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Appendix D Collision Risk Modelling

Section 2.3.2 Species Recorded - Shy White-Capped Albatross

The methodology used to derive the percentage allocation between shy and white-capped albatross is not clear, just some information sources listed, so it is difficult to evaluate whether this is a reasonable approach.

Section 2.3.2 Flight frequency data

The methodology used to apportion unidentified birds to species based on the composition of identified birds recorded during the boat-based surveys relies on several underlying assumptions. These include that species composition remains consistent between survey periods and environmental conditions, that species are equally likely to be identified, and that detectability and behavioural responses to the survey vessel are comparable between species. The assessment does not discuss the potential implications if these assumptions are not met.

As species-specific flight frequencies are subsequently used as inputs to the collision risk model, any bias introduced through the apportioning process has the potential to influence the estimated collision mortality. The assessment would therefore benefit from further justification of this approach, including an indication of the proportion of observations affected by the apportioning process and a discussion of the sensitivity of the collision risk estimates to these assumptions.

The collision risk assessment includes a number of species with very low estimated densities and corresponding low levels of exposure to the rotor swept zone. Where collision risk modelling is undertaken using very small sample sizes or low numbers of allocated flights, the resulting mortality estimates are likely to be associated with substantial uncertainty. Under these circumstances, model outputs may be influenced to a greater extent by the assumptions and parameter values within the model than by the empirical survey data. It is therefore important that the uncertainty associated with these estimates is clearly quantified and communicated.

For species with very low exposure, it is also unclear whether the collision risk modelling provides meaningful additional information to support the assessment. Consideration should be given to whether the available evidence is sufficient to produce robust species-specific estimates, and whether a proportionate approach, such as the application of transparent screening criteria or a more explicit discussion of uncertainty, would improve the interpretation of the model outputs. This would help distinguish between species for which collision risk estimates are well supported by the available data and those where the outputs should be interpreted with greater caution.

Section 2.3.5 Flight height data and derivation of flight height distributions

The authors argue that, since maximum flight heights for each individual were recorded during the boat-based survey, an Extreme Value Distribution (EVD) is appropriate. My understanding is that this kind of distribution is not generally appropriate in this situation since EVDs are designed for derived from a time series via a block maxima or peaks over threshold approach. An EVD may, for example, be appropriate in this setting if a maximum were recorded over many flights of an individual (though it is hard to say what would count as a single ‘flight’ in this setting). From the limited detail provided, I would caution against using this distribution and request further justification on this choice. Based on the description, it sounds as though a standard distribution would be more appropriate with the specific choice depending on features of the data itself.

Due to the differences in data collection methods, the authors take a sampling approach to make the observed distributions comparable. However, I am not convinced that a direct comparison is being made. The data recorded from the boat-based survey are maximum flight height for each individual and the data sampled from LiDAR are maximum flight height over samples of flights (i.e. the maximum value across a set of individuals). I would not expect these data to be comparable.

Based on these observations, I do not believe there is sufficient justification for the statement 'the two data sources were representative of the same distribution' and I caution against any conclusions drawn that are based on this claim.

Finally, irrespective of the above, there is little detail provided on how exactly the data were combined. A 'Bayesian statical process' can mean a multitude of different things, and more detail should be provided on what this means in order for the quality of the findings to be assessed.

2.3.7 Flight heights relative to turbine dimensions

It is unclear whether uncertainty in the flight height distributions has been propagated through to the collision risk modelling. Table 5 presents only point estimates of the allocated number/proportion of flights within the rotor-swept height, but no indication is given of the associated uncertainty (e.g. confidence intervals or bootstrapped distributions). If fixed point estimates have been used as CRM inputs, variability in the flight height data may not be fully reflected in the model outputs, potentially underestimating the uncertainty associated with predicted collision risk.

Figure 5 indicates that the flight height distributions derived from the different survey methods do not align particularly well for several species, including Australasian gannet. While some differences are expected given the differing methodologies (e.g. boat-based observations estimating maximum individual flight height compared with instantaneous LiDAR measurements), the extent of the observed discrepancies is not discussed. Given these apparent differences, further justification should be provided to demonstrate that combining these datasets is appropriate. In particular, it would be useful to explain whether the observed differences are an artefact of the differing survey methodologies or reflect genuine differences in the recorded flight height distributions. As flight height distributions are a key input to the collision risk model, the approach used to derive and combine these distributions has the potential to influence the estimated proportion of birds within the rotor swept zone and, consequently, the predicted collision mortality, particularly if the combined distribution overrepresents higher flight heights.

In addition, Figure 5 shows that flight height distributions for several species are based on relatively small sample sizes. Where sample sizes are limited, there is greater uncertainty that the derived flight height distributions are representative of species behaviour. As flight height distributions are a key input to the collision risk model, uncertainty in these distributions will propagate through the modelling and influence the estimated proportion of birds within the rotor swept zone and subsequent collision mortality estimates.

3.2.4 Modelled collision risk results relative to species populations

The increase in air gap appears to have been driven largely by the predicted collision risk for a small number of species. However, the predicted collision mortality represents only a very small proportion of the relevant reference populations. Given the precautionary assumptions incorporated within the collision risk modelling, it would be helpful to provide further justification for why the predicted collision risk was considered sufficient to warrant the proposed design change.