



BEEs

The LifeWatch ERIC Biodiversity & Ecosystem eScience Conference

Seville
22-24/05/23



Threats and challenges to biodiversity and ecosystem conservation from an eScience perspective



UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa



Wind Energy and Bats: A Match Made in Hell

Sonia Sánchez Navarro, Elena Tena López, Jesús Nogueras & Carlos Ibáñez

CONSUMERISM

RESOURCE DEPLETION

OVERPOPULATION

CARBON FOOTPRINT

EARTH OVERSHOOT DAY

AIR POLLUTION

GREAT PACIFIC GARBAGE PATCH

NO PLANET B



SUSTAINABILITY

GREEN ENERGY

RECYCLE

REDUCE

REUSE

ZERO EMISSIONS

CONSCIOUSNESS

#MOVETHEDATE

CONSUMERISM

RESOURCE DEPLETION

OVERPOPULATION

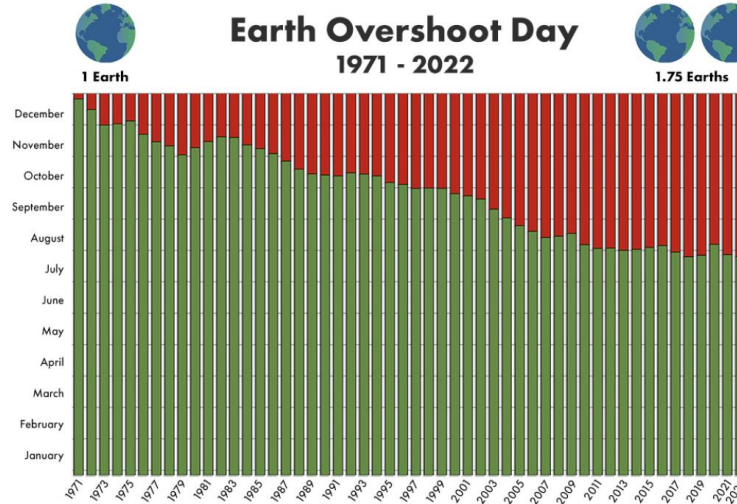
CARBON FOOTPRINT

EARTH OVERSHOOT DAY

AIR POLLUTION

GREAT PACIFIC GARBAGE PATCH

NO PLANET B



SUSTAINABILITY

GREEN ENERGY

RECYCLE

REDUCE

REUSE

ZERO EMISSIONS

CONSCIOUSNESS

#MOVETHEDATE



Source: National Footprint and Biocapacity Accounts 2022 Edition
data.footprintnetwork.org



BEEs

Seville, 22-24 May 2023





BEEs

Seville, 22-24 May 2023

COEXISTENCE





BEEs

Seville, 22-24 May 2023

Acta Chiropterologica, 21(2): 349–358, 2019
PL ISSN 1508-1109 © Museum and Institute of Zoology PAS
doi: 10.3161/15081109ACC2019.21.2.010

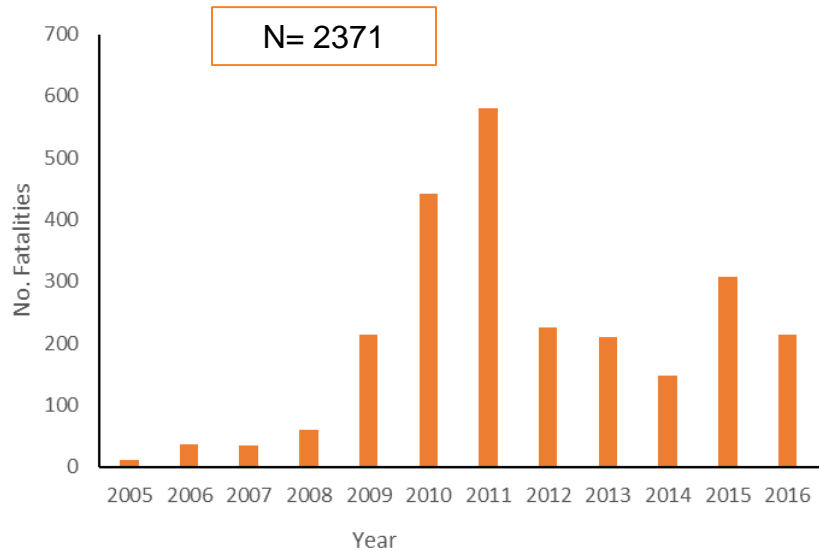
Bat fatalities at wind-farms in the lowland Mediterranean of southern Spain

SONIA SÁNCHEZ-NAVARRO¹, JENS RYDELL², and CARLOS IBÁÑEZ¹

¹Department of Evolutionary Ecology, Estación Biológica de Doñana (CSIC), Av. Américo Vespucio 26, 41092 Sevilla, Spain

²Department of Biology, Lund University, S-223 62 Lund, Sweden

³Corresponding author: E-mail: sonia.sanchez@ebd.csic.es



UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa



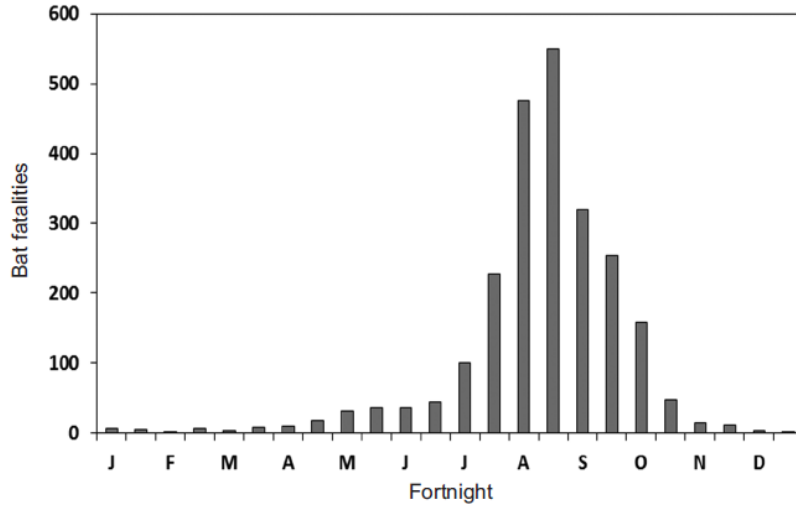
Bat fatalities at wind-farms in the lowland Mediterranean of southern Spain

SONIA SÁNCHEZ-NAVARRO¹, JENS RYDELL², and CARLOS IBÁÑEZ¹

¹*Department of Evolutionary Ecology, Estación Biológica de Doñana (CSIC), Av. Américo Vespucio 26, 41092 Sevilla, Spain*

²*Department of Biology, Lund University, S-223 62 Lund, Sweden*

³*Corresponding author: E-mail: sonia.sanchez@ebd.csic.es*



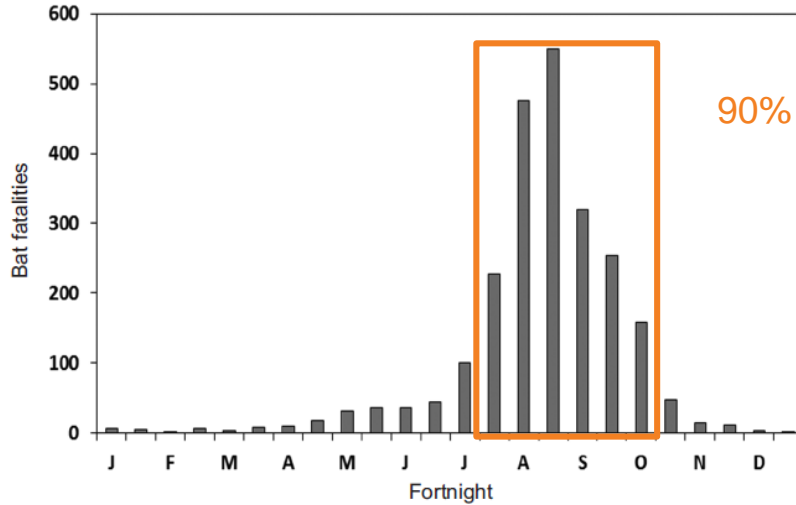
Bat fatalities at wind-farms in the lowland Mediterranean of southern Spain

SONIA SÁNCHEZ-NAVARRO¹, JENS RYDELL², and CARLOS IBÁÑEZ¹

¹*Department of Evolutionary Ecology, Estación Biológica de Doñana (CSIC), Av. Américo Vespucio 26, 41092 Sevilla, Spain*

²*Department of Biology, Lund University, S-223 62 Lund, Sweden*

³*Corresponding author: E-mail: sonia.sanchez@ebd.csic.es*



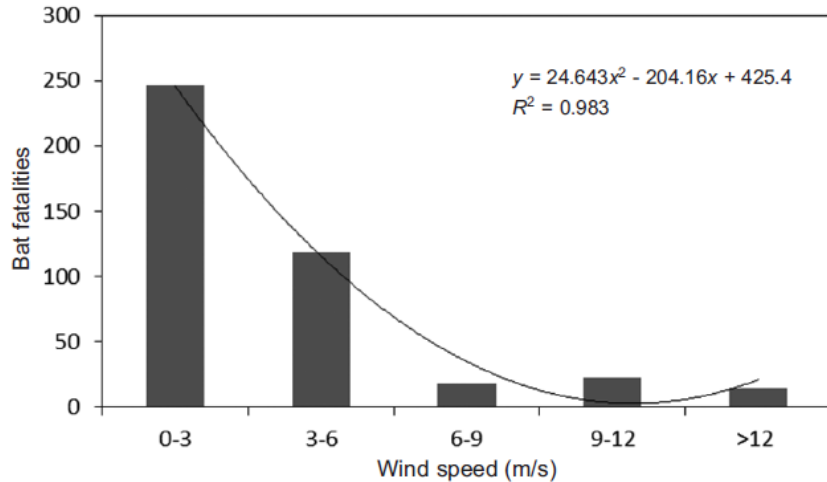
Bat fatalities at wind-farms in the lowland Mediterranean of southern Spain

SONIA SÁNCHEZ-NAVARRO¹, JENS RYDELL², and CARLOS IBÁÑEZ¹

¹Department of Evolutionary Ecology, Estación Biológica de Doñana (CSIC), Av. Américo Vespucio 26, 41092 Sevilla, Spain

²Department of Biology, Lund University, S-223 62 Lund, Sweden

³Corresponding author: E-mail: sonia.sanchez@ebd.csic.es



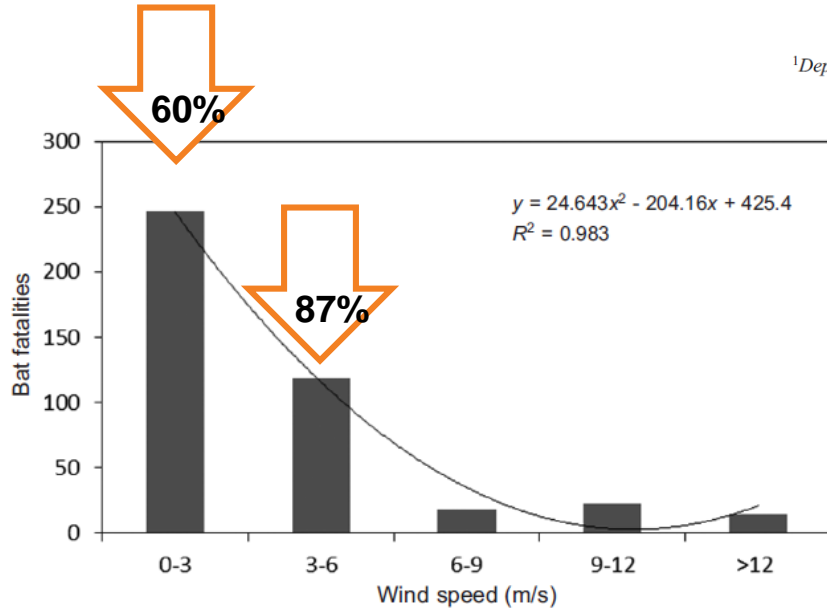
Bat fatalities at wind-farms in the lowland Mediterranean of southern Spain

SONIA SÁNCHEZ-NAVARRO¹, JENS RYDELL², and CARLOS IBÁÑEZ¹

¹Department of Evolutionary Ecology, Estación Biológica de Doñana (CSIC), Av. Américo Vespucio 26, 41092 Sevilla, Spain

²Department of Biology, Lund University, S-223 62 Lund, Sweden

³Corresponding author: E-mail: sonia.sanchez@ebd.csic.es



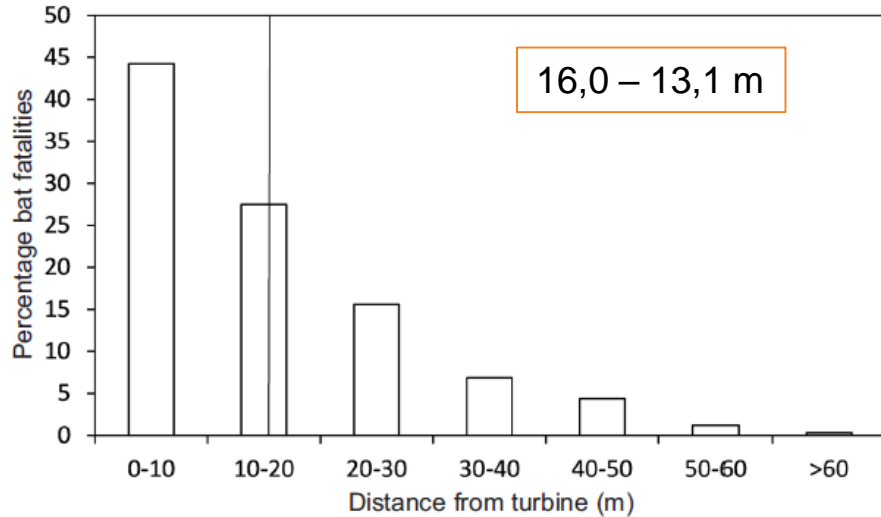
Bat fatalities at wind-farms in the lowland Mediterranean of southern Spain

SONIA SÁNCHEZ-NAVARRO¹, JENS RYDELL², and CARLOS IBÁÑEZ¹

¹ *Unit of Evolutionary Ecology, Estación Biológica de Doñana (CSIC), Av. Américo Vespucio 26, 41092 Sevilla, Spain*

² *Department of Biology, Lund University, S-223 62 Lund, Sweden*

³ *Corresponding author: E-mail: sonia.sanchez@ebd.csic.es*



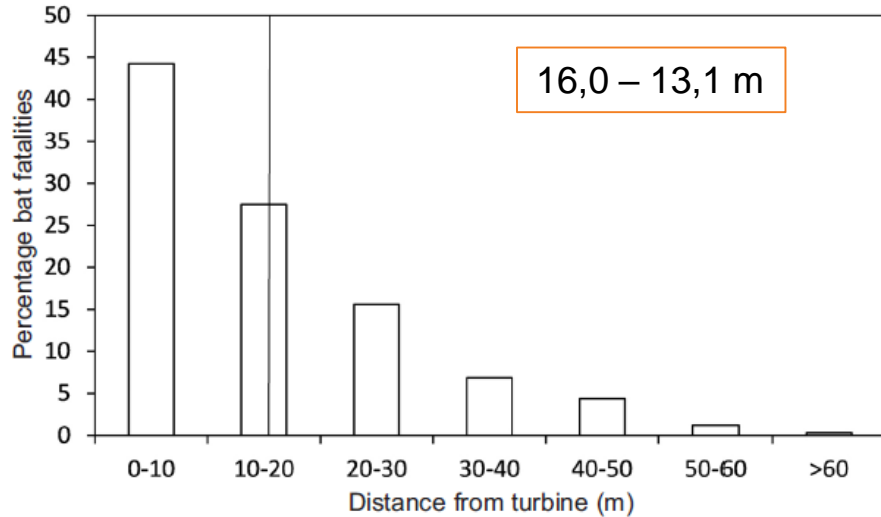
Bat fatalities at wind-farms in the lowland Mediterranean of southern Spain

SONIA SÁNCHEZ-NAVARRO¹, JENS RYDELL², and CARLOS IBÁÑEZ¹

¹*Unit of Evolutionary Ecology, Estación Biológica de Doñana (CSIC), Av. Américo Vespucio 26, 41092 Sevilla, Spain*

²*Department of Biology, Lund University, S-223 62 Lund, Sweden*

³*Corresponding author: E-mail: sonia.sanchez@ebd.csic.es*



ProBat Tools

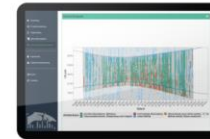
As part of the project "ProBat - Further development of the practice of shutdown requirements for the protection of bats during the operation of wind turbines", two separate apps have been developed. ProBat 7 enables surveyors' offices to determine differentiated, bat-friendly cut-in wind speeds of wind turbines. ProBat-Inspector makes it easier for authorities to check compliance with mandatory shutdowns. A third application to determine the optimal sampling design is in progress.



ProBat 7

Calculation of differentiated cut-in wind speeds

to the app



ProBat Inspector

Verification of compliance with shutdown requirements

to the app



ProBat Designer

Determination of an optimal sampling design

to the app

**Original Study**

Dina Rnjak*, Magdalena Janeš, Josip Križan and Oleg Antonić

Reducing bat mortality at wind farms using site-specific mitigation measures: a case study in the Mediterranean region, Croatia

PLOS ONE

RESEARCH ARTICLE

A review of the effectiveness of operational curtailment for reducing bat fatalities at terrestrial wind farms in North America

Evan M. Adams , Julia Gulka, Kathryn A. Williams












Biodiversity Research Institute, Portland, Maine, United States of America

* evan.adams@brwidlife.orgEuropean Journal of Wildlife Research (2020) 66:44
<https://doi.org/10.1007/s10344-020-01378-x>

ORIGINAL ARTICLE

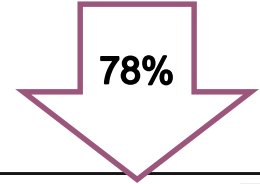
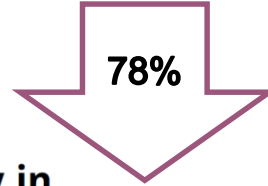


Wildlife and infrastructure: impact of wind turbines on bats in the Black Sea coast region

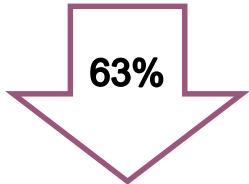
Dragoș Ștefan Măntoiu^{1,2}  • Kseniia Kravchenko^{3,4}  • Linn Sophia Lehnert³  • Anton Vlaschenko⁴  • Oana Teodora Moldovan^{1,5}  • Ionuț Cornel Mirea¹  • Răzvan Cătălin Stanciu⁶  • Răzvan Zaharia⁶  • Răzvan Popescu-Mirceni⁶  • Marius Costin Nistorescu²  • Christian Claus Voigt³ 

Original Study

Dina Rnjak*, Magdalena Janeš, Josip Križan and Oleg Antonić

Reducing bat mortality at wind farms using site-specific mitigation measures: a case study in the Mediterranean region, CroatiaEuropean Journal of Wildlife Research (2020) 66:44
<https://doi.org/10.1007/s10344-020-01378-x>

ORIGINAL ARTICLE

**PLOS ONE**

RESEARCH ARTICLE

A review of the effectiveness of operational curtailment for reducing bat fatalities at terrestrial wind farms in North America

Evan M. Adams*, Julia Gulka, Kathryn A. Williams

Biodiversity Research Institute, Portland, Maine, United States of America

* evan.adams@brwidlife.org**Wildlife and infrastructure: impact of wind turbines on bats in the Black Sea coast region**Dragoș Ștefan Măntoiu^{1,2} • Kseniia Kravchenko^{3,4} • Linn Sophia Lehnert³ • Anton Vlaschenko⁴ • Oana Teodora Moldovan^{1,5} • Ionuț Cornel Mirea¹ • Răzvan Cătălin Stanciu⁶ • Răzvan Zaharia⁶ • Răzvan Popescu-Mirceni⁶ • Marius Costin Nistorescu² • Christian Claus Voigt³

PROBLEM**PATTERNS****TOOLS****PREVIOUS STUDIES****STUDY AREA****DATA???**

SEARCH EFFICIENCY

SEARCHED SURFACE

CARCASS PERSISTENCE

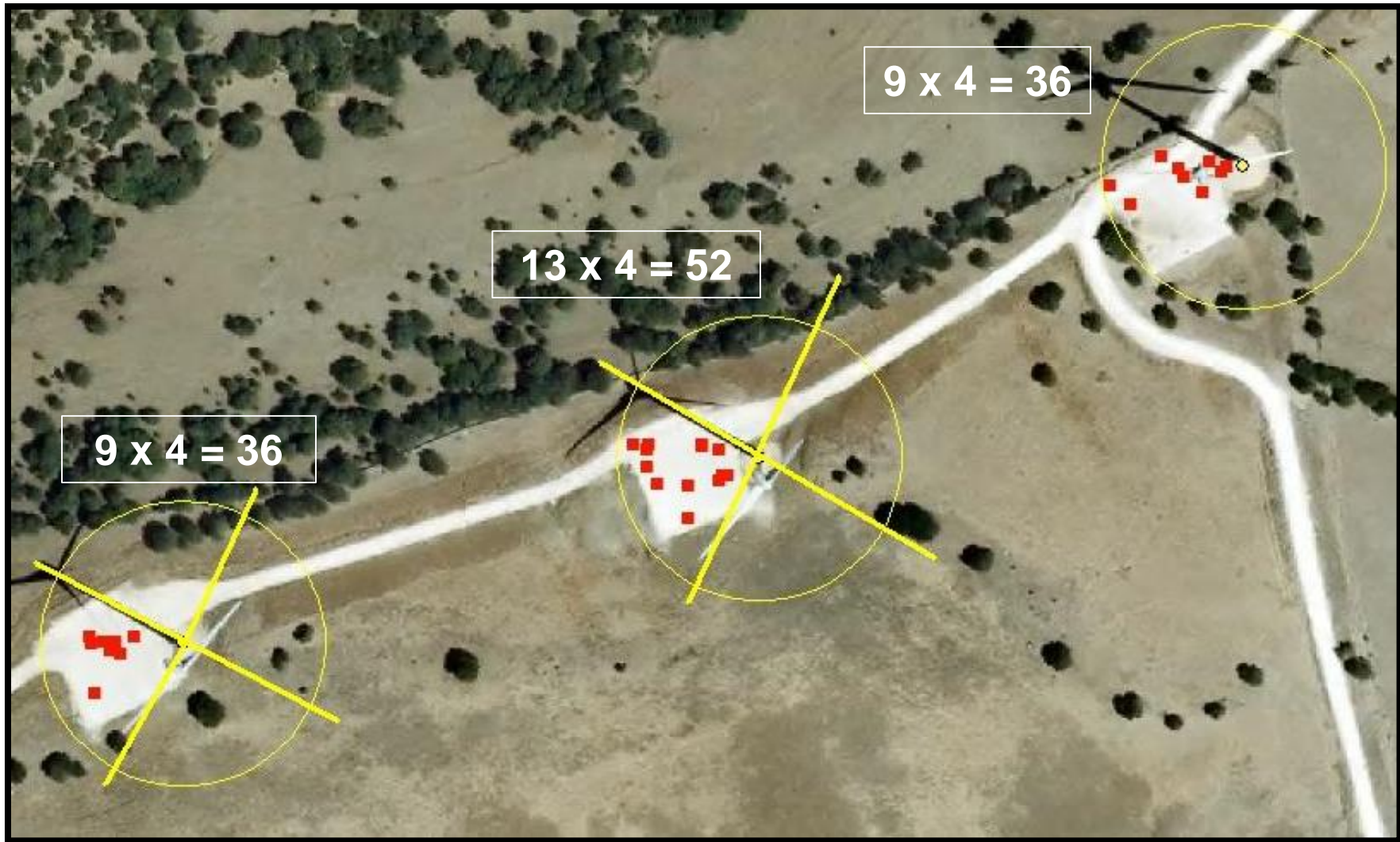


HOW WELL

HOW MUCH

HOW LONG

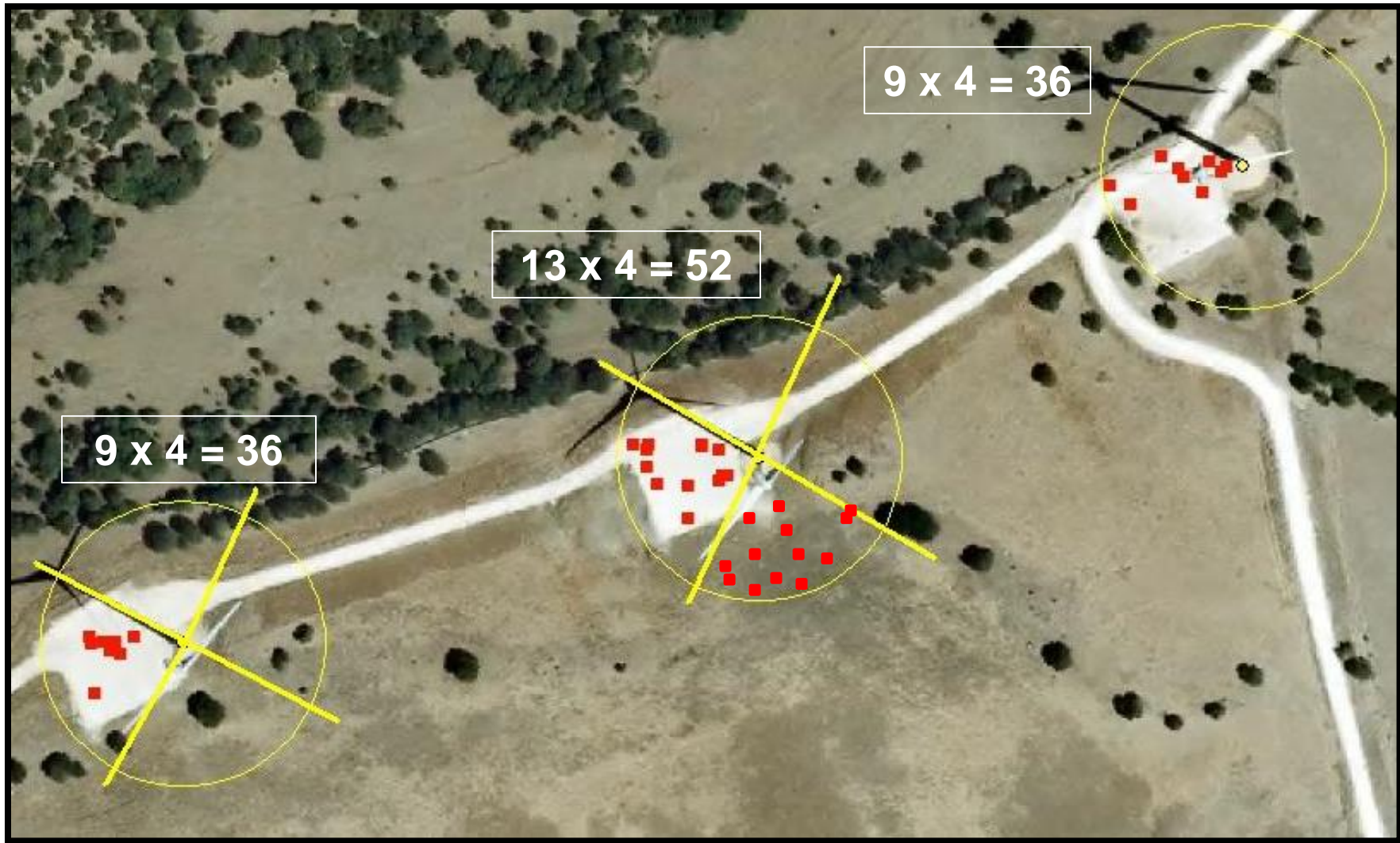




$9 \times 4 = 36$

$13 \times 4 = 52$

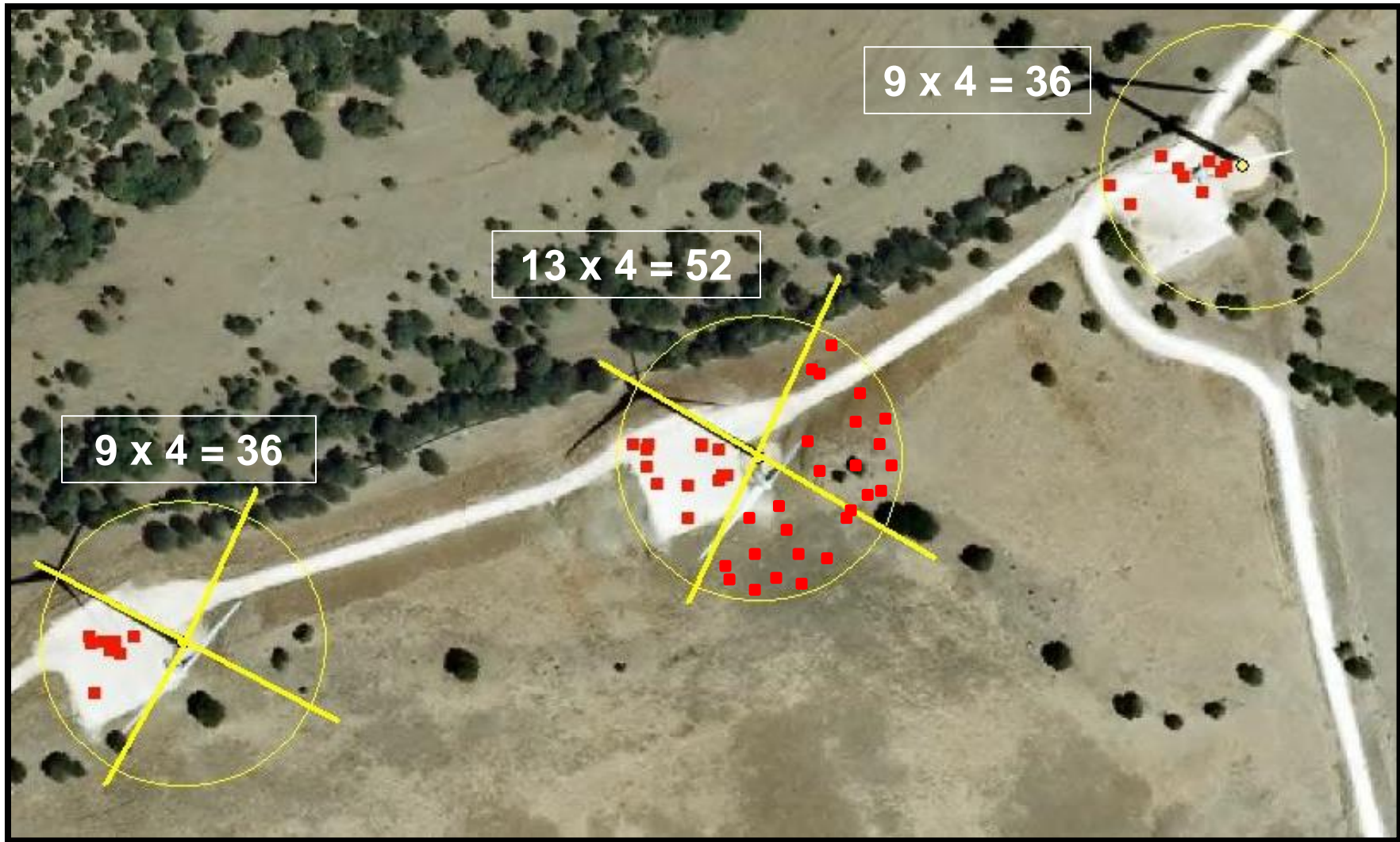
$9 \times 4 = 36$



$$9 \times 4 = 36$$

$$13 \times 4 = 52$$

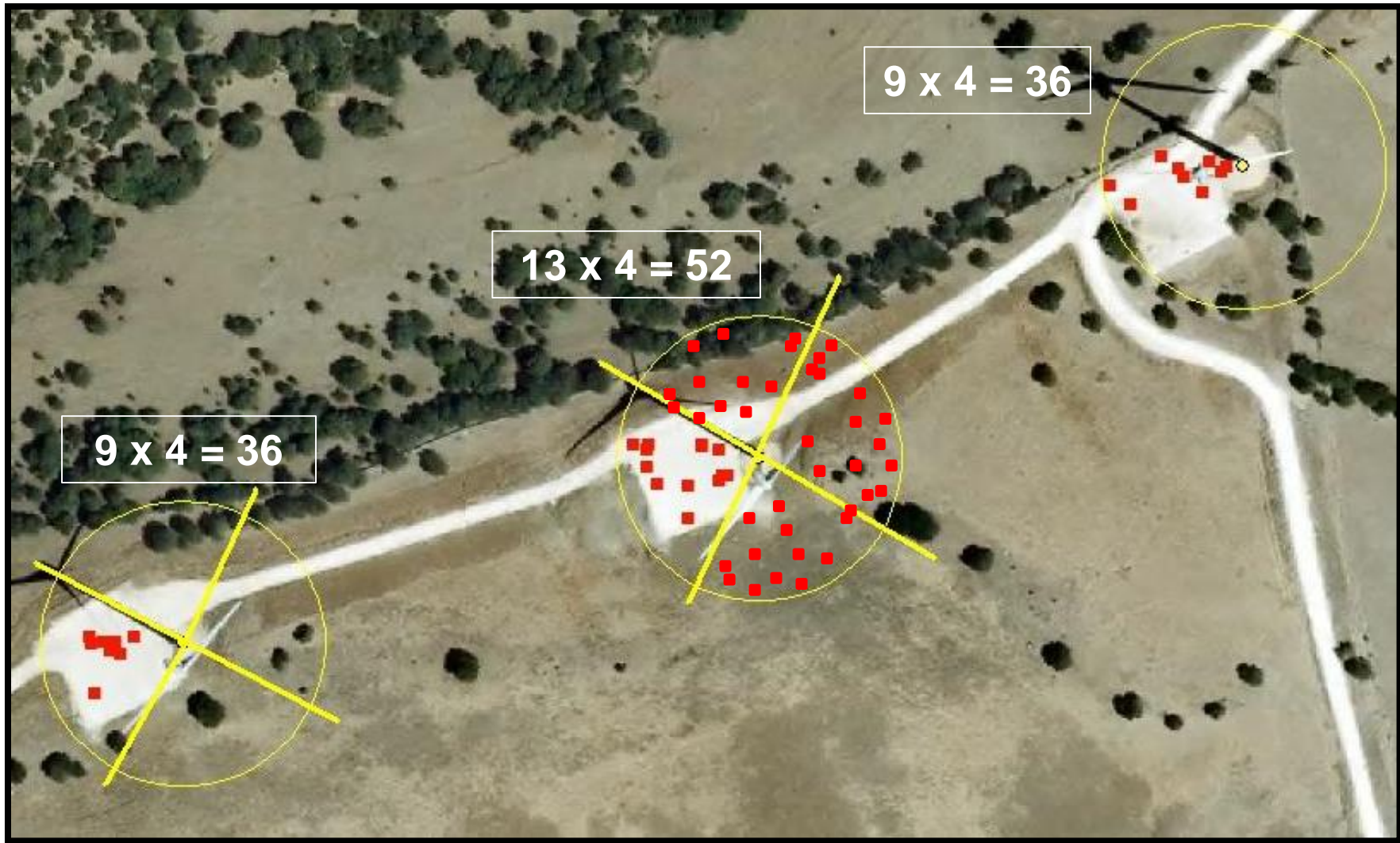
$$9 \times 4 = 36$$



$$9 \times 4 = 36$$

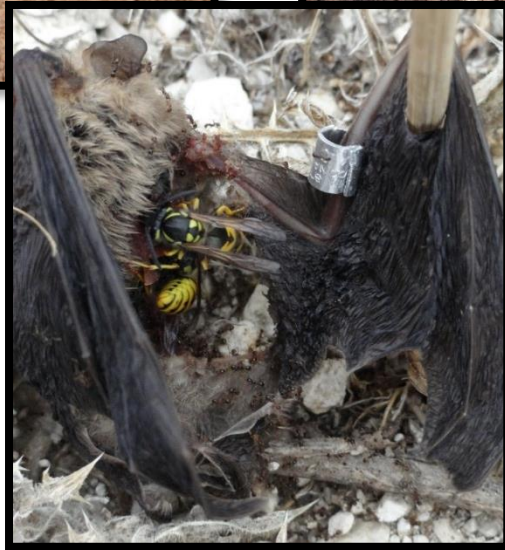
$$13 \times 4 = 52$$

$$9 \times 4 = 36$$





1 Day



SEARCH EFFICIENCY

SEARCHED SURFACE

CARCASS PERSISTENCE



HOW WELL



17,3%

HOW MUCH



14,8%

HOW LONG



2,4 days



Acta
Chiropterologica

HIGH BAT FATALITY RATES ESTIMATED AT WIND FARMS IN SOUTHERN SPAIN

Sonia Sánchez-Navarro^{1*}, Jens Rydell², David Gálvez-Ruiz³ and Carlos Ibáñez¹



$$FR_i = \frac{CFZ_i}{SESR_i}$$



0,64 bat/turbine

*Acta
Chiropterologica*

HIGH BAT FATALITY RATES ESTIMATED AT WIND FARMS IN SOUTHERN SPAIN

Sonia Sánchez-Navarro^{1*}, Jens Rydell², David Gálvez-Ruiz³ and Carlos Ibáñez¹

$$FR_i = \frac{CFZ_i}{SESR_i}$$

41,1 bats/turbine



Acta
Chiropterologica

HIGH BAT FATALITY RATES ESTIMATED AT WIND FARMS IN SOUTHERN SPAIN

Sonia Sánchez-Navarro^{1*}, Jens Rydell², David Gálvez-Ruiz³ and Carlos Ibáñez¹



$$FR_i = \frac{CFZ_i}{SESR_i}$$



41,1 bats/turbine



Turbines
917 Cádiz
21574 Spain



Fatalities
37.689 Cádiz
886.691 Spain



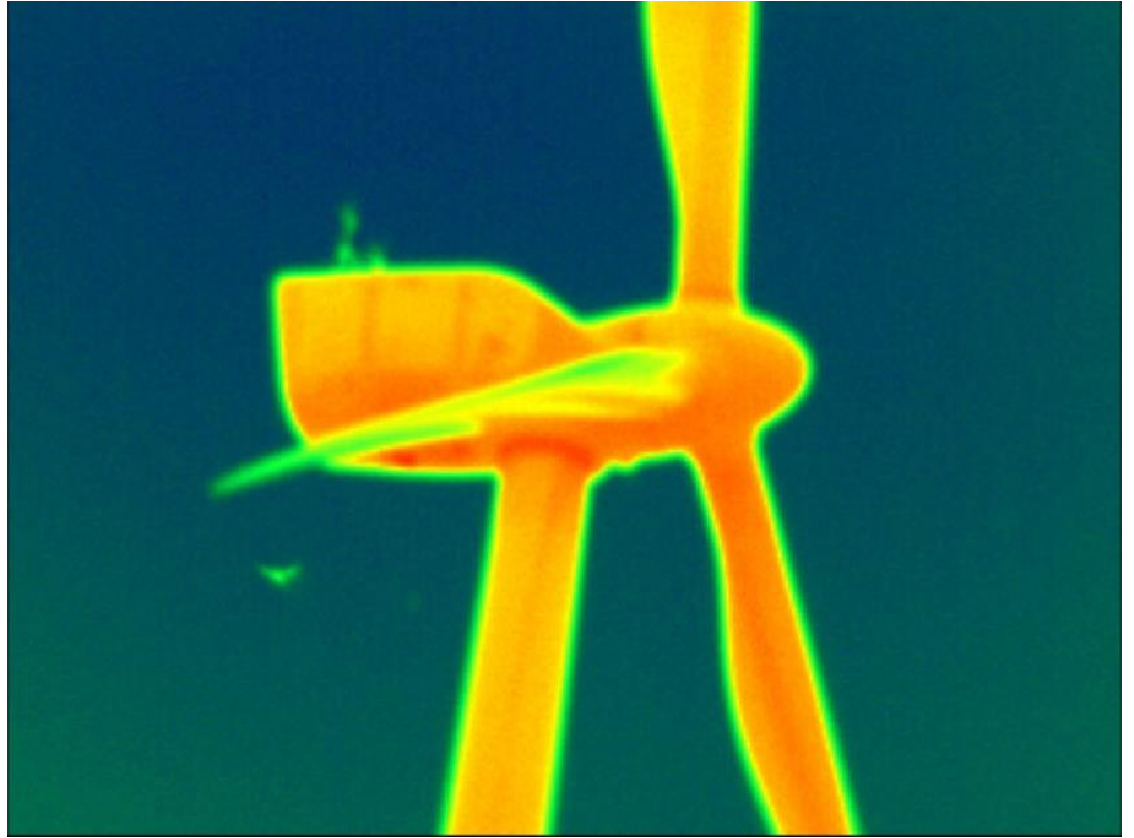


BEeS

Seville, 22-24 May 2023

eSCIENCE IS WONDERFUL

pSCIENCE IS MANDATORY



UNIÓN EUROPEA

Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa

**THANK YOU
FOR LISTENING**



This study was funded by Ministry of Science and Innovation of Spain through European Regional Development Fund [SUMHAL, LIFEWATCH-2019-09-CSIC-4, POPE 2014-2020].





BEeS

The LifeWatch ERIC Biodiversity & Ecosystem eScience Conference

Seville
22-24/05/23



Threats and challenges to biodiversity and ecosystem conservation from an eScience perspective



UNIÓN EUROPEA
Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa



Thank you! | www.lifewatch.eu/bees-2023

