The following supplement accompanies the article

Intra- and interspecific niche partitioning in striped and common dolphins inhabiting the southwestern Mediterranean Sea

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SUPPLEMENTARY TEXT

Six different Layman metrics were used as a measure of niche variation between the species (Layman, 2007):

1) δ^{15}N Range (NR): Distance between the most enriched and most depleted δ^{15}N values (i.e., maximum δ^{15}N - minimum δ^{15}N). NR is a representation of vertical structure. Trophic position of organisms must be calculated in relation to the δ^{15}N values of a standardized baseline (Post, 2002) but, generally, a larger range in δ^{15}N among consumers suggests more trophic levels and thus a greater degree of trophic diversity;

2) δ^{13}C range (CR): Distance between the most enriched and most depleted δ^{13}C values (i.e., maximum δ^{13}C- minimum δ^{13}C). Increased CR would be expected if there are multiple basal resources with varying δ^{13}C values;

3) Total area (TA): Convex hull area encompassed by all samples in δ^{13}C– δ^{15}N bi-plot space. This represents a measure of the total amount of niche space occupied, and thus a proxy for the total extent of trophic diversity within this group. TA is influenced by individuals with extreme positions on either the δ^{13}C or δ^{15}N axis (or both), and thus typically will be correlated to some degree with these two metrics;

4) Mean distance to centroid (CD): Average euclidean distance of each sample to the δ^{13}C – δ^{15}N centroid. This metric provides a measure of the average degree of trophic diversity. In cases where a few outlier individuals may differentially affect TA, this measure may better reflect the overall degree of trophic diversity. However, this measure also is a function of the degree of individual spacing (see following metric);

5) Mean nearest neighbour distance (MNND): Mean of the euclidean distances to each individual' nearest neighbour in biplot space, and thus a measure of the overall density of individuals packing. Groups with a large proportion of individuals characterized by similar trophic ecologies will exhibit a smaller MNND (increased trophic redundancy) than a group in which individuals are, on average, more divergent in terms of their trophic niche;

6) Standard deviation of nearest neighbour distance (SDNND): A measure of the evenness of individuals packing in bi-plot space that is less influenced than MNND by sample size. Low SDNND values suggest more even distribution of trophic niches. All Layman metrics were bootstrapped with replacement (n=10000) based on half of the sample size to obtain confidence intervals around each metric (Jackson et al., 2012).

FIGURES

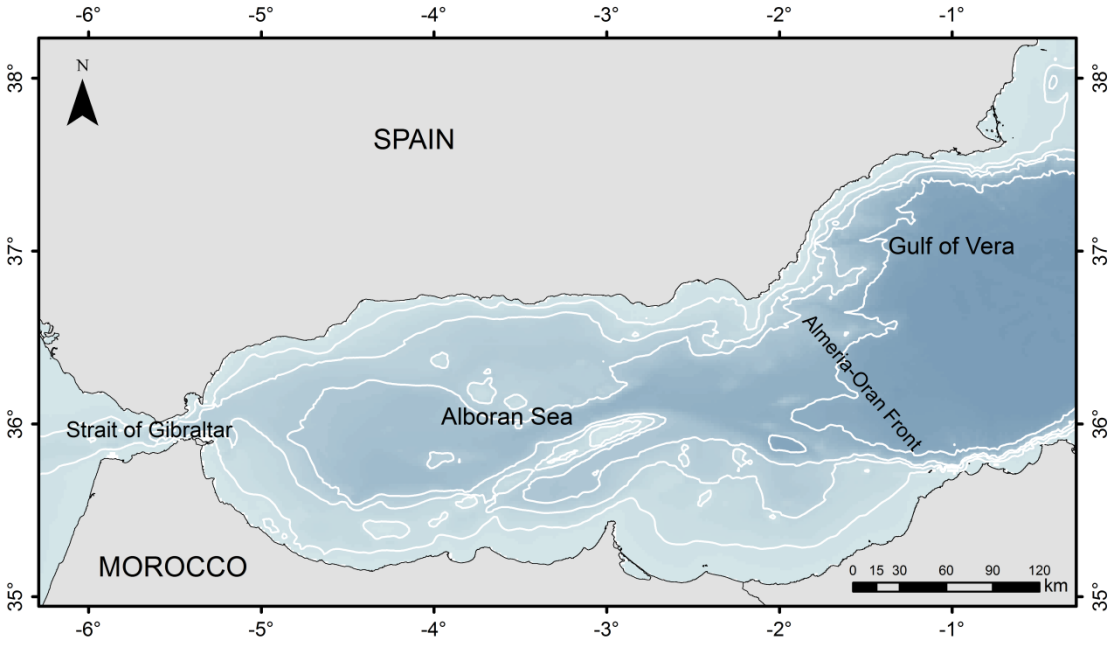

Figure S1: Study area map showing the Strait of Gibraltar, Alboran Sea, Gulf of Vera and Almeria-Oran front.

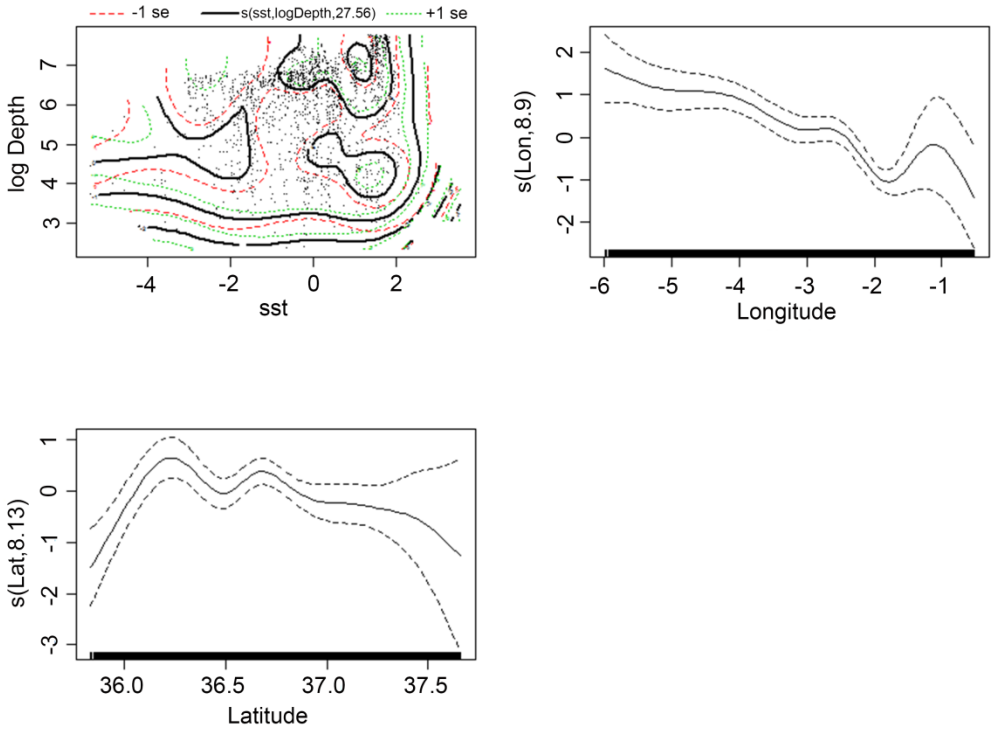

Figure S2: Shapes of the functional forms for the smoothed covariates used in the models for abundance of groups of common dolphins. Zero on the vertical axes corresponds to no effect of the covariate on the estimated response (group density). The dashed lines represent twice the standard errors of the estimated curve (95% confidence band). The locations of the observations are plotted as small tick marks along the horizontal axes. The interactions between two variables are shown as two-dimensional plots. In these cases, the locations of the observations are plotted as small dots. The dotted red and green lines represent -1 standard

error and + 1 standard error respectively (equivalent to the dashed lines of the univariate plots). The number on the lines indicates whether it has a positive effect (e.g. '+1'), a negative effect (e.g. '-1') or is neutral ('0').

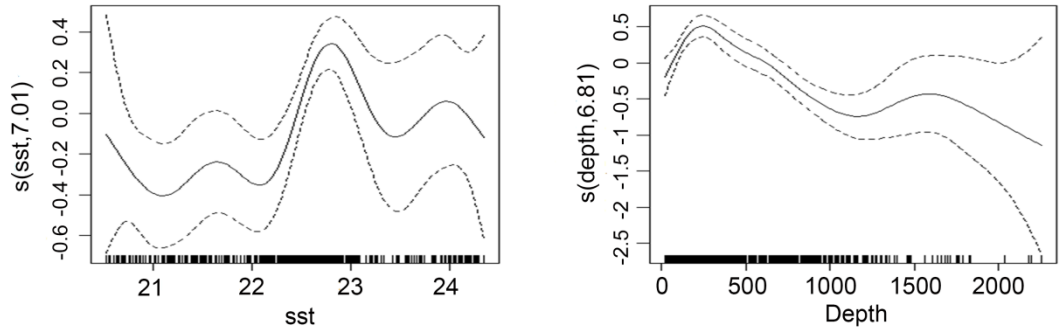

Figure S3: Shapes of the functional forms for the smoothed covariates used in the models for group sizes of common dolphins. Zero on the vertical axes corresponds to no effect of the covariate on the estimated response (group density). The dashed lines represent twice the standard errors of the estimated curve (95% confidence band). The locations of the observations are plotted as small tick marks along the horizontal axes.

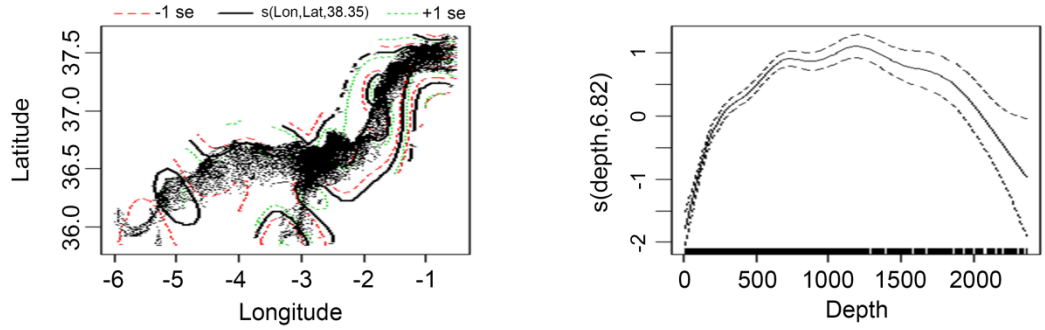

Figure S4: Shapes of the functional forms for the smoothed covariates used in the models for abundance of striped dolphins. Zero on the vertical axes corresponds to no effect of the covariate on the estimated response (group density). The dashed lines represent twice the standard errors of the estimated curve (95% confidence band). The locations of the observations are plotted as small tick marks along the horizontal axes. The interactions between two variables are shown as two-dimensional plots. In these cases, the locations of the observations are plotted as small dots. The dotted red and green lines represent -1 standard error and + 1 standard error, respectively (equivalent to the dashed lines of the univariate plots). The number on the lines indicates whether it has a positive effect (e.g. '+1'), a negative effect (e.g. '-1') or is neutral ('0').

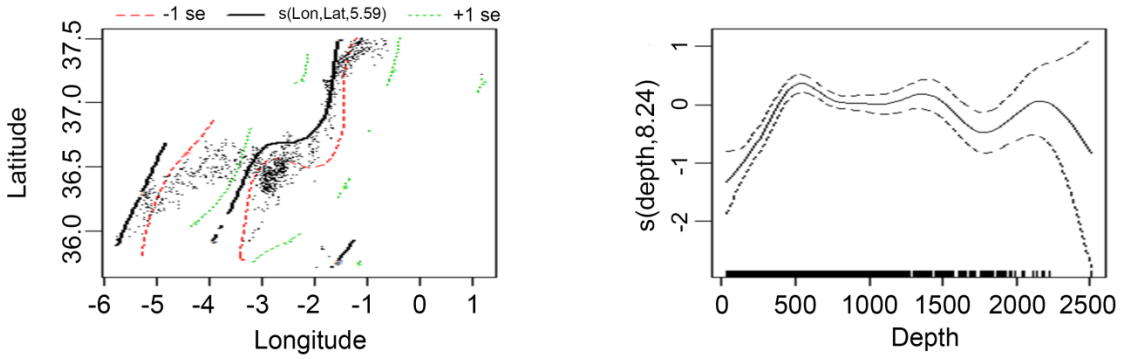

Figure S5: Shapes of the functional forms for the smoothed covariates used in the models for group sizes of striped dolphins. Zero on the vertical axes corresponds to no effect of the covariate on the estimated response (group density). The dashed lines represent twice the standard errors of the estimated curve (95% confidence band). The locations of the observations are plotted as small tick marks along the horizontal axes. The interactions between two variables are shown as two-dimensional plots. In these cases, the locations of the observations are plotted as small dots. The dotted red and green lines represent -1 standard error and + 1 standard error, respectively (equivalent to the dashed lines of the univariate plots). The number on the lines indicates whether it has a positive effect (e.g. '+1'), a negative effect (e.g. '-1') or is neutral ('0').

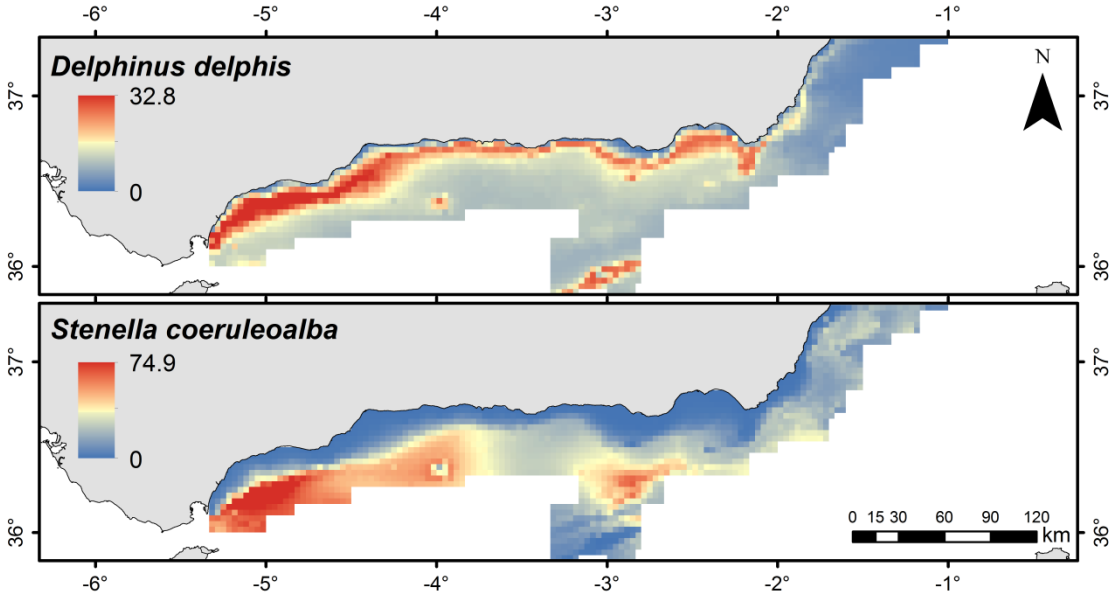

Figure S6: Spatial abundance distribution of common and striped dolphins in the Alboran Sea between 1992 and 2009. The prediction is presented in grid cells of 2 x 2 min latitude–longitude of resolution. High abundance areas in red versus low abundance areas in blue.

TABLES

Table S1: Summary of samples analyzed for isotopic analysis split by month, year and sex. Mean $\delta^{15}N$ and $\delta^{13}C$ values and its standard deviations are shown for each category.

	Common dolphins					Striped dolphins					
Sex	**n**	**$\delta^{15}N$ (sd)**		**$\delta^{13}C$ (sd)**		**n**	**$\delta^{15}N$ (sd)**		**$\delta^{13}C$ (sd)**		**TOTAL**
Female	28	11.34	(0.83)	-17.52	(0.48)	32	11.74	(1.02)	-17.45	(0.44)	60
Male	21	11.75	(0.80)	-17.62	(0.53)	55	11.58	(0.89)	-16.62	(0.41)	76
na	32	11.37	(0.95)	-17.18	(0.58)	3	12.09	(1.59)	-17.57	(0.63)	35
	81					90					171

	Common dolphins					Striped dolphins					
Month	**n**	**$\delta^{15}N$ (sd)**		**$\delta^{13}C$ (sd)**		**n**	**$\delta^{15}N$ (sd)**		**$\delta^{13}C$ (sd)**		**TOTAL**
1	6	10.94	(0.53)	-17.59	(0.29)	6	11.34	(0.35)	-17.46	(0.42)	12
2	4	11.00	(0.24)	-17.43	(0.50)	11	11.57	(0.64)	-17.67	(0.27)	15
3	3	10.75	(0.31)	-17.51	(0.68)	4	11.67	(0.66)	-17.51	(0.24)	7
4						8	11.16	(0.48)	-17.75	(0.27)	8
5	2	11.69	(1.52)	-17.42	(1.31)	5	10.98	(0.43)	-17.79	(0.15)	7
6	4	12.11	(1.25)	-17.23	(0.39)	5	11.01	(0.27)	-17.80	(0.48)	9
7	10	11.72	(0.87)	-17.71	(0.49)	12	11.76	(1.23)	-17.59	(0.53)	22
8	12	11.69	(0.97)	-17.61	(0.67)	15	12.33	(1.24)	-17.28	(0.50)	27
9	5	11.48	(0.88)	-17.58	(0.48)	8	12.04	(1.12)	-17.45	(0.35)	13
10	2	12.11	(1.15)	-17.59	(0.21)	6	11.54	(1.15)	-17.72	(0.53)	8
11	5	11.16	(0.35)	-17.76	(0.19)	3	11.88	(0.47)	-17.53	(0.08)	8
12	2	11.14	(0.72)	-17.43	(0.70)	7	11.51	(0.81)	-17.48	(0.55)	9
na	26	11.44	(0.94)	-17.07	(0.51)						26
	81					90					171

	Common dolphins					Striped dolphins					
Year	**n**	**$\delta^{15}N$ (sd)**		**$\delta^{13}C$ (sd)**		**n**	**$\delta^{15}N$ (sd)**		**$\delta^{13}C$ (sd)**		**TOTAL**
2001	3	11.70	(0.40)	-16.70	(0.01)	0					3
2002	3	11.48	(0.74)	-17.05	(0.59)	1	10.80		-17.73		4
2003	14	11.07	(0.69)	-17.37	(0.61)	5	11.82	(1.19)	-17.69	(0.34)	19
2004	16	11.92	(1.30)	-17.30	(0.61)	3	12.04	(1.43)	-17.49	(0.74)	19
2005	3	11.86	(0.02)	-17.00	(0.30)	3	12.79	(1.04)	-17.11	(0.27)	6
2006	4	11.64	(0.72)	-16.95	(0.16)	2	11.90	(0.18)	-16.82	(0.08)	6
2007	3	11.47	(0.91)	-17.35	(0.41)	16	11.63	(0.92)	-17.50	(0.41)	19
2008	4	11.95	(0.89)	-17.59	(0.24)	23	11.64	(0.76)	-17.64	(0.36)	27
2009	4	10.83	(0.34)	-17.37	(0.56)	10	11.77	(1.15)	-17.43	(0.42)	14
2010	10	11.51	(1.02)	-17.46	(0.54)	15	11.28	(0.80)	-17.66	(0.42)	25
2011	12	11.24	(0.52)	-18.02	(0.32)	5	11.47	(1.35)	-17.77	(0.59)	17
2012	2	10.80	(0.29)	-17.63	(0.16)	4	12.11	(1.55)	-17.58	(0.66)	6
2013	0					3	11.45	(0.48)	-17.53	(0.28)	3
na	3	11.27	(0.37)	-17.51	(0.14)	0					3
	81					90					171

Table S2: Results of the GAM models for explaining striped and common dolphins stable isotope values. Explanatory variables, R^2, deviance explained and Akaike Information Criterion (AIC) value for each model are given. Significant variables in each model are highlighted in bold and final models chosen (smallest AIC value with all significant variables in the model) are highlighted in grey.

		R^2	Deviance	AIC
Stenella coeruleoalba	$\delta^{15}N$ ~ **s(LENGTH)** + MONTH + YEAR + **SEX**	0.750	83.10%	135.22
	$\delta^{15}N$ ~ **s(LENGTH)** + MONTH + **SEX**	0.750	80.20%	129.18
	$\delta^{15}N$ ~ **s(LENGTH)** + SEX	0.732	75.40%	126.64
	$\delta^{15}N$ ~ **s(LENGTH)**	0.724	74.40%	128.17
	$\delta^{13}C$ ~ **s(LENGTH)** + MONTH + **YEAR** + SEX	0.573	70.80%	46.73
	$\delta^{13}C$ ~ **s(LENGTH) + YEAR + SEX**	0.611	69.10%	32.82
	$\delta^{13}C$ ~ **s(LENGTH) + YEAR**	0.593	67.40%	36.22
	$\delta^{13}C$ ~ **s(LENGTH)**	0.459	49.40%	51.05
Delphinus delphis	$\delta^{15}N$ ~ **s(LENGTH)** + MONTH + YEAR + SEX	0.382	67.70%	106.44
	$\delta^{15}N$ ~ **s(LENGTH)** + YEAR + SEX	0.558	68.90%	88.84
	$\delta^{15}N$ ~ **s(LENGTH)** + SEX	0.44	47.70%	92.00
	$\delta^{15}N$ ~ **s(LENGTH)**	0.422	44.70%	92.39
	$\delta^{13}C$ ~ s(LENGTH) + MONTH + **YEAR** + SEX	0.299	63.40%	62.39
	$\delta^{13}C$ ~ s(LENGTH) + **YEAR** + SEX	0.408	56.20%	51.29
	$\delta^{13}C$ ~ s(LENGTH) + **YEAR**	0.428	56.40%	49.17
	$\delta^{13}C$ ~ s(LENGTH)	0.004	2.67%	67.02

Table S3: Isotopic niche metrics for striped and common dolphins. The subscript boot signifies that the value (mean) has been obtained through bootstrapping. Dde = *Delphinus delphis*; Sco = *Stenella coeruleoalba*.

	Striped dolphin	Common dolphin	Probability
SEA_c	0.48	0.78	
SEA_B	0.61	1.05	98.41% Dde > Sco
$\delta^{15}N$ range	2.30	2.08	
$\delta^{15}N$ $range_{boot}$	1.99	1.47	80.50% Sco > Dde
$\delta^{13}C$ range	1.65	1.59	
$d^{13}C$ $range_{boot}$	1.42	1.32	62.88% Sco > Dde
TA	2.42	2.39	
TA_{boot}	1.54	1.07	79.36% Sco > Dde
CD	0.52	0.58	
CD_{boot}	0.51	0.55	61.30% Dde > Sco
MNND	0.11	0.26	
$MNND_{boot}$	0.11	0.24	91.52% Dde > Sco
SDNND	0.10	0.29	
$SDNND_{boot}$	0.14	0.28	91.19% Dde > Sco