

The recent plethora of windfarm activity, including the controversial proposal for a 140km transmission line eastward from the proposed Robbins Island/Jims Plains windfarms and media inquiries around the recent release of the proposed St Patricks Plains windfarm's eagle nest survey, leads me to revisit the issue. For years I have been assured by officialdom including the Tasmanian regulator (the Environmental Protection Agency) and different government ministers that both '...a robust procedure is in place...' and '...the assessment process and offset program are under review...'. But it seems that nothing substantial has changed since the mid-2000's beginnings and we are still stuck with oddly clunky assessments, lack of progress in the face of continued eagle strikes, many more windfarm proposals (to date for more than 500 turbines). I think industry can and should do much better and not just limit itself to simply what is required by the regulator.

Prevention of Collisions Prevention obviously should be the priority but we fail immediately through a lack of strategic planning. Some countries such as South Africa and Spain are 'risk mapping' their land to look for the places with the best combination of wind suitability and low impacts on the environment. Here in Tasmania we appear to just sit back and wait for someone to find enough money to build wherever they can, essentially without environmental guidance. It's simply pot luck whether a proposal is in a high density of eagles and other values or not. Widespread point surveys of the Where? Where? Wedgie type would be very useful in strategic planning for potential windfarm sites. This complete lack of strategic planning stems from a lack of focus and will – the last Recovery Plan for Tasmania's threatened eagles (Threatened Species Section 2006) is now painfully out of date. Much faith seems to be invested in a collision-reduction package being installed at the Cattle Hill windfarm using camera recognition of flying eagles that slows/feathers nearby turbines to try and reduce collisions risk. Well, the recognition part seems to work okay overseas but translating that into actually reducing collisions has not been demonstrated anywhere. I hope it works.

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Assessment of Risks to Eagles of Particular Windfarms Looking from the outside, the Eagle Utilisation Surveys used in assessment are not very useful. They essentially consist of observers looking for eagles around the site and writing down where they think the eagles they see are and how high they think they are flying. There are many sources of error, beyond misidentification at a distance. The numbers of birds being seen (in a period) is not known since there is no means of identifying individuals. Some eagles are curious and will rotate around observers checking them out and eagles often shadow people to see what prey they might flush. So, there can be substantial observer influence and double (and more) counting. Importantly, there has been no calibration of judgments even though there are GPS-tagged eagles elsewhere in Tasmania that could be used. Such direct observation to guesstimate factors that would greatly benefit from precise measurement seems rather Dickensian in 2019 when GPS tagging is commonly used now for such things. It seems almost perverse

that the GPS-tagging eagle study in Tasmania that is producing amazing data on things other than windfarms is partly supported by the windfarm industry yet the tool is not used in their back yards (except for one tagged eagle in the northeast). Eagle Utilisation Surveys are used to help locate turbines but windfarm industry publications themselves claim that eagles modify their flight behaviours once turbines are constructed (eg Hull and Muir 2013), somewhat making nonsense of the whole exercise. The enormous expense involved in the current observational assessment might well be better directed at GPS tracking. Advocates claim Eagle Utilisation Surveys lead to some nests being found but with the thorough searching for nests that is undertaken I can't see they are needed for that. The location of nests already known or through a new Eagle Nest Survey leads to a buffer distance of 1km to turbines nominated by the regulator (a distance the regulator has seen fit at the Point Latta windfarm to reduce, under industry pressure). Unfortunately, the 1km is completely arbitrary in terms of protecting eagles from physical danger and looks increasingly bizarre in the face of ever-taller turbines which almost loom over some nests. And even if the turbine base is 1km away the huge blade tips can be much closer. The 1km is in fact 'cut and pasted' from guidelines I came up with 30 years ago to protect active nests from the disturbance of forestry operations. One would think that in 2019 when spending billions we might have data-driven protocols not just convenience. Other countries are using data from GPS-tracked nesting eagles to set the buffer distance (usually more than 4km). Flight intensity usually suddenly dilutes at a certain distance from Wedge-tailed Eagle, Tasmanian sub-species. Photo by Alan Fletcher. Wedge-tailed Eagle, Tasmanian sub-species. Photo by Alan Fletcher.

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nests – that's how buffers for physical safety are decided, not borrowing from a completely different issue. The regulator mirrors the usual industry claim of '...no impact on nesting eagles...' but quoted publications also claim eagles change behaviours in response to turbines (isn't that an impact?) and the study on eagles breeding close to turbines (Hull et al. 2015) gives a clear warning about the study's lack of robustness. Without marked birds and/or very sophisticated DNA study at windfarms and control sites study it's also impossible to know the turnover of eagles at windfarms and compare it to other areas. They well might be population sinks and we wouldn't even know with the current paucity of data.

Assessment of Population Impacts Having enough GPS-equipped eagles of various age groups would allow the accurate estimate of local survivability and population densities, essentials for a proper Population Viability Analysis, without which any calculation of sustained yield and accumulated impact is unreliable. The Cattle Hill windfarm proposal, for instance, came up with a statewide sustainable yield of 29 per year from anthropogenic causes. Well, we know that many are killed on power distribution infrastructure alone (forget accidental poisoning, persecution, collisions with turbines, vehicles and fences), highlighting the estimate's fragility. My questions to the EPA on how it accounts for accumulated mortality in its assessments simply go unanswered because with current poor data they can't do the necessary sums. Now that in 2019 we have the means, the regulator should insist on high-quality data so meaningful assessments can be made. The regulator's claim that windfarms cause no significant impacts on populations of Tasmanian eagles is a familiar twist on

the fact that there is no data to show they do – a very different thing. The (scary) fact is, there is no data.

Assessing Mortalities The miniscule areas searched under some turbines for dead or catastrophically injured birds (such that fall almost straight down) is, at best, an uncalibrated index. Originally, larger areas were searched but never with dogs, a method proven to increase detectability, especially of fragments of birds. Therefore, the industry mantra and regulator mantra that what's found represents what is hit seems to me a somewhat Machiavellian feedback loop. Having enough GPS-tagged birds would give us very exact measures of risk to eagles in and around windfarms. Such assessment should, of course, start well before commissioning and it's very disappointing to see windfarm after windfarm avoid such direct study instead favouring sloppy methods that give more 'wiggle room'. GPS study of enough eagles would allow calibration of the index the above partial searches present and might even allow back-calculation of past mortality. But I am even dubious about the value of the searches as an index in that the methods keep changing, especially in regard to means of transport during searches (foot, quads, 4WDs etc) likely being a key factor affecting detectability of dead and injured birds and bats.

Offsetting Impacts Offsets in Tasmania have been varied, as allowed under the Commonwealth policy. Importantly, the effectiveness of offsets in offsetting deaths and breeding disruption has not been measured – their application so far seems more an act of faith than anything. Covenanting or otherwise protecting private land around viable nests under threat from things other than windfarms has the potential to offset nests compromised by windfarms but its effectiveness in terms of productivity clearly should be routinely measured as part of the offset but isn't. Extending covenanting nest sites into compensation for eagle deaths is far more problematic in that productivity would have to be elevated to compensate for the ages of different eagles killed (eg a dead juvenile might be represented by 1 more fledgling whereas a dead adult might need 15 more fledglings).