STRIX

Turbine shutdown on demand: a key mitigation measure

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IAIA19 - Solutions for conflicts between wind energy technologies and birds

Brisbane, Australia 2019

Impacts are site-,

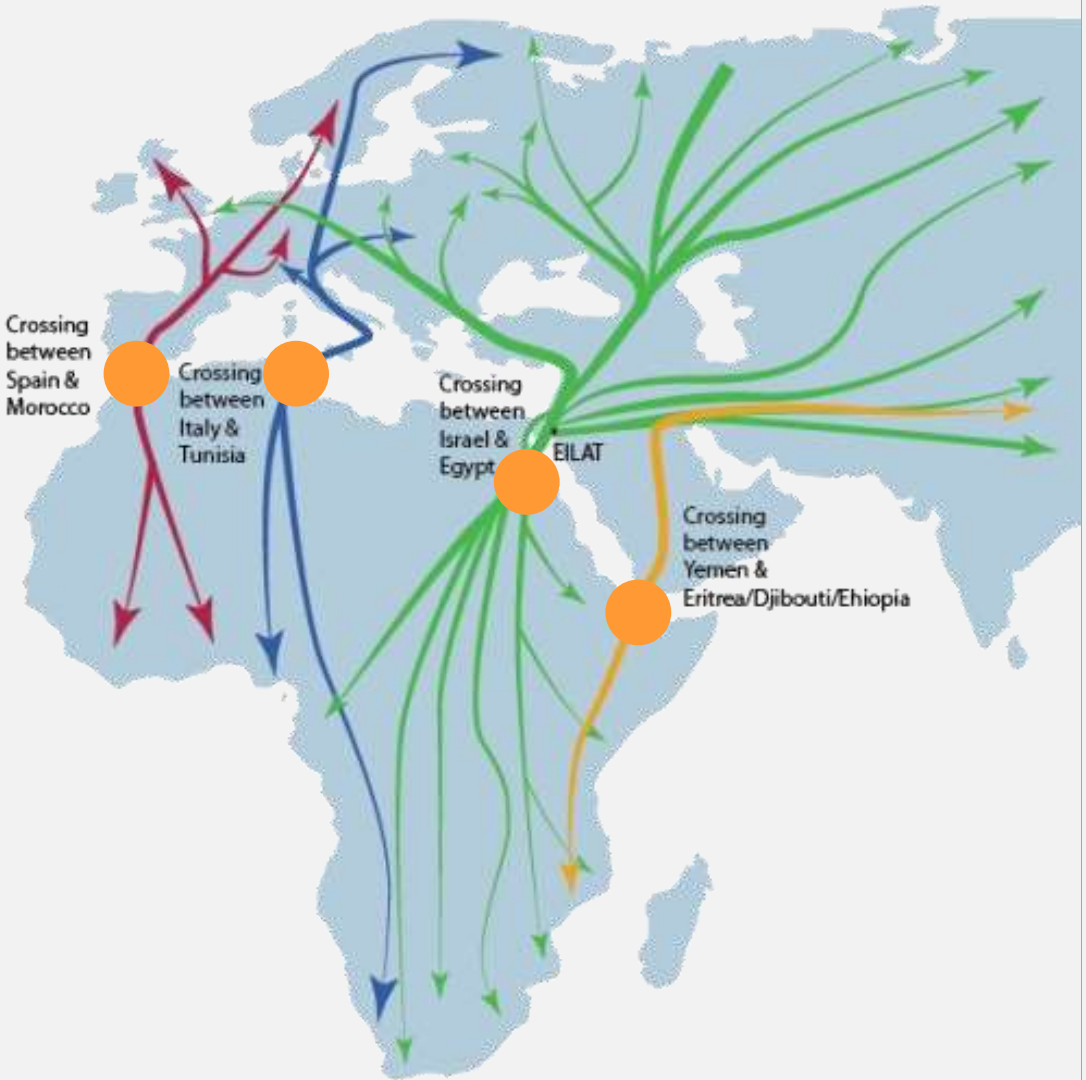
structure- and

species-specific

Soaring birds are among the most susceptible groups

Most vulnerable sites include areas that aggregate or attract birds

E.g. migratory flyways


Crossing between Spain & Morocco
Crossing between Italy & Tunisia
Crossing between Israel & Egypt
EILAT
Crossing between Yemen & Eritrea/Djibouti/Ehiopia

Portugal:

Barão S. João,

BSJ Wind Farm

25 turbines

50 MW

Swept area:

35 – 125 m

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Egypt:

Gabal el Zayt,

GeZ Wind Farm

100 turbines

200 MW

Swept area:

20 – 100 m

BSJ - Portugal

37 species

Autumn: 4 000-5 000

soaring birds

ca. 22 000 movements

GeZ - Egypt

36 species

Spring*: ca.* 370 000

soaring birds/movements

BSJ - Portugal

73% movements

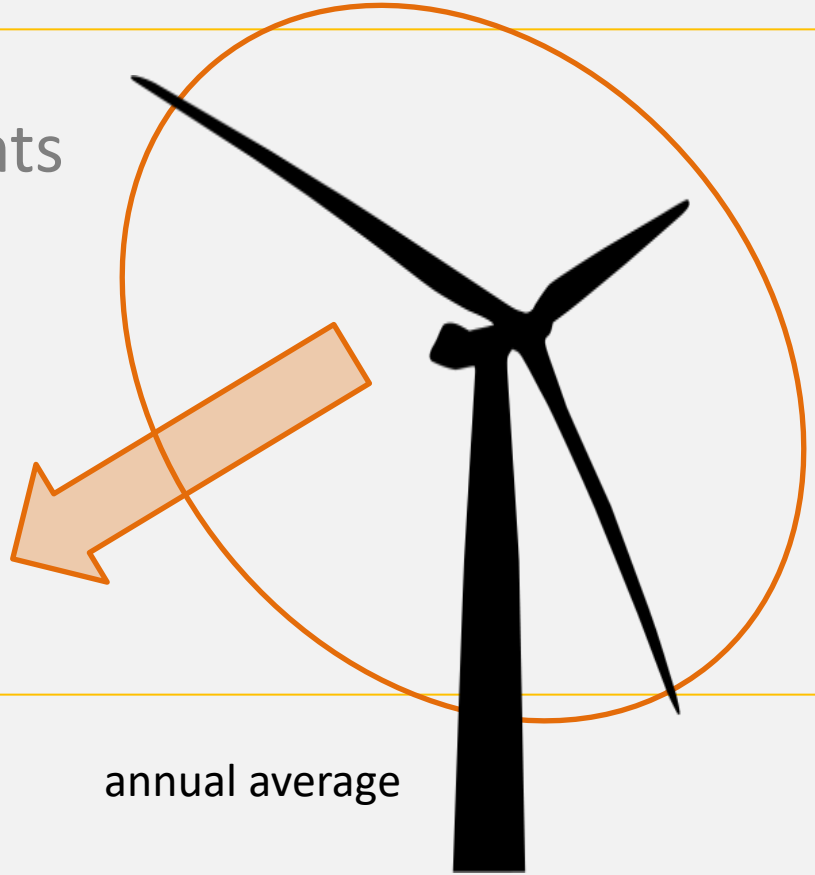
ca. 2 500 birds

698 birds

GeZ - Egypt

15% movements

ca. 22 000 birds



annual average

Mitigation

RADAR-Assisted

Turbine Shutdown

On-Demand

(**RASOD**)

ICNF
Instituto da Conservação da Natureza e das Florestas

KFW
Bank aus Verantwortung

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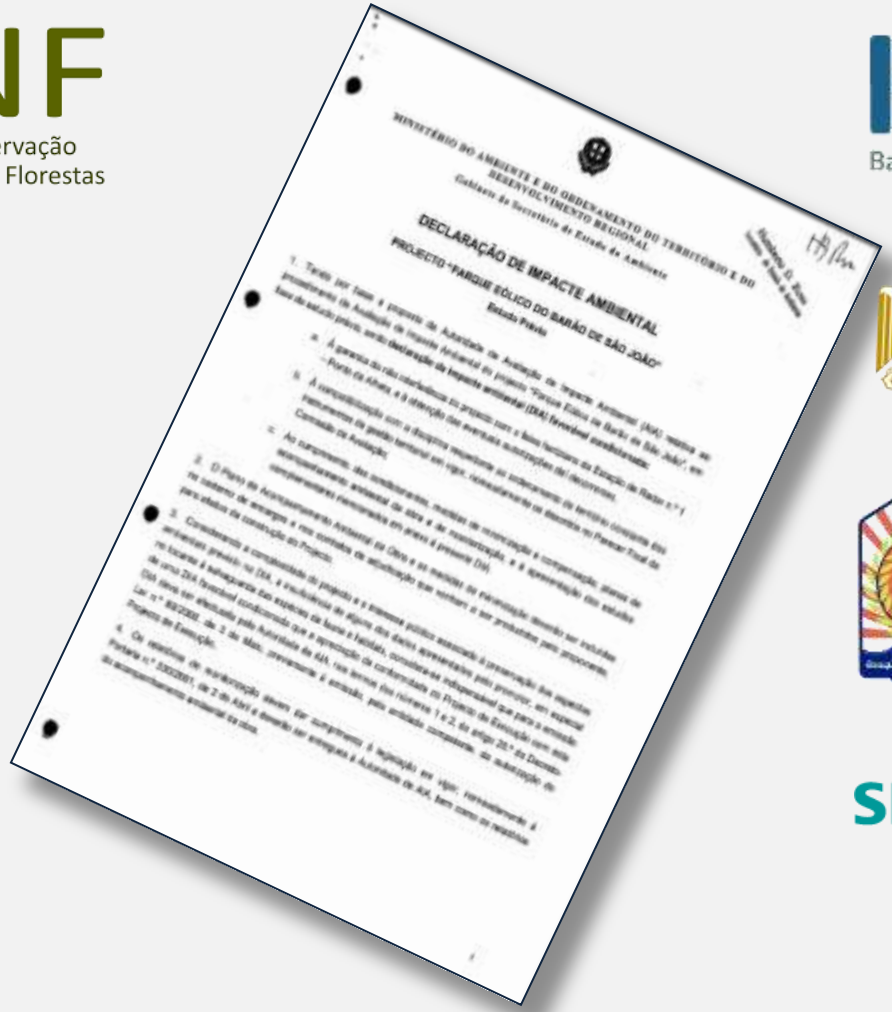

MINISTÉRIO DO AMBIENTE E DO ORDENAMENTO DO TERRITÓRIO E DO DESENVOLVIMENTO REGIONAL
Gabinete do Secretário de Estado do Ambiente

DECLARAÇÃO DE IMPACTE AMBIENTAL

PROJECTO "PARQUE EÓLICO DO BARÃO DE SÃO JOÃO"

Estado Prévio

Arab Republic of Egypt
Ministry of Environment
Egyptian Environmental Affairs Agency

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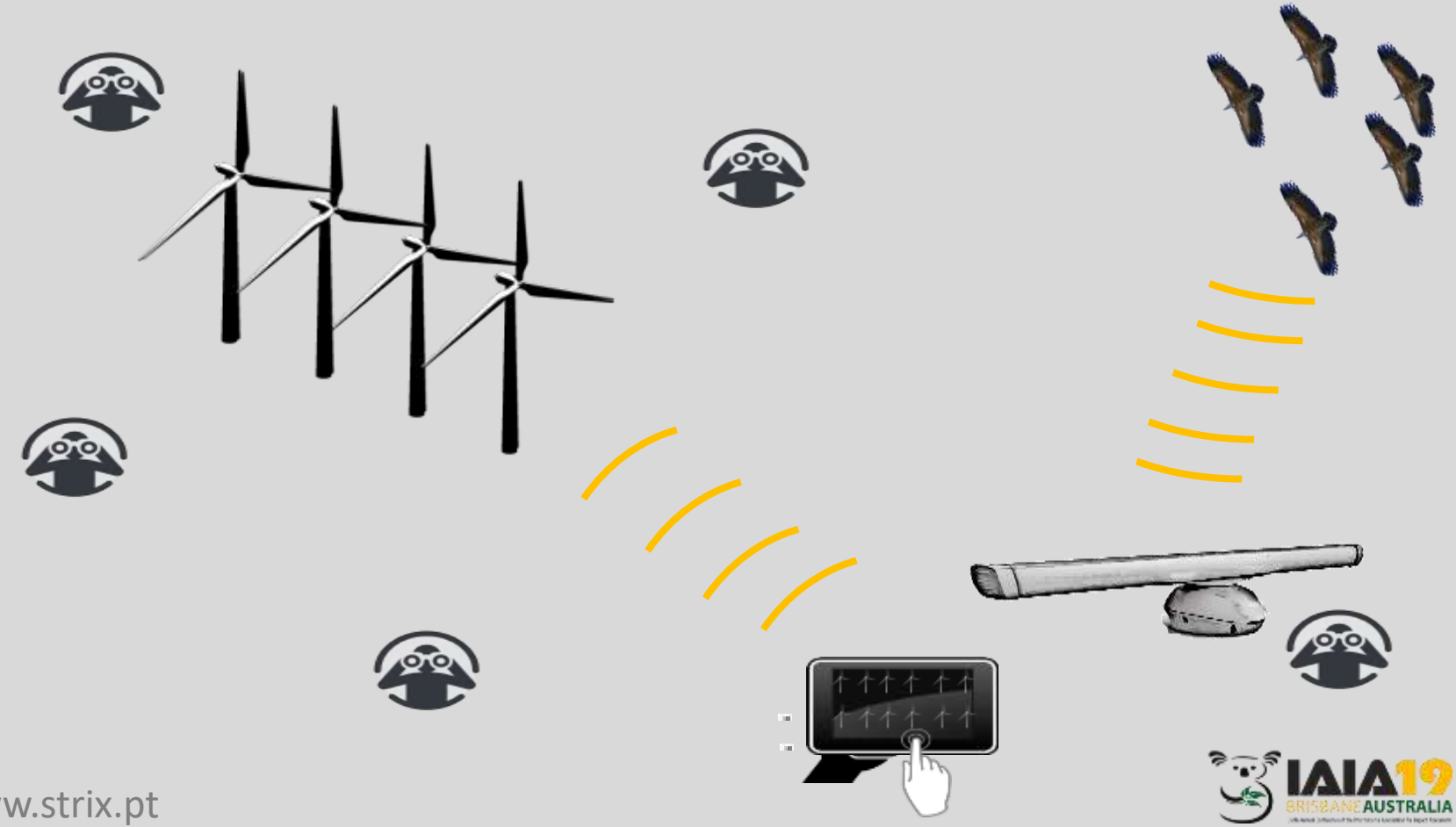
Shutdown criteria

- Intensity of migratory flow
- Flocks
- Globally threatened species
- Imminent collision risk
- Sand storms

RADAR-Assisted Turbine Shutdown On-Demand



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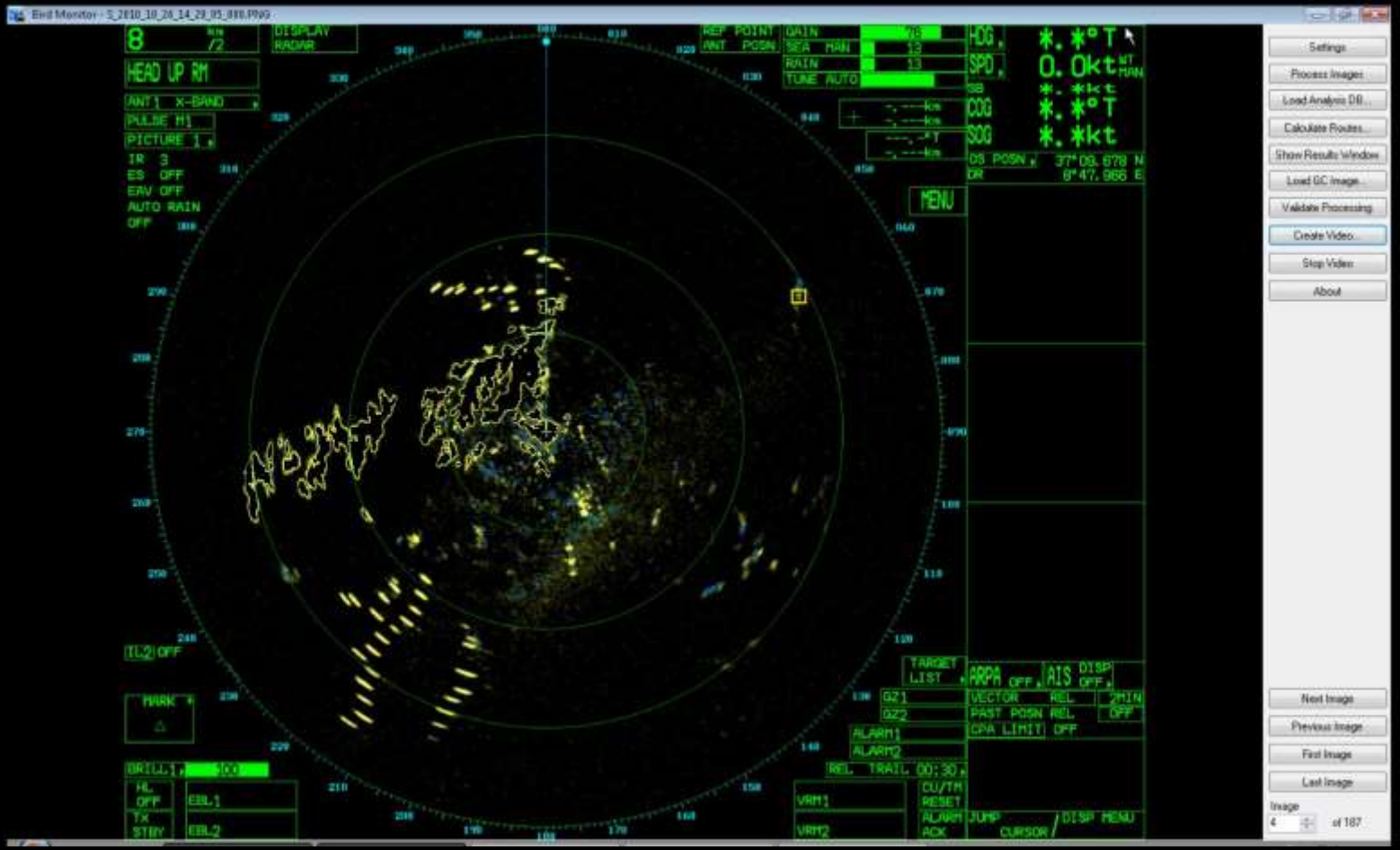
SW Portugal

BSJ, Portugal

GeZ, Egypt


Bird Monitor - S_2010_10_26_14_29_05_000.PPI3
HEAD UP RM
ANT1 X-BAND
PULSE M1
PICTURE 1
IR 3
ES OFF
EAV OFF
AUTO RAIN
OFF
DISPLAY
RADAR
REF POINT
ANT POSN
GAIN
SEA MAN
RAIN
TUNE AUTO
HDG
SPD
COG
SOG
DR
MENU
TL2 OFF
MARK
TARGET LIST
ARPA OFF
AIS DISP OFF
VECTOR REL
PAST POSN REL
CPA LIMIT OFF
ALARM1
ALARM2
REL TRAIL 00:30
VRM1
VRM2
CU/TM RESET
ALARM ACK
JUMP CURSOR
DISP MENU
Settings
Process Images
Load Analysis DB...
Calculate Routes...
Show Results Window
Load GC Image...
Validate Processing
Create Video...
Stop Video
About
Next Image
Previous Image
First Image
Last Image
Image
of 187

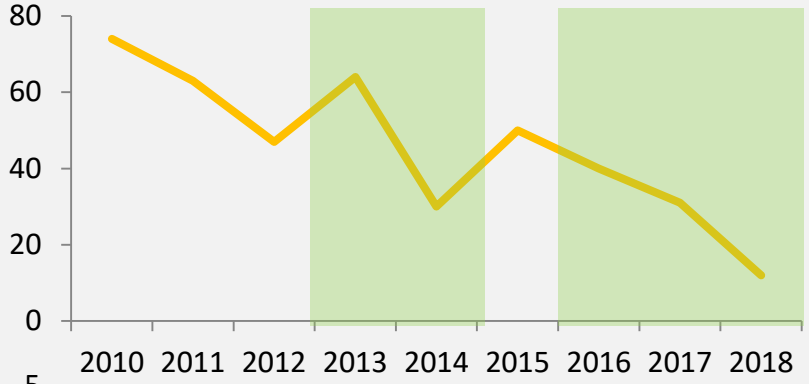
Mortality in BSJ (2010-2018)

- Systematic bi-weekly extensive carcass searches
- only 2 fatalities in 9 years

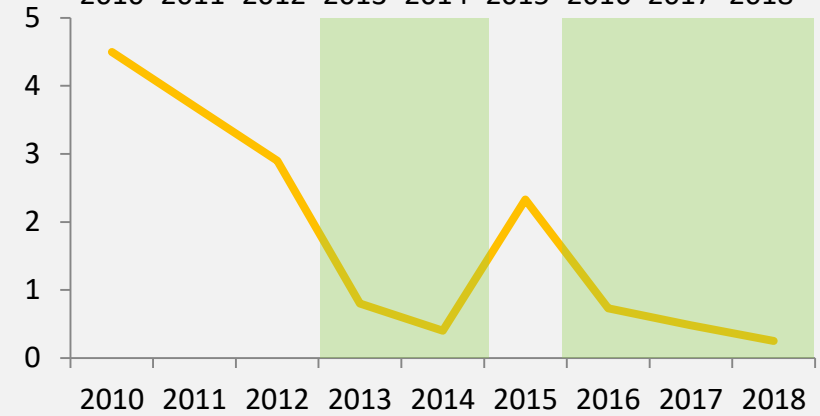
Mortality in GeZ (2016-2018)

- Unsystematic and limited to systematic and extensive carcass searches
- 5-7 fatalities/year

RASOD in BSJ

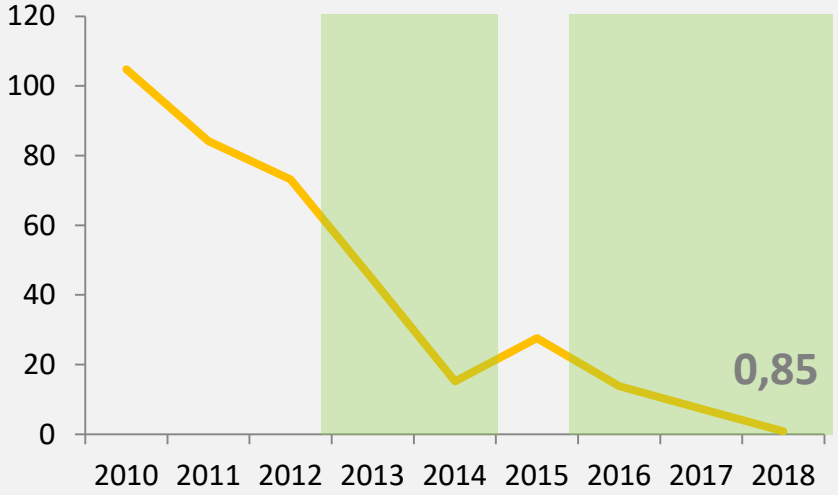


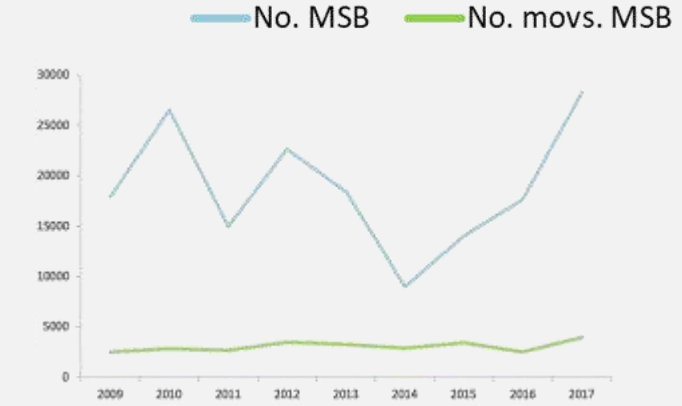
No. shutdowns

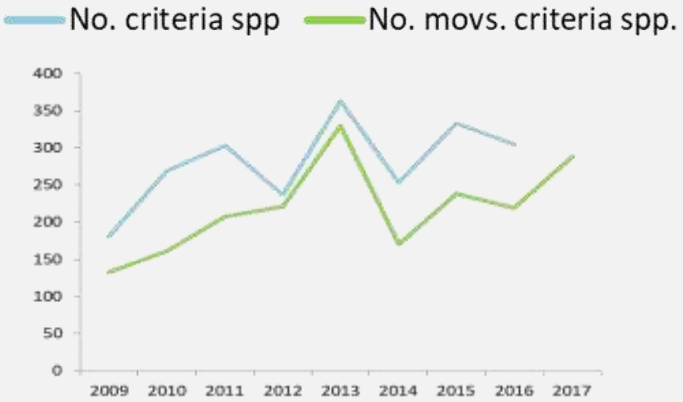


Response time (min)

RASOD in BSJ

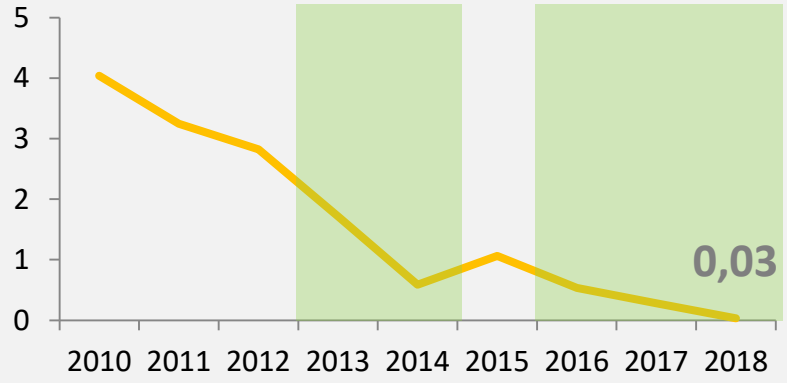




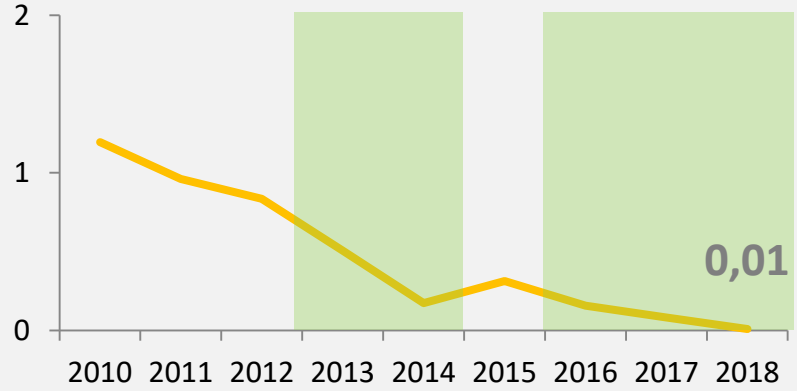


Equivalent shutdown period (h)

RASOD in BSJ

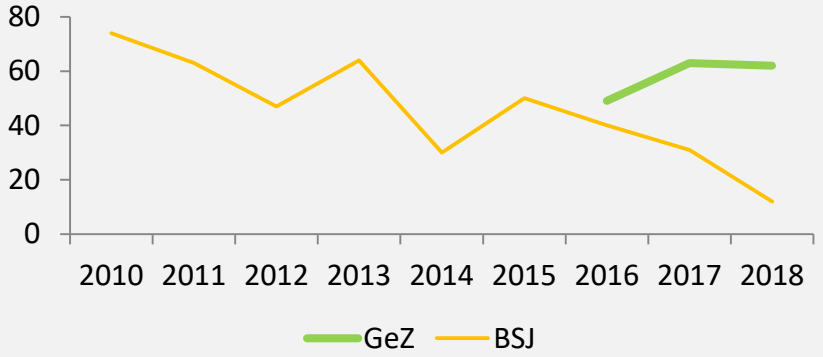


% equivalent shutdown period relative to the available production period/season



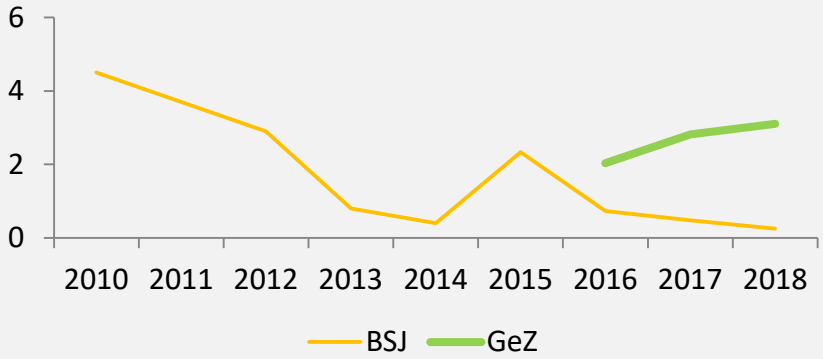
% equivalent shutdown period relative to the available production period/year

RASOD in GeZ



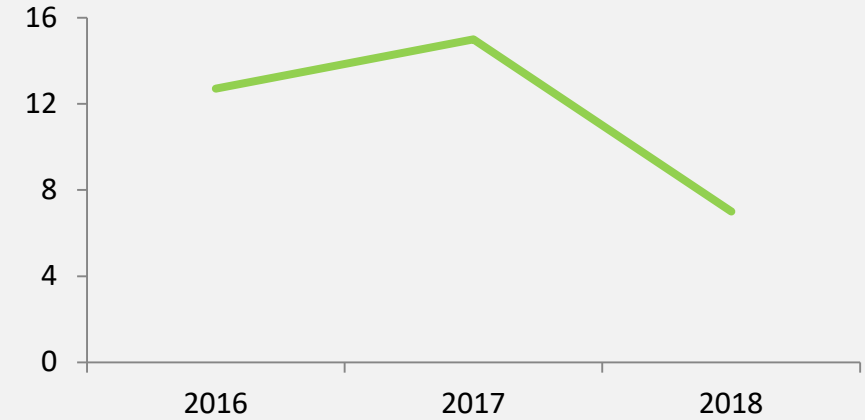
BSJ GeZ

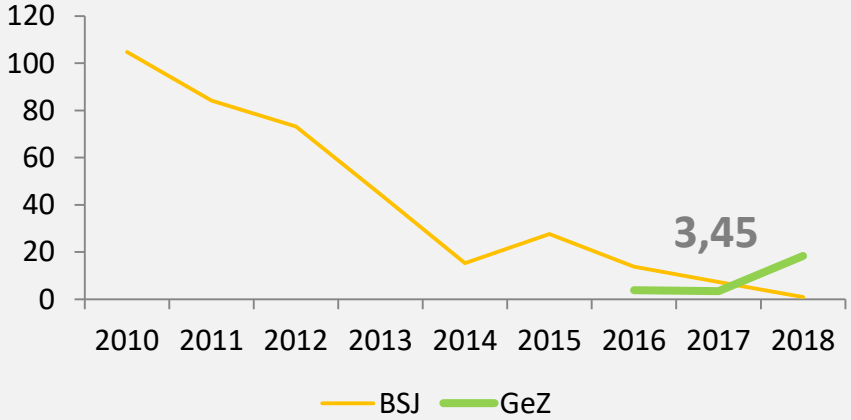
No. shutdowns



Response time (min)

RASOD in GeZ



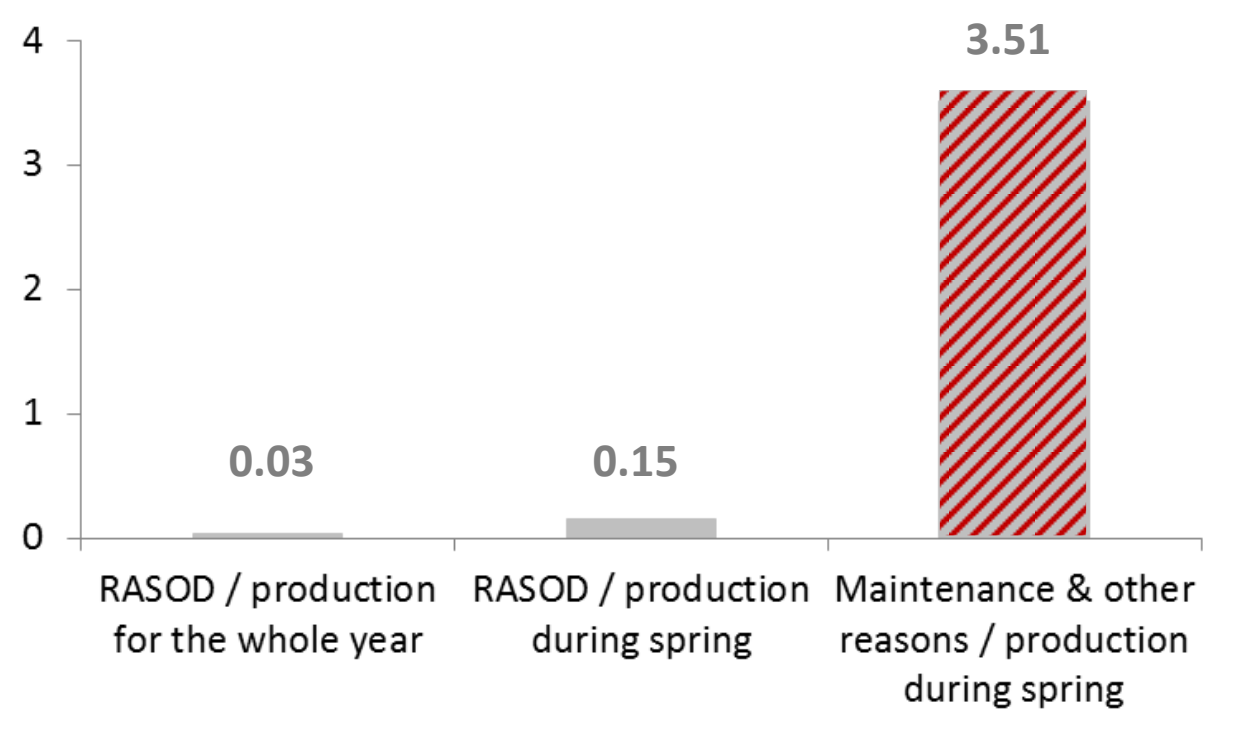


BSJ GeZ

% shutdown turbines/event

Equivalent shutdown period (h)

RASOD in GeZ



% Production loss (2016, 2017)

Conclusions

Temporary (on demand) turbine shutdown can be extremely efficient in avoiding collision mortality

Conclusions

In neighbouring wind farms in SW Portugal over 50 soaring birds died in the last 12 years

Conclusions

Loss in energy production is negligible (< 0.05% of available annual production)

Conclusions

Radar and vantage points contribute decisively to birds detection, tracking and identification

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Conclusions

Adaptive management enhances performance:

e.g. direct access to SCADA, cumulative experience by the team, radar position, monitoring period

Conclusions

Future improvements may include the combined use of other technologies (e.g. satellite-tracked birds/geo-fencing) and full automatization

Conclusions

But **handle with care!**

RASOD may be the optimal mitigation measure in some cases but site-and-species-specific approaches should always be adopted and can prove differently

Acknowledgements

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Thank you very much!

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