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Measuring the Effect of Whalewatching Boats on Minke Whale Behavioural Budget Using a Multivariate Hidden Markov Model

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Human disturbances of wildlife, such as tourism, can alter the activities of targeted individuals. Repeated behavioural disruptions can have long-term consequences on individual’s vital rates. To manage these sub-lethal impacts, we need to understand how activity disruptions can influence variation in individual’s vital rates. This study informs the mechanistic links between whalewatching boat exposure and behavioural variation and vital rates for Mysticetes. We compared Minke whale Balaenoptera acutorostrata behaviour on a feeding ground in the presence and absence of whalewatching boats in Iceland, using individual focal follows. Activity states were inferred from movement metric data and multi-state models were used to estimate the relative proportion of different activity states. Spatially explicit mark-recapture models were used to estimate the seasonal exposure rate of individual whales to whalewatching activities. Whalewatching interactions disrupted the foraging behaviour of Minke whales, causing a decrease in proportion of time whales spent foraging. The cumulative exposure was sufficiently large to cause changes in the animal’s seasonal behavioural budget. Minke whales are capital breeders, so a decrease in foraging success on feeding grounds due to whalewatching could lead to a decrease in energy available for lactation on breeding grounds, which could have negative effects on calf survival.