

Estimation of Wind Farm Mortality for Golden Eagles



The Challenge: Wind farms show great promise as a source of renewable energy. Birds and bats can fly into turbines and suffer mortality, but the severity of this problem is difficult to assess. The golden eagle is a species of special concern that is frequently found in the proximity of wind farms. The U.S. Fish and Wildlife Service (FWS) and other agencies desire information on wind farm mortality of golden eagles for the purpose of informing regulatory decisions.

The Science: The potential importance of bat and bird mortality has led to carcass surveys at many wind facilities. However, simple counts of carcasses do not reflect overall mortality for at least 4 reasons. (1) Many surveys do not cover all areas where wind farm mortalities might occur. (2) Surveys are conducted periodically (e.g., every 5 days) with inadequate attention to mortality occurring between surveys. (3) Carcasses are removed from surveyed locations (and hence from the possibility of detection) by scavengers. (4) Carcasses that do appear in surveyed locations at survey times are sometimes missed (incomplete detection). USGS is working with FWS and other cooperators to develop robust methods for estimating total wind mortality of eagles in the presence of these sources of incomplete data.

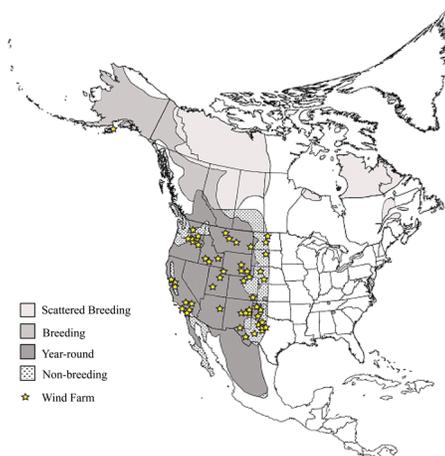


Figure. Distribution of Golden Eagle in North America and locations of wind farms. Map adapted from Kochert et al. (2002).

The Future: USGS scientists are working with FWS biologists to develop a statistical framework for estimating total mortality based on carcass surveys characterized by all four of the above sources of incomplete data. The thinking is based on the so-called superpopulation approach to capture-recapture modeling. The inference approach has been developed and tested via simulation. The methodology is being used to develop recommendations for sampling protocols that will be most useful for estimating mortality. The methods will be used to analyze existing data on golden eagle mortality at wind farms and to recommend modifications to carcass surveys designed to make such efforts as efficient as possible.