Text S1

In order to ensure that differences among periods in isotopic values were not due to changes in the sizes of either species, we tested for a relationship between individual size (SCL for green turtles and standard length for pinfish) and isotopic values. Additionally, we tested for differences among periods in the size of individuals used in our analyses. For green turtles, all individuals had size data and were included in these analyses. For pinfish, a total of 96 individuals were used in the analysis, as 14 individuals from period 2 and three individuals from period 3 did not have size data available and could not be included in the analysis. To test for differences among periods in the sizes of individuals, we used a Bayesian linear model. To test for a relationship between size and isotopic values, we used a Bayesian multivariate, non-linear distributional regression model with size as the predictor for mean and variance of isotopic values.

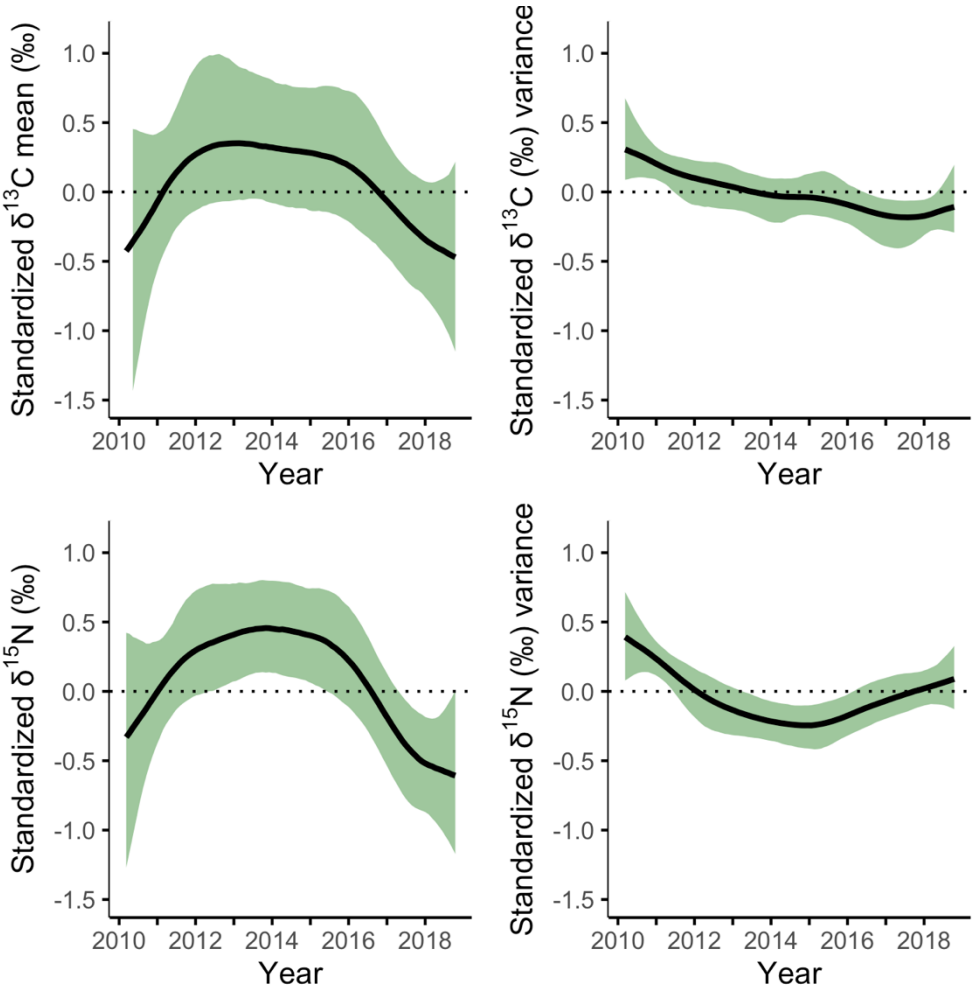

Fig. S1. Results of the continuous-time Bayesian multivariate distributional regression model of central Indian River Lagoon, Florida green turtle stable isotopic values. Response values are standardized, green intervals represent 95% credibility intervals. Dotted line at 0 represents the mean value of the response over the course of the study. Mean values of both elements showed little change over the study period. Carbon variance declined slowly through the study period and nitrogen variance declined and recovered.

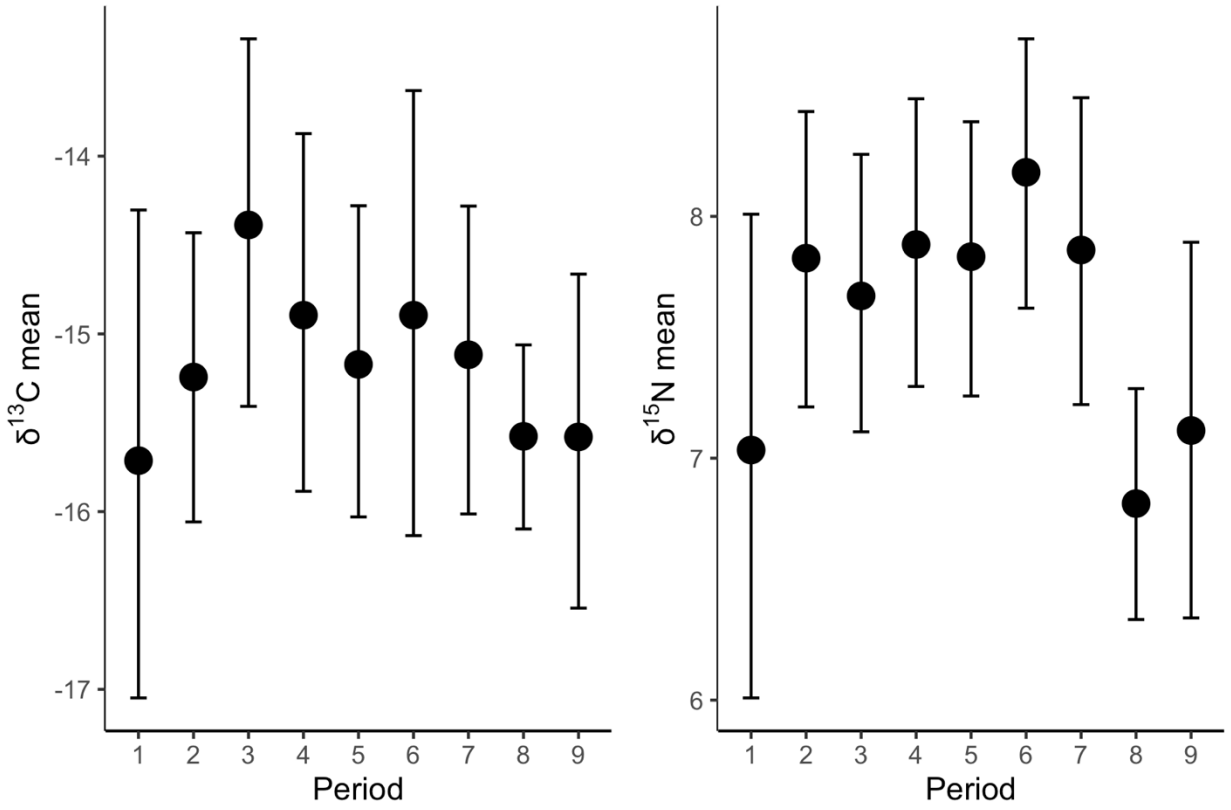

Fig. S2. Mean isotopic value estimates by period for Indian River Lagoon, Florida green turtles as estimated by the Bayesian linear model with discrete time periods. Error bars represent 95% credibility intervals of the models estimate of the mean. Mean values of both elements showed mostly small change over the study period, although these changes occurred fastest in periods 1–3.

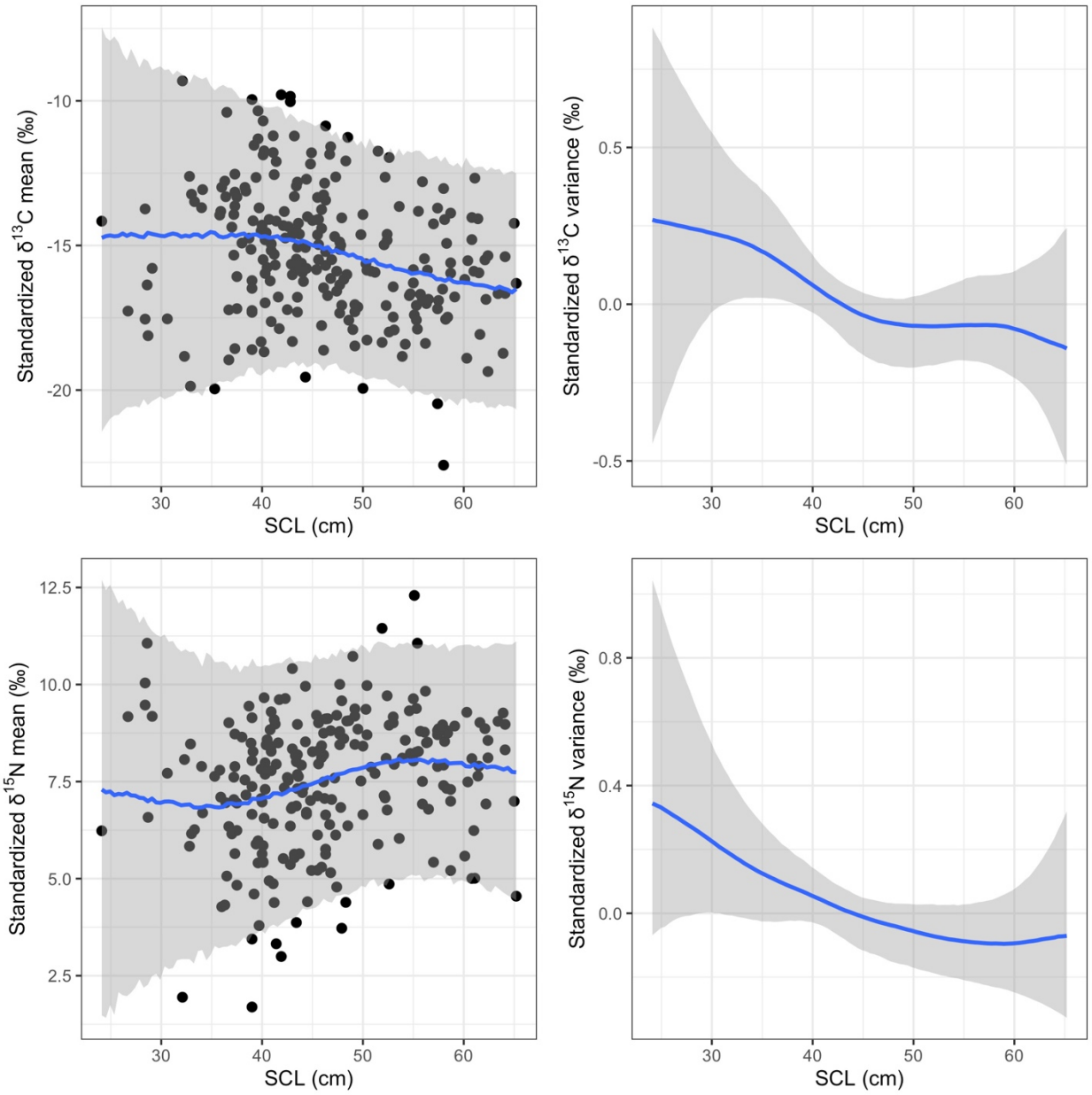

Fig. S3. Trends in green turtle carbon and nitrogen isotopic values and isotopic variance with size. For the variance figures, if the credibility interval for the smooth includes zero, the variance is not estimated to be different from the mean value across all lengths.

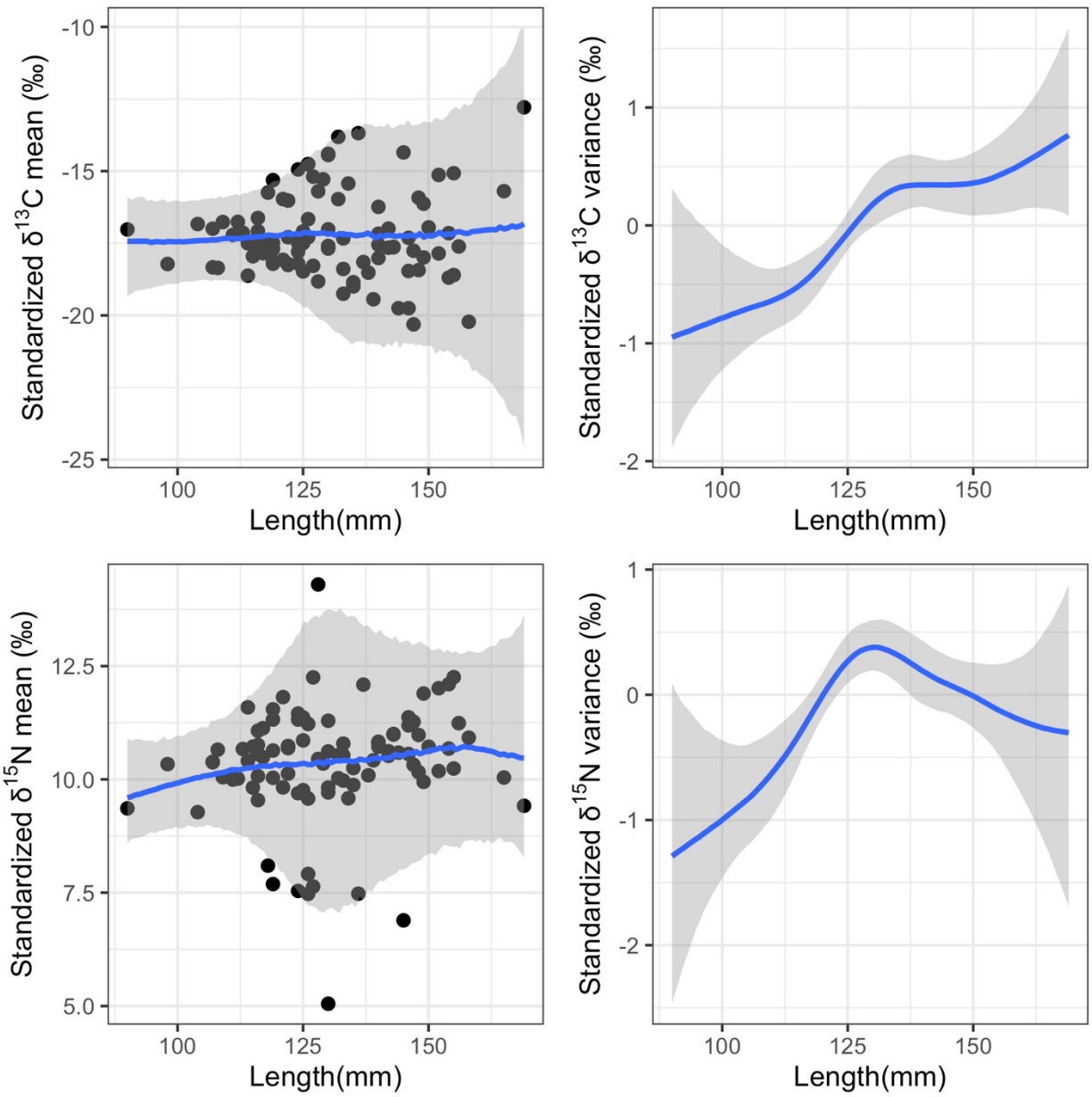

Fig. S4. Trends in pinfish carbon and nitrogen isotopic values and isotopic variance with size. For the variance figures, if the credibility interval for the smooth includes zero, the variance is not estimated to be different from the mean value across all lengths.

Table S1. Coefficient estimates and credibility intervals for the comparative model of Indian River Lagoon green turtle and pinfish stable isotopic values. Breakdown of sampling periods can be found in Figure 1(b). Variance coefficients begin with "sigma" and are log-transformed.

	Estimate	Est.Error	L-95% CI	U-95% CI
$\delta^{13}C$_Intercept	-15.44	0.34	-16.09	-14.78
sigma_$\delta^{13}C$_Intercept	1	0.08	0.84	1.17
$\delta^{15}N$_Intercept	7.5	0.26	7.01	8.02
sigma_$\delta^{15}N$_Intercept	0.73	0.08	0.57	0.9
$\delta^{13}C$ _Period2	1.05	0.59	-0.13	2.23
$\delta^{13}C$ _Period3	0.54	0.56	-0.57	1.66
$\delta^{13}C$ _Period4	0.26	0.56	-0.83	1.38
$\delta^{13}C$ _Pinfish	-1.51	0.43	-2.38	-0.69
$\delta^{13}C$ _Period2:Pinfish	-1.33	0.7	-2.7	0.05
$\delta^{13}C$ _Period3:Pinfish	-0.4	0.71	-1.82	1
$\delta^{13}C$ _Period4:Pinfish	-1.31	0.69	-2.64	0.06
sigma_$\delta^{13}C$ _Period2	-0.27	0.17	-0.59	0.09
sigma_$\delta^{13}C$ _Period3	-0.21	0.16	-0.52	0.13
sigma_$\delta^{13}C$ _Period4	-0.28	0.15	-0.56	0.03
sigma_$\delta^{13}C$ _Pinfish	-0.65	0.15	-0.93	-0.35
sigma_$\delta^{13}C$ _Period2:Pinfish	0.43	0.23	-0.03	0.87
sigma_$\delta^{13}C$ _Period3:Pinfish	0.32	0.24	-0.16	0.8
sigma_$\delta^{13}C$ _Period4:Pinfish	0.26	0.25	-0.24	0.75
$\delta^{15}N$ _Period2	0.18	0.38	-0.57	0.91
$\delta^{15}N$ _Period3	0.39	0.38	-0.36	1.14
$\delta^{15}N$ _Period4	0.34	0.38	-0.4	1.09
$\delta^{15}N$ _Pinfish	3.14	0.32	2.54	3.75
$\delta^{15}N$ _Period2:Pinfish	-0.71	0.43	-1.56	0.15
$\delta^{15}N$ _Period3:Pinfish	-1.48	0.57	-2.57	-0.35

$\delta^{15}N$ _Period4:Pinfish	-0.1	0.47	-1.04	0.8
sigma_$\delta^{15}N$ _Period2	-0.59	0.18	-0.91	-0.21
sigma_$\delta^{15}N$ _Period3	-0.43	0.16	-0.73	-0.12
sigma_$\delta^{15}N$ _Period4	-0.46	0.16	-0.75	-0.13
sigma_$\delta^{15}N$ _Pinfish	-0.74	0.15	-1.02	-0.44
sigma_$\delta^{15}N$ _Period2:Pinfish	0.31	0.24	-0.19	0.77
sigma_$\delta^{15}N$ _Period3:Pinfish	0.99	0.24	0.52	1.47
sigma_$\delta^{15}N$ _Period4:Pinfish	0.36	0.25	-0.15	0.85

Table S2. Coefficient estimates and credibility intervals for the Indian River Lagoon, Florida green turtle-only model of stable isotopic values. Breakdown of sampling periods can be found in Figure 1(b). Variance coefficients begin with "sigma" and are log-transformed.

	Estimate	Est.Error	l-95% CI	u-95% CI
$\delta^{13}C$ _Intercept	-15.7	0.67	-17.01	-14.35
sigma_$\delta^{13}C$ _Intercept	1.22	0.13	0.99	1.49
$\delta^{15}N$ _Intercept	7.01	0.5	5.96	7.99
sigma_$\delta^{15}N$ _Intercept	0.93	0.13	0.69	1.21
Period 2	0.46	0.78	-1.04	1.97
Period 3	1.31	0.85	-0.41	2.94
Period 4	0.82	0.84	-0.88	2.39
Period 5	0.54	0.81	-1.11	2.16
Period 6	0.8	0.91	-1.01	2.6
Period 7	0.59	0.79	-0.94	2.12
Period 8	0.13	0.72	-1.28	1.51
Period 9	0.12	0.83	-1.57	1.71
sigma_$\delta^{13}C$ _Period2	-0.33	0.16	-0.66	-0.02
sigma_$\delta^{13}C$ _Period3	-0.46	0.19	-0.84	-0.07
sigma_$\delta^{13}C$ _Period4	-0.33	0.19	-0.69	0.04
sigma_$\delta^{13}C$ _Period5	-0.46	0.19	-0.82	-0.09
sigma_$\delta^{13}C$ _Period6	-0.33	0.21	-0.72	0.08
sigma_$\delta^{13}C$ _Period7	-0.5	0.18	-0.86	-0.14
sigma_$\delta^{13}C$ _Period8	-0.71	0.16	-1.02	-0.4
sigma_$\delta^{13}C$ _Period9	-0.38	0.18	-0.73	-0.03
Period 2	0.81	0.59	-0.33	2.02
Period 3	0.66	0.57	-0.48	1.82
Period 4	0.87	0.58	-0.24	2.07
Period 5	0.81	0.58	-0.34	2.01
Period 6	1.17	0.57	0.01	2.33
Period 7	0.84	0.6	-0.31	2.06
Period 8	-0.21	0.55	-1.29	0.92
Period 9	0.1	0.64	-1.12	1.4
sigma_$\delta^{15}N$ _Period2	-0.3	0.16	-0.63	0.01
sigma_$\delta^{15}N$ _Period3	-0.75	0.19	-1.13	-0.36
sigma_$\delta^{15}N$ _Period4	-0.53	0.19	-0.9	-0.14
sigma_$\delta^{15}N$ _Period5	-0.61	0.18	-0.97	-0.24
sigma_$\delta^{15}N$ _Period6	-0.82	0.21	-1.22	-0.41
sigma_$\delta^{15}N$ _Period7	-0.51	0.18	-0.88	-0.16
sigma_$\delta^{15}N$ _Period8	-0.49	0.16	-0.81	-0.2
sigma_$\delta^{15}N$ _Period9	-0.28	0.18	-0.63	0.07

Table S3. Bayesian model-estimated mean sizes and 95% credibility intervals of green turtles and pinfish by period, with periods listed as defined in the green turtle-only model (refer to Figure 1 in main text for dates). Note that 17 pinfish we used for stable isotope analyses did not have length measurements available.

Period	Turtle estimated mean SCL (cm)	Turtle lower 95% CI (cm)	Turtle upper 95% CI (cm)	Green turtle length sample size	Pinfish estimated mean length (mm)	Pinfish lower 95% CI (mm)	Pinfish upper 95% CI (mm)	Pinfish length sample size
1	43.65	40.22	47.08	27				
2	44.32	39.93	48.66	38	126.17	121.11	131.41	30
3	44.54	39.38	49.84	18	123.72	115.82	131.83	24
4	44.58	39.87	49.42	25	136.88	128.61	145.12	20
5	48.06	43.16	52.92	23	137.7	129.88	145.95	22
6	49.11	43.75	54.53	16				
7	48.1	43.29	52.81	23				
8	47.29	43.11	51.56	43				
9	48.24	43.58	52.91	25				

Table S4. Coefficient estimates and credibility intervals for the Bayesian multivariate distributional regression model testing the relationship between green turtle straight carapace length (SCL) and stable isotopic values and their variances.

Smooth Terms				
	Estimate	Est.Error	l-95% CI	u-95% CI
sds(δ13C _sSCL_1)	2.08	1.53	0.1	5.83
sds(sigma_δ13C _sSCL_1)	0.92	0.77	0.04	2.86
sds(δ15N_sSCL_1)	2.6	1.6	0.25	6.36
sds(sigma_δ15N_sSCL_1)	0.71	0.68	0.02	2.49
Population-Level Effects				
	Estimate	Est.Error	l-95%	CI
δ13C _Intercept	-15.23	0.15	-15.51	-14.94
sigma_δ13C _Intercept	0.78	0.05	0.7	0.88
δ15N_Intercept	7.48	0.11	7.27	7.7
sigma_δ15N_Intercept	0.5	0.05	0.41	0.6
δ13C _sSCL_1	-2.16	6.01	-11.4	12.35
sigma_δ13C _sSCL_1	-0.52	2.28	-5.14	4.83
δ15N_sSCL_1	-2.8	6.36	-17.58	7.25
sigma_δ15N_sSCL_1	-0.56	1.73	-3.98	3.55

Table S5. Coefficient estimates and credibility intervals for the Bayesian multivariate distributional regression model testing the relationship between pinfish length and stable isotopic values and their variances.

Smooth Terms				
	Estimate	Est.Error	l-95% CI	u-95% CI
sds(δ^{13}C _sLength_1)	1.44	1.28	0.06	4.9
sds(sigma_δ^{13}C _sLength_1)	2.17	1.35	0.2	5.39
sds(δ^{15}N _sLength_1)	1.35	1.11	0.05	4.28
sds(sigma_δ^{15}N _sLength_1)	2.81	1.32	1.01	6.15
Population-Level Effects				
	Estimate	Est.Error	l-95% CI	u-95% CI
δ^{13}C _Intercept	-17.22	0.16	-17.52	-16.91
sigma_δ^{13}C _Intercept	0.28	0.07	0.14	0.43
δ^{15}N _Intercept	10.39	0.12	10.16	10.63
sigma_δ^{15}N _Intercept	0.12	0.07	-0.02	0.28
δ^{13}C _sLength_1	1.18	3.6	-5.97	9.5
sigma_δ^{13}C _sLength_1	2.99	3.99	-4.57	12.13
δ^{15}N _sLength_1	1.19	3.03	-6.06	6.68
sigma_δ^{15}N _sLength_1	1.23	5.1	-8.78	12.23