

Stewart, G.B., A.S. Pullin, and C.F. Coles. 2007. Poor evidence-base for assessment of windfarm impacts on birds. *Environmental Conservation* 34(1):1-11.

Abstract: Concerns about anthropogenic climate change have resulted in promotion of renewable energy sources, especially wind energy. A concern raised against widespread windfarm development is that it may negatively impact bird populations as a result of bird collision with turbines, habitat loss and disturbance. Using systematic review methodology bird abundance data were synthesized from 19 globally-distributed windfarms using meta-analysis. The effects of bird taxon, turbine number, power, location, latitude, habitat type, size of area, time since operation, migratory status of the species and quality of evidence were analysed using meta-regression. Although the synthesized data suggest a significant negative impact of windfarms on bird abundance, there is considerable variation in the impact of individual windfarm sites on individual bird species, and it is unclear if the negative impact is a decline in population abundance or a decline in use owing to avoidance. Anseriformes experienced greater declines in abundance than other taxa, followed by Charadriiformes, Falconiformes and Accipitriformes, and Passeriformes. Time since windfarms commenced operation also had a significant impact on bird abundance, with longer operating times resulting in greater declines in abundance than short operating times. Other variables, including turbine number and turbine power either had very weak but statistically significant effects or did not have a significant effect on bird abundance. Windfarms may have significant biological impacts, especially over longer time scales, but the evidence-base is poor, with many studies being methodologically weak, and more long-term impact assessments are required. There is clear evidence that Anseriformes (wildfowl) and Charadriiformes (waders) experience declines in abundance, suggesting that a precautionary approach should be adopted to windfarm development near aggregations of these taxa in offshore and coastal locations. The impact of windfarm developments on bird populations must also be viewed in the context of the possible impact of climate change in the absence of windfarms.