

1 Drifting Fish Aggregating Devices (DFADs) as ecological traps: no evidence displayed  
2 by a long-term analysis of yellowfin tuna condition

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## Supplementary Materials

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6 Amaël Dupaix<sup>1\*</sup>, Laurent Dagorn<sup>1</sup>, Antoine Duparc<sup>1</sup>, Aurélie Guillou<sup>1</sup>, Jean-Louis Deneubourg<sup>2</sup>,

7 Manuela Capello<sup>1</sup>

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9 <sup>1</sup>: MARBEC, Univ. Montpellier, CNRS, Ifremer, IRD, Sète, France

10 <sup>2</sup>: CENOLI, Université Libre de Bruxelles (ULB), Bruxelles, Belgium

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12 \* corresponding author:

13 Amaël Dupaix

14 e-mail: [amael.dupaix@ens-lyon.fr](mailto:amael.dupaix@ens-lyon.fr)

15 ORCID number: 0000-0001-9925-5756

16 **Supplementary Table**

17 **Table S1: Number of sampled yellowfin tuna per year.**

<b>Year</b>	<b>Number of samples</b>
1987	659
1988	664
1989	401
1990	805
2003	496
2004	773
2005	1,224
2006	3,781
2007	1,619
2008	962
2009	2,621
2010	1,500
2011	1,824
2012	3,431
2013	1,361
2014	1,103
2015	1,060
2016	294
2017	254

Year	Number of samples
2018	416
2019	666
Total	25,914

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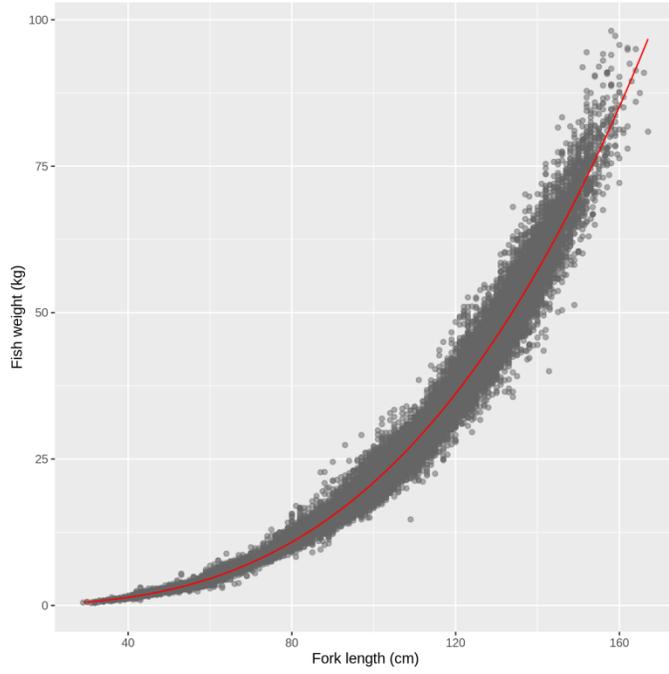
## 19 **Supplementary Material 1**

20 The power-law function  $W_{th} = a FL^b$  was used to fit the fish weight as a function of the fork length data  
 21 recorded throughout the study period (Figure S1), using a linear regression procedure of the log-  
 22 transformed data (using the *lm* function of the package *stats* in R). The following parameters were  
 23 obtained:

	Value	Standard deviation	p-value
ln(a)	-10.658	$7.5 \cdot 10^{-3}$	$<10^{-16}$
<b>a</b>	<b><math>2.35 \cdot 10^{-5}</math></b>		
<b>b</b>	<b>2.976</b>	$1.6 \cdot 10^{-3}$	$<10^{-16}$

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25 Hence,  $W_{th} = 2.35 \cdot 10^{-5} FL^{2.976}$ ,  $R^2 = 0.992$ ; where  $W_{th}$  is the predicted weight, in kilograms, and FL is the  
 26 fork length, in centimeters.



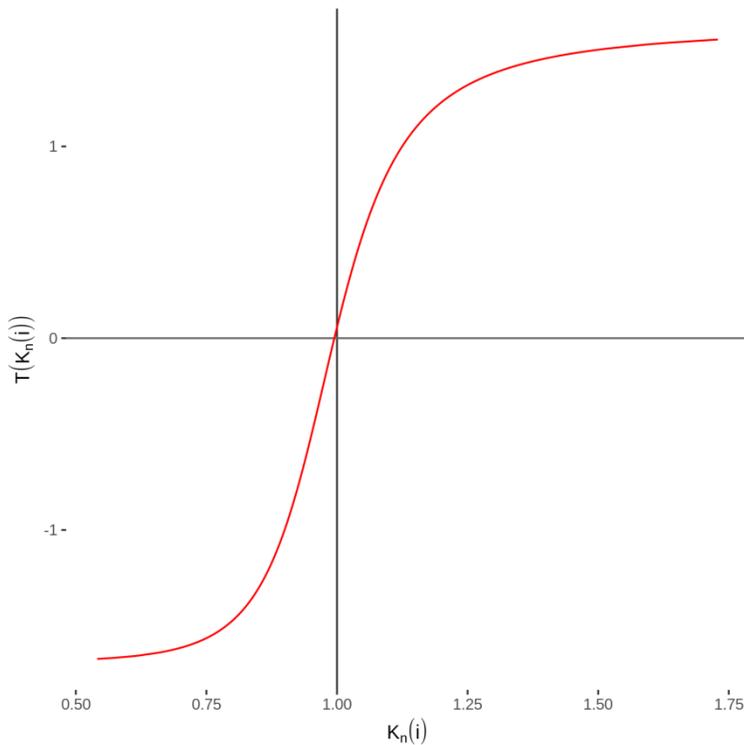
28 **Figure S1: Relationship between fish weight and fork length.**

## 29 **Supplementary Material 2**

30 The transformed  $T(K_n(i))$  was obtained as follows:

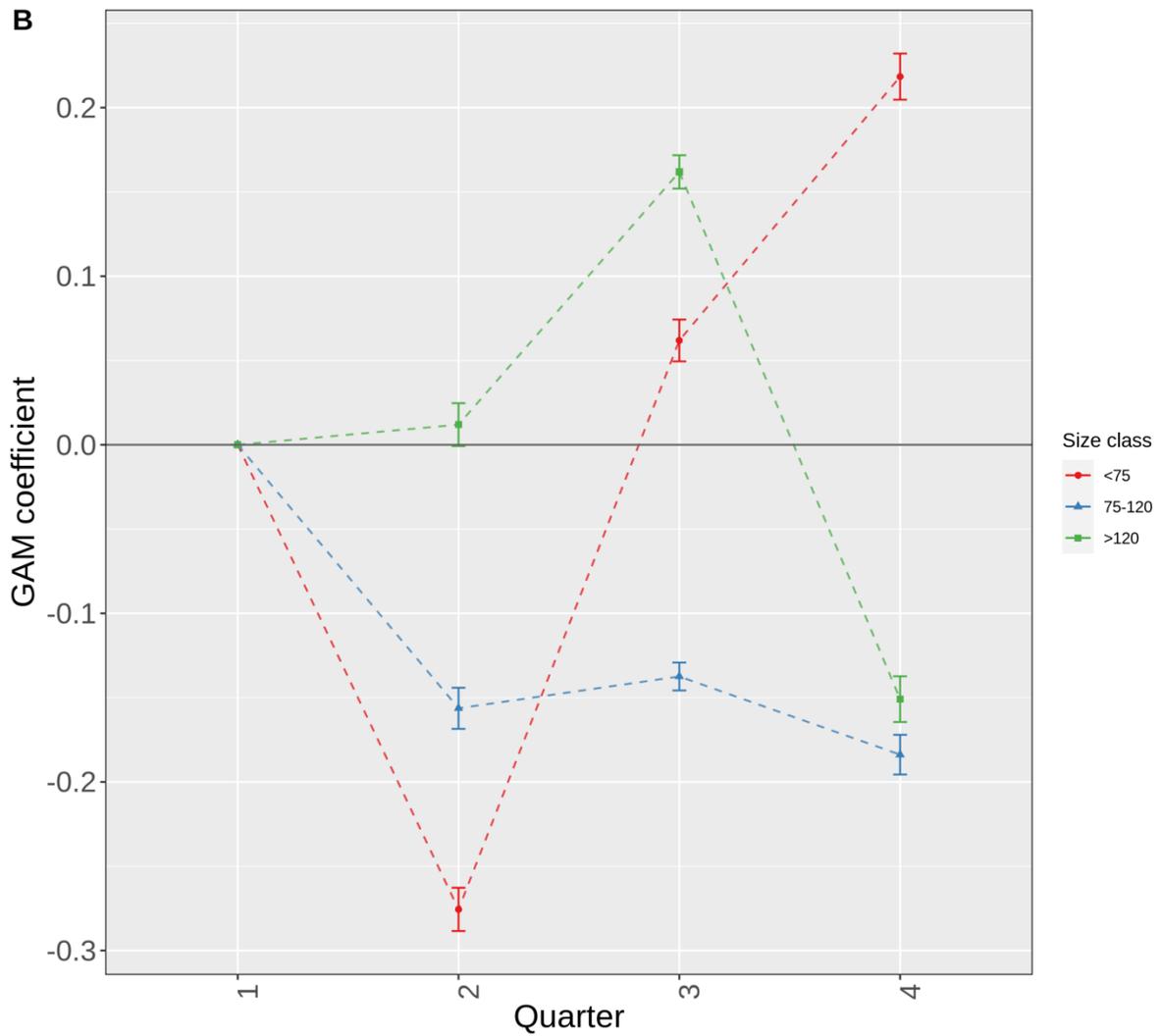
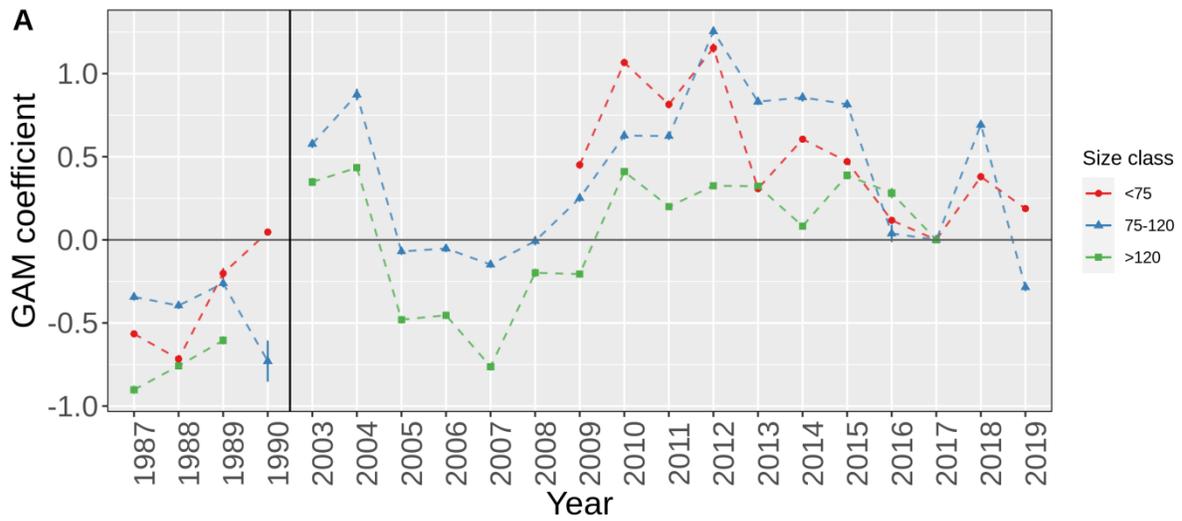
$$31 \quad T(K_n(i)) = \frac{\overline{W}_{th} K_n(i) - \overline{W}}{\sqrt{\sigma_{th}^2 K_n(i)^2 - 2\rho\sigma\sigma_{th} K_n(i) + \sigma^2}}$$

32 where  $K_n(i)$  is the relative condition factor of individual ( $i$ );  $\overline{W}$  is the mean measured weight, and  $\sigma$  its  
33 standard deviation;  $\overline{W}_{th}$  is the mean theoretical weight, and  $\sigma_{th}$  its standard deviation. Geary (1930)  
34 demonstrated that  $T(K_n(i))$  is normally distributed with mean zero and standard deviation unity.

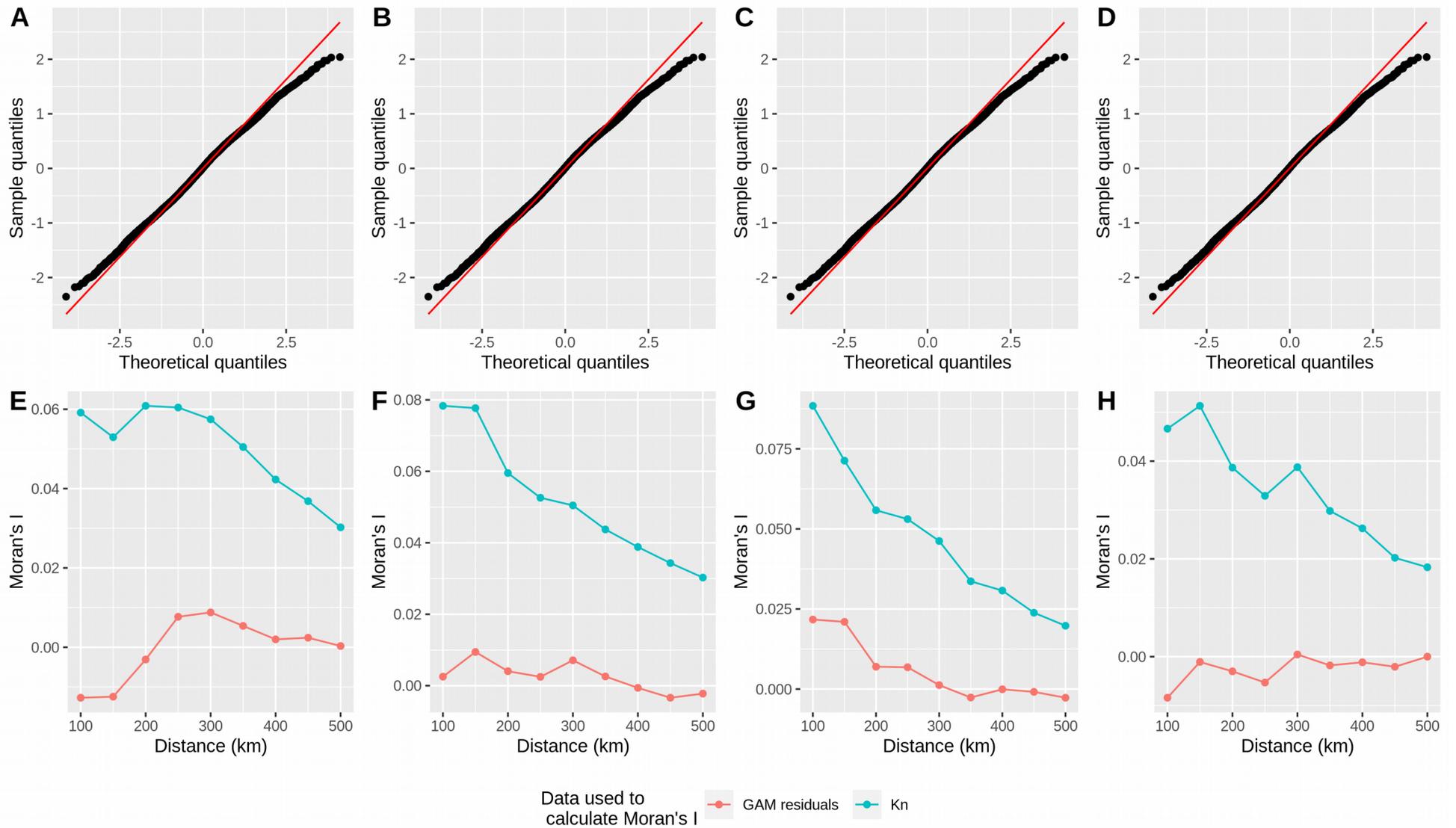


36 **Figure S2: Result of the Geary-Hinkley transformation performed on  $K_n(i)$ .**

37 **Supplementary Figures**

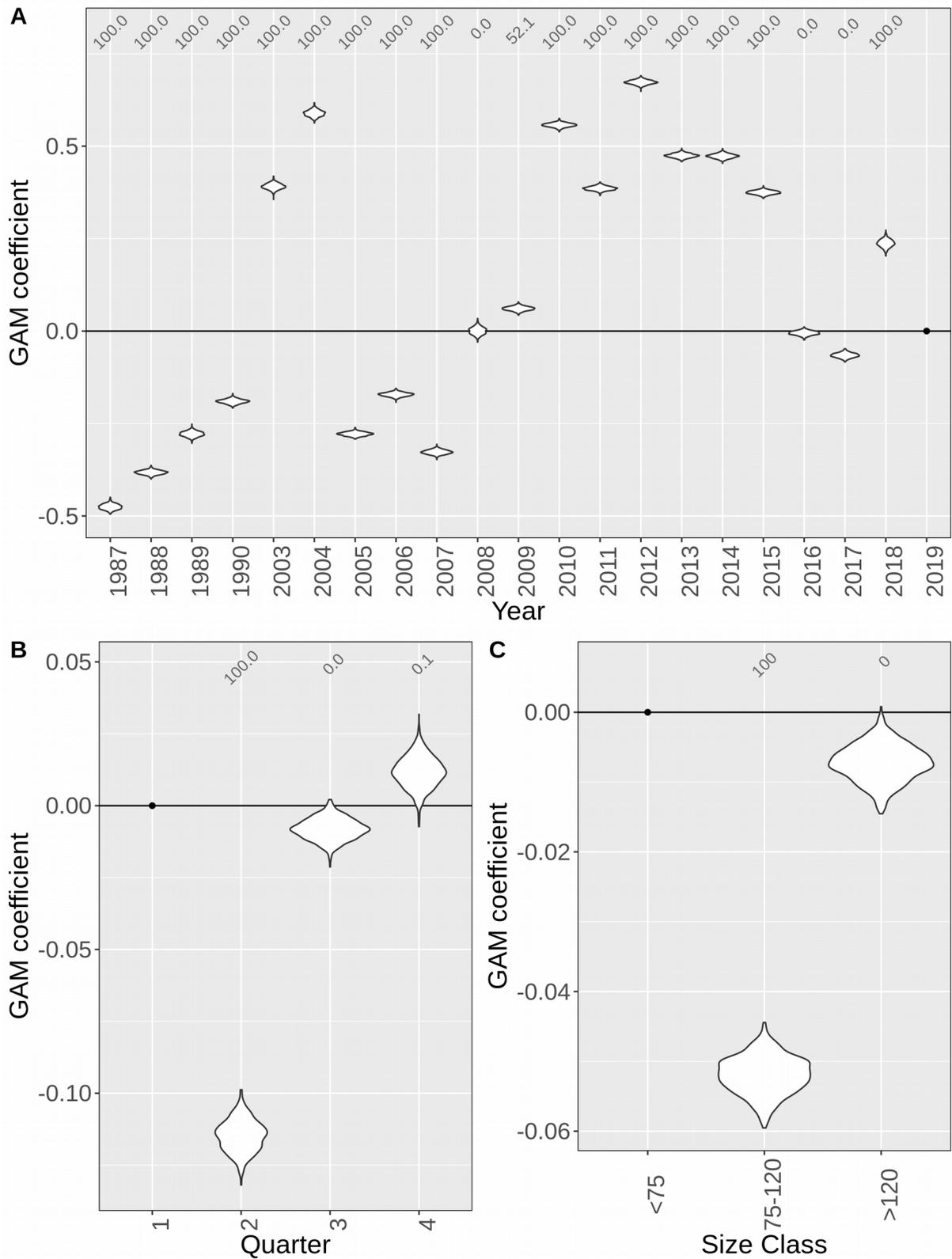


38 **Figure S3: Coefficients of the Generalized Additive Models considering a subset of data.** Only  
39 small fish (<75cm, red circles), only medium fish (75-120cm, blue triangles) or only large fish  
40 (>120cm, green squares). Coefficients of the fishing year (A) and of the quarter (B). Each coefficient  
41 represent the mean deviation of  $T(K_n)$  from the values at a given level of reference. The error bars  
42 represent the standard deviation. Considered categories of reference: Y: 2017; Q: Q1. The year 2017  
43 was chosen as the reference year because it is the most recent year with all size classes measured.



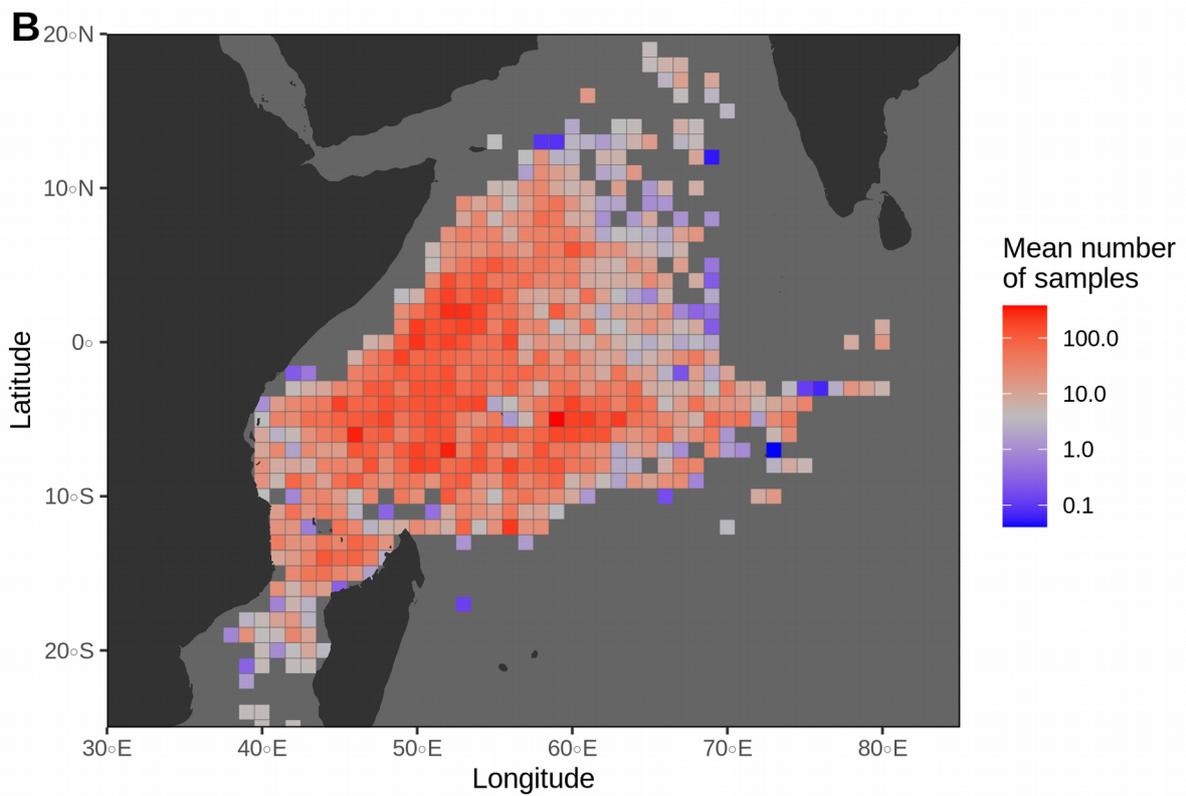
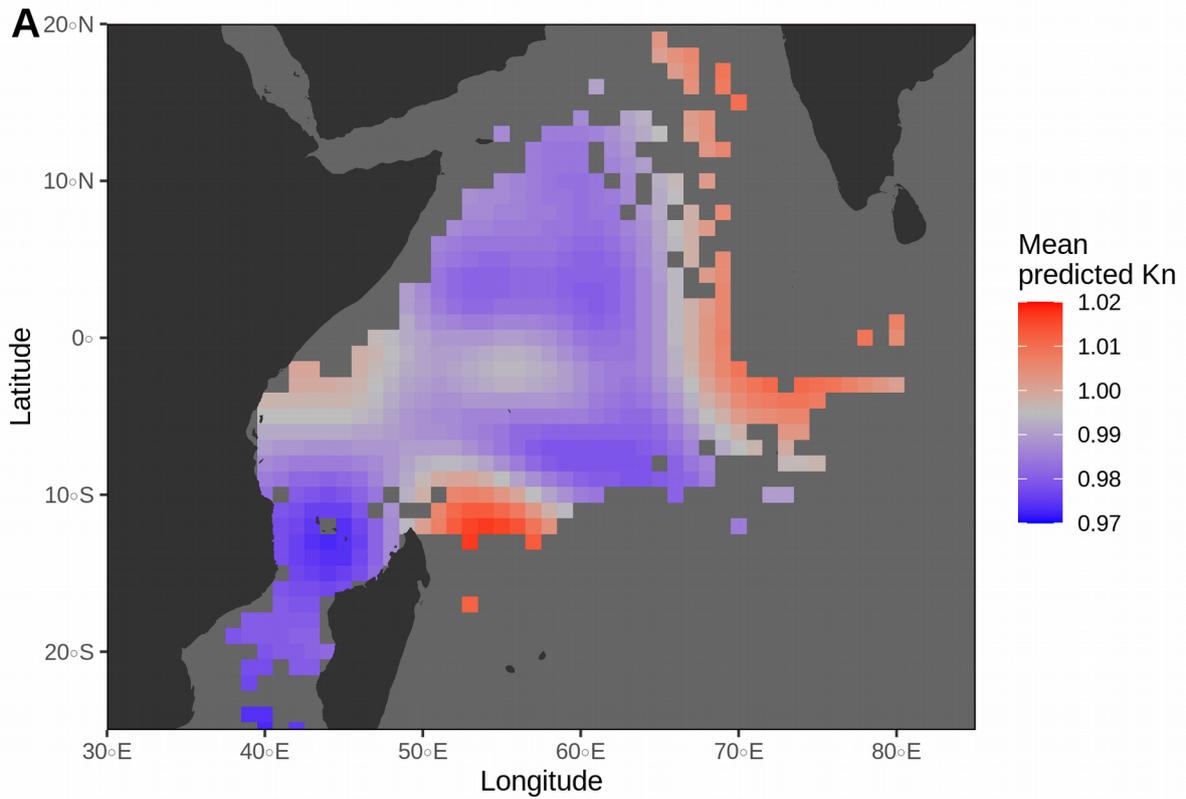
44 **Figure S4: Diagnostic plots of the residuals of 4 randomly picked Generalized Additive Models performed.** (A-D) Quantile-quantile plots of the  
 45 residuals. (E-H) Plot of the Moran's I in the data, in blue, and in the model residuals, in red. Distances on x axis is the distance used to define two

46 points as “linked” in the Moran’s I calculation (see details of the *dnearneigh* function in the *spdep* package in R).



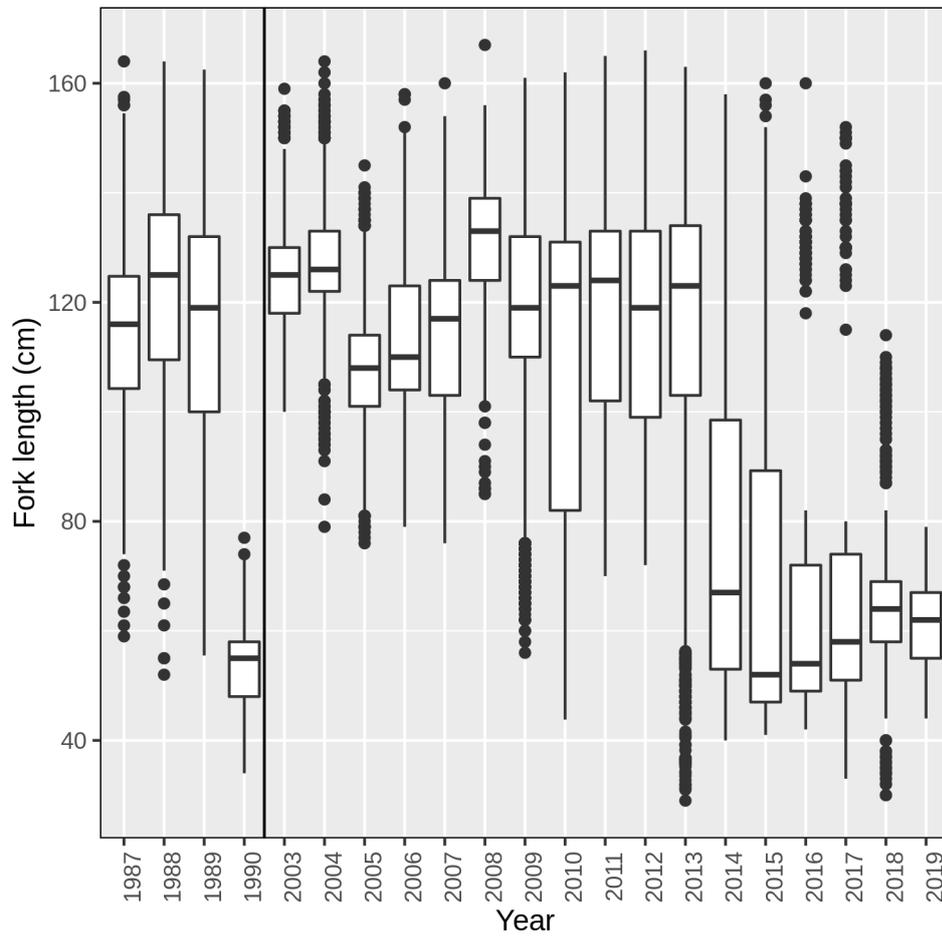
47 **Figure S5: Coefficients of the Generalized Additive Model.** Coefficients of the fishing year  
 48 (A), of the quarter (B) and of the size class (C). Each coefficient represents the mean  
 49 deviation of  $T(K_n)$  from the values for a category of reference. The shape of the points

50 represents the distribution of the values obtained with the bootstrap process. Numbers in grey  
51 in the upper part of the panels represent the percentage of the models generated in the  
52 bootstrap for which a given category was significantly different from the category of  
53 reference. Considered category of reference, represented by a black dot: Y: 2019; Q: Q1; SC:  
54 <75 cm.



55 **Figure S6: Spatial prediction of the Generalized Additive Models.** (A) Mean predicted  
 56 value of  $K_n$ . (B) Mean number of samples in the data used as input in the model. Dark grey

57 cells represent cells in which no tuna was sampled. Considered categories of reference for the  
58 prediction: Y: 2019; Q: Q1; size class: <75 cm.



59 **Figure S7: Boxplot of the fork length of sampled tuna per year.** The uneven distribution  
 60 of the sampling is mainly due to the fact that data comes from different research projects,  
 61 which do not always aim at studying the same size class.