Industry guidance for early screening of biodiversity risk

ONSHORE WIND

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Introduction

This document provides brief practical guidance on early risk screening for onshore wind projects. It outlines how to identify and avoid areas of high biodiversity sensitivity, based on the IUCN/TBC Guidelines for Mitigating biodiversity impacts associated with solar and wind energy development.[1] It is relevant to both project financers and developers and is applicable to developments around the world.

The guidance focuses on early desk-based risk screening, as part of the early planning and design phase of a development (Figure 1).[2] Siting projects away from sensitive areas (such as important bird habitats and migration routes) can help to avoid significant negative impacts, and in turn reduce the need for expensive and prolonged survey, mitigation, and approval processes.

Financers may need to screen projects at different stages of development. The approaches used in early risk screening may be helpful to flag risks for projects that are at later stages of planning, but a range of other due diligence questions may also need to be considered.[3]

1 Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N., Carbone, G. (2021). Mitigating biodiversity impacts associated with solar and wind energy development. Guidelines for project developers. Gland, Switzerland: IUCN and Cambridge, UK: The Biodiversity Consultancy. https://doi.org/10.2305/IUCN.CH.2021.04.en

2 See Figure 3.2 in the Guidelines for further detail.

3 See the IBAT briefing note, *Considering biodiversity for solar and wind energy investments.*

Considerations for early risk screening

Early risk screening is a valuable tool to assess if a particular site or sites may pose an elevated biodiversity risk. It does not provide information on whether suitable but less risky locations exist elsewhere. Spatial plans and wildlife sensitivity mapping can provide this information (see Figure 1 and section 3 of the Guidelines).

- Early risk screening can indicate potential elevated risk but does not provide a definitive picture. It is not an alternative to site-specific assessment for mitigation planning. Risks may be present that were not evident during screening, while on the other hand potential risk does not always translate into actual risk (for example, migrating birds might be present but routinely flying well above the height of turbines).
- Risks will depend not only on project location but on the size and design of the project.
- Risk screening results should be interpreted carefully, bearing in mind that:
    - There may be data gaps, especially in less studied regions. Absence of data does not indicate absence of risk.
    - In regions where wind developments are relatively new there may be limited information on which species could be most at risk (e.g. from collision with turbines or behavioural displacement), although experience from elsewhere provides some indication.
    - For birds that range very widely (such as some vulture species) or that make long-distance movements, the mapped presence of the species overlapping a site may not in itself provide a good indication of risk. Supplementary information or expert advice should be used where possible to aid interpretation.

In addition to informing site selection, a risk screening can help scope further site-specific assessments to assess the presence and status of the full range of sensitive biodiversity features at risk from the project. Multiple rounds of surveys across one or more years may be needed to develop a good understanding of a species' ecological requirements, population and seasonal distribution.

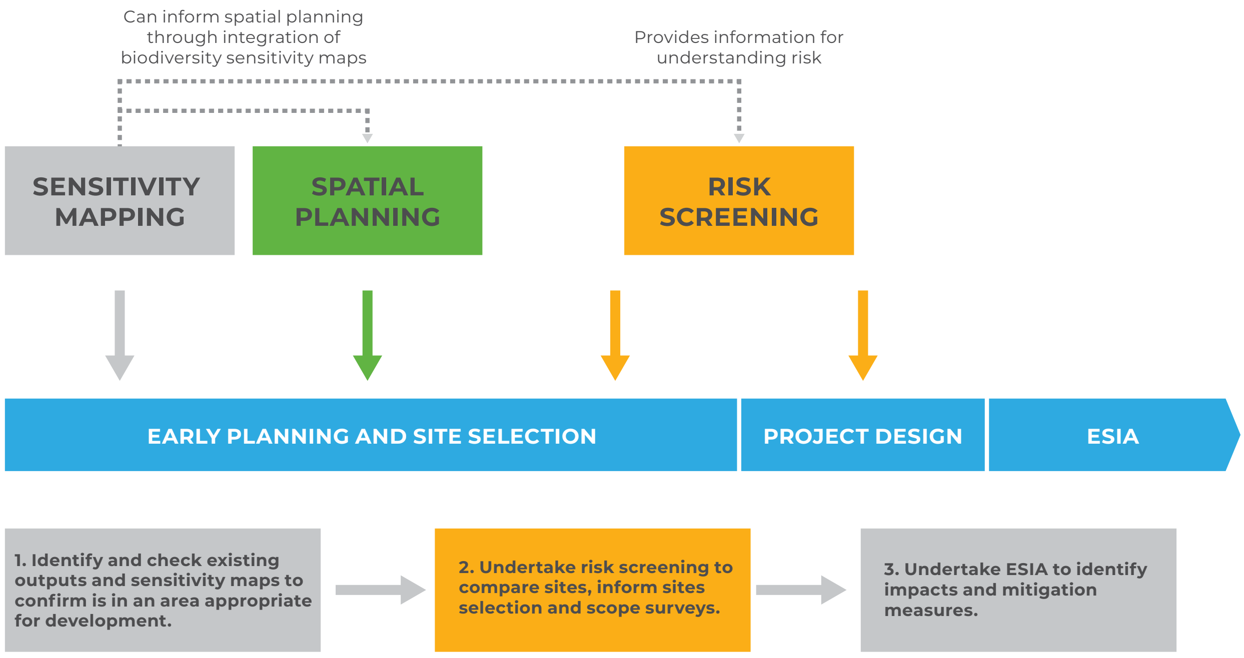

Figure 1. This guidance is applicable to the risk screening stage of the early planning phase of a project. Screening can also be used to inform project design, following confirmation of the project site. Provisional site selection and screening should ideally be guided by spatial planning and/or wildlife sensitivity mapping where these exist. It is important that developers and financers identify such information sources and where available use them to confirm that the proposed development site is not known to overlap with sensitive areas. Additional guidance on sensitivity mapping, spatial planning and Environmental and Social Impact Assessment (ESIA) can be found in Section 3 of the Guidelines.

Biodiversity data sources and interpretation

Important biodiversity data and information sources for early screening are identified in Table 1. Depending on project location, other relevant national or regional datasets may be available.

The Integrated Biodiversity Assessment Tool (IBAT) is a key resource and the usual starting point for screening. IBAT provides commercial users[4] with spatial data for global biodiversity from several key datasets, such as the IUCN Red List of Threatened Species™, the World Database on Protected Areas and the World Database of Key Biodiversity Areas (which includes Important Bird and Biodiversity Areas). Reports showing the proximity of a particular area of interest in relation to these features can be generated in IBAT. All of these are critical for identifying sites of high biodiversity significance. In this document we show how these reports can be used to identify potential risks associated with biodiversity features including threatened species.

Additional datasets are needed to assess overlap with important bird and bat habitat or migration routes (e.g. BirdLife's Migratory Soaring Birds Project). Where available, these are included in Table 1.

Screening should consider the wider area around a project site. This is to account for potential direct and indirect impacts associated with the project and its associated facilities (e.g. powerlines and roads), as well as potential movements of wide-ranging species. A buffer of at least 20 km around the proposed wind development is recommended (IBAT allows users to select up to three buffers between 1km and 50km in its site reports). This may need to be scaled up if planned new roads or powerlines are more extensive, or if high-risk, wide-ranging species such as vultures are likely to be present.

It is recommended to work with biodiversity specialists to help undertake the screening and interpret the findings. Specialists will also be able to help investors and developers understand the implications for aligning with biodiversity safeguards and to scope further work, including field surveys and Environmental Impact Assessment.

Further guidance on risk screening can be found in Section 3 of the Guidelines.

4 IBAT data can be accessed either as a pay as you go service or through an annual subscription service. See here for costs and details and here for IBAT's briefing note on considering biodiversity for solar and wind energy investments.

Framework for integrating biodiversity into project planning

Table 1 presents the key types of risk associated with a project's location and specific construction and operational features where relevant, based on two broad categories of impact:

i. **Footprint**: habitat loss, degradation and/or fragmentation (including behavioural change by wildlife) resulting from the project's land-take;
ii. **Collisions**: bird and/or bat mortality due to collisions with turbines and transmission lines.

Further context and guidance are provided in Table 1 to help understand risk. The guidance and information sources in Table 1 are not exhaustive – it is important to work with specialists to locate and interpret relevant information. Section 5 of the Guidelines identifies other potential impacts and mitigation approaches, including opportunities to enhance biodiversity through proactive conservation actions such as site enhancement.

Sensitive species groups are referenced where such information is known and supported by scientific research. See Annex 1 for a detailed table of vulnerable species, with references. These are examples to aid screening and not intended to be a comprehensive list.

Table 1. Key biodiversity risks associated with onshore wind developments, and means to identify risk based on existing information sources. Specific references to studies on species known to be sensitive to wind developments resources can be found in Annex 1.

<table>
<tr><th>Potential impacts</th><th>What indicates potentially high risk?</th><th>How can I assess risk?</th><th>IBAT and additional information sources not available through IBAT</th></tr>
<tr><td colspan="4">Impact category: Project footprint</td></tr>
<tr><td rowspan="6">• Loss or degradation of natural vegetation
• Habitat fragmentation
• Displacement of wildlife
• Barriers to wildlife movement</td><td>Footprint in or near designated Protected Areas</td><td>Protected areas have been mapped globally. Projects within or adjacent to such areas may be incompatible with its objectives, and risk impacting the biodiversity values for which they were designated.</td><td>• IBAT Proximity or Multisite reports which include protected areas</td></tr>
<tr><td>Footprint in or near Key Biodiversity Areas</td><td>Key Biodiversity Areas have been identified globally. Projects within such areas risk impacting the biodiversity values for which they were designated, particularly where these have been identified based on significance of birds and bats.</td><td>• IBAT Proximity or Multisite reports which includes the World's Database of Key Biodiversity Areas</td></tr>
<tr><td>Footprint within the range of threatened or restricted-range species</td><td>Species range maps are available through the IUCN Red List to identify potential overlap. Some threatened birds and bats are known to be at high risk of collision with turbines or transmission lines (see below).

Open-country species may be displaced from areas around tall structures (i.e., turbines or transmission-line towers). Threatened and restricted-range species at highest risk.</td><td>• IBAT Proximity or Multisite reports</td></tr>
<tr><td>Overlapping with a migratory corridor or bottleneck for birds or bats</td><td>Some species avoid wind farms, resulting in displacement and effective loss of habitat. Species range maps are available through the IUCN Red List. Threatened and restricted-range species at highest risk. Species known to be vulnerable to displacement include:
• Hawks
• Kites
• Vultures</td><td>• IBAT Proximity or Multisite reports</td></tr>
<tr><td>Footprint in natural or semi-natural vegetation</td><td>Potential areas of Natural Habitat have been mapped globally based on IFC PS6 definitions. Developments within or adjacent to areas of Natural Habitat are likely to be high risk for development. Areas of Modified Habitat such as farmlands and pastures may still support sensitive species so are not necessarily low risk.</td><td>• Natural and Modified Habitat map - free for commercial use with appropriate attribution</td></tr>
<tr><td>Footprint in mapped Critical Habitat</td><td>Potential or likely Critical Habitat has been identified and mapped globally based on the IFC PS6 criteria and a range of biodiversity data. Developments within or adjacent to areas of Critical Habitat are likely to be high risk for development.</td><td>• Critical Habitat map - free for commercial use with appropriate attribution</td></tr>
<tr><td colspan="4">Impact category: Collisions with turbines</td></tr>
</table>

Fatalities or injuries to birds	Within range of bird species vulnerable to collisions	Range maps for most vulnerable birds are available through the IUCN Red List. Birds known to be vulnerable to collision risk include: • large soaring raptors (eagles, vultures) • migratory raptors (falcons, hawks, harriers, kestrels, buzzards) • birds with high wing loading (bustards, cranes, flamingos, storks, geese, pelicans) Birds that are threatened or have a restricted range are at the highest risk.	• IBAT Proximity or Multisite reports
	Close to wetlands	Important wetlands have been identified for most parts of the world. Wetlands often support significant populations of birds at high collision risk. Range maps for most vulnerable wetland bird species are available through the IUCN Red List. Wetland birds known to be vulnerable to collision risk include those with high wing-loading such as: • cranes • flamingos • storks • geese • pelicans Birds that are threatened or have a restricted range are at the highest risk.	• Global surface Water dataset - includes important seasonal and intermittent wetlands • Ramsar site information service - generates site reports which can be downloaded • Regional wetland databases such as the Critical Sites Network
	Within range of bat species vulnerable to collisions	Range maps for most vulnerable bats are available through the IUCN Red List. Bats vulnerable to collision risk include open-air foragers and migratory species. Species groups known to be vulnerable to collision risk include: • Fruit Bats (Megachiroptera) • Free-tailed Bats (Molossidae) • Vespertilionidae (including Nyctalus spp., Myotis spp. and pipistrelles) • Emballonuridae • Miniopteridae • Craseonycteridae • Cistugidae • Rhinopomatidae Bats that are threatened or have a restricted range are of highest risk. Information on sensitivity for bats in tropics and for Megachiroptera (fruit bats) currently very limited.	• IBAT Proximity or Multisite reports
	In or near cliffs, valleys or other notable topographic relief	In addition to vulnerable species' range maps, topographic maps can be used to identify sensitive features. These include features of high relief which may provide important nesting and roosting sites for soaring birds such as eagles and vultures. These features are also often used for migrating bird species susceptible to collision risk.	• Topographic maps • The Soaring Bird Sensitivity Map tool - provides distribution maps of soaring bird species along the Rift Valley / Red Sea flyway
	Within defined vulture hotspots and in areas with free-ranging wildlife or livestock and waste disposal areas	Old-world vultures are at especially high collision risk because of their foraging behaviour and limited frontal binocular vision. Many species are also highly threatened. Regional hotspot maps are available for some vulnerable species. Vultures may also be associated with open rangeland areas with large wild ungulates or livestock. Other attractive places for scavenging birds may be landfill sites or waste disposal areas.	• Vulture hotspot maps, including the pan-African spatial assessment of Vulture hotspots - provides range, movement, and habitat maps in pdf format
	Overlapping with migratory stopover sites, corridors and 'bottlenecks' for birds or bats	Areas along migratory corridors that support high concentrations of migratory birds or bats such as at staging areas, stopover sites and 'bottleneck' areas such as narrow straits.	• The Soaring Bird Sensitivity Map tool - provides distribution maps of soaring bird species along the Rift Valley / Red Sea flyway • Movebank - provides freely available data on satellite tagged migratory species including birds
Fatalities or injuries to birds or bats	Overlapping with natural or semi-natural vegetation, in or near Protected Areas or Key Biodiversity Areas	As well as posing high footprint risk, such areas are more likely to hold species that are vulnerable to collisions with turbines. See 'Project Footprint' section above.	• See 'Project Footprint' section above
Impact category: Collisions with transmission lines			
Fatalities or injuries to birds	Within range of bird species vulnerable to collisions	Range maps are available through the IUCN Red List. Species known to be vulnerable to transmission line collisions include those with high wing-loading and low manoeuvrability, notably: • Geese • Flamingos • Storks • Bustards • Cranes • Ground Hornbills • Spurfowl Species that are threatened or have a restricted range pose the highest risk.	• IBAT Proximity or Multisite reports which include the IUCN Red List
	Close to wetlands	See 'Close to wetlands' section above.	• See 'Close to wetlands' section above.

Annex 1. Birds and bats known to be vulnerable to onshore wind developments

Class	Species group	Species sub-group	Family (examples)	Species (examples)	Potential impacts	References to examples (not comprehensive)
Birds	**Raptors**	**Large migratory eagles**	**Accipitridae**	Steppe eagle (*Aquila nipalensis*)	Collision risk with turbines	Dixon et al. 2018. (https://www.conservationevidence.com/individual-study/6861); BirdLife International 2012 (http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/factsheet%20Solar%20Developer%20v1H.pdf)
		Large resident eagles		Verreaux's eagle (*Aquila verreauxii*)		Ralston Paton et al. 2017 (https://tethys.pnnl.gov/sites/default/files/publications/Ralston-Paton-et-al-2017.pdf)
				Martial eagle (*Polemaetus bellicosus*)		
				White-tailed eagle (*Haliaeetus albicilla*)		Dahl et al. 2013 (DOI: 10.1002/wsb.258); BirdLife international 2012 (http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/factsheet%20Solar%20Developer%20v1H.pdf)
		Old-world vultures		Rüppell's vulture (*Gyps rueppelli*)		TBC 2019 (https://www.thebiodiversityconsultancy.com/wp-content/uploads/2019/08/Wind-energy-TBC-IBN-August-2019-1.pdf); BirdLife international 2012 (http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/factsheet%20Solar%20Developer%20v1H.pdf)
				White-backed vulture (*Gyps africanus*)		
				Egyptian vulture (*Neophron percnopterus*)		Angelov et al. 2013 (doi:10.1017/S0959270912000123)
				Griffon vulture (*Gyps fulvus*)		De Lucas et al. 2012. (https://doi.org/10.1016/j.biocon.2011.12.029)
				Bearded vulture (*Gypaetus barbatus*)		Reid et al. 2015 (DOI: 10.1111/1365-2664.12468); Rushworth, I. and Krüger, S. 2013. Wind-farms threaten Southern Africa's cliff nesting vultures. Ezemvelo KZN Wildlife report, 23 pp. (unpublished)
				Cape vulture (*Gyps coprotheres*)		
				Black vulture (*Aegypius monachus*)		Dixon et al. 2018. (https://www.conservationevidence.com/individual-study/6861); BirdLife international 2012 (http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/factsheet%20Solar%20Developer%20v1H.pdf)
		Other migratory raptors		Black kite (*Milvus migrans*)		
				Common buzzard (*Buteo buteo*)		
				Long-legged buzzard (*Buteo rufinus*)		
				Common kestrel (*Falco tinnunculus*)		

Class	Species group	Species sub-group	Family (examples)	Species (examples)	Potential impacts	References to examples (not comprehensive)
Birds	**Raptors**	**Other migratory raptors**	**Falconidae**	Saker falcon (*Falco cherrug*)	Collision risk with turbines	Dixon et al. 2018. (https://www.conservationevidence.com/individual-study/6861); BirdLife international 2012 (http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/factsheet%20Solar%20Developer%20v1H.pdf)
				Amur falcon (*Falco amurensis*)		Ralston-Paton et al. 2017 (https://tethys.pnnl.gov/sites/default/files/publications/Ralston-Paton-et-al-2017.pdf)
			Accipitridae	White-tailed Hawk (*Buteo albicaudatus*)	Displacement	Villegas-Patraca et al. 2014 (https://doi.org/10.1371/journal.pone.0092462)
				Swainson's hawk (*Buteo swainsoni*)		
			Cathartidae	Turkey vulture (*Cathartes aura*)		
		Other resident raptors	**Accipitridae**	Jackal buzzard (*Buteo rufofuscus*)	Collision risk with turbines	Ralston Paton et al. 2017. (https://tethys.pnnl.gov/sites/default/files/publications/Ralston-Paton-et-al-2017.pdf); BirdLife South Africa, Johannesburg, South Africa
				Black harriers (*Circus maurus*)		
				Upland buzzard (*Buteo hemilasius*)		Dixon et al. 2018. (https://www.conservationevidence.com/individual-study/6861); BirdLife international 2012 (http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/factsheet%20Solar%20Developer%20v1H.pdf)
		Pelicans	**Pelecanidae**	Great white pelican (*Pelecanus onocrotalus*)		Thaxter et al. 2017 (https://doi.org/10.1098/rspb.2017.0829); BirdLife international 2012 (http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/factsheet%20Solar%20Developer%20v1H.pdf)
		Storks	**Ciconidae**	White stork (*Ciconia ciconia*)		
		Cranes	**Gruidae**	Blue crane (*Anthropoides paradiseus*)		Ralston-Paton et al., 2017 (https://tethys.pnnl.gov/sites/default/files/publications/Ralston-Paton-et-al-2017.pdf)
	Landfowl	**Spurfowl and francolins**	**Phasianidae**	Cape spurfowl (*Pternistis capensis*)		Ralston-Paton et al. 2017 (https://tethys.pnnl.gov/sites/default/files/publications/Ralston-Paton-et-al-2017.pdf); Jenkins et al. 2010 (http://www.the-eis.com/data/literature/Jenkins%20et%20al.%202010_Power%20line%20collisions%20review.pdf)

Class	Species group	Species sub-group	Family (examples)	Species (examples)	Potential impacts	References to examples (not comprehensive)
Bats	Insectivores		Mormoopidae	Davy's naked-backed bat (*Pteronotus davyi*)	Collision risk with turbines	Arnett et al. 2016 (https://doi.org/10.1007/978-3-319-25220-9)
				Ghost-faced bat (*Mormoops megalophylla*)		
			Vespertilionidae	Common pipistrelle (*Pipistrellus pipistrellus*)		Scottish Natural Heritage 2019 (https://www.nature.scot/sites/default/files/2019-01/Bats%20and%20onshore%20wind%20turbines%20-%20survey%2C%20assessment%20and%20mitigation.pdf); Arnett et al. 2016 ((https://doi.org/10.1007/978-3-319-25220-9)); Thaxter et al. 2017 (https://doi.org/10.1098/rspb.2017.0829)
				Soprano pipistrelle (*Pipistrellus pygmaeus*)		
				Common noctule (*Nyctalus noctula*)		
				Giant noctule (*Nyctalus lasiopterus*)		
				Chinese noctule (*Nyctalus plancyi velutinus*)		
				Leisler's bat (*Nyctalus leisleri*)		
				Nathusius' pipistrelle (*Pipistrellus nathusii*)		
				Hoary bat (*Lasiurus cinereus*)		Arnett et al. 2016 (https://doi.org/10.1007/978-3-319-25220-9); Thaxter et al. 2017 (https://doi.org/10.1098/rspb.2017.0829); Frick et al. 2017 (https://doi.org/10.1016/j.biocon.2017.02.023)
				Eastern red bat (*Lasiurus borealis*)		Arnett et al. 2016 (https://doi.org/10.1007/978-3-319-25220-9); Thaxter et al. 2017 (https://doi.org/10.1098/rspb.2017.0829)
				Silverhaired bat (*Lasionycteris noctivagans*)		
				Indiana bat (*Myotis sodalis*)		
				Hawaiian hoary bat (*Lasiurus cinereus semotus*)		
				Particolored bat (*Vespertilio murinus*)		
				Northern bat (*Eptesicus nilssonii*)		
				Kuhl's pipistrelle (*Pipistrellus kuhlii*)		
				Savi's pipistrelles (*Hypsugo savii*)		
				Leisler's bat (*Nyctalus leisleri*)		
				Cape serotine (*Neoromicia capensis*)		
				Gould's wattled bats (*Chalinolobus gouldii*)		
				Japanese pipistrelle (*Pipistrellus abramus*)		
				Horikawa's brown bat (*Eptesicus serotinus horikawai*)		
				Common house bat (*Scotophilus kuhlii*)		
				Taiwanese golden bat (*Myotis formosus flavus*)		
				Mouse-eared bat (*Myotis secundus*)		
				Japanese long-fingered bat (*Miniopterus fuliginosus*)		

Class	Species group	Species sub-group	Family (examples)	Species (examples)	Potential impacts	References to examples (not comprehensive)
Bats	Insectivores		**Vespertilionidae**	Yellow-necked sprite (*Arielulus torquatus*)	Collision risk with turbines	Arnett et al. 2016 (https://doi.org/10.1007/978-3-319-25220-9); Thaxter et al. 2017 (https://doi.org/10.1098/rspb.2017.0829)
				Taiwanese tube-nosed bat (*Murina puta*)		
			Molossidae	East Asian free-tailed bat (*Tadarida insignis*)		
				Brazilian free-tailed bats (*Tadarida brasiliensis*)		
				Egyptian free-tailed bat (*Tadarida aegyptiaca*)		
				White-striped free-tailed bat (*Austronomus australis*)		
			Emballonuridae	none specified		Ng et al. 2019 Challenges to mitigating wind energy impacts on bats in the tropics and sub-tropics. Conference of Wind and Wildlife Impacts. 27-30 August 2019
			Miniopteridae	none specified		
			Craseonycteridae	none specified		
			Cistugidae	none specified		
			Rhinopomatidae	none specified		
	Fruit bats		**Pteropodidae**	Wahlberg's epauletted fruit bat (*Epomophorus wahlbergi*)		MacEwan 2016 (http://www.africanbats.org/Documents/Papers/MacEwan_2016.pdf); Ng et al. 2019 Challenges to mitigating wind energy impacts on bats in the tropics and sub-tropics. Conference of Wind and Wildlife Impacts. 27-30 August 2019; Thaxter et al. 2017 (https://doi.org/10.1098/rspb.2017.0829)
				Egyptian Rousette (*Rousettus aegyptiacus*)		

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