

The following supplement accompanies the article

Multi-isotopic assessments of spatio-temporal diet variability: the case of two sympatric gulls in the western Mediterranean

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Supplementary material

Figure S1: three dimensional plots of $\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and $\delta^{34}\text{S}$ representing the isotopic variability among individuals from every group (i.e., colony by year). Plots are represented for each species separately (at the same scales) to better represent the isotopic segregation between the two gull species. Coloured ellipsoids represent the three-dimensional standard ellipsoids for every group. Perspective of the plots can be moved by clicking and dragging and zooming in and out is possible using the mouse wheel. The figure is accessible at http://www.int-res.com/articles/suppl/m606p201_suppl/

Table S1: comparison of posterior estimates of $\delta^{13}\text{C}$ values between all groups. Values between 0.3 and 0.7 are considered as “low probability of differing”; between 0 and 0.3, as high probability of the group listed in the column having larger $\delta^{13}\text{C}$ than the group listed in the row, and between 0.7 and 1, as “high probability of the group stated in the row having higher $\delta^{13}\text{C}$ than that of the group stated in the column.

Species	Colony	Year	Yellow-legged gull										Audouin's gull									
			Columbretes			Delta			Dragonera		Medes			Zembra	Alborán			Delta			Zembra	
			2009	2010	2011	2009	2010	2011	2010	2011	2009	2010	2011	2009	2009	2010	2011	2009	2010	2011	2009	
Yellow-legged gull	Columbretes	2009	-	1	0.83	1	1	1	1	1	0.99	1	1	0	0	0.01	0	0	0.20	0.07	0	
		2010	0	-	0	0.61	1	0.97	1	1	0.49	1	1	0	0	0	0	0	0	0	0	0
		2011	0.17	1	-	1	1	1	1	1	0.98	1	1	0	0	0	0	0	0.03	0	0	0
	Ebro Delta	2009	0	0.39	0	-	1	0.90	1	1	0.41	1	1	0	0	0	0	0	0	0	0	0
		2010	0	0	0	0	-	0.02	1	0.94	0	1	0.92	0	0	0	0	0	0	0	0	0
		2011	0	0.03	0	0.10	0.98	-	1	1	0.08	1	1	0	0	0	0	0	0	0	0	0
	Dragonera	2010	0	0	0	0	0	0	-	0.01	0	0.19	0	0	0	0	0	0	0	0	0	0
		2011	0	0	0	0	0.06	0	0.99	-	0	1	0.33	0	0	0	0	0	0	0	0	0
	Medes	2009	0.01	0.51	0.02	0.59	1	0.92	1	1	-	1	1	0	0	0	0	0	0	0	0	0
		2010	0	0	0	0	0	0	0.81	0	0	-	0	0	0	0	0	0	0	0	0	0
		2011	0	0	0	0	0.08	0	1	0.67	0	1	-	0	0	0	0	0	0	0	0	0
	Zembra	2009	1	1	1	1	1	1	1	1	1	1	1	-	0	0.18	0	0.02	1	0.99	0.07	
L. audouinii	Alborán	2009	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1	1	1	1	
		2010	0.99	1	1	1	1	1	1	1	1	1	1	0.82	0.00	-	0.08	0.49	0.98	0.97	0.54	
		2011	1	1	1	1	1	1	1	1	1	1	1	1	0	0.92	-	1	1	1	1	
	Ebro Delta	2009	1	1	1	1	1	1	1	1	1	1	1	0.98	0	0.51	0	-	1	1	0.59	
		2010	0.80	1	0.97	1	1	1	1	1	1	1	1	0	0	0.02	0	0	-	0.26	0	
		2011	0.93	1	1	1	1	1	1	1	1	1	1	0.01	0	0.03	0	0	0.74	-	0	
	Zembra	2009	1	1	1	1	1	1	1	1	1	1	1	0.93	0	0.46	0	0.41	1	1	-	

Table S2: comparison of posterior estimates of $\delta^{15}\text{N}$ values between all groups. Values between 0.3 and 0.7 are considered as “low probability of differing”; between 0 and 0.3, as high probability of the group listed in the column having larger $\delta^{15}\text{N}$ than the group listed in the row, and between 0.7 and 1, as “high probability of the group stated in the row having higher $\delta^{15}\text{N}$ than that of the group stated in the column.

Species	Colony	Year	Yellow-legged gull									Audouin's gull											
			Columbretes			Delta			Dragonera		Medes			Zembra	Alborán			Delta			Zembra		
			2009	2010	2011	2009	2010	2011	2010	2011	2009	2010	2011	2009	2009	2010	2011	2009	2010	2011	2009		
Yellow-legged gull	Columbretes	2009	-	1	0.82	0	0.61	0.01	1	1	1	1	1	1	0	0	0	0	0	0	0	0.07	
		2010	0	-	0	0	0	0	1	1	1	1	1	0.58	0	0	0	0	0	0	0	0	0
		2011	0.18	1	-	0	0.18	0	1	1	1	1	1	0.99	0	0	0	0	0	0	0	0	0.02
	Ebro Delta	2009	1	1	1	-	1	0.74	1	1	1	1	1	1	0	0	0	0	0.01	0.00		0.65	
		2010	0.39	1	0.82	0	-	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.04
		2011	0.99	1	1	0.26	1	-	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.49
	Dragonera	2010	0	0	0	0	0	0	-	0.28	0.28	0.09	0.62	0	0	0	0	0	0	0	0	0	0
		2011	0	0	0	0	0	0	0.72	-	0.48	0.28	0.85	0	0	0	0	0	0	0	0	0	0
	Medes	2009	0	0	0	0	0	0	0.72	0.52	-	0.33	0.83	0.01	0	0	0	0	0	0	0	0	0
2010		0	0	0	0	0	0	0.91	0.72	0.67	-	0.99	0	0	0	0	0	0	0	0	0	0	
2011		0	0	0	0	0	0	0.38	0.15	0.17	0.01	-	0	0	0	0	0	0	0	0	0	0	
Zembra	2009	0	0.42	0.01	0	0	0	1	1	0.99	1	1	-	0	0	0	0	0	0	0	0	0	
<i>L. audouinii</i>	Alborán	2009	1	1	1	1	1	1	1	1	1	1	1	-	0.05	0.02	0.99	1	1		1		
		2010	1	1	1	1	1	1	1	1	1	1	1	1	0.95	-	0.38	1	1	1		1	
		2011	1	1	1	1	1	1	1	1	1	1	1	1	0.98	0.62	-	1	1	1		1	
	Ebro Delta	2009	1	1	1	1	1	1	1	1	1	1	1	1	0.01	0	0	-	0.99	0.72		1	
		2010	1	1	1	0.99	1	1	1	1	1	1	1	1	0	0	0	0.01	-	0.01		0.96	
		2011	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0.28	0.99	-		1	
	Zembra	2009	0.93	1	0.98	0.35	0.96	0.51	1	1	1	1	1	1	0	0	0	0	0.04	0		-	

Table S3: comparison of posterior estimates of $\delta^{34}\text{S}$ values between all groups. Values between 0.3 and 0.7 are considered as “low probability of differing”; between 0 and 0.3, as high probability of the group listed in the column having larger $\delta^{34}\text{S}$ than the group listed in the row, and between 0.7 and 1, as “high probability of the group stated in the row having higher $\delta^{34}\text{S}$ than that of the group stated in the column.

Species	Colony	Year	Yellow-legged gull									Audouin's gull												
			Columbretes			Delta			Dragonera		Medes			Zembra	Alborán			Delta			Zembra			
			2009	2010	2011	2009	2010	2011	2010	2011	2009	2010	2011	2009	2009	2010	2011	2009	2010	2011	2009			
Yellow-legged gull	Columbretes	2009	-	0	0.99	0.96	1	0.96	1	1	1	1	1	1	1	1	0.26	0	0	0	0	0.01	0.90	0
		2010	1	-	1	1	1	1	1	1	1	1	1	0.97	0	0	0	0.26	0.51	1	0	0	0	0
		2011	0.01	0	-	0.53	0.97	0.24	0.95	1	1	1	1	0.01	0	0	0	0	0	0.31	0	0	0	0
	Ebro Delta	2009	0.04	0	0.47	-	0.92	0.28	0.92	1	1	1	1	0.02	0	0	0	0	0	0.32	0	0	0.32	0
		2010	0	0	0.03	0.08	-	0.01	0.60	1	1	1	1	0	0	0	0	0	0	0.03	0	0	0.03	0
		2011	0.04	0	0.76	0.72	0.99	-	0.98	1	1	1	1	0.02	0	0	0	0	0	0.50	0	0	0.50	0
	Dragonera	2010	0	0	0.05	0.08	0.40	0.02	-	1	1	1	1	0	0	0	0	0	0	0.03	0	0	0.03	0
		2011	0	0	0	0	0	0	0	-	0	0.95	0.88	0	0	0	0	0	0	0	0	0	0	0
	Medes	2009	0	0	0	0	0	0	0	1	-	1	1	0	0	0	0	0	0	0	0	0	0	0
		2010	0	0	0	0	0	0	0	0.05	0	-	0.32	0	0	0	0	0	0	0	0	0	0	0
2011		0	0	0	0	0	0	0	0.12	0	0.68	-	0	0	0	0	0	0	0	0	0	0	0	
Zembra	2009	0.74	0.03	0.99	0.98	1	0.98	1	1	1	1	1	-	0	0	0	0.02	0.06	0.94	0	0.02	0.06	0.94	0
L. audouinii	Alborán	2009	1	1	1	1	1	1	1	1	1	1	1	1	-	0.89	0.90	0.99	1	1	0.99	1	1	0.32
		2010	1	1	1	1	1	1	1	1	1	1	1	1	0.11	-	0.47	0.96	0.99	1	0.96	0.99	1	0.07
		2011	1	1	1	1	1	1	1	1	1	1	1	1	0.10	0.53	-	0.97	0.99	1	0.97	0.99	1	0.07
	Ebro Delta	2009	1	0.74	1	1	1	1	1	1	1	1	1	0.98	0.01	0.04	0.03	-	0.71	1	0	0.71	1	0
		2010	0.99	0.49	1	1	1	1.00	1	1	1	1	1	0.94	0	0.01	0.01	0.29	-	1	0	0.29	-	1
		2011	0.10	0	0.69	0.68	0.97	0.50	0.97	1	1	1	1	0.06	0	0	0	0	0	-	0	0	-	0
	Zembra	2009	1	1	1	1	1	1	1	1	1	1	1	1	0.68	0.93	0.93	1	1	1	1	1	1	-

Table S4: pairwise comparisons of posterior estimates of centroid locations. The value represents the probability of the centroid locations (CL) of both groups being different. Values between 0.3 and 0.7 are considered as “low probability of differing”; between 0 and 0.3, and 0.7 and 1, as “high probability of differing”

Species	Colony	Year	Yellow-legged gull										Audouin's gull								
			Columbretes			Ebro Delta			Dragonera		Medes			Zembra	Alborán			Ebro Delta			Zembra
			2009	2010	2011	2009	2010	2011	2010	2011	2009	2010	2011	2009	2009	2010	2011	2009	2010	2011	2009
Yellow-legged gull	Columbretes	2009	-																		
		2010	0.98	-																	
		2011	0.69	1.00	-																
	Ebro Delta	2009	0.80	0.99	0.76	-															
		2010	0.98	1.00	0.93	0.71	-														
		2011	0.93	1.00	0.94	0.20	0.80	-													
	Dragonera	2010	1.00	0.99	0.99	0.99	0.94	0.99	-												
		2011	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-											
	Medes	2009	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	-										
		2010	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.62	1.00	-									
		2011	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.35	0.98	0.64	-								
	Zembra	2009	0.85	0.99	0.97	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-							
Audouin's gull	Alborán	2009	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-						
		2010	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86	-					
		2011	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.46	-				
	Ebro Delta	2009	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.54	0.92	-			
		2010	0.93	1.00	1.00	0.93	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.90	1.00	0.83	-		
		2011	0.96	1.00	0.99	0.79	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	0.93	0.83	-	
	Zembra	2009	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.99	0.89	0.98	0.83	0.92	1.00	-	

Table S5: pairwise comparisons of posterior estimates of Standard Ellipsoid Volume (SEV). The value represents the probability of the SEV of both groups being different. Values between 0.3 and 0.7 are considered as “low probability of differing”; between 0 and 0.3, as high probability of the group listed in the column having larger SEV than the group listed in the row, and between 0.7 and 1, as “high probability of the group stated in the row is higher than that of the group stated in the column.”

Species	Colony	Year	Yellow-legged gull											Audouin's gull							
			Columbretes			Ebro Delta			Dragonera		Medes			Zembra	Alborán			Ebro Delta			Zembra
			2009	2010	2011	2009	2010	2011	2010	2011	2009	2010	2011	2009	2009	2010	2011	2009	2010	2011	2009
Yellow-legged gull	Columbretes	2009	-	0.57	0.56	0.06	0.01	0.31	0	0	0.01	0	0	0.08	0.78	0	0.92	0.04	0	0	0.17
		2010	0.43	-	0.49	0.03	0	0.23	0	0	0	0	0	0.04	0.76	0	0.91	0.02	0	0	0.13
		2011	0.44	0.51	-	0.02	0	0.21	0	0	0	0	0	0.03	0.79	0	0.93	0.01	0	0	0.11
	Ebro Delta	2009	0.94	0.97	0.98	-	0.24	0.9	0	0.04	0.22	0.11	0.01	0.61	1	0.15	1	0.46	0.1	0.01	0.69
		2010	0.99	1	1	0.76	-	0.99	0	0.1	0.44	0.28	0.02	0.86	1	0.35	1	0.74	0.25	0.01	0.87
		2011	0.69	0.77	0.79	0.1	0.01	-	0	0	0.02	0	0	0.15	0.93	0.01	0.98	0.08	0	0	0.29
	Dragonera	2010	1	1	1	1	1	1	-	0.96	0.99	1	0.93	1	1	0.99	1	1	0.99	0.88	1
		2011	1	1	1	0.96	0.9	1	0.04	-	0.81	0.79	0.26	0.99	1	0.77	1	0.95	0.72	0.19	0.98
	Medes	2009	0.99	1	1	0.78	0.56	0.98	0.01	0.19	-	0.38	0.08	0.86	1	0.43	1	0.77	0.34	0.06	0.88
		2010	1	1	1	0.89	0.72	1	0	0.21	0.62	-	0.05	0.95	1	0.54	1	0.88	0.43	0.03	0.94
		2011	1	1	1	0.99	0.98	1	0.07	0.74	0.92	0.95	-	1	1	0.91	1	0.99	0.9	0.35	0.99
	Zembra	2009	0.92	0.96	0.97	0.39	0.14	0.85	0	0.01	0.14	0.05	0	-	0.99	0.09	1	0.35	0.04	0	0.6
Audouin's gull	Alborán	2009	0.22	0.24	0.21	0	0	0.07	0	0	0	0	0	0.01	-	0	0.78	0	0	0	0.04
		2010	1	1	1	0.85	0.65	0.99	0.01	0.23	0.57	0.46	0.09	0.91	1	-	1	0.82	0.41	0.07	0.91
		2011	0.08	0.09	0.07	0	0	0.02	0	0	0	0	0	0	0.22	0	-	0	0	0	0.01
	Ebro Delta	2009	0.96	0.98	0.99	0.54	0.26	0.92	0	0.05	0.23	0.12	0.01	0.65	1	0.18	1	-	0.11	0.01	0.72
		2010	1	1	1	0.9	0.75	1	0.01	0.28	0.66	0.57	0.1	0.96	1	0.59	1	0.89	-	0.07	0.94
		2011	1	1	1	0.99	0.99	1	0.12	0.81	0.94	0.97	0.65	1	1	0.93	1	0.99	0.93	-	0.99
	Zembra	2009	0.83	0.87	0.89	0.31	0.13	0.71	0	0.02	0.12	0.06	0.01	0.4	0.96	0.09	0.99	0.28	0.06	0.01	-