

Results obtained with $v = 0.5 \text{ m.s}^{-1}$ and $R_0 = 2 \text{ km}$

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To obtain the Figures and Tables presented here, the method developed in the main document was applied. However, instead of using the model parameters fitted in Pérez et al. (2022) to simulate tuna trajectories, the parameters presented in Table 1 were used: the speed v was replaced by $v = 0.5 \text{ m.s}^{-1}$ and the orientation radius R_0 was replaced by $R_0 = 2 \text{ km}$.

TABLE 1 Parameters used in the simulations presented in the Supplementary Materials 5. Δt : time-step; v : speed; R_0 : orientation radius; c : sinuosity coefficient; D : mean inter-FAD distance.

Δt	v	R_0	c	D
100 s	0.5 m.s⁻¹	2 km	0.99	15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100 km

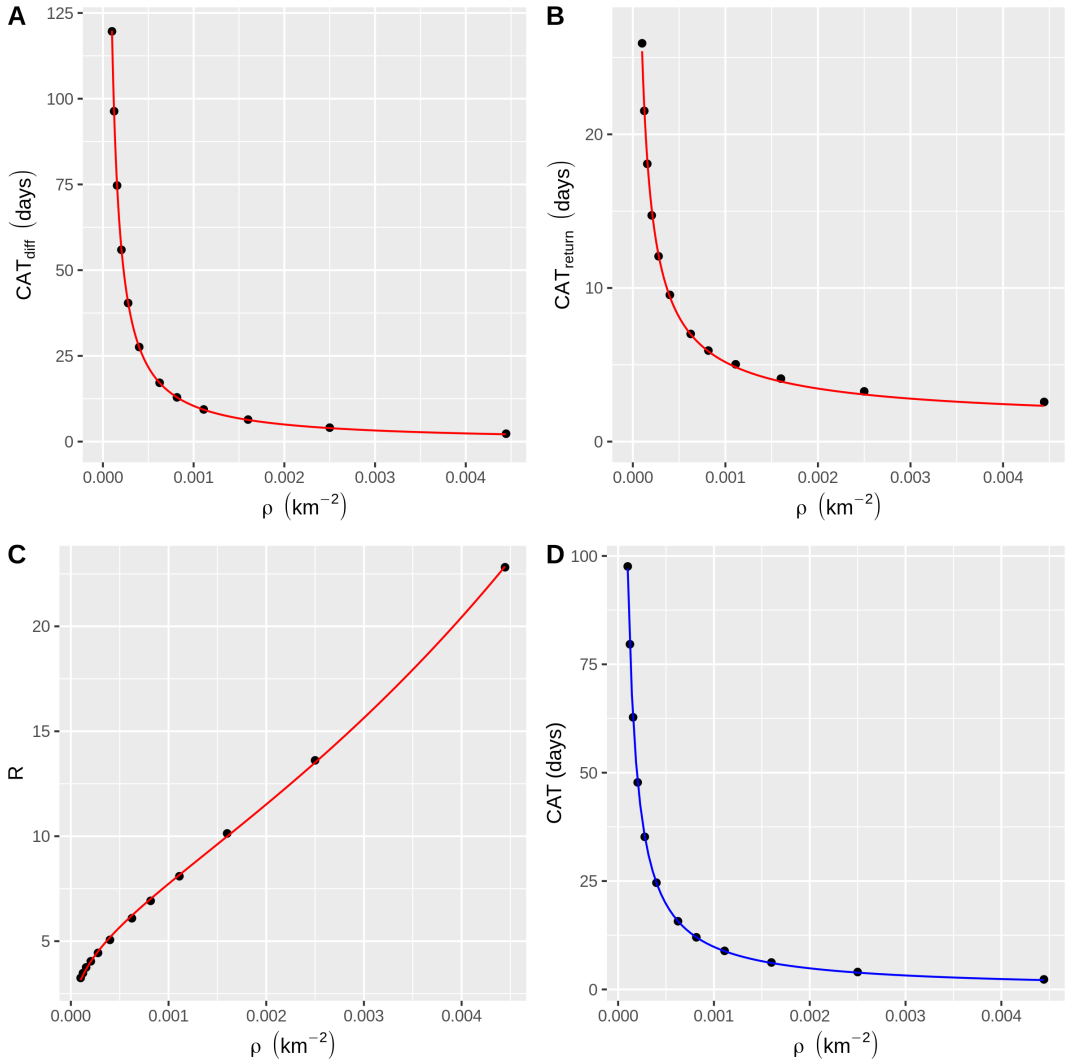


FIGURE 1 Continuous Absence Times (CATs) trends as a function of FAD density, obtained from the simulations, performed with $v = 0.5 \text{ m.s}^{-1}$ and $R_0 = 2 \text{ km}$. (A) \overline{CAT}_{diff} fitted according to Equation 1; parameter values: $a_d = 6.84 \times 10^{-3}$; $b_d = 1.06$. (B) \overline{CAT}_{return} fitted according to Equation 2; parameter values: $a_r = 2.28 \times 10^{-2}$; $b_r = 7.56 \times 10^{-1}$. (C) Ratio of the number of CAT_{diff} over the number of CAT_{return} (R) fitted according to Equation 3; parameter values: $a = 60.62$; $b = 175.48$ and $c = 3.24 \times 10^{-1}$. (D) Mean \overline{CAT} . The blue line is obtained from the fits in panels A,B and C and from Equation 4. ρ : FAD density.

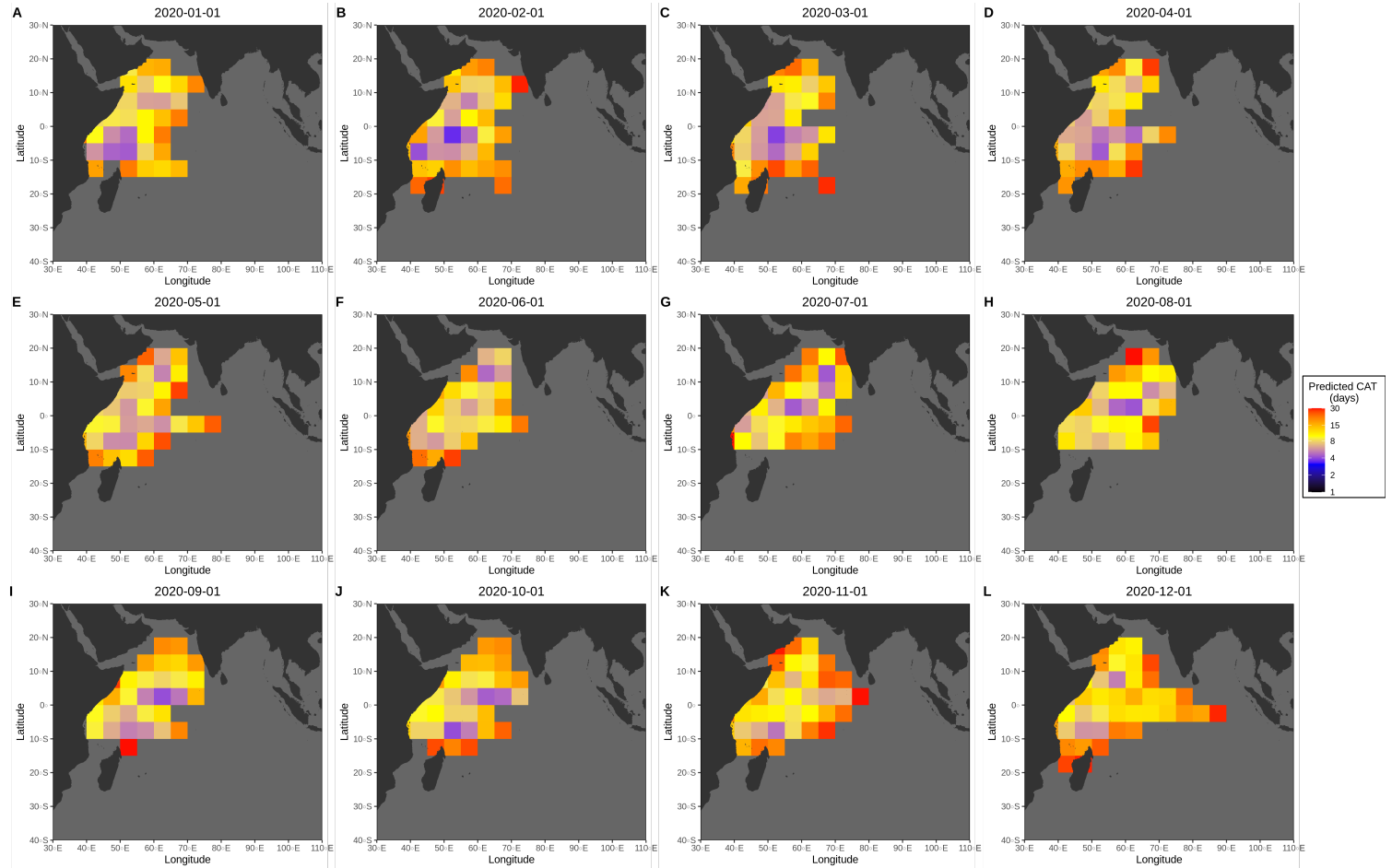


FIGURE 2 Predicted monthly mean Continuous Absence Times of individual yellowfin tunas (\overline{CAT} , in days) per 5° cells in the western Indian Ocean. Simulations were performed with $v = 0.5 \text{ m}\cdot\text{s}^{-1}$ and $R_0 = 2 \text{ km}$. The color scale is log transformed. \overline{CAT} longer than 30 days, out of the main fishing grounds, were not represented.

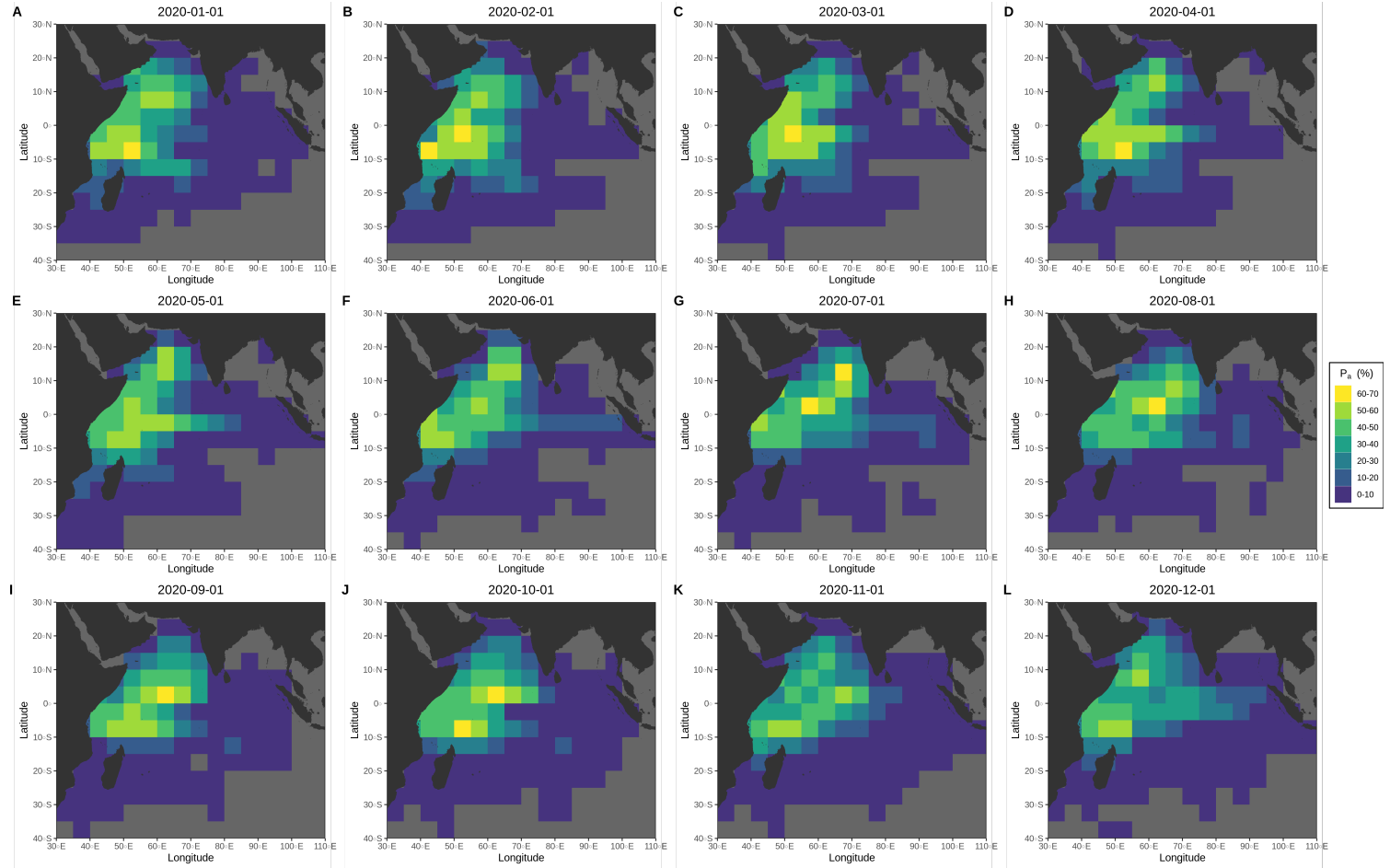


FIGURE 3 Predicted monthly percentage of time spent associated by individual yellowfin tunas (P_a) per 5° cells in the Western Indian Ocean. Simulations were performed with $v = 0.5 \text{ m}\cdot\text{s}^{-1}$ and $R_0 = 2 \text{ km}$.

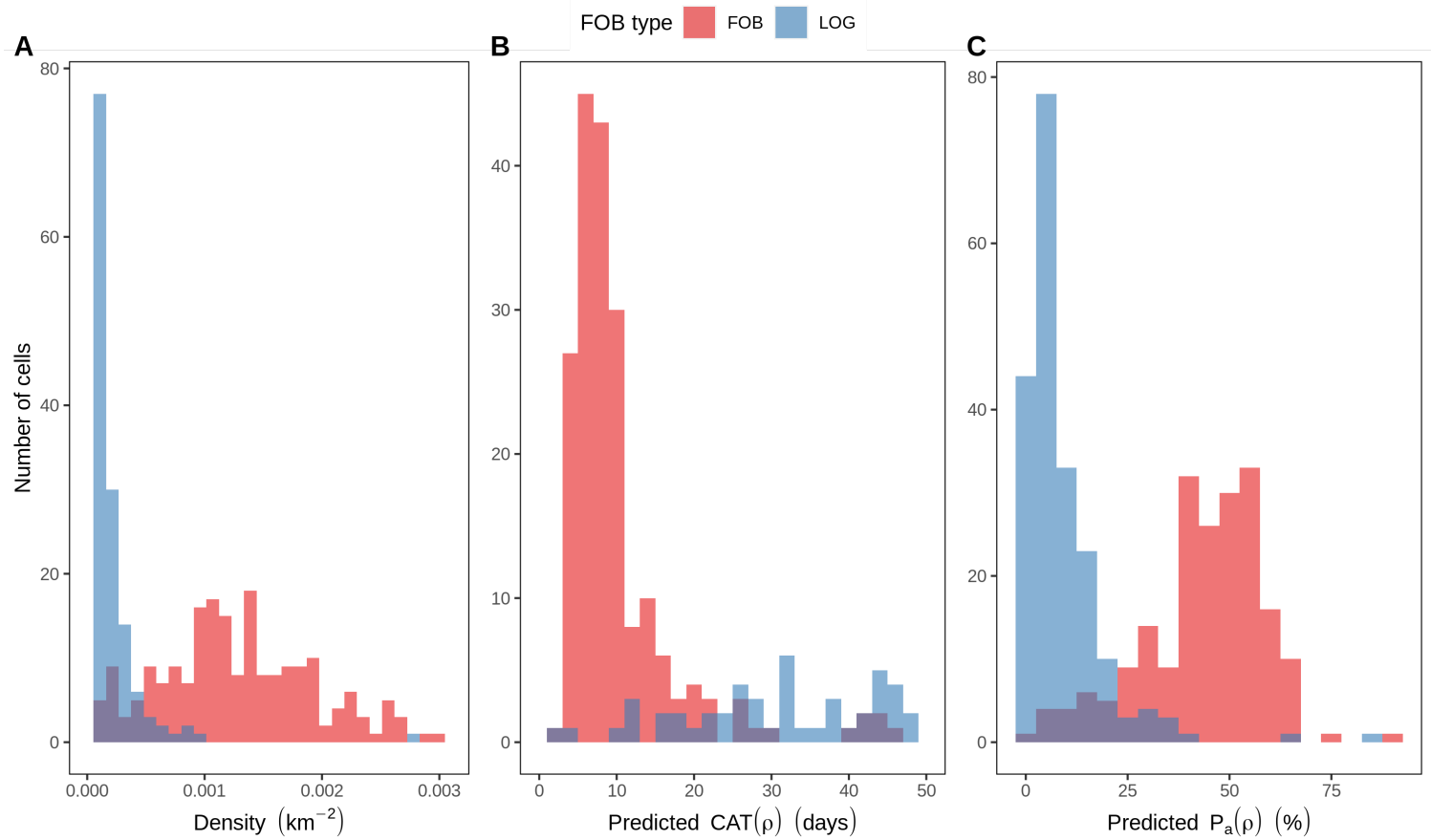


FIGURE 4 Comparison between predictions performed on the density of all FOBs (ρ_{FOB} , in red) and LOGs only (ρ_{LOG} , in blue) density. Monthly mean density of floating object (A), predicted mean monthly CAT (B) and P_a (C), per 5° cell. Simulations were performed with $\nu = 0.5 \text{ m}\cdot\text{s}^{-1}$ and $R_0 = 2 \text{ km}$.

TABLE 2 Trends of CAT, measured using the model, for each of the tested density. Simulations were performed with $v = 0.5 \text{ m.s}^{-1}$ and $R_0 = 2 \text{ km}$. ρ : FAD density (in km^{-1}); D: mean inter-FAD distance in a regular square lattice (in km); \overline{CAT} : mean Continuous Absence Time (in days); \overline{CAT}_{diff} : mean Continuous Absence Time when the movement occurred between two different FADs (in days); \overline{CAT}_{return} : mean Continuous Absence Time when the individual returned to the departure FAD (in days); R: ratio of the number of \overline{CAT}_{diff} divided by the number of \overline{CAT}_{return} .

ρ	D	\overline{CAT}	\overline{CAT}_{diff}	\overline{CAT}_{return}	R
4.44×10^{-3}	15	2.32	2.31	2.54	22.89
2.50×10^{-3}	20	4.03	4.08	3.26	13.69
1.60×10^{-3}	25	6.24	6.46	4.04	9.99
1.11×10^{-3}	30	8.89	9.36	4.98	8.16
8.16×10^{-4}	35	12.13	13.02	5.97	6.96
6.25×10^{-4}	40	15.82	17.26	7.08	6.08
4.00×10^{-4}	50	24.60	27.59	9.39	5.10
2.78×10^{-4}	60	35.21	40.39	11.96	4.48
2.04×10^{-4}	70	47.98	56.31	14.72	3.99
1.56×10^{-4}	80	62.61	74.69	18.18	3.68
1.23×10^{-4}	90	79.54	96.32	21.03	3.49
1.00×10^{-4}	100	97.67	120.06	25.38	3.23

TABLE 3 Summary of the fitted metrics and the obtained parameter values. Simulations were performed with $v = 0.5 \text{ m.s}^{-1}$ and $R_0 = 2 \text{ km}$.

Metric	Formula	Fitted values	Standard Error
\overline{CAT}_{diff}	$a_d \times \rho^{-b_d}$	$a_d = 6.84 \times 10^{-3}$	1.19×10^{-4}
		$b_d = 1.06$	3.89×10^{-3}
\overline{CAT}_{return}	$1 + a_r \times \rho^{-b_r}$	$a_r = 2.28 \times 10^{-2}$	1.93×10^{-3}
		$b_r = 7.56 \times 10^{-1}$	1.93×10^{-2}
R	$a\rho^c \exp(b \times \rho)$	$a = 60.62$	3.72
		$b = 175.48$	4.64
		$c = 3.24 \times 10^{-1}$	7.91×10^{-3}

references

- Pérez, G., Dupaix, A., Dagorn, L., Deneubourg, J.-L., Holland, K., Beeharry, S. and Capello, M. (2022) Correlated Random Walk of tuna in arrays of Fish Aggregating Devices: A field-based model from passive acoustic tagging. *Ecological Modelling*, 470, 110006. URL: <https://www.sciencedirect.com/science/article/pii/S030438002200117X>.