Supplemental Material

Table S1. Isotopic niche metrics generated from carbon and nitrogen stable isotope values of blue sharks (*Prionace glauca*). Standard ellipse (SEA) areas (‰^{2}) are derived from Northern California Current, Southern California Bight, Southern Baja, Eastern Tropical Pacific, and West Pacific Ocean (WPO). SEA estimates represent maximum likelihood (SEA) and Bayesian (SEA_B; [75% Cis]) derived estimates based on 40% of the data.

	Northern California Current	Southern California Bight	Southern Baja	Eastern Tropical Pacific	WPO
SEA	0.63	1.1	1.22	1.78	1.23
SEA_B	0.63 (0.61–0.64)	1.1 (1.07 – 1.12)	1.22 (1.19 – 1.24)	1.78 (1.74 – 1.81)	1.23 (1.20 – 1.25)

Table S2. Reliance of EPO blue shark populations on regional prey groups as inferred from Bayesian isotope mixing models. Results are median estimates (95% credible intervals [CIs]) derived from the posterior distributions of dual ($\delta^{13}C$ and $\delta^{15}N$) and single ($\delta^{15}N$) isotope models. For dual isotope models, the percentage of individuals with >95% probability of falling outside of the simulated prey mixing space is shown.

		Probable Contribution (%)					
Isotopes	Population	NCC	SCB	SBaja	ETP	WPO	Outside prey space (%)
$\delta^{13}C$, $\delta^{15}N$	SCB	5 (1 – 10)	74 (70 – 78)	1 (0 – 1)	8 (5 – 12)	12 (6 – 17)	32.2
	NCC	2 (0 – 5)	66 (62 – 70)	0 (0 – 1)	16 (12 – 20)	15 (8 – 22)	22.0
	ETP	0 (0 – 2)	98 (96 – 99)	0 (0 – 1)	1 (0 – 2)	1 (0 – 2)	8.5
	Sbaja	0 (0 – 1)	100 (99 – 100)	0 (0 – 1)	0 (0 – 0)	0 (0 – 0)	17.8
	All	0 (0 – 1)	92 (95 – 95)	0 (0 – 0)	2 (0 – 5)	6 (1 – 8)	20.8
$\delta^{15}N$	SCB	16 (8 – 24)	58 (49 – 67)	6 (2 – 10)	10 (6 – 14)	10 (4 – 18)	-
	NCC	13 (3 – 25)	49 (38 – 61)	6 (1 – 11)	18 (11 – 24)	14 (4 – 24)	-
	ETP	13 (1 – 51)	53 (23 – 88)	22 (2 – 33)	4 (1 – 7)	4 (1 – 11)	-
	Sbaja	1 (0 – 3)	72 (69 – 75)	27 (24 – 29)	0 (0 – 0)	0 (0 - 1)	-
	All	24 (3 – 62)	40 (16 – 77)	20 (2 – 33)	5 (1 – 12)	6 (1 – 15)	-

Table S3. Reliance of WPO blue shark populations on regional prey groups as inferred from Bayesian isotope mixing models. Results are median estimates (95% credible intervals [CIs]) derived from the posterior distributions of dual ($\delta^{13}C$ and $\delta^{15}N$) and single ($\delta^{15}N$) isotope models. For dual isotope models the percentage of individuals that had a >95% probability of falling outside of the simulated prey mixing space is indicated.

Mixing model	Probable Contribution				
	East Japan	Kuroshio-Oyashio	Sea of Japan	Taiwan	Outside mixing space (%)
$\delta^{13}C$, $\delta^{15}N$	0.01 (0.00 – 0.02)	0.65 (0.61 – 0.69)	0.00 (0.00 – 0.01)	0.34 (0.30 – 0.38)	54.5
$\delta^{15}N$	0.106 (0.02 – 0.23)	0.19 (0.06 – 0.36)	0.13 (0.03 – 0.27)	0.56 (0.52 – 0.59)	-

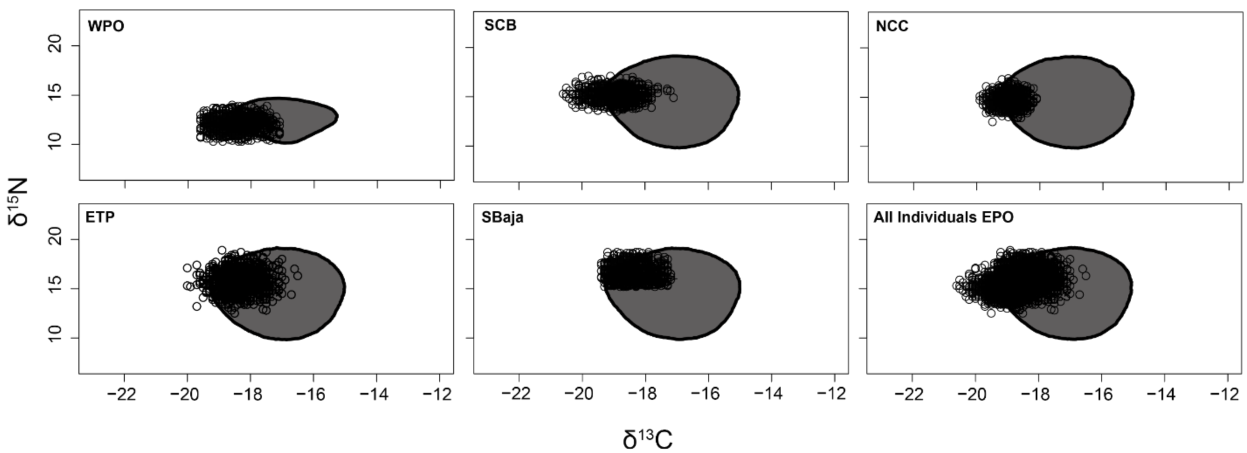

Figure S1. Comparisons of blue shark (*Prionace glauca*) $\delta^{13}C$ and $\delta^{15}N$ values to regional prey. Prey fields (filled grey forms) were generated by simulating 10,000 polygons using prey $\delta^{13}C$ and $\delta^{15}N$ values, following Smith et al. (2013). All prey values are adjusted by the addition of calculated diet-based DTDFs to allow quantification of overlap with blue shark $\delta^{13}C$ and $\delta^{15}N$ values (black circles). Proportion of blue shark values falling outside prey polygons, mostly due to low shark $\delta^{13}C$ values, were 55% in the WPO (upper left panel) and 9-32% in regions of the EPO (other panels). These data highlight the importance of quantitatively assessing prey/predator isotope dynamics to ensure accurate interpretation of mixing models results and/or to determine (and report) the level of potential bias.

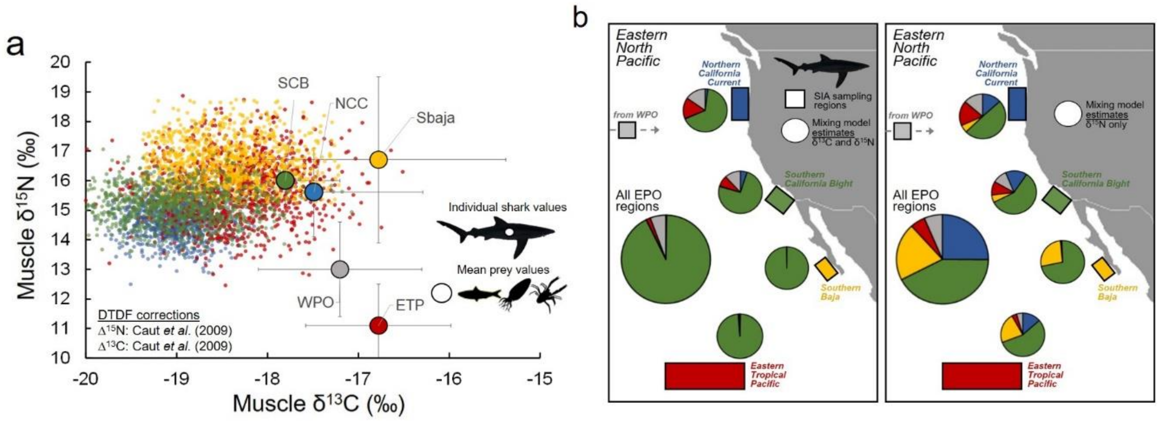

Figure S2. Isotopic overlap of regional blue shark (*Prionace glauca*) data with regional prey, and exploratory mixing model estimates of regional prey contributions, in sub-regions of the eastern Pacific Ocean. (a) Bootstrapped blue shark $\delta^{13}C$ and $\delta^{15}N$ values (small circles, colored by EPO sampling sub-region) and regional prey means (large circles; error bars ± SD), from the western (WPO) and eastern (EPO) Pacific Ocean. Mean prey $\delta^{13}C$ and $\delta^{15}N$ values are adjusted by the addition of calculated diet-dependent diet-tissue discrimination factors (DTDFs; Caut et al. 2009). After prey mean adjustment for DTDF, most blue shark $\delta^{13}C$ values were left-shifted (lower $\delta^{13}C$) relative to prey $\delta^{13}C$ values. **(b)** Estimated regional prey inputs to EPO blue shark diet from Bayesian mixing models. Left panel shows results from the dual isotope model ($\delta^{13}C$ and $\delta^{15}N$), which were biased towards the regional prey with lowest $\delta^{13}C$ values, and right panel the single isotope ($\delta^{15}N$) model.

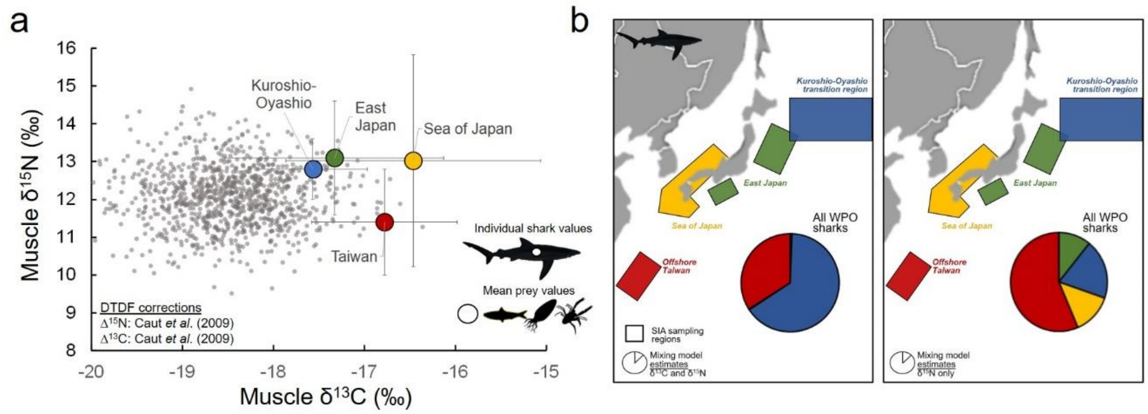

Figure S3. Isotopic overlap of blue shark (*Prionace glauca*) data with regional prey, and exploratory mixing model estimates of regional prey contributions, in the western Pacific Ocean. (a) Bootstrapped blue shark $\delta^{15}N$ values (small grey circles) and regional prey means (large circles, colored by WPO sub-region) from the western Pacific Ocean (WPO). Mean prey $\delta^{13}C$ and $\delta^{15}N$ values are adjusted by the addition of calculated diet-dependent diet-tissue discrimination factors (DTDFs; Caut et al. 2009). After prey mean adjustment for DTDF, most blue shark $\delta^{13}C$ values were left-shifted (lower $\delta^{13}C$) from expected prey-based values. **(b)** Estimated regional prey inputs to WPO blue shark diet from Bayesian mixing models. Left panel shows results from two isotope model ($\delta^{13}C$ and $\delta^{15}N$), which were biased towards the regional prey with lowest $\delta^{13}C$ values, and right panel shows a single isotope ($\delta^{15}N$) model.