The following supplement accompanies the article

Effects of swim-with-dolphin tourism on the behaviour of a threatened species, the Burrunan dolphin *Tursiops australis*

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Supplement

Transition probabilities

The transition probability, p_{ij}, between the preceding behavioural state *i* and the succeeding behavioural state *j* was estimated (Christiansen et al., 2010; Lusseau, 2003):

$$p_{ij} = \frac{a_{ij}}{\sum_{j=1}^{n} a_{ij}}, \sum_{j=1}^{n} p_{ij} = 1$$

where *n* is the total number of behavioural states (i.e. 4) and a_{ij} is the number of transitions observed from behavioural state *i* to *j*.

Average bout length

The average bout length (i.e. number of transitions that the dolphins spent in each behavioural state) of each behavioural state, t_{ii}, was estimated in the presence and absence of swim-with-dolphin vessels (Guttorp, 1995):

$$t_{ii} = \frac{1}{1 - p_{ii}}$$

where p_{ii} is the probability that a dolphin group remained in a given behavioural state at the next time step. By multiplying t_{ii} with the sample interval length (i.e. 3 min) the bout length, expressed in minutes, was derived. The standard error (SE) around each bout length estimate was calculated (Guttorp, 1995):

$$SE = \sqrt{\frac{p_{ii} * (1 - p_{ii})}{n_i}}$$

where n_i is the number of transitions with *i* as preceding behavioural state.

Recovery time

The average time it took a dolphin group to return to a given behavioural state, the recovery time, was estimated in the presence and absence of swim-with-dolphin vessels (Stockin et al., 2008):

$$E(T_j) = \frac{1}{\pi_j}$$

where T_j is the number of transitions required to return to state j given that the dolphins are currently in state j, and π is the steady-state probability of each behavioural state in the Markov chain. By multiplying T_j with the sample interval length (i.e. 3 min), the recovery time (min) was derived.

Cumulative behavioural budgets

The cumulative behavioural budget was estimated as follows (Christiansen et al., 2010; Lusseau, 2003):

$$Cumulative\ budget = (a * impact\ budget) + (b * control\ budget)$$

where a is the proportion of daytime hours (ranging from 0 to 1) that dolphins spend with swim-with-dolphin vessels (thus following a behavioural budget similar to the impact chain) on average throughout the year (cumulative interaction time/(365 days * 12 hours * 60 min)), and b is the remaining proportion of time per day (1-a) that dolphins spend without swim-with-dolphin vessels present (thus following a behavioural budget similar to the control chain).

LITERATURE CITED

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