Supporting Information. Quantifying the impact of habitat modifications on species behavior and mortality: A case study of tropical tuna. Amaël Dupaix, Laurent Dagorn, Jean-Louis Deneubourg, & Manuela Capello. Ecological Applications.

Appendix S5: Results obtained with v = 0.5 m.s^{-1} and R_0 = 2 km

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 S1 were used: the speed v was replaced by v = 0.5 m.s^{-1} and the orientation radius R_0 was replaced by R_0 = 2 km.

Table S1. Parameters used in the simulations presented in the Appendix S5. 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

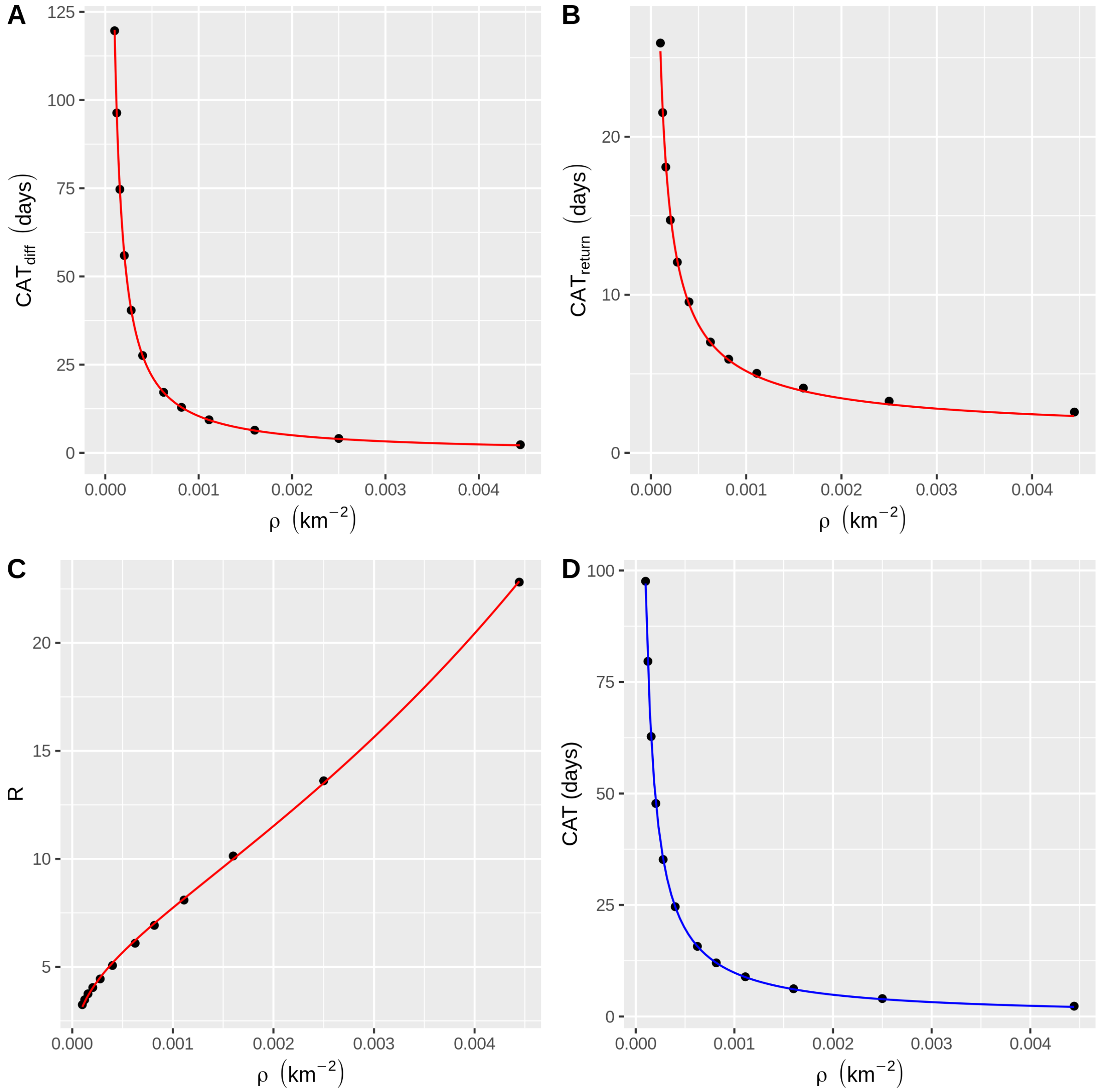

Figure S1. Continuous Absence Times (CATs) trends as a function of FAD density, obtained from the simulations, performed with $v = 0.5$ m.s^{-1} and $R_0 = 2$ km. (A) $\overline{\text{CAT}_{\text{diff}}}$ fitted according to Equation 1; parameter values: $a_d = 6.84 \times 10^{-3}$; $b_d = 1.06$. (B) $\overline{\text{CAT}_{\text{return}}}$ 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 $\text{CAT}_{\text{return}}$ (R) fitted according to Equation 3; parameter values: $a = 60.62$; $b = 175.48$ and $c = 3.24 \times 10^{-1}$. (D) Mean $\overline{\text{CAT}}$. The blue line is obtained from the fits in panels A,B and C and from Equation 4. ρ: FAD density.

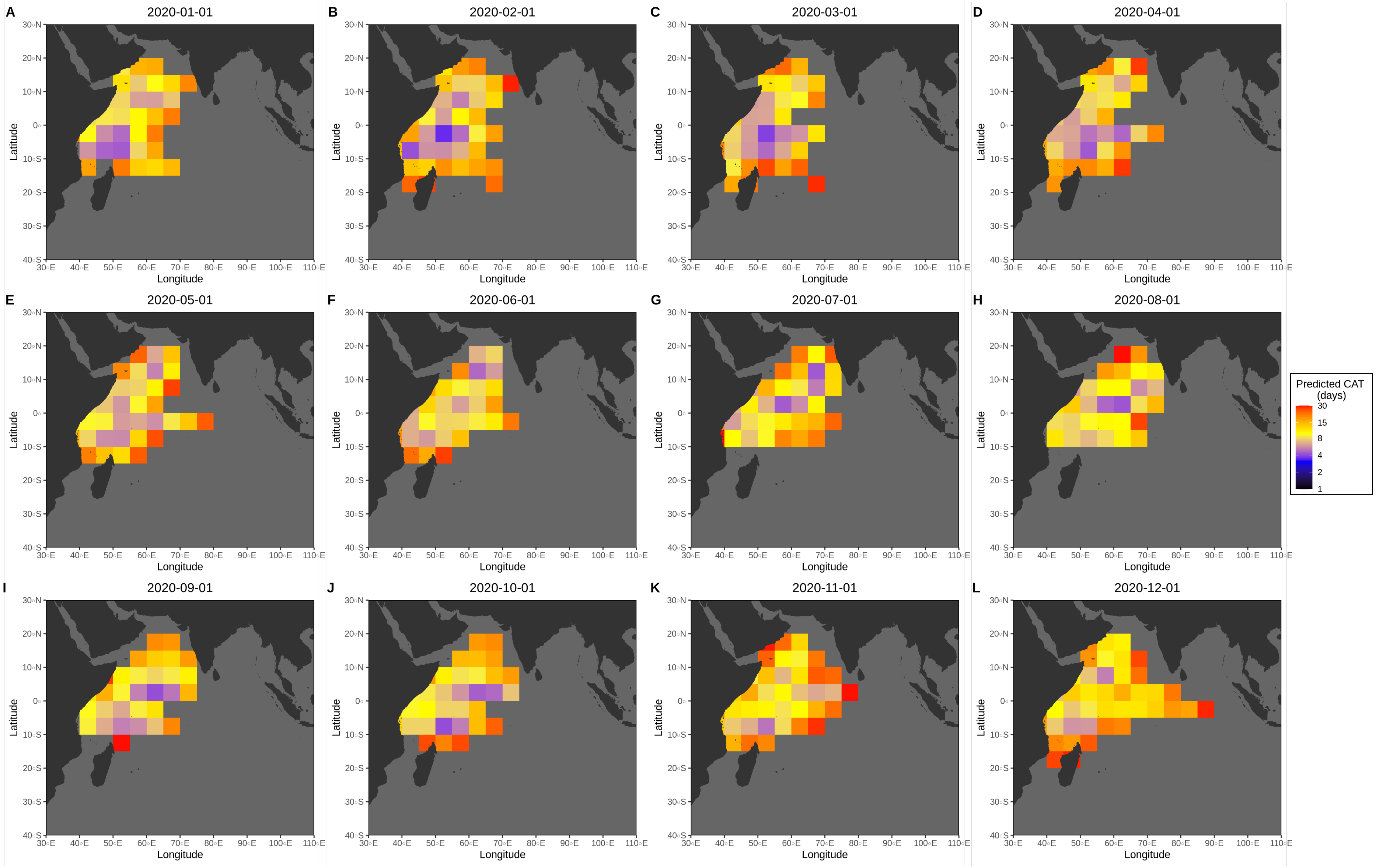

Figure S2. Predicted monthly mean Continuous Absence Times of individual yellowfin tunas ($\overline{\text{CAT}}$, in days) per 5° cells in the western Indian Ocean. Simulations were performed with $v = 0.5$ m.s^{-1} and $R_0 = 2$ km. The color scale is log transformed. $\overline{\text{CAT}}$ longer than 30 days, out of the main fishing grounds, were not represented.

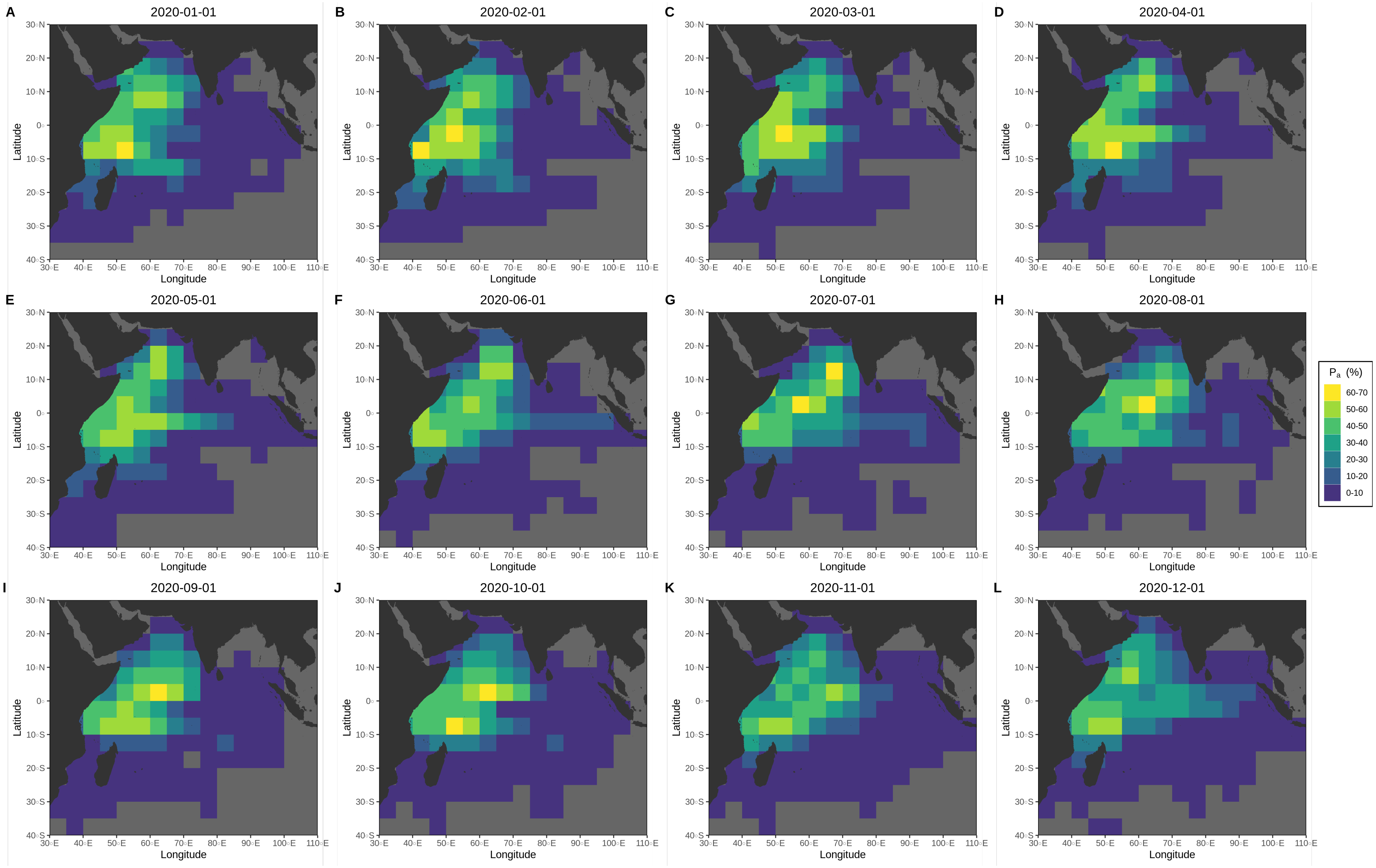

Figure S3. Predicted monthly percentage of time spent associated by individual yellowfin tunas (P_a) per 5° cells in the Western Indian Ocean. Simulations were performed with $v = 0.5$ m.s^{-1} and $R_0 = 2$ km.

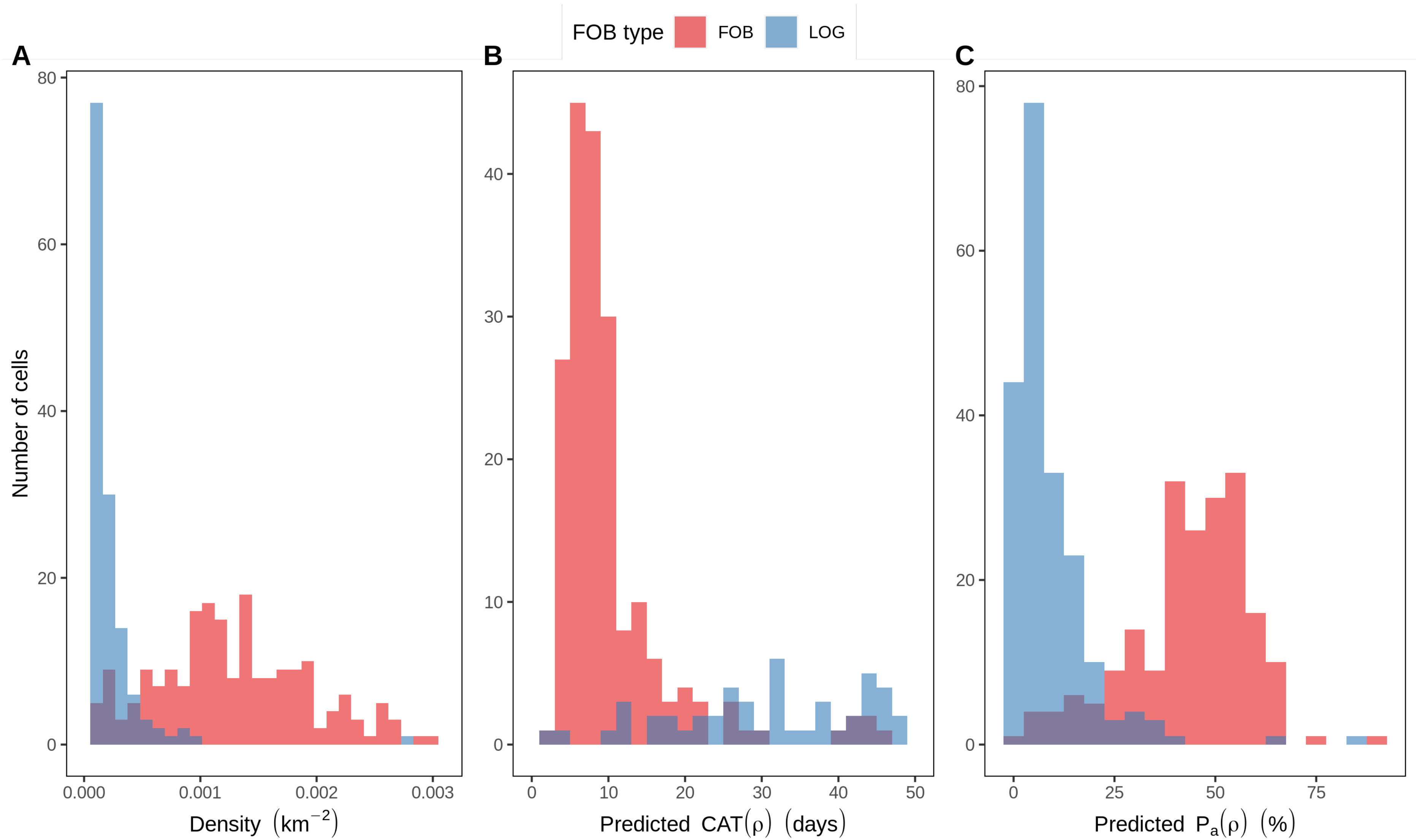

Figure S4. Comparison between predictions performed on the density of all FOBs (ρ_{FOB}, in red) and LOGs only (ρ_{LOG}, in blue) density. Monthly mean density of floating object (A), predicted mean monthly CAT (B) and P_a (C), per 5° cell. Simulations were performed with $v = 0.5$ m.s^{-1} and $R_0 = 2$ km.

Table S2. Trends of CAT, measured using the model, for each of the tested density. Simulations were performed with $v = 0.5$ m.s^{-1} and $R_0 = 2$ km. ρ: FAD density (in km^{-1}); D: mean inter-FAD distance in a regular square lattice (in km); $\overline{\text{CAT}}$: mean Continuous Absence Time (in days); $\overline{\text{CAT}_{\text{diff}}}$: mean Continuous Absence Time when the movement occurred between two different FADs (in days); $\overline{\text{CAT}_{\text{return}}}$: mean Continuous Absence Time when the individual returned to the departure FAD (in days); R: ratio of the number of CAT_{diff} divided by the number of $\text{CAT}_{\text{return}}$.

ρ	D	$\overline{\text{CAT}}$	$\overline{\text{CAT}_{\text{diff}}}$	$\overline{\text{CAT}_{\text{return}}}$	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 S3. Summary of the fitted metrics and the obtained parameter values. Simulations were performed with $v = 0.5$ m.s^{-1} and $R_0 = 2$ km.

Metric	Formula	Fitted values	Standard Error
$\overline{\text{CAT}_{\text{diff}}}$	$a_d \times \rho^{-b_d}$	$a_d = 6.84 \times 10^{-3}$	1.19×10^{-4}
		$b_d = 1.06$	3.89×10^{-3}
$\overline{\text{CAT}_{\text{return}}}$	$1 + a_r \times \rho^{-b_r}$	$a_r = 2.28 \times 10^{-2}$	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, A Dupaix, L Dagorn, JL Deneubourg, K Holland, S Beeharry, and M Capello (Aug. 2022). Correlated Random Walk of tuna in arrays of Fish Aggregating Devices: A field-based model from passive acoustic tagging. en. *Ecological Modelling* 470, 110006. ISSN: 0304-3800. https://doi.org/10.1016/j.ecolmodel.2022.110006.