

Carretea, M., J.A. Sánchez-Zapatab, J.R. Benítez, M. Lobón and J.A. Donázara. 2009. Large scale risk-assessment of wind-farms on population viability of a globally endangered long-lived raptors. *Biological Conservation* 14:2954-2961.

Abstract: Wind-farms receive public and governmental support as an alternative energy source mitigating air pollution. However, they can have adverse effects on wildlife, particularly through collision with turbines. Research on wind-farm effects has focused on estimating mortality rates, behavioural changes or interspecific differences in vulnerability. Studies dealing with their effects on endangered or rare species populations are notably scarce. We tested the hypothesis that wind-farms increase extinction probability of long-lived species through increments in mortality rates. For this purpose, we evaluate potential consequences of wind-farms on the population dynamics of a globally endangered long-lived raptor in an area where the species maintains its greatest stronghold and wind-farms are rapidly increasing. Nearly one-third of all breeding territories of our model species are in wind-farm risk zones. Our intensive survey shows that wind-farms decrease survival rates of this species differently depending on individual breeding status. Consistent with population monitoring, population projections showed that all subpopulations and the meta-population are decreasing. However, population sizes and, therefore, time to extinction significantly decreased when wind-farm mortality was included in models. Our results represent a qualitative warning exercise showing how very low reductions in survival of territorial and non-territorial birds associated with wind-farms can strongly impact population viability of long-lived species. This highlights the need for examining long-term impacts of wind-farms rather than focusing on short-term mortality, as is often promoted by power companies and some wildlife agencies. Unlike other non-natural causes of mortality difficult to eradicate or control, wind-farm fatalities can be lowered by powering down or removing risky turbines and/or farms, and by placing them outside areas critical for endangered birds.