Wind Energy

Managing the risks to birds

Richard Grimmett
Head of Conservation
BirdLife International

Sherif Baha El Din
President, Nature Conservation Egypt

&

Hanneline Smit, Conservation Manager, BirdLife South Africa

‘Mainstreaming the Conservation of Migratory Soaring Birds in Red Sea-Rift Valley Flyway’

Risks

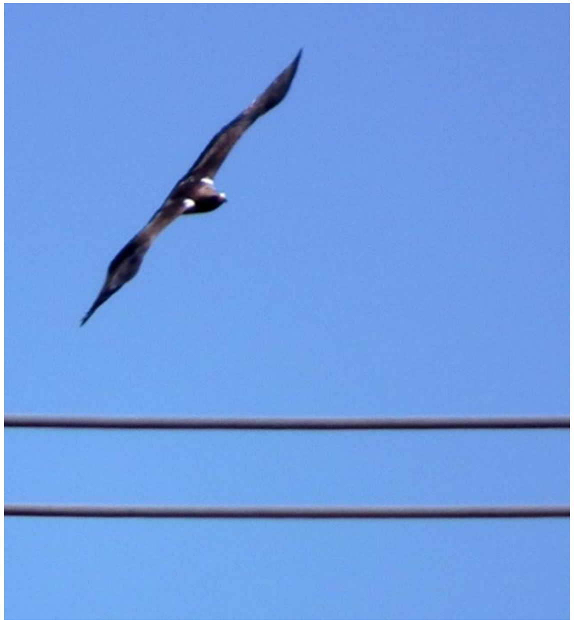
- Collision with rotor blades

- Displacement

- Habitat loss (wind farm foot-print)

Particularly significance:

- long-lived birds (e.g. raptors, large waterbirds)
-migration routes

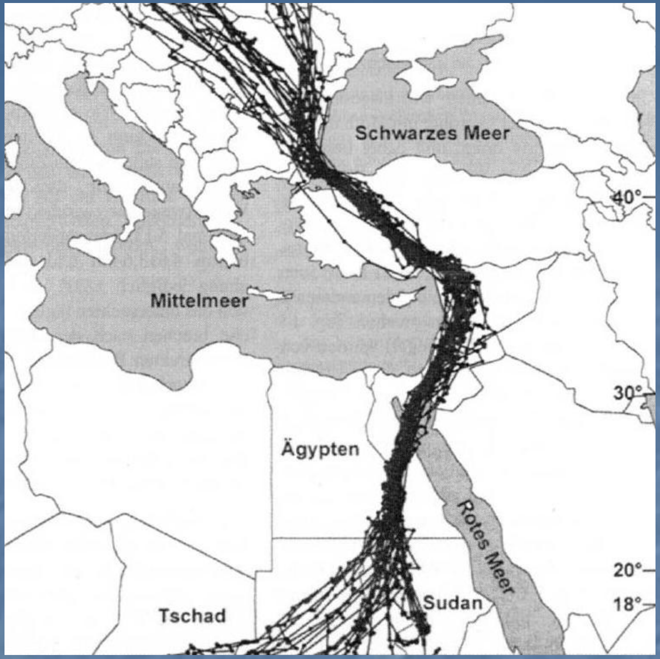


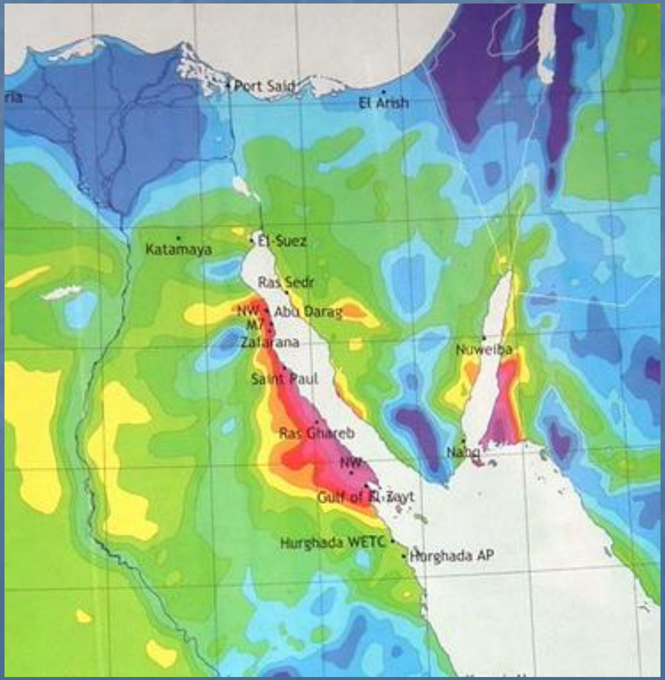
Associated power infrastructure

- Collision with lines

- Electrocution (medium voltage power lines with short insulators)

- Displacement and habitat loss (transmission-line foot-print)





Strong overlap in some regions between migration routes and favourable wind energy conditions (e.g. Gulf of Suez)

Location, Location & Location

Many sites of limited biodiversity concern

Altamont Pass, California

Alameda County Board made a decision:

- Half the turbines shut down in low wind season
- 100 – 200 of the oldest and most dangerous replaced; repowered

Scientific Bird Fatality study from Oct 2005 – Sep 2007:

- ○ 1596 mortalities
    - 40% raptors

Can wind energy and birds co-exist?

Wind farm development can occur with relatively little risk to birds by following a structured approach to the planning, construction and operation of wind farms.

Applying the Mitigation Hierarchy: Avoid, Reduce, Mitigate, Offset

Strategic Environmental Assessment (SEA)

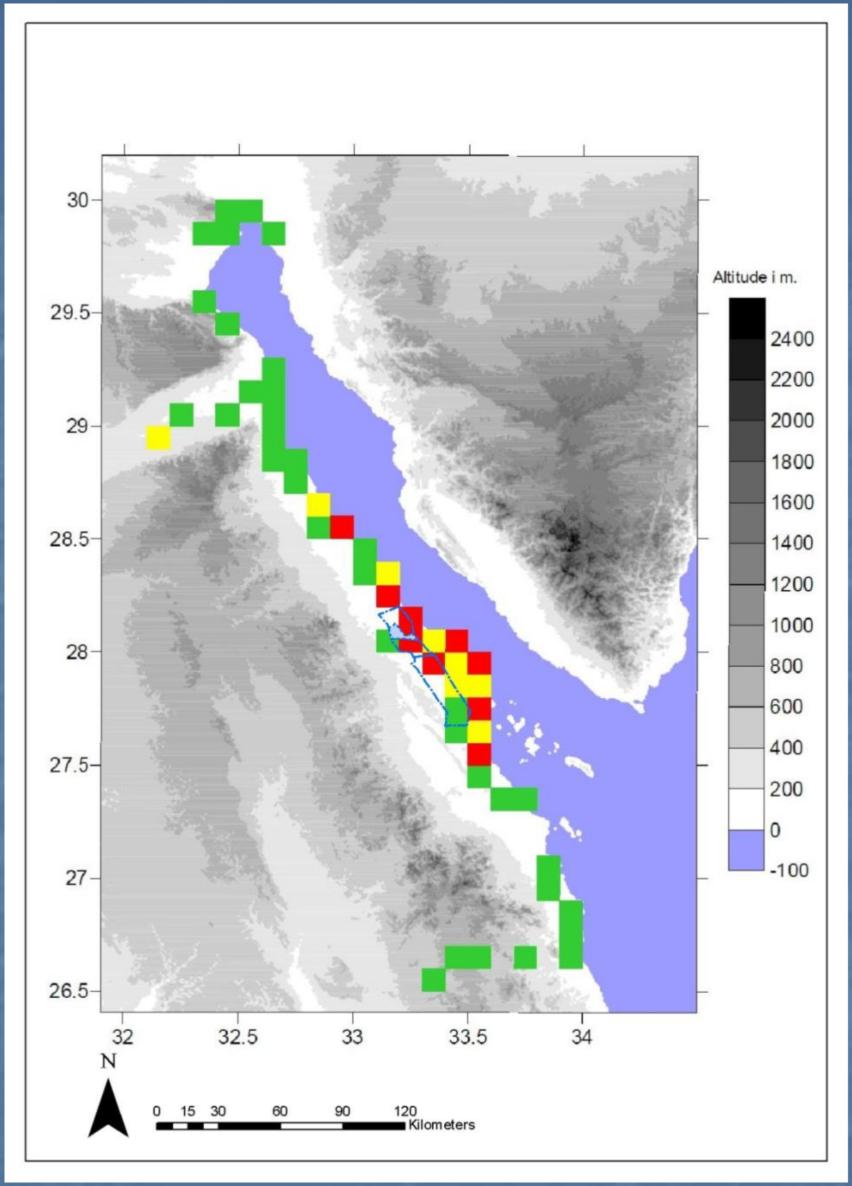
- Balance opportunities and constraints for wind energy development, and identify favoured areas for development.
- Addressing barrier effects and taking into consideration other existing or planned land uses in the region.
- Addressing cumulative impacts of multiple wind energy developments may impact upon same species and populations.
- Should include information on the locations of concentrations and bottlenecks of potentially vulnerable bird species through Sensitivity Mapping.

Strategic Environmental Assessment (SEA)

- Importance to apply the strategic approach early on in the planning process
- Wind energy is a landscape issue that is planned to occupy and affect vast land and sea areas throughout the world
- For example 9000km² are allotted for wind energy in Egypt

Environmental Impact Assessment (EIA): Site level

- EIA must include special assessment of risk to birds at the site
- This is based on Pre-construction monitoring
- The intensity of study should be linked to the anticipated level of risk (Sensitivity mapping)
- The EIA will quantify the likely ecological significance of impacts associated with proposed wind farms, including the risks posed to birds
- It should identify potential mitigation or compensatory options
- Post-construction monitoring should be conducted to confirm preconstruction risk assessment and facilitate adaptive management



Sensitivity mapping

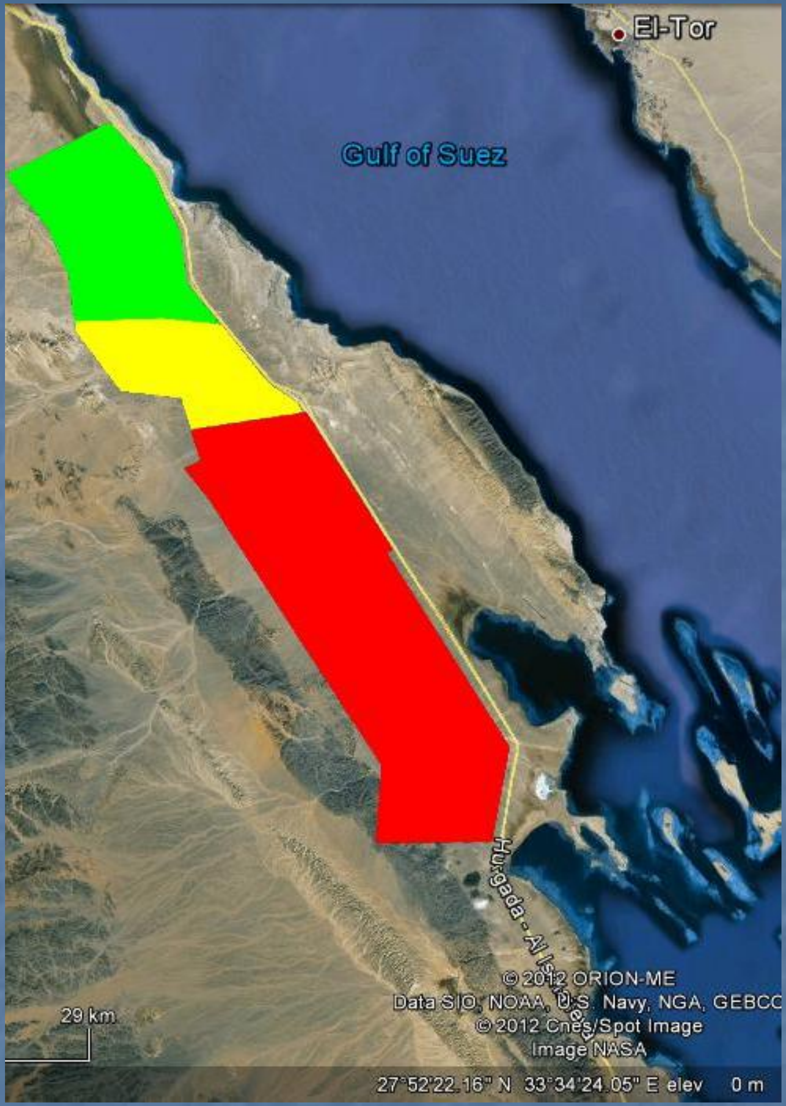
Highlight locations where wind energy development is most sensitive

Assist planning at early stages

Guide the EIA process

Possible in data-poor areas, using a combination of data and modelling sources

Example from Gulf of Suez/Red Sea region of Egypt



Gulf of Suez, Egypt

Green Zone: clearance for wind energy development subject to EIA

Yellow Zone: requires further detailed bird studies

Red Zone: considered too sensitive for wind energy development

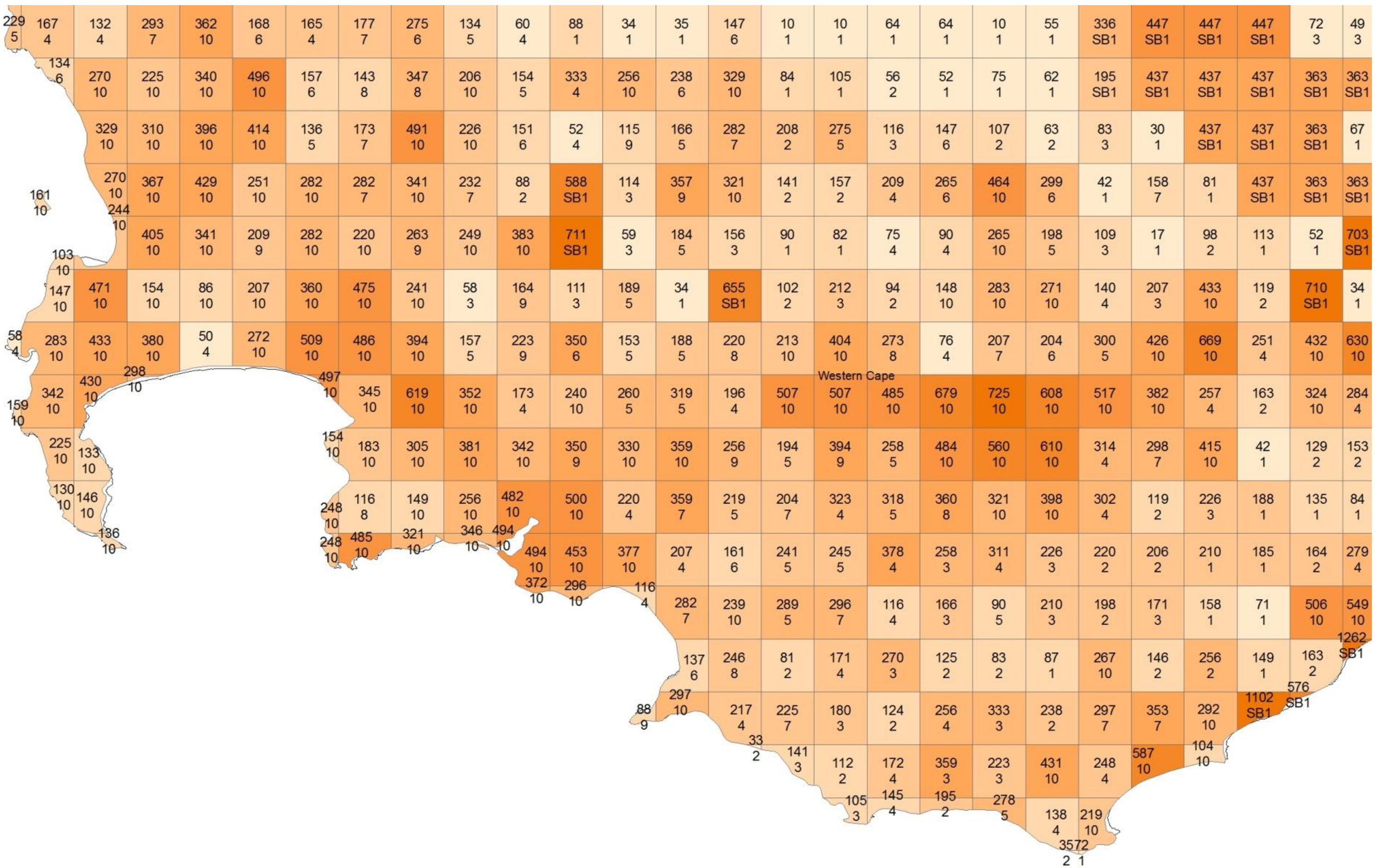
Sensitivity Mapping in South Africa

How is the sensitivity level of an area calculated?

- Status of the land
- Status based on the species that occur at a specific locality

  - **Obtain data** where all the species to be consider have been recorded in South Africa
  - Obtain the **species priority score** for each species
  - **Count** the priority scores together
  - **Calculate** a sensitivity value for the geographic area

The Final Map



South Africa

Best Practice Monitoring Guidelines

Stages of Monitoring

- Stage 1: Reconnaissance phase (EIA specialist report)
- Stage 2: Avian Impact Assessment (AIA) i.e. pre-construction monitoring
- Stage 3: Comparative post-construction monitoring
- Stage 4: Experimental research

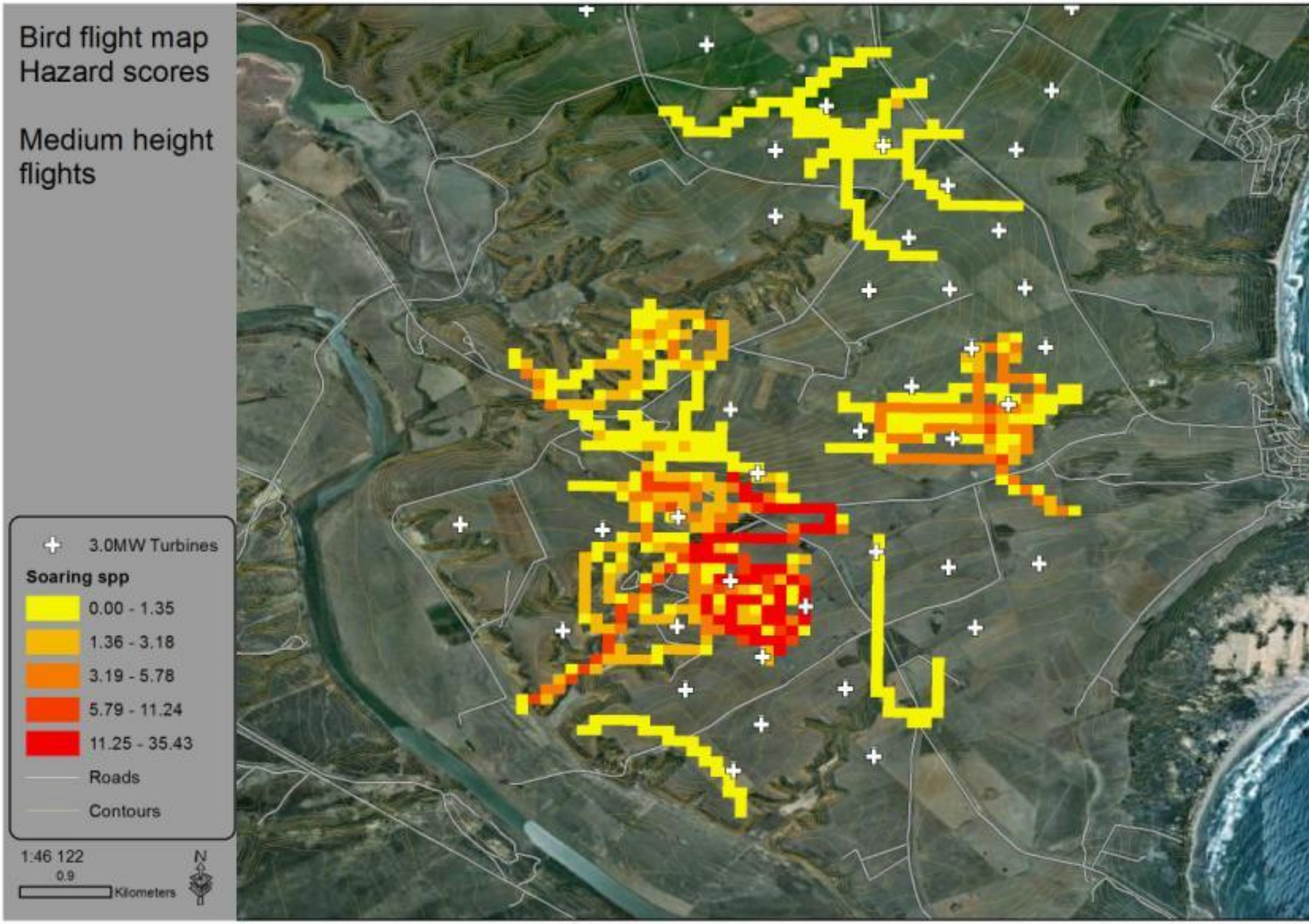
Reason for Monitoring: SSS-S

Season, site, species – specific

The effects of a wind farm on birds are highly variable and depend on a wide range of factors including

- the specification of the development,
- the topography of the surrounding land,
- the habitats affected and
- the number and species of birds present.

EIA with monitoring



Mitigation measures

- Minimise attraction of site to birds (green areas, rubbish tips, water sources in/around site)
- Short-term Shutdown during periods of peak bird activity
- Smaller number of large turbines (rather than large number of small turbines)
- Avoid turbines with lattice towers (to reduce suitable perching sites)
- Avoid lighting of turbines

Mitigation measures

- Avoid small turbines with high-speed rotors
- Avoid closely packed turbines
- Maintain corridors aligned with main flight directions (≥ 1 km between wind farms)
- Provide visual deterrents on power lines in sensitive areas
- Provide covers for short insulators in sensitive areas
- Post-construction Monitoring is important to ensure that mitigation measures are implemented and are effective, with adaptation as necessary

Shutdown

- Can be applied only as a mitigation measure where risk level is deemed acceptable but high
- Can be initiated manually or automatically (radar) once reaching a predetermined thresh-hold: Post-construction Monitoring
- In response to particular high risk weather conditions (e.g. sand storms, dangerous wind directions)

However:

- Who initiates and controls shutdown?
- Who pays for shutdown?

Offsets

After the fulfilment of the Mitigation Hierarchy, if acceptable levels of residual damage are identified, then the conservation or restoration of habitats or removal of threats elsewhere (e.g. hunting) might be undertaken as compensation.

This is however a last resort, particularly as compensation is technically difficult to achieve effectively in many cases, and has considerable uncertainty.

Important guidance available, e.g.

Greening the Wind: Environmental and Social Considerations for Wind Power Development in Latin America and Beyond (World Bank)

Wind Energy Developments and Natura 2000 (European Commission)

Windfarms and Birds (Council of Europe & BirdLife)

CMS/AEWA Guidelines on Electricity Power Grids

Recent US Government Guidance

Guidance on best practice in wind, energy transmission and solar (in prep. BirdLife/UNDP/GEF 'Soaring Birds Project')

Bats & Wind-Energy

Cris Hein-Bats and Wind Energy Program Coordinator

4 May 2012

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Bats Impacted

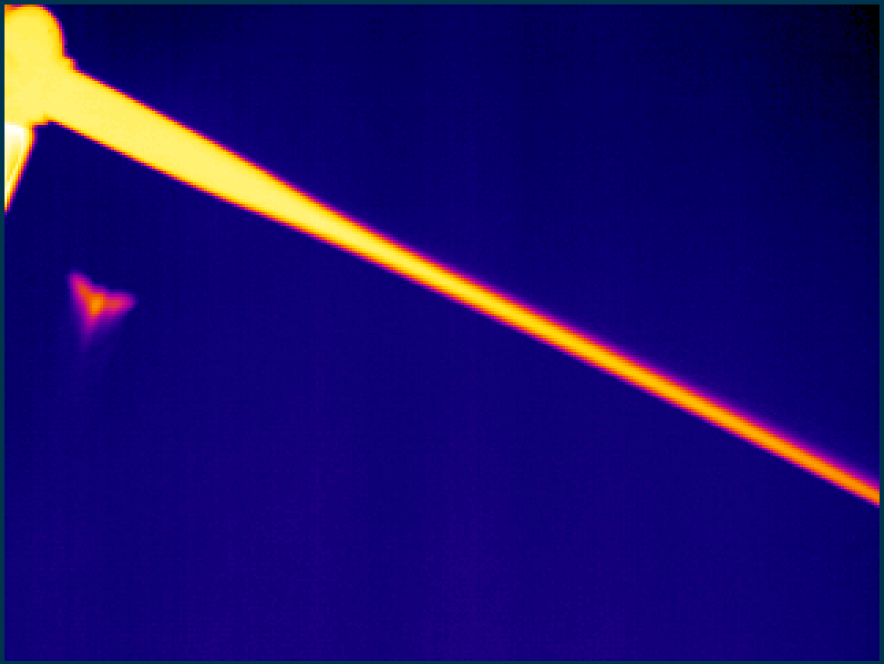
- US & Canada
  - 21 of 45 spp.
  - 75% fatalities-3 migratory tree bats
- Europe
  - 19 of 28 spp
  - 98% fatalities 4 open-air foraging bats
- Central/South America
  - Pollen/Nectar & Fruit bats
- Lacking information from most of world
  - Understudied, not reported, initiating development

Fatality Trends

- Higher fatalities
  - Late summer through fall
  - Low wind speeds
  - Warmer temperatures
  - Some evidence for barometric pressure, moonlight
  - Forested ridgelines or near coast
  - Taller turbines with larger rotor-swept areas

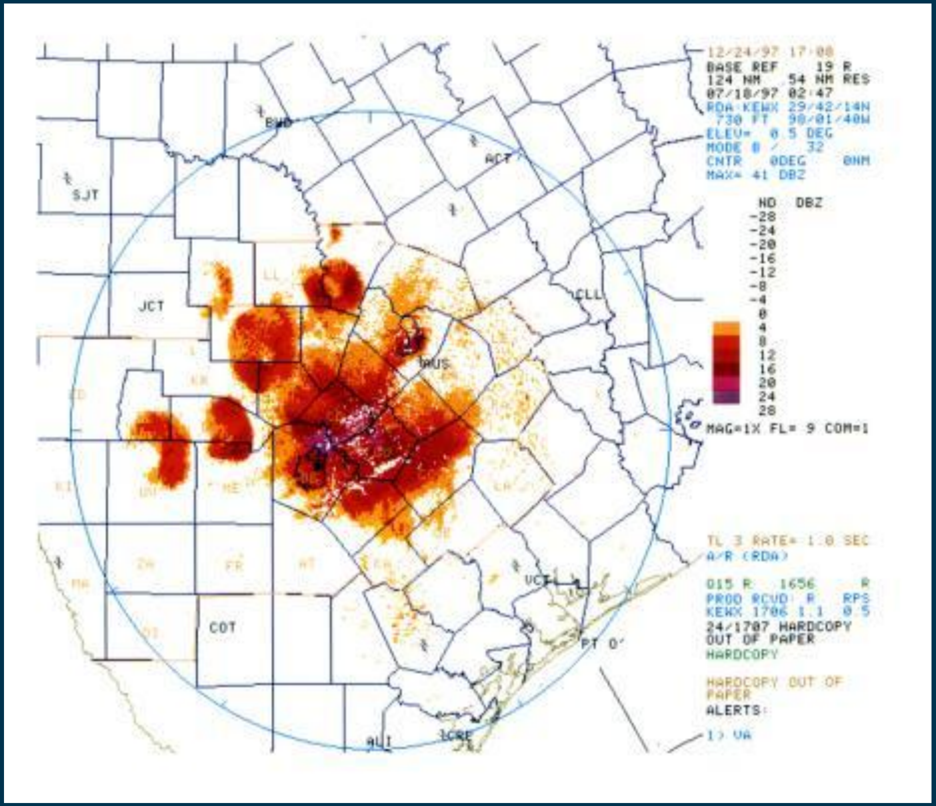
Bat Behavior

- Attraction Hypotheses
- Bat/Turbine Interactions
- Collision vs. Barotrauma



Proper Siting

- Avoid high risk areas
- Assess risk



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Operational Mitigation

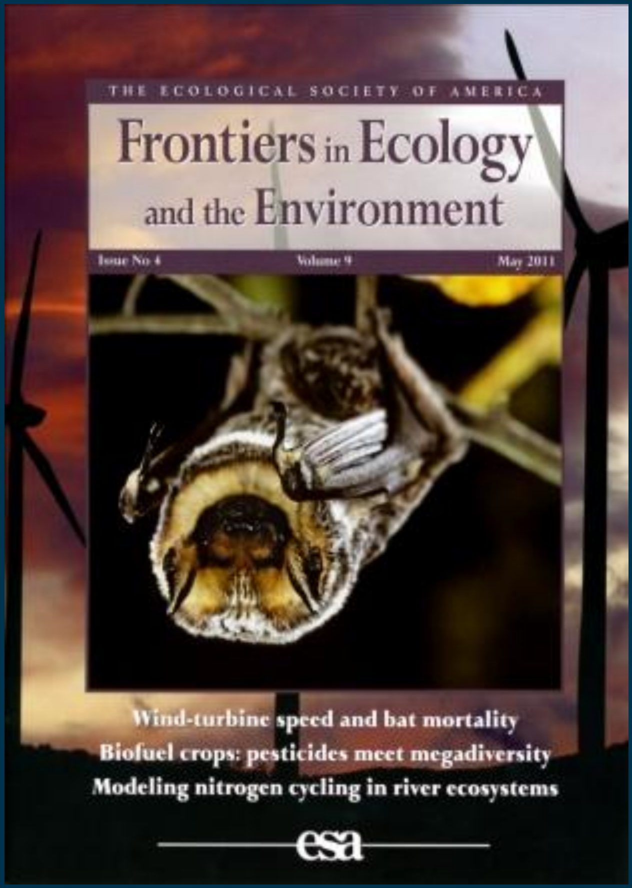
Arnett et al. (2011)

1st US-based curtailment study

44–93% fewer bats killed at turbines with cut-in speed raised between 5.0 & 6.5 m/s

0.3–~1% annual power loss when cut-in speed raised between 5.0 & 6.5 m/s

Subsequent studies support these findings – raising cut in speed significantly reduces bat fatalities



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Acoustic Deterrents

Arnett et al. (In Prep)

1st (& only) deterrent study

~2% more to 64% fewer fatalities at deterrent-equipped turbines

Variation likely result of problems with devices & physics of sound

More effective on low-frequency species (hoary & silver-haired bats)

R&D essential to improve devices