

Time-in-area represents foraging activity in a wide-ranging pelagic forager

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Supplement 1.

The R package *Trip* (Sumner 2011) was used to calculate the time spent (seconds) in each cell of a pre-defined grid, for 26 foraging trips from nine northern gannets from the Les Etacs colony, Alderney. Cell sizes of 5 × 5 km and 10 × 10 km were tested. The proportion of dives occurring in the core foraging area was similar using either grid size (Table S1), however the designation was much more efficient when the 5 × 5 km grid cells were used (Fig. S1), demonstrated visually in Fig. S2.

Table S1. Bootstrapped proportion with 95% confidence intervals (CI) of all foraging events occurring in the core foraging areas defined by the 25%, 50% and 75% Utilisation Density Contours and various filters, defined using the time-in-area approach with 5 × 5 km and 10 × 10 km grid cells for 26 trips from nine northern gannets from the Les Etacs colony, Alderney, Channel Islands

Filter	Contour (%)	Proportion of foraging events occurring in core foraging area	
		5 km grid cell (CI)	10 km grid cell (CI)
None	25	0.28 (0.23-0.32)	0.28 (0.23-0.34)
	50	0.50 (0.43-0.57)	0.51 (0.52-0.59)
	75	0.82 (0.75-0.88)	0.78 (0.71-0.82)
Day	25	0.27 (0.20-0.35)	0.32 (0.23-0.40)
	50	0.49 (0.39-0.57)	0.48 (0.38-0.58)
	75	0.75 (0.66-0.81)	0.72 (0.62-0.80)
Speed	25	0.19 (0.15-0.23)	0.22 (0.16-0.28)
	50	0.38 (0.29-0.47)	0.43 (0.34-0.51)
	75	0.59 (0.50-0.67)	0.59 (0.51-0.68)
Speed and day	25	0.16 (0.12-0.21)	0.21 (0.15-0.28)
	50	0.30 (0.25-0.36)	0.35 (0.29-0.42)
	75	0.57 (0.48-0.66)	0.49 (0.42-0.56)

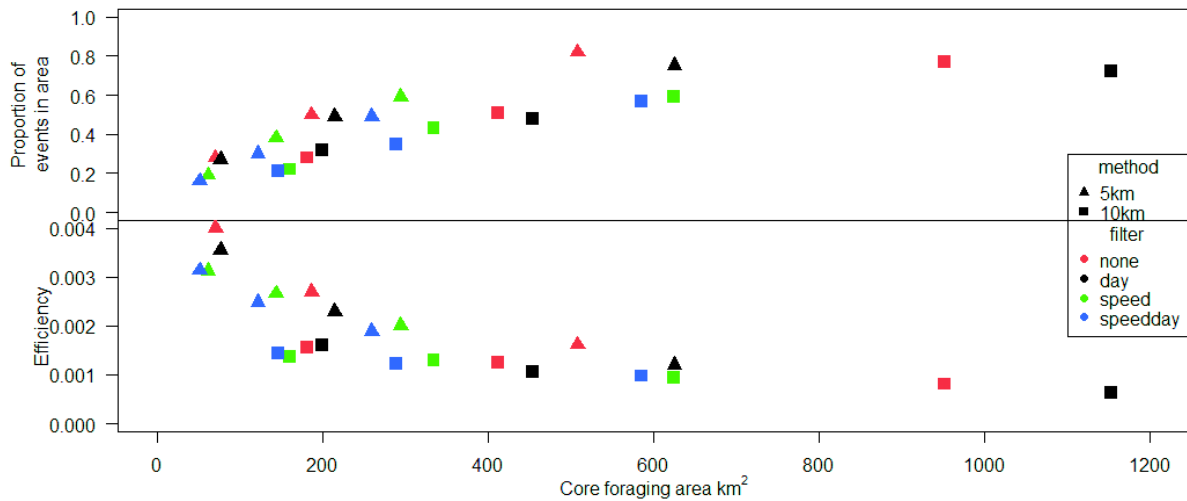


Fig. S1. The proportion of all foraging events occurring in the core foraging areas defined using 5×5 km and 10×10 km grid cells using the time-in-area approach. Points represent the 25%, 50% and 75% probability of use for unfiltered data and data filtered for day, speed, speed and day. Data presented are bootstrapped mean values for 26 foraging trips from nine northern gannets from the Les Etacs colony, Alderney.

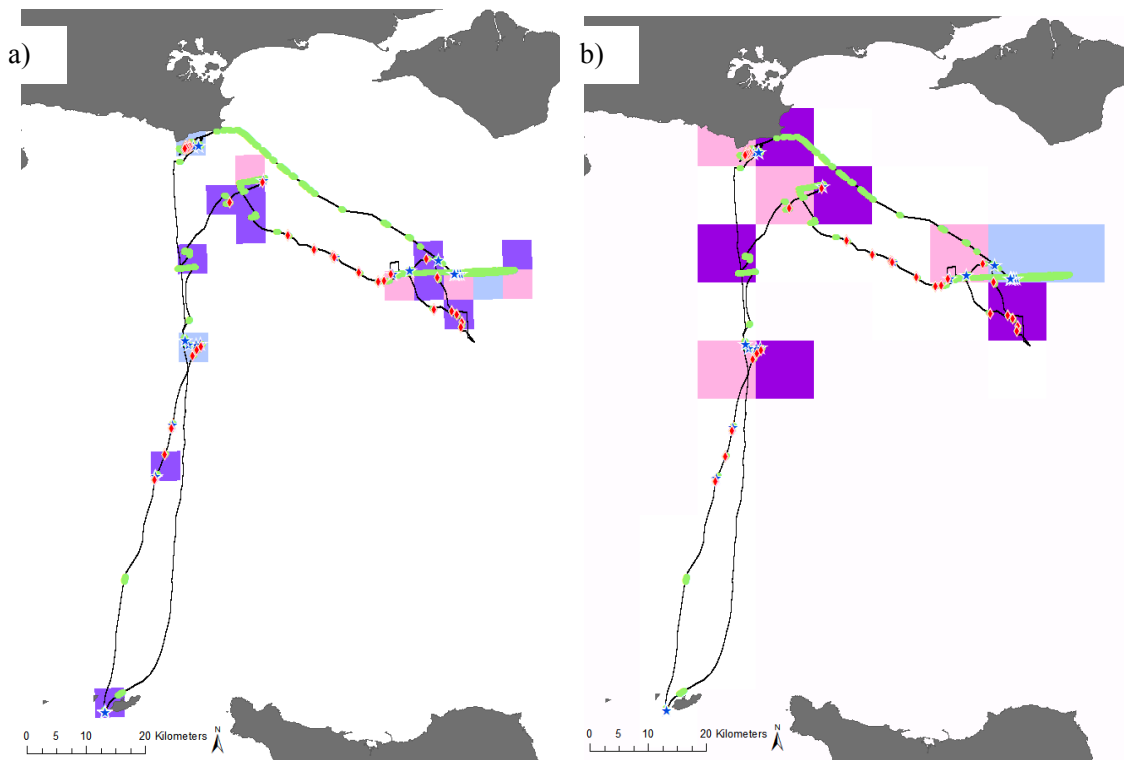


Fig. S2: Example of foraging events occurring in core foraging areas defined by the time-in-area approach using (a) 5×5 km and (b) 10×10 km grid cells for one trip from a northern gannet. Colours and shapes indicate behaviours – flying (black line), floating (green circle), plunge diving (red diamond), surface foraging (blue star). Core foraging areas are 25% (pale blue), 50% (pink), 75% (purple).

Supplement 2

Utilisation distributions were estimated for 26 foraging trips from nine northern gannets from Les Etacs colony, Alderney, by calculating the Kernel Density (KD) using a UTM zone 30 projection and a grid size of 1 km² in R package *adehabitatHR* (Calenge 2006). The smoothing parameter (h) was calculated using both the *ad-hoc* method ($KD_{ad\ hoc} = h = \sigma n^{-1/6}$ where $\sigma^2 = 0.5(\text{var}(x) + \text{var}(y))$) and $h = 9.1$ km ($KD_{h=9.1}$). The proportion of foraging events occurring within the core foraging area designated using each method was calculated. Results from $KD_{h=9.1}$ are discussed in the main text.

Table S2. Bootstrapped proportion with 95% confidence intervals (CI) of all foraging events occurring in the core foraging areas defined by the 25% and 50% Utilisation Density Contours and various filters, defined using $KD_{ad\ hoc}$ for 26 trips from nine northern gannets from the Les Etacs colony, Alderney, Channel Islands

Filter	Contour (%)	Proportion of foraging events occurring in core foraging area		
		All foraging events	Plunge dives	Surface foraging
None	25	0.49 (0.4-0.57)	0.46 (0.35-0.56)	0.51 (0.41-0.61)
	50	0.71 (0.65-0.76)	0.68 (0.57-0.77)	0.72 (0.66-0.78)
Day	25	0.47 (0.39-0.56)	0.56 (0.44-0.66)	0.40 (0.28-0.52)
	50	0.70 (0.62-0.77)	0.78 (0.70-0.85)	0.63 (0.53-0.73)
Speed	25	0.42 (0.33-0.50)	0.46 (0.34-0.56)	0.38 (0.27-0.49)
	50	0.63 (0.54-0.70)	0.70 (0.58-0.80)	0.57 (0.46-0.66)
Speed and day	25	0.42 (0.34-0.51)	0.51 (0.40-0.62)	0.36 (0.25-0.46)
	50	0.62 (0.52-0.72)	0.72 (0.63-0.80)	0.54 (0.42-0.66)
Tortuosity	25	0.28 (0.23-0.34)	0.41 (0.34-0.39)	0.20 (0.12-0.28)
	50	0.48 (0.41-0.54)	0.61 (0.51-0.7)	0.38 (0.29-0.47)
Tortuosity and day	25	0.24 (0.19-0.29)	0.38 (0.28-0.47)	0.16 (0.09-0.21)
	50	0.43 (0.36-0.50)	0.56 (0.46-0.67)	0.32 (0.23-0.42)