# Wind, wind-farms, birds and bats – insights and predictions from the Atlas of Living Australia

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Wind is proposed as a viable alternative energy source for Australia, with many areas in southern Australia identified as potentially suitable sites for wind farms, based on wind flow regimes. Wind farms around the world have a history of substantial numbers of annual bird kills from striking blades travelling in excess of 200km.h$^{-1}$. Recent evidence suggests that considerable numbers of bats are also killed by wind-turbines, both from impacts with blades and also from barotrauma.

We used the Spatial Portal of the Atlas of Living Australia (http://spatial.ala.org.au) to determine the intersection of vulnerable species with high-wind areas in Australia.

## Where are Australia's operating and planned wind-farms?

There are approximately 26 wind farms operating in Australia (as of 2010), with a combined maximum capacity of 2,000 MW. In addition, another 100 wind-farms with a combined maximum capacity of more than 9100 MW are under consideration, in planning assessment or under construction. Naturally, wind-farms are preferentially sited in areas of stronger winds, usually expressed as 'wind run' in km.day$^{-1}$, Figure 1.

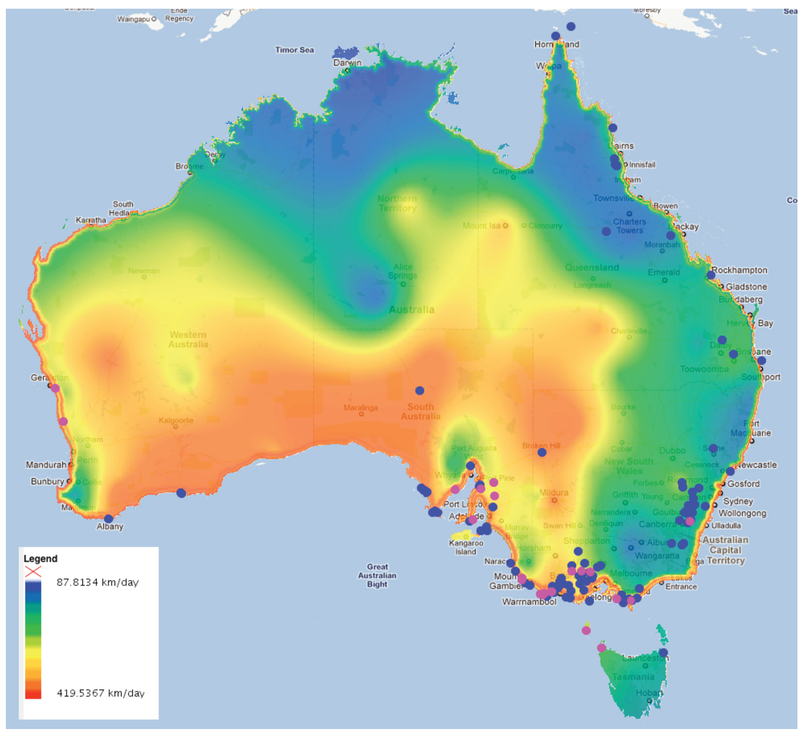


Figure 1. Operational (pink, n=26) and proposed (blue, n= 100) wind-farms in Australia, with an overlay of the annual mean wind-run (km.day$^{-1}$). The legend refers to the wind-run layer.

| Birds | |
|---|---|
| Australasian gannet | *Morus serrator* |
| Australian pelican | *Pelecanus conspicillatus* |
| Black currawong | *Strepera fuliginosa* |
| Blue-winged parrot | *Neophema chrysostoma* |
| Brown falcon | *Falco berigora* |
| Brush bronze-wing | *Phaps elegans* |
| Common diving petrel | *Pelecanoides urinatrix* |
| Flame robin | *Petroica phoenicea* |
| Forest raven | *Corvus tasmanicus* |
| Green rosella | *Platycercus caledonicus* |
| Grey-backed storm-petrel | *Oceanites nereis* |
| Ground parrot | *Pezoporus wallicus* |
| Short-tailed shearwater | *Puffinus tenuirostris* |
| Silver gull | *Chroicocephalus novaehollandiae* |
| Silvereye | *Zosterops lateralis* |
| Swamp harrier | *Circus approximans* |
| Wedge-tailed eagle | *Aquila audax* |
| White-bellied sea-eagle | *Haliaeetus leucogaster* |
| White-faced storm-petrel | *Pelagodroma marina* |
| White-throated needle-tail | *Hirundapus caudacutus* |
| **Bat** | |
| Gould's wattled bat | *Chalinolobus gouldii* |

Table 1. The assemblage of bird and bat speces reported to have struck the Woolnorth wind-farm in northwest Tasmania.

## Wind-farms, bird and bat collisions

Unfortunately, data on bird strikes with wind farms are only publicly available from Roaring 40s, the operator of wind-farms in Tasmania. Therefore, the list of bird species (Table 1) recorded colliding with the Woolnorth wind farm of Roaring 40s in northwest Tasmania was used to examine the overlap between these species and wind-farms in general.

## Bird and bat distributions

The distribution of the bird and bat assemblage (Table 1) is shown in Figures 2 and 3. There is a clear spatial overlap between the higher densities of observed occurrences of the assemblage with operating and proposed wind-farms, and with the annual mean wind run.

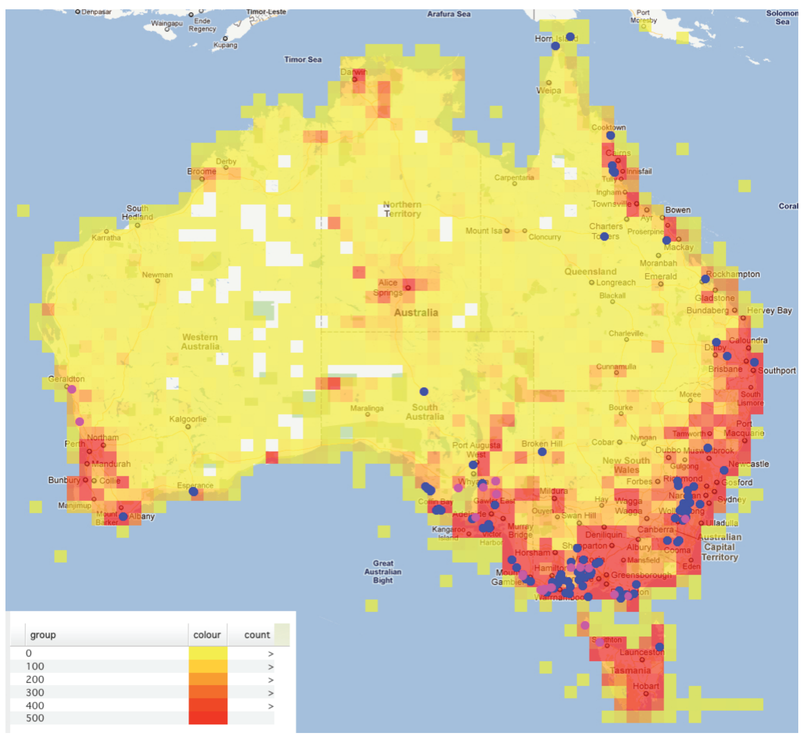


Figure 2. The density distribution of the species assemblage listed in Table 1 (number of occurrences of species within the vulnerable assemblage in each grid cell*) with the distribution of operational (pink) and proposed (blue) wind-farms. *The size of the spatial grid is dependent on the scale of the view.

## Co-occurrences, future directions and conclusions

The example presented here was based on bat and bird species known to be killed by wind-farms in Tasmania. All of these species are present on the Australian mainland, and are therefore of potentially at risk from wind-farms. It is apparent that the occurrence and density of these species are strongly associated with operating and proposed wind-farms (Figures 2 and 3). In the absence of comparable data from mainland wind-farms, interpolation from Tasmanian results is required. There is no reason to believe that these species would not be vulnerable to wind-farm strikes on the Australian mainland.

The Atlas of Living Australia contains an extremely large volume of aggregated species sightings, museum records, environmental layers and analysis tools. The Atlas therefore facilitates desktop assessments of vulnerable species in association with other biological and physical environmental variables, such as wind run and vegetation. Other aspects, such as conservation status (endangered, rare, etc) or range-restrictions can easily be integrated into analyses to further refine the assessment efforts. There are a wide range of determinants as to the location of a wind-farm, including access to land and grid connectivity. While these are presently unavailable to the Atlas, point and area data can be imported into the Atlas for subsequent analysis. Data and results can also be downloaded and analysed with desktop tools.

Given the greater species diversity on the Australian mainland, it is likely that other species would need to be added to the current assemblage analysed here to assess appropriately any wind-farm on the Australian mainland.

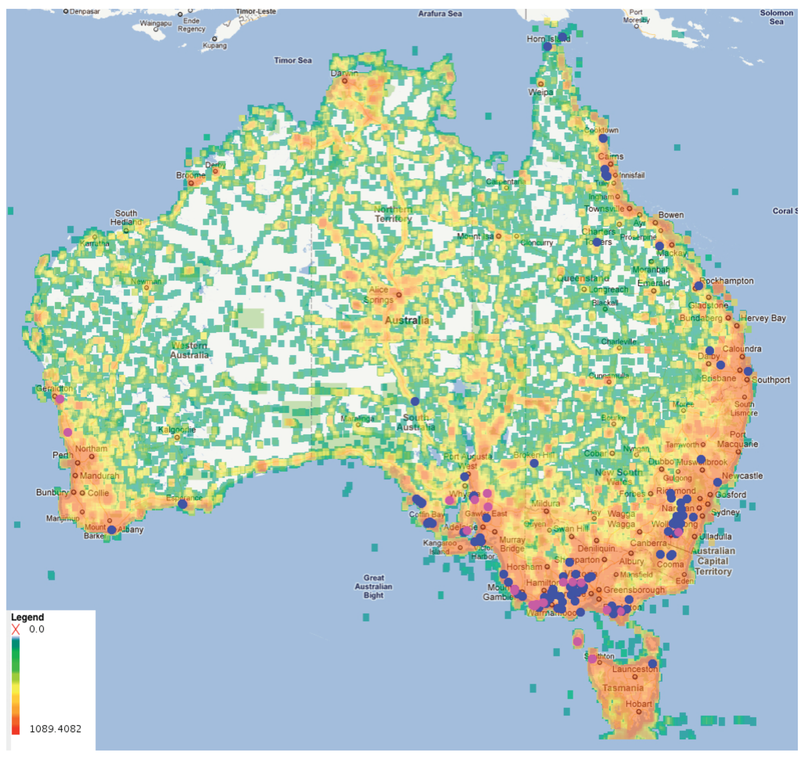


Figure 3. The bird and bat assemblage from Table 1 expressed as an observed density (using a 5km moving average with a 7x7 cell window) with the operational (pink) and proposed (blue) wind-farms shown.

Acknowledgements
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