



Poor soil quality may reduce farmland bird population

Researchers have investigated the relationship between soil quality and the decline of yellow wagtail birds on arable farmland in the UK. The results suggest that reduced soil penetrability in particular affects the numbers and distribution of the species.

Modern, intensive-farming methods can lead to changes in habitats with a loss in biodiversity, including farmland bird species. Degradation of soil quality, through loss of organic matter from soil erosion, causes, among others, drainage problems and pesticide leaching. Heavy machinery compacts the soil, thus 'hardening' it, resulting in reduced soil penetrability, a measure of how 'soft' soils are.

Yellow wagtails, *Motacilla flava flavissima*, have been included on the red list¹ of birds of conservation concern in the UK. Numbers declined by 65 per cent between 1972 and 2006. The study examined habitat features, including soil and favoured crop types and the nature of field boundaries, in relation to the distribution of yellow wagtails across 14 intensively cultivated farms in the UK. The findings suggest that compacted, or hard, soil on farms may be partly to blame for declining yellow wagtail populations.

The number of yellow wagtails was most strongly linked to the penetrability of soil in fields planted with crops. Fields with more penetrable soils housed greater numbers of nesting colonies of birds. Levels of organic content in the soil did not predict population levels well, even though organic content is related to how penetrable soils are.

Yellow wagtails are insect-eaters and catch food in flight or pick insects off the ground or from foliage. Even though yellow wagtails do not feed by probing the ground for food or feed on soil invertebrates, as some other birds do, hard soil may have a knock-on effect by reducing the food source of the yellow wagtails' prey.

Both soil penetrability and soil organic content in arable fields were related to the availability of flying insects, such as flies, butterflies and flying beetles, as a food source for yellow wagtails, particularly in June when food is needed to rear chicks. Although the organic content of soil was more strongly related to the supply of insects, the researchers suggest yellow wagtails might be able to gauge the penetrable condition of soils more easily than the organic content when assessing the suitability of sites for breeding in May. This was despite soil penetrability being a less suitable predictor for food supplies.

In addition, yellow wagtails scrape out a hollow in the ground to nest. Soils with greater penetrability could make construction of a nest easier for the birds. Penetrable soils are more aerated and might have better drainage and be warmer, increasing the chance of survival for chicks in the nest.

The researchers recommend protecting soils from further degradation through soil management plans, such as outlined in the EU Thematic Strategy for soil protection². Reducing the intensive use of heavy machinery, autumn sowing and irrigation of crops would benefit both farmland biodiversity and agriculture, including conservation of water resources. The impact of soil quality on other farmland bird species needs to be investigated. Local and regional conservation plans, such as implemented under The Habitats Directive³ and the Birds Directive⁴, should also consider the relationship between yellow wagtails and soil quality.

1 See: <http://www.iucnredlist.org/static/introduction>

2 See: http://ec.europa.eu/environment/soil/pdf/com_2006_0231_en.pdf

3 See: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

4 See: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

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