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 S2: Determining the spatial and temporal resolution of the prediction

Before building maps of the mean Continuous Absence Times in the IO, by applying the regression obtained from the FAT albaCoRaW model (Dupaix et al., 2023), we need to determine the **spatial and temporal resolution** at which we can make the predictions. We want to be able to consider the units we use (both temporal, *i.e.* the month, and spatial, *i.e.* the cell size) as **homogeneous**. For example, if we predict in a 1°×1° cell that the mean CAT will be 10 days and that in average tuna travel a distance of 500 km in 10 days, it would be a problem. Hence, we use the predicted mean values of CAT and traveled distances in the interval of observed FAD densities, to determine if the chosen resolution can be considered as homogeneous.

Using simulations performed in randomly generated arrays, at different FAD densities, we determined the mean distance between the two visited FADs during a CAT, as well as the mean CAT duration. We then determined the minimum, mean and maximum DFAD densities observed in the IOTC buoy data (IOTC, 2021). The mean distance between two visited FADs was comprised between 35 and 100km for the densities observed in the Indian Ocean (Figure S1). Hence, if we consider cells of 5°×5°, each cell can be considered as a homogeneous unit. The mean CAT is comprised between 3 and 20 days for the densities observed in the Indian Ocean (Figure S2). Hence, by considering a temporal resolution of 1 month, each cell can be considered as a homogeneous unit.

References

Dupaix A, G Pérez, and M Capello (May 2023). FAT albaCoRaW. https://doi.org/10.5281/zenodo.5834056.

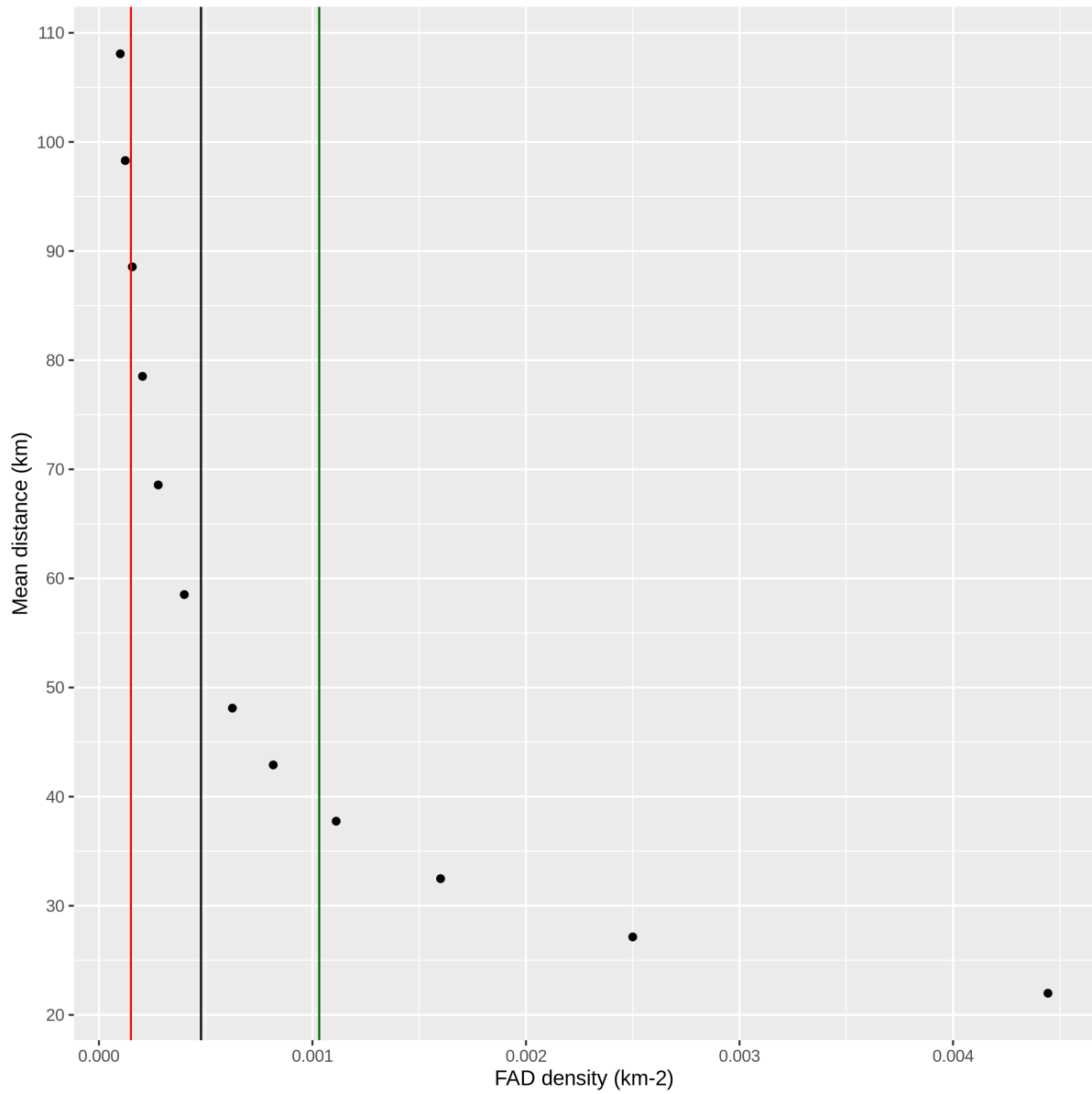IOTC (2021). *Instrumented buoy data (Jan 2020 - May 2021)*. IOTC ad hoc Working Group on FADs (WGFAD2).

Figure S1. Mean distance traveled by tuna during a CAT in the simulations as a function of FAD density. The red, black and green lines represent the minimum, mean and maximum operational buoy density per cell averaged over the whole IO respectively.
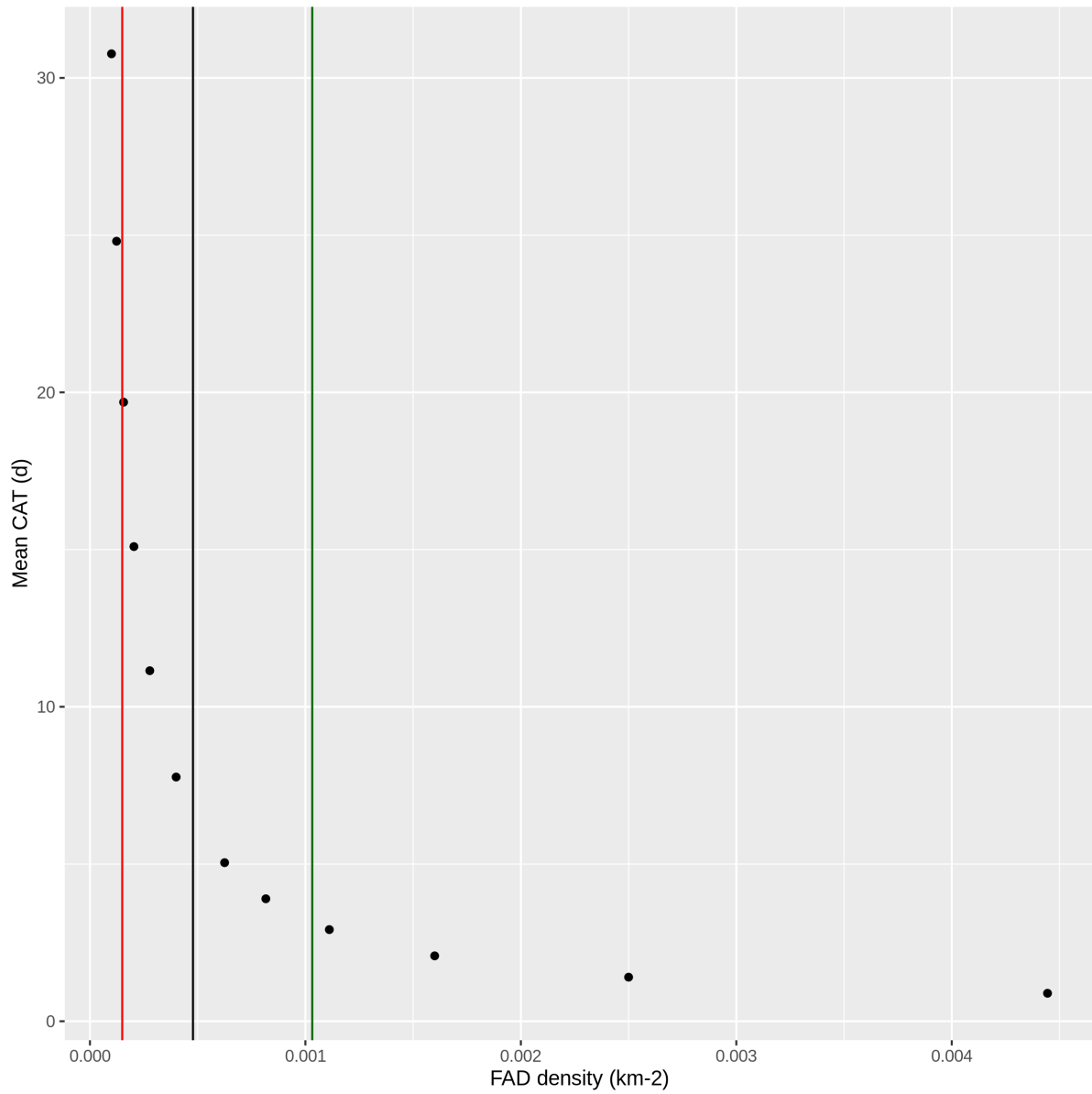
Figure S2. Mean Continuous Absence Time measured in the simulations as a function of FAD density. The red, black and green lines represent the minimum, mean and maximum operational buoy density per cell averaged over the whole IO respectively.