Australasian Bat Society policy statement on wind farms

Introduction

The Australasian Bat Society Inc. (ABS) is the peak body promoting bat conservation in the Australasian region. The primary aim of the ABS is to promote the conservation of bats and their habitats through the advancement of quality science and the extensive experience of our members. We recognise the intrinsic value of all bat species as well as their place in this region's natural heritage and the key ecological roles they play in our natural environment.

The ABS supports the transition to renewable energy to mitigate the impacts of climate change.
This includes support for wind energy as part of an important obligation to climate action to help protect our declining biodiversity.

Climate change poses a key threat to bats globally.[1] The expected increase in frequency and intensity of extreme weather events such as cyclones, extreme heat, drought, bushfires and flooding in Australasia, will negatively impact bats, causing mass mortalities,[2] reducing foraging and roosting habitat availability,[3] and reducing survival.[4]

Too many bats are dying at wind farms.
However, it is the position of the ABS that across Australasia the number of bats killed by wind farms is unacceptably high and expected to increase further as more wind farms are developed. Hence, we strongly believe that steps must be taken to reduce these adverse impacts on bats.

It is currently not possible to accurately quantify the numbers of bats being killed at wind farms across Australasia. Information from many jurisdictions is not available, due to inadequate survey methods, unavailability of data, or lack of requirements to undertake mortality monitoring. Based on data collected in Victoria, which is the best available at the moment, it is estimated that between 6 and 11 insectivorous bats die per turbine per year.[5] However, increasingly, some individual sites are recording mean impact estimates above 20 bat deaths per turbine per year. When calculated over the number of turbines across Victoria, estimates are in the order of tens of thousands of bats killed per year. Considering the number of turbines in the entire Australasian region, the number of bat mortalities is unacceptable.

The information from our region is consistent with overseas mortality estimates and warrants intervention strategies to reduce the impact. [6] Modelling in the USA suggests that even for common bat species , impacts from wind turbines may threaten population viability if actions to reduce collisions are not undertaken.[7]

[1] Sherwin et al. 2013, Frick et al. 2020
[2] Mo et al. 2021
[3] Sherwin et al. 2013, Harris et al. 2018
[4] van Harten et al. 2022
[5] Moloney et al. 2019, Symbolix 2020
[6] Florent and Bennett 2024
[7] Frick et al. 2017, Friedenberg & Frick 2021

The ABS believes we can have a viable wind industry with no net loss to bat populations of all species if these ten key principles are adopted:

1. **Avoid developing wind farms in inappropriate locations**
2. **Increase the scientific rigour of pre-construction assessments to better predict post-construction mortality rates**
3. **Implement appropriate micro-site selection for turbines within the wind farm footprint**
4. **Develop and implement comprehensive Bat Management Plans**
5. **Improve and standardise post-construction mortality monitoring**
6. **Prevent turbines from freewheeling when energy is not being produced**
7. **Implement curtailment to reduce collision risks**
8. **Where losses are unavoidable, effective offsets should be implemented and monitored**
9. **Improved transparency and data sharing**
10. **Collaborative research to improve our knowledge and inform management actions**

Principles for no net loss to bat populations of all species

The following ten principles for no net loss to bat populations form a mitigation hierarchy. The mitigation hierarchy should be followed at all proposed wind farms,[8] with **all ten steps taken** to *avoid* and *minimise* impacts (in that order) to the greatest extent possible, before considering offset or compensation measures. The examples used in these principles refer to onshore windfarms, but the broad principles are also relevant to offshore wind farms. Consideration should be given to bats during the planning and operating phases of offshore wind farms as well.

1. Avoid developing wind farms in inappropriate locations

Wind farms established near sites where bats congregate for roosting, or that contain extensive suitable foraging habitat, or flight paths between key roosting and foraging areas, pose an increased risk to bats. Therefore, the following areas should be avoided when the location of wind farms are being considered:

- Known high risk sites (especially within nightly flight distance of congregational species roosts such as flying-fox camps, and maternity and important non-maternity caves where subterranean-roosting species are likely to occur). Best available data on roost locations and movements of these species should be used to inform the minimum distance of wind farms to these critical habitats for bats.
- Flight paths between key roosting sites (e.g. between maternity caves and key non-breeding caves for subterranean-roosting bats), between roosting sites and foraging areas, and between foraging areas.
- Sites that are likely to impact bats associated with high conservation value areas, such as national parks, world heritage areas etc.
- Native vegetation and vegetation edges. These important habitats for many bat species should not be directly impacted during any stage of the development and/or operation of a wind farm. This includes clearing native vegetation to locate wind farm infrastructure.
- Within treed areas, irrespective of whether the vegetation is native or exotic, including plantations. Turbines should only be sited in open landscapes.

[8] Bennun et al. 2021

- Areas that rely on energy produced from high night wind profiles during warmer months or during peak bat activity times, especially in areas with more marginal energy production where curtailment strategies (see Principle 7) may make the development unviable.

If development must occur within these areas, a higher level of mitigation must be required, for example, mandatory, year-round nightly curtailment (see Principle 7) at a higher cut-in speed, than for developments built in lower risk areas.

The geographic scale over which individual species move also must be considered, as some bat species are highly mobile. For example, Southern Bent-wing Bats (*Miniopterus orianae bassanii*) can forage up to 80 km from roosting caves and fly even greater distances when moving between caves.[9] Migratory species, including flying-foxes (*Pteropus* spp.) may travel thousands of kilometres annually throughout their range.[10]

2. Increase the scientific rigour of pre-construction assessments to better predict post-construction mortality rates

Pre-construction assessments should include the following:

- Assess which species are likely to occur in the area and the patterns of activity throughout the year, and in conditions representative of typical climatic conditions for the site.
- Consider communal roost sites of congregational species within nightly foraging range of the wind farm boundary.
- Investigate flight predictors (relationship between wind speed, temperature, time, humidity and activity levels) of all bat species present in an area prior to construction.

3. Implement appropriate micro-site selection for turbines within the wind farm footprint

Within a wind farm footprint, some landscape features have a higher mortality risk for bats. These features should be identified and protected by a 'buffer zone'. Turbines should not be placed within these buffer zones. Landscape habitat features used by bats include, but is not limited to, native vegetation in the form of large areas of vegetation, linear strips or scattered paddock trees, planted vegetation (exotic or native tree species) within plantations or along fence lines or roads; and wetlands, watercourses and dams, both permanent and ephemeral, caves, cliffs and rocky escarpments. Pre-construction surveys may also determine additional areas in the wind farm footprint with higher bat use that require buffering.

Within Australia there is little information to determine the appropriate buffer distances to site turbines from such features. Until such studies are undertaken, the ABS recommends adopting a precautionary approach and that buffer zones should be at least 200 metres from the outer tip of the blades based on the EUROBATS guidelines[11] until there is sufficient local data to inform the size of effective buffer zones.

4. Develop and implement comprehensive Bat Management Plans

All wind farm developments should prepare a comprehensive Bat Management Plan during the planning phase. It is recognised that pre-construction assessments may never be able to fully assess bat collision risk, and therefore a precautionary approach is recommended.

[9] Bush et al. 2022
[10] Roberts et al. 2012; Welbergen et al. 2020
[11] Rodrigues et al. 2015

Mitigations should be factored in at the planning stage, outlined fully in the Bat Management Plan and implemented upon commissioning of the first turbine. Outcomes should be monitored to ensure the mitigations (or levels thereof) are effectively managing risk to bats. These mitigations should be ongoing unless subsequent rigorous scientific studies show that they are no longer required or that they are ineffective. In the case of the latter, alternative mitigations should be implemented and monitored to assess effectiveness as part of an adaptive management process. This is in contrast to the current situation, where mitigations are often not considered until monitoring is undertaken and large numbers of individuals are found to be dying, by which time significant numbers of individuals may have been killed. Mitigation decisions post-construction can also be hampered by uncertainty, because the number of mortalities detected in surveys are known to represent a small and uncertain proportion of true mortality per year.[12]

The Bat Management Plan should outline clear threshold mortality rates that trigger further interventions (additional to upfront mitigations), with detailed specifications on what the interventions will comprise and the outcome to be achieved. While further monitoring is an essential element of adaptive management, the mitigation actions cannot *only* be more monitoring (as currently occurs at some wind farms), as this outcome fails to meet the principle of no net loss to bat populations.

Operating wind farms that did not include bats in their risk assessment and planning stages, should take action now to identify and address any impacts to bats.

5. Improve and standardise post-construction mortality monitoring

All post-construction mortality monitoring programs should be rigorous and scientifically robust with adequate replication and clear objectives.[13] The following elements should be included.

- Utilise specifically trained detection dogs (where possible) for surveys when searching for microbat carcasses as these have been shown to be more effective than human searchers in finding small bats.
- All searcher efficiency trials should be truly blind to avoid biases and undertaken by an independent and suitably experienced assessor.
- Annual mortality rates should be calculated (factoring in search area and effort, searcher efficiency, and carcass persistence rates) and reported for all species (not just threatened species). These rates should be used for reporting, rather than only the raw number of bats found during mortality searches which will be a small fraction of the number actually killed.
- This information should be made publicly available to facilitate research into cumulative impacts across jurisdictions, and how impacts on bats can be reduced (see Principle 9 below).

6. Prevent turbines from freewheeling when energy is not being produced, all year round

Turbines should be prevented from 'freewheeling' below manufacturer cut-in speed (i.e. when no energy is being produced, typically approx. 3 m/s) by locking or feathering blades. Feathering is when the angle of turbine blades is adjusted to be parallel to the wind direction to stop or slow the spinning of the blades. Overseas this has been shown to reduce bat fatalities by more than a third, while causing negligible energy loss;[14] similar benefits are expected to occur in Australia. As bat

[12] Moloney et al. 2019
[13] e.g. see IFC 2023
[14] Arnett and Baerwald 2013

activity is highest at low wind speeds, feathering (or otherwise preventing freewheeling based on turbine specifications) should be implemented at all wind farms from dusk to dawn, all year around.

7. Implement curtailment to reduce collision risks

Curtailment involves restricting operations of turbines. Insectivorous bats are most active at low wind speeds, therefore raising the speed at which turbines commence operating reduces the risk of collision. Low-wind speed curtailment regimes are highly effective at significantly reducing insectivorous bat mortality internationally and in Australia, typically with relatively minimal costs to energy production. [15] While most bat activity occurs in lower wind speeds, some fast-flying species, such as the White-striped Freetail Bat (*Austronomus australis*) or larger species such as flying-foxes, may fly at higher wind speeds. Determining suitable cut-in speeds to minimise collision risk requires measuring predictive flight parameters against flight activity. Suitable cut-in speeds are likely to be between 5.0 m/s and 9.0 m/s depending upon the species and site. For example, in the US, a cut-in speed of 6.9 m/s is typically applied in areas with federally listed species, 5 m/s or 6 m/s is applied in the Netherlands depending on risk factors such as location, weather and season, and in Germany mandatory curtailments are usually developed through site-specific monitoring.

There are three types of curtailment

- Blanket curtailment where turbines are stopped from spinning below a pre-determined wind speed during identified risk periods, irrespective of other risk factors. Blanket curtailment regimes are usually applied dusk to dawn, and often during specified months or seasonal periods based on mortality risk.
- Smart curtailment where other risk factors are also considered and incorporated into the curtailment regime (e.g., temperature, time of night) can offer opportunities to minimise bat impacts whilst maximising energy production.
- On-demand curtailment where turbines are temporarily shut down in response to a target species detected flying close to a turbine (used most often for birds – such as the IdentiFlight bird detection system which currently operates in Tasmania for detecting eagles). This approach might be particularly suitable for flying-foxes if combined with technologies suitable for nocturnal species, such as thermal or infrared cameras and radar.

In the absence of detailed site-specific collision risk data to develop targeted curtailment strategies, the following curtailment regimes should be undertaken at all wind energy facilities in Australasia to reduce mortality risk to bats.

- Implement blanket curtailment to 7.0 m/s at all turbines from dusk until dawn during months where bats are active over the full operational life of the wind farm.
- Curtailment regimes should be applied irrespective of whether the site is known to have threatened bat species present. This will help reduce impacts to species such as the White-striped Freetail Bat, which although not currently listed as threatened, collides with turbines in high numbers and may become threatened due to cumulative impacts. However, areas with threatened species may require stronger curtailment requirements (e.g. higher cut-in speeds over more months of the year) to minimise impacts to the greatest degree possible for these already declining species.
- Development of site-specific smart curtailment approaches that target curtailment to minimise bat mortality and potentially reduce energy losses are recommended. To enable smart curtailment approaches to be implemented, site-level post-construction activity

[15] e.g. Bennett et al. 2022, Whitby et al. 2021

monitoring is required to determine parameters for each key species, including activity monitoring at rotor height.

- Any smart curtailment strategies implemented will require monitoring to ensure they are effectively reducing bat mortalities to an equal or greater extent than blanket approaches.
- Where flying-foxes are at risk, on-demand curtailment could be considered, such as using information from weather radar data on local flying-fox emergence activity, numbers and directions, and/or thermal cameras to detect approaching bats to trigger a temporary shutdown of the turbines similar to the IdentiFlight bird detection system.[16]

8. Where losses are unavoidable, effective offsets should be implemented and monitored

Even where the mitigation hierarchy has been applied to the greatest extent possible, some impacts will still occur. For example, low windspeed curtailment will significantly reduce, but not eliminate, insectivorous bat mortality. Residual impacts (i.e. impacts that occur after all efforts have been made to avoid and minimise these impacts) should be offset in line with the no net loss objective.

Where impacts cannot be avoided

- Implement offset strategies that provide a proportionate, measurable, direct benefit to effected bat populations, such as habitat restoration.
- Establish a mechanism for offsetting windfarm impacts on bats that are transparent and accountable.

9. Improved transparency and data sharing

Most wind farms record bat mortality data; however, much of these data are not publicly available, which hampers research into how we can better understand the patterns, cumulative impacts, risk factors and improve strategies to minimise bat mortality at wind farms.

- All monitoring data must be made publicly available through a centralised repository for monitoring results and research, developed by local authorities (e.g., state, territory or provincial government).
- Mechanisms must be developed to facilitate information sharing between regulators, and between different levels of government, to facilitate best practise knowledge sharing.
- Monitoring results should be used to inform mitigation and offset options.

10. Collaborative research to improve our knowledge and inform management actions

- Facilitate collaborative research between the bat conservation community, government agencies, universities, and the renewable energy sector, to increase our understanding of the impacts of wind farms on bats and the effectiveness of proposed mitigations.
- Support researchers to publish their findings in open peer reviewed publications so that the information is readily available to all.
- Partner with organisations such as REWI (Renewable Energy Wildlife Institute) to provide an Australian context to global research.

[16] e.g., Meade et al 2019

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