

1 ***Supplementary Information***

2 **SI2 Adult survival**

3 To estimate the effect of mass on adult survival, we modified adult encounter histories such
4 that individuals entered the population the year they were weighed. For example, the
5 encounter history of an individual born in 1990 but weighed in 1999 started only in 1999,
6 even if the individual was re-sighted earlier. This approach allowed individual-based analysis
7 when most individuals are only weighed once throughout their life time.

8 As the wandering albatross is a non-obligate biennial breeder, successive capture events are
9 not independent. To account for this, we implemented an Immediate Trap Effect on Capture
10 model (ITEC) [1]; individuals are either trap aware if they have been captured at the
11 immediate previous occasion or trap unaware if not. We defined a sex and mass-dependent
12 survival process and sex-specific trap-awareness process depending on the previous state
13 (aware/unaware).

14 The transition matrix is the multiplication of the survival matrix S_t with the trap awareness
15 process matrix P which takes place between the intermediate time step $t+1^-$ and $t+1^+$. The
16 different stages are A trap aware, U trap unaware (both have the same survival, ϕ) and D for
17 dead. The probability, p differs between the trap aware and trap unaware stages and captures
18 the probability to be encountered and become trap aware. The matrix of event E , is trivial, a
19 trap-aware individual has necessarily been seen at the previous occasion. From [1].

$$A_{t+1^-} \quad U_{t+1^-} \quad D_{t+1^-}$$

$$S_t = \begin{array}{c|ccc} A_t & \Phi & 0 & 1-\phi \\ U_t & 0 & \Phi & 1-\phi \\ D_t & 0 & 0 & 1 \end{array} \begin{array}{l} \\ \\ \\ \end{array}$$

$$\begin{array}{ccc} A_{t+1^+} & U_{t+1^+} & D_{t+1^+} \end{array}$$

$$P_{t+1} = \begin{array}{c|ccc} A_{t+1^-} & p' & 1-p' & 0 \\ U_{t+1^-} & p & 1-p & 0 \\ D_{t+1^-} & 0 & 0 & 1 \end{array} \begin{array}{l} \\ \\ \\ \end{array}$$

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"0" "1"

$$E_t = \begin{array}{c|cc} A_t & 0 & 1 \\ U_t & 1 & 0 \\ D_t & 1 & 0 \end{array} \begin{array}{l} \\ \\ \\ \end{array}$$

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22 **Literature**

- 23 1. Pradel, R. & Sanz-Aguilar, A. 2012 Modeling trap-awareness and related
 24 phenomena in capture-recapture studies. *PLoS One* **7**, 1–4.

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