

# Analysis of wind farm effects on the surrounding environment: Assessing population trends of breeding passerines



Davide Astiaso Garcia <sup>a,\*</sup>, Giulia Canavero <sup>b</sup>, Francesco Ardenghi <sup>b</sup>, Martina Zambon <sup>b</sup>

<sup>a</sup> DIAEE (Dipartimento di Ingegneria, Astronautica, Elettrica ed Energetica – Department of Astronautical, Electrical and Energy Engineering), Sapienza University, Corso Vittorio Emanuele II, 244, 00186 Rome, Italy

<sup>b</sup> FERA (Fabbrica Energie Rinnovabili Alternative) Srl., Piazza Cavour 7, 20121, Milano, Italy

## ARTICLE INFO

### Article history:

Received 14 February 2014

Accepted 3 February 2015

Available online

### Keywords:

Wind farm

Environmental assessment

Bird populations trend

## ABSTRACT

The main aim of this paper is to analyze the effect of wind farms on population trends of breeding passerines assessing between years changes in abundance of the bird species under examination. The surveys were realized in a pilot area 4 years before and 4 after the wind farm construction, by means of the point count method. The collected data were then statistically analyzed using TRIM (TRENDS & INDICES FOR MONITORING DATA) software, developed for the analysis of count data obtained from monitoring wildlife populations. Then, in order to evaluate whether the obtained population trends were influenced by the presence of the wind farm, they were compared with the national trends of the same passerine species during the same period. The results showed that during the wind farm construction phase some species had a decreasing trends but all of them increased their trends when the wind turbines were operating.

© 2015 Elsevier Ltd. All rights reserved.

## 1. Introduction

Since wind farms, together with other renewable energy sources, are a key mean of tackling climate change [1] and reducing greenhouse gases emission [2,3], their development globally provoke healthy effects on birds populations, whose geographical distribution is affected by climate changes [4]. On the other hand, wind farms could sometimes provoke potential risks to bird species which can be grouped into two main typologies: death through collision with turbine blades [5] and displacement through direct or indirect habitat loss [6].

Wind turbine collision risk, highly depending on the topography, turbine construction, and local bird species and behaviours, can be significantly reduced using models which take into account all of these factors [7]. Direct habitat loss is generally caused by the construction of the permanent infrastructures of the wind farm, such as access roads and wind turbine bases, while indirect habitat loss occurs if birds begin to avoid a wind farm surrounding areas

changing their normal routes to roosting grounds or feeding. These impacts might be minimized adopting available mitigation measures and tools to aid avian conservation [8,9].

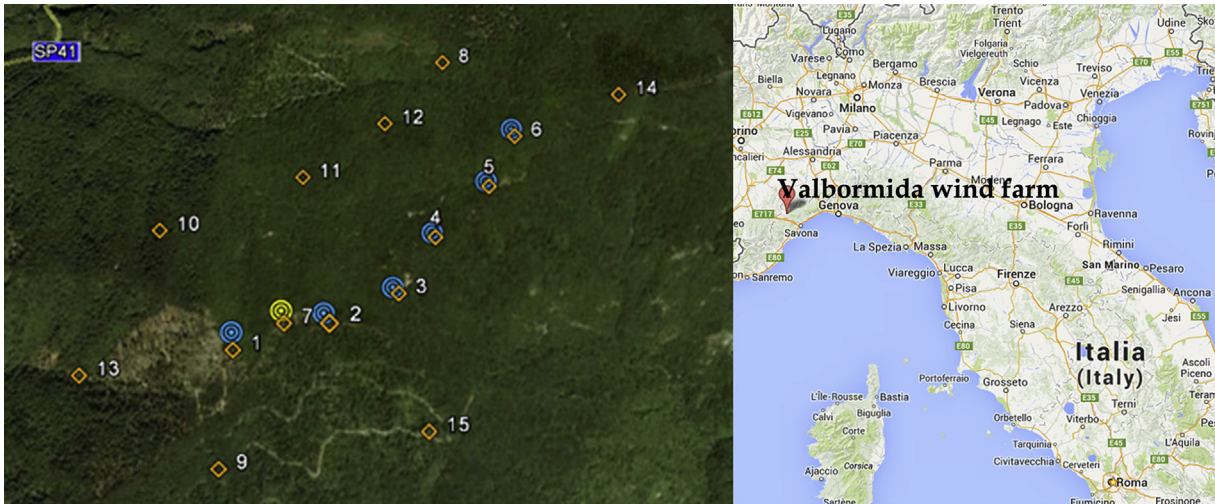
The impact of the wind farm on birds populations may thus be a reduction in local abundance by displacement of individuals to other areas which may cause loss of condition amongst the individuals and reductions in reproductive output [10].

In Italy, as in many other European countries, the number of wind farms has grown rapidly to meet EU targets of sourcing 20% of energy from renewable sources by 2020. Concerning the Italian studies on bird conservation in wind farm sites, the Italian Wind Energy Association ANEV (Associazione Nazionale Energia del Vento) and the environmentalist association Legambiente, with the collaboration of ISPRA (Italian Institute for Environmental Protection and Research) jointly instituted a National Wind and Wildlife Observatory in order to promote a wind energy development avoiding or minimising impacts on threatened species and their habitats, as well as supporting a correct diffusion of information based on real data.

Aiming to conciliate the development of the production of wind energy with the necessary protection, valorisation and safeguard of the environment, the Italian observatory founded a Scientific Committee of experts and academics who worked for the elaboration of a Protocol for Monitoring interactions between wind farms and birds and bats populations according to the latest scientific methods

\* Corresponding author.

E-mail addresses: [davide.astiasogarcia@uniroma1.it](mailto:davide.astiasogarcia@uniroma1.it) (D. Astiaso Garcia), [g.canavero@ferasrl.it](mailto:g.canavero@ferasrl.it) (G. Canavero), [f.ardenghi@ferasrl.it](mailto:f.ardenghi@ferasrl.it) (F. Ardenghi), [monitoraggi1@ferasrl.it](mailto:monitoraggi1@ferasrl.it) (M. Zambon).



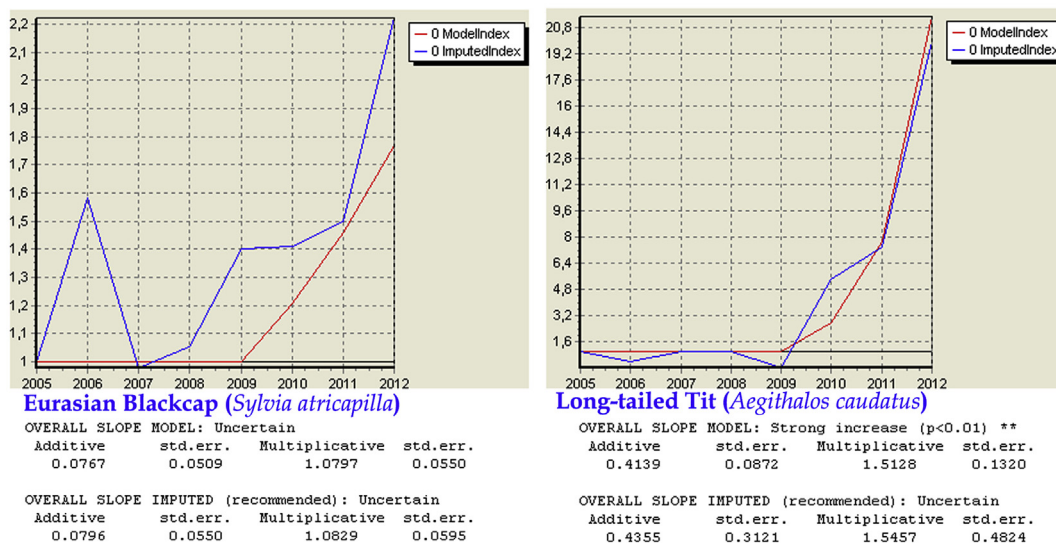
**Fig. 1.** Valbormida wind farm: 15 listening points (orange squares), six operational wind turbines (in blue) with one additional wind turbine (in yellow) whose construction is under evaluation. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

internationally recognized. The Protocol contains technical and scientific information for planning and carrying out *ex-ante* and *ex-post* monitoring activities of birds and bats populations on and around wind farms. In particular, the protocol describes methods, materials and timing for the monitoring of the different species of birds and bats, considering also data gathering for the assessment of noise disturbance as well as the estimation of avian mortality calculating carcass removal time and the estimation of scavenging correction factor [11]. Moreover, promoting its application on the whole Italian territory, the use of the Protocol will allow the elaboration of a national database in order to compare data gathered with the same methodologies in different areas and periods. In fact, the implementation of long-term studies based on systematically collected data according to standardized protocols is crucial for a correct estimation of impact of wind parks on birds [12].

Studies of wind farm effects on breeding birds led to debatable results: a research conducted in upland wind farms in the UK

highlights significant avoidance of otherwise apparently suitable habitat close to turbines [13]; other reliable studies suggest a low disturbance distance from the wind farm [14] or underline that wind farms may not necessarily result in declines in bird populations in the operational phase but may provoke more severe effects during the construction phase [6,15,16]. Moreover, comparing the number of birds killed per kilowatt-hour generated for wind electricity and fossil fuel power systems, a study [5] estimates that wind farms are responsible for between 0.3 and 0.4 fatalities per gigawatt-hour (GWh) of electricity while fossil fuel power stations are responsible for about 5.2 fatalities per GWh, caused by acid rain, mercury pollution, and climate change.

In the light of these considerations, the main aim of the research is to assess the potential impacts that a wind farm development may cause on the population trends of breeding passerines, using some methodologies described in the above mentioned Italian Protocol and used in previous scientific studies [10,17]. In particular,



**Fig. 2.** Eurasian Blackcap and Long-tailed Tit population trends in the Valbormida wind farm.

Download English Version:

<https://daneshyari.com/en/article/6767086>

Download Persian Version:

<https://daneshyari.com/article/6767086>

[Daneshyari.com](https://daneshyari.com)