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Predation and upland birds

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The impacts of apparently increasing numbers of predators on avian prey populations are widely debated among stakeholders and the general public with the debate being particularly polarized in the UK. Some interest groups argue that predation is a natural process which could be mitigated mainly by habitat management, whereas other interest groups advocate culling of predators as the most efficient way to alleviate negative effects of predation.

There are no recent literature reviews of whether predation is actually limiting breeding birds in the UK. This has restricted our understanding of the perceived problem and blocked progress in resolving this conservation conflict. Here, we present results from a systematic review, which covered 66 studies, of which 18 were from upland habitats, published between 1988 and 2011. Together, these studies have examined whether 76 prey species breeding in the UK are limited by predation. For the purpose of this presentation, we focus on upland birds.

Our results confirm the notion that most avian and mammalian predators have increased numerically in the UK during recent decades. The proportion of studies reporting that predation could be a limiting factor for passerines was significantly higher for upland species (Eurasian Skylarks *Alauda arvensis*, Meadow Pipits *Anthus pratensis* and European Stonechats *Saxicola rubicola*) than for woodland and lowland agricultural species. However, overall we found little general support that predation limits songbird populations in the UK. Our review shows that mainly ground-nesting and long-lived species (i.e. upland waders and gamebirds) can be limited by nest predation, primarily by generalist predators.

Increasing evidence suggests that both post-breeding numbers and following year's breeding populations of upland waders and gamebirds can be increased by lethal predator control. The effectiveness of non-lethal predator control (e.g. fencing) has been mixed and we encourage further work in this field. However, we argue that both lethal and non-lethal predator control only address the proximate cause of high levels of predation (i.e. high number of generalist predators). A more sustainable solution would be to understand the ultimate causes of why the predation pressure, in some circumstances, is unsustainably high. There is growing evidence that land-use patterns, such as upland conifer plantations, could be linked to unsustainably high predation. For example, several studies have shown an association between short distance to forestry plantation and declining wader populations. The direct mechanism behind this, i.e. whether nest predation increases near forestry plantations or whether adult birds avoid potentially risky areas near plantations, should be established as a matter of urgency. It

is also possible, but still not studied, that large releases of non-native gamebirds for sport shooting might increase the carrying capacity of generalist predators.

In conclusion, generalist predators might limit populations of some ground-nesting non-passerines. For these species, predator removal may be necessary to halt population declines. However, this is a temporary remedy, and the ultimate causes of unsustainably high predation rates are often linked to land-use patterns. These land-uses should be changed to reduce predation on vulnerable bird species.