already high uptake of this scheme would make much difference.

Overall, these results support the idea that, whilst HLS works in the sense that it increases bird populations, it is not being introduced at a scale which is sufficient to reverse wider declines. To a large extent, we can say that the research has worked - our understanding of the ecology of farmland birds, and hence the impacts of how agricultural management affects their populations, has increased massively over the past two decades. Thanks to this, the options provided under HLS (and in general other AES) can increase local abundances and thereby reverse at least local population declines. There are certainly some issues to address – for HLS, there needs to be an assessment of options for target species, better regionally targeted options and more options that are less sensitive to weather extremes – but the remaining big challenge is one of policy rather than research.

In common with previous research undertaken at a smaller scale (Henderson *et al*., 2012), this paper stresses that simply not enough farmland is under the right kind of management to make a difference to bird populations at larger scales. If governments are serious about reversing biodiversity losses on farmland, then either they need to change the prescriptions for AES to encourage much wider uptake, or they need to start developing entirely new initiatives to address the problem. Recent reforms to European Union agricultural policy may have been a missed opportunity to take more affirmative action (Pe'er *et al*., 2014). For the UK, where this study took place, whether Brexit presents an opportunity or a threat to farmland biodiversity remains to be seen.

References

Baker, D.J., Freeman, S.N., Grice, P.V. & Siriwardena, G.M. (2012). Landscape-scale responses of birds to agrienvironment management: a test of the English Environmental Stewardship scheme. *J. Appl. Ecol.* **49**, 871–882.

Davey, C., Vickery, J., Boatman, N., Chamberlain, D., Parry, H. & Siriwardena, G. (2010). Regional variation in the efficacy of Entry Level Stewardship in England. *Agri. Ecosyt. Environ.* **139**, 121–128.

Defra (2015). *Wild Bird Populations in the UK, 1970 to 2014.* Available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/471745/UK_Wild_birds_1970-2014__2_.pdf

Donald, P.F., Green, R.E. & Heath, M.F. (2001). Agricultural intensification and the collapse of Europe's farmland bird populations. *Proc. R. Soc. Lond. B* **268**, 25-29.

Hayhow, D.B., Ausden, M.A., Bradbury, R.B., Burnell, D., Copeland, A.I., Crick, H.Q.P., Eaton, M.A., Frost, T., Grice, P.V., Hall, C., Harris, S.J., Morecroft, M.D., Noble, D.G., Pearce-Higgins, J.W., Watts, O., & Williams, J.M. (2017). *The State of the UK's Birds 2017.* The RSPB, BTO, WWT, DAERA, JNCC, NE and NRW, Sandy, Bedfordshire.

Henderson, I.G., Holland, J.M., Storkey, J., Lutman, P., Orson, J. & Simper, J. (2012). Effects of the proportion and spatial arrangement of un-cropped land on breeding bird abundance in arable rotations. *J. Appl. Ecol.* **49**, 883–891.

Newton, I. (2017). *Farming and Birds.* William Collins, London.

Pe'er, G., Dicks, L.V., Visconti, P., Arlettaz, R., Bàldi, A., Benton, T.G., Collins, S., Dieterich, M., Gregory, R.D., Hartig, F., Henle, K., Hobson, P.R., Kleijn, D., Neumann, R.K., Robijns, T., Schmidt, J., Shwartz, A., Sutherland, W.J., Turbé, A., Wulf, F. & Scott, A.V. (2014). EU agricultural reform fails on biodiversity. *Science* **344**, 1090 -1092.

Walker, L.K., Morris, A.J., Cristinacee, A., Dadam, D., Grice, P.V. & Peach, W.J. (2018). Effects of higher-tier agri-environment scheme on the abundance of priority farmland birds. *Anim. Conserv.* in press.