Text S1. Supplementary information for section 2.2. Otolith preparation and elemental analysis

Sagittae from juveniles collected in the Gulf of California were removed, cleaned and embedded in epoxy blocks and sectioned through the core in the transverse plane with a low-speed diamond saw (Buehler Isomet) and then progressively polished using lapping film until the daily rings and the otolith core were exposed. Sagittae collected in the Galápagos Archipelago were mounted on the edge of microscope slides using thermoplastic adhesive (Crystalbond^{TM}) to expose the rostrum but to keep the nucleus of the otolith protected on the slide. The exposed section of each otolith was ground down to the slide edge using a series of polishing paper and diamond lapping film (400 grit or 30µm – 4000 grit or 3µm in decreasing order). The half section of each otolith was then re-heated using a hotplate and flipped so that the post-rostrum was vertically oriented. The post-rostral section was then ground and polished to the nucleus (until the core was visible) in the same sequence as already described. The methodologies to obtain the thin transverse sections of otoliths were different because no low-speed diamond saw was available in Galápagos.

The operating parameters for the LA-ICPMS laser were: pulse rate of 7 Hz with an ablation spot size of 30 μm that translated across the sample at 5 μm/s. A 30-second washout before and after each sample was completed to remove residues from previous samples and to collect background data. Transects were pre-ablated (2 Hz, 50 μm spot size, 100 μm/s) to further reduce potential sample contamination. For the Gulf of California, magnesium (^{24}Mg), calcium (^{43}Ca), manganese (^{55}Mn), strontium (^{86}Sr), lead (^{208}Pb), barium (^{138}Ba) and zinc (^{66}Zn) were consistently above detection limits. For Galápagos, all the elements were consistently above detection limits.

National Institute of Standards and Technology glass (NIST 612), and two calcium carbonate (USGS MACS-1 and MACS-3) standards were measured every 10 otoliths.

Text S2. Supplementary information for section 2.4. Statistical analysis

We determined the extent to which the yellow snapper from the Galápagos and the Gulf of California, and the grouper *M. olfax* from the Galápagos Archipelago had similar patterns in their elemental signatures. The elemental ratios were transformed using the square root of each mean trace elemental ratio, prior to computing the distance matrix, to improve normality and homoscedasticity of the data.

PERMANOVA assumptions:

PERMANOVA is a semiparametric method that performs a geometric partitioning of multivariate variation in the space of a chosen dissimilarity measure with no assumption of multivariate normality (Anderson 2014) – a feature that is common among otolith microchemistry data. The assumption of homogeneity was tested using betadisper {vegan Package in R} and was met for the interspecific comparisons.

ANOVA assumptions:

For the ANOVA comparisons, we tested for normality and homoscedasticity using Shapiro-Wilk test and Bartlett's test for each elemental ratio (Me:Ca) and factor (species or region), respectively. The Shapiro-Wilk test indicated the data distributions for Pb:Ca and Zn:Ca were not normally distributed between Galápagos species, or Pb:Ca, Rb:Ca and Zn:Ca between

snappers from Galápagos vs. those from the Gulf. The Bartlett's test confirmed homoscedasticity for most of the elemental ratios analyzed, with the exception of Pb:Ca, Rb:Ca and Zn:Ca for both groups. Bonferroni correction was applied to adjust p-values to account for the multiple comparisons. We performed Tukey's post hoc test to examine which group pair (e.g. *L. argentiventris* - Galápagos vs. *M. olfax* - Galápagos) exhibited significant differences for each trace elemental ratio (Fig. S5).

ANOSIM model interpretation:

This hypothesis test used distance or dissimilarity matrices and significance was evaluated by permutation. The ANOSIM statistic compares the mean of ranked dissimilarities between groups to the mean of ranked dissimilarities within groups. An R value close to "1.0" suggests dissimilarity between groups, or high separation between groups, while an R value close to "0" suggests an even distribution of high and low ranks within and between groups, or no separation between groups.

PCoA model:

PCoA is an eigen-analysis of a distance or dissimilarity matrix. A dissimilarity matrix was constructed based on the "Gower" method (Gower, 1966), using a two-dimensional projection of distance between average otolith Me:Ca values. In order to fit the trace elements onto an ordination, we projected the points onto vectors that have maximum correlation with corresponding elemental ratio, using envfit {vegan Package in R}.

Gulf of California temporal comparison:

The yellow snappers from the Gulf of California did not present differences in the elemental ratios (Me:Ca) within the same year of collection (Fig. S2, S3 in Supplements). Therefore, these data were grouped per year (2003 vs. 2004) to examine interannual variability on elemental

composition across life stages using Welch t-tests, which accounts for unequal variances and *P*-values were Bonferroni-corrected after analysis for multiple comparisons. This analysis was not possible for Galápagos, since only 12 fishes (5 snappers and 7 sailfin groupers) out of a total of 158 were collected in April of 2016.

Table S1. Estimation of accuracy and precision using calcium carbonate standards (MACS-3 and MACS-1) and the mean percent relative standard deviations (%RSD) of the NIST 612. All standards were run at every 10 otoliths for the Galápagos and the Gulf of California samples. NIST: National Institute of Standards and Technology; NA: not applicable

Ecosystem	Species	Standard	Sr:Ca	Ba:Ca	Cu:Ca	Li:Ca	Mg:Ca	Mn:Ca	Zn:Ca	Pb:Ca	Rb:Ca
Galápagos	Yellow Snapper	MACS3	1.11	1.32	0.82	0.83	1.12	0.97	0.91	1.16	NA
		MACS 1	1.09	1.09	NA	NA	1.45	1.01	0.91	0.80	NA
		NIST 612	6.10	5.07	15.93	18.38	12.76	9.45	19.94	13.43	14.00
Galápagos	Sailfin Grouper	MACS3	1.01	1.25	0.79	0.83	1.02	0.96	0.77	1.24	NA
		MACS 1	1.10	1.07	NA	NA	1.61	1.05	0.92	0.77	NA
		NIST 612	5.72	4.58	13.91	15.68	11.42	9.18	16.55	11.37	12.25
Gulf of California	Yellow Snapper	MACS3	1.09	1.25	0.74	0.76	1.13	0.94	0.78	0.98	NA
		MACS 1	1.12	1.13	NA	NA	1.63	1.02	0.89	0.75	NA
		NIST 612	6.53	4.85	15.87	16.99	12.63	9.23	18.17	12.52	12.56

Table S2. Comparison by t-test of elemental ratio means between 2003 and 2004 years for all life stages (larvae, settlers, post-settlers and immatures) of yellow snappers from the Gulf of California.. *P*-values were adjusted for multiple comparisons using the "Bonferroni" procedure (*P*-bonf corr). Bold values indicate significant *P*-values (<0.05). Asterisks denote significance (* = 0.05 , ** = 0.01 , *** = 0.001). NS: non-significant.

		Mean					
Element	Life stage	Year 2003	Year 2004	*t*	d.f.	*P*- bonf corr	
Ba:Ca	Larvae	2.999	2.755	0.82	171.81	NS	
	Settler	4.255	3.173	3.41	157.16	**0.03**	*
	Post-settler	4.088	3.454	1.95	151.00	NS	
	Immature	2.618	3.000	-0.95	22.60	NS	
Cu:Ca	Larvae	7.538	15.001	-7.71	109.29	**< 0.001**	***
	Settler	7.268	15.193	-8.38	98.30	**< 0.001**	***
	Post-settler	7.377	15.329	-7.93	98.43	**< 0.001**	***
	Immature	8.205	15.819	-3.19	20.87	NS	
Li:Ca	Larvae	7.168	9.081	-8.84	132.10	**< 0.001**	***
	Settler	6.331	8.459	-8.10	103.75	**< 0.001**	***
	Post-settler	5.167	7.186	-9.06	113.64	**< 0.001**	***
	Immature	5.129	7.228	-3.66	18.74	NS	
Mg:Ca	Larvae	0.333	0.303	2.60	155.17	NS	
	Settler	0.282	0.253	2.96	166.57	NS	
	Post-settler	0.226	0.212	1.71	150.91	NS	
	Immature	0.178	0.208	-1.71	22.03	NS	

Mn:Ca	Larvae	0.023	0.020	3.55	133.98	**0.019**	*
	Settler	0.024	0.020	3.36	158.94	**0.035**	*
	Post-settler	0.022	0.018	2.99	150.65	NS	
	Immature	0.019	0.016	2.24	31.50	NS	
Pb:Ca	Larvae	0.277	0.311	-0.62	119.73	NS	
	Settler	0.287	0.244	0.94	163.91	NS	
	Post-settler	0.339	0.238	1.45	112.49	NS	
	Immature	0.232	0.283	-0.63	23.94	NS	
Rb:Ca	Larvae	0.323	0.535	-7.92	128.16	**< 0.001**	***
	Settler	0.296	0.503	-7.73	111.84	**< 0.001**	***
	Post-settler	0.268	0.480	-7.79	100.34	**< 0.001**	***
	Immature	0.277	0.488	-3.98	27.83	**0.016**	*
Sr:Ca	Larvae	2.613	2.591	0.71	153.45	NS	
	Settler	2.758	2.770	-0.32	154.84	NS	
	Post-settler	2.864	2.835	0.71	148.47	NS	
	Immature	2.833	2.595	2.17	36.00	NS	
Zn:Ca	Larvae	4.331	7.854	-2.74	89.62	NS	
	Settler	3.911	6.458	-2.11	101.64	NS	
	Post-settler	3.913	5.710	-2.36	105.33	NS	
	Immature	4.273	13.528	-1.85	16.21	NS	

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Table S3. Mean, standard deviation (SD), minimum and maximum values of sea surface temperature (SST, °C) and chlorophyll-a (Chl-a, mg m3) adjacent to the mangrove sites of Galápagos and the Gulf of California during the lifetime of snappers and grouper juveniles.

Ecosystem	Mangrove Site	Long	Lat	Variable	Mean	SD	Minimum	Maximum	Variable
Galápagos	Punta Espinoza	-91.45	-0.27074	**SST**	25.59	1.48	23.12	29.25	**Chl-a**
	Punta Mangle	-91.39	-0.44557		25.11	1.70	22.32	29.36	
	Poza los Patillos	-91.38	-0.35773		24.79	1.80	21.67	28.89	
	Baya Post Office	-90.44	-1.22958		24.91	1.70	21.40	28.29	
	Urbina Sur	-91.26	-0.37787		25.76	1.08	24.06	27.80	
	Urbina Sur 2	-91.28	-0.35745		25.13	1.85	21.77	28.51	
	Abaledo	-91.21	-0.67247		25.58	1.47	22.28	28.96	
	Punta Moreno	-91.33	-0.71536		25.22	1.75	22.44	29.68	
	Cartago Grande	-90.92	-0.6195		24.79	1.88	21.57	29.00	
	Cartago Chico	-90.86	-0.65825		25.58	1.33	22.92	28.53	
	Cartago North	-90.98	-0.57869		24.73	1.95	21.81	29.08	
	Albemarle	-91.36	0.16087		25.06	1.79	21.76	28.60	
	Puerto Grande	-89.47	-0.79902		24.59	1.90	21.83	28.73	
	Las Sardinas	-89.39	-0.71701		24.68	1.96	21.38	28.62	
	Parroquinnos	-90.42	-0.76666		25.16	1.45	22.61	28.29	
	Caleta Tortuga Negra	-90.33	-0.50359		24.42	1.97	21.23	28.97	
	Itabaca Canal	-90.28	-0.48788		24.90	1.73	21.98	28.45	
	East Santa Cruz	-90.2	-0.68371		24.38	1.73	20.53	28.73	
	Poza de las azules	-90.67	-0.3489		24.94	1.77	21.75	28.59	
	La Bomba	-90.7	-0.17611		24.89	1.81	21.46	28.16	
Gulf of California	San Lucas	-112.2	27.23	**SST**	24.42	4.19	15.65	31.70	**Chl-a**
	Los Mojones	-112	27.02		25.14	4.34	16.67	32.29	
	Punta Mangle Baja	-111.3	26.267		25.21	4.01	15.53	32.34	

	Puerto Escondido	-111.3	25.82	25.55	3.86	18.15	32.29
	Los Gatos	-110.9	25.52	25.69	3.68	18.30	32.55
	San Jose	-110.6	24.87	25.71	3.52	18.75	32.26
	Balandra	-110.3	24.32	25.53	3.29	17.44	32.10
	El Soldado	-111	27.96	25.05	5.03	15.17	33.57
	Punta Yavaros	-109.5	26.71	26.28	4.95	16.54	34.53
	Barra de Piaxtla	-106.4	23.2	27.27	3.31	19.01	33.90

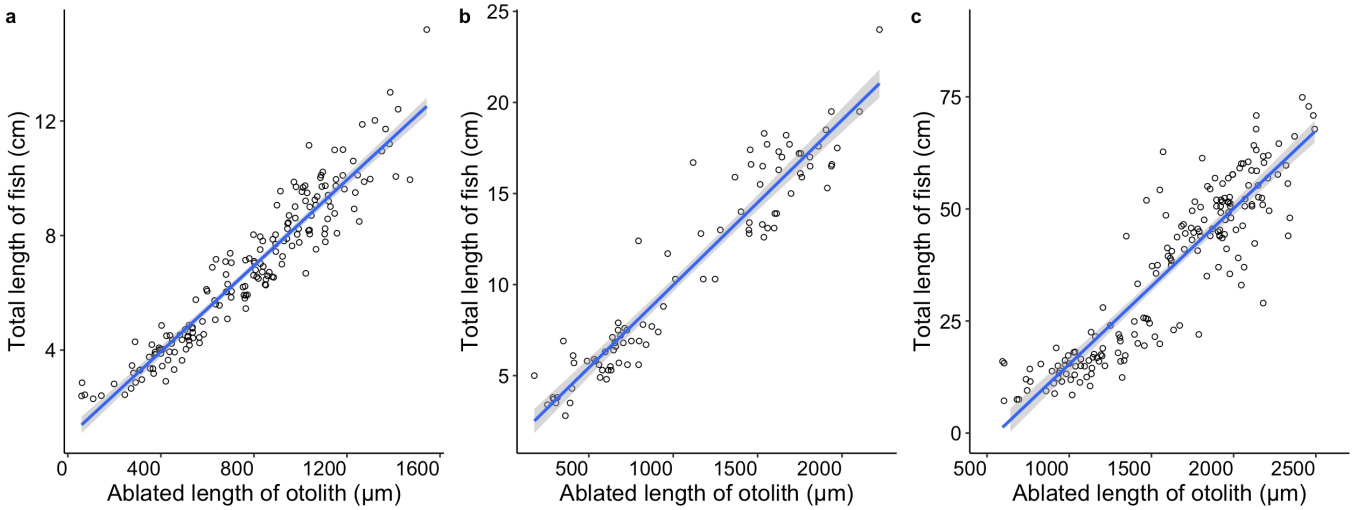

Figure S1. Linear relationship between the total length of fish (mm) and the ablated length of otolith (μm) using the LA-ICPMS for (A) the Gulf of California yellow snapper juveniles, (B) the Galápagos yellow snapper juveniles and (C) the Galápagos sailfin groupers.

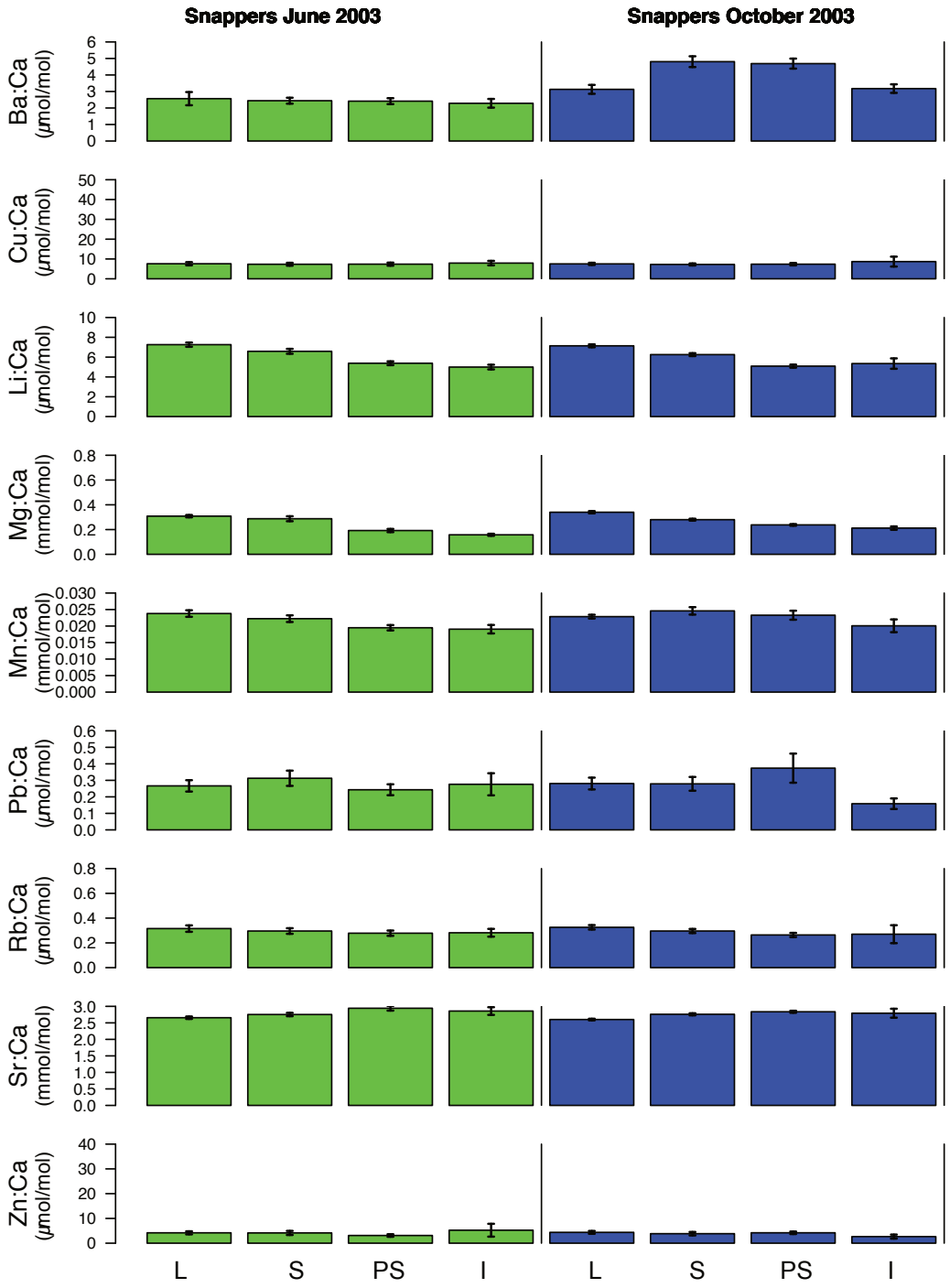

Figure S2. Average ± standard error of element to calcium ratios per juvenile size classes for yellow snapper collected in June of 2003 (green) and October of 2003 (blue) from the Gulf of California. Larvae (L) < 2cm, Settler (S): 2-4 cm, Post-Settler (PS): 4-10 cm, and Immature (I): 10-20 cm for yellow snappers.

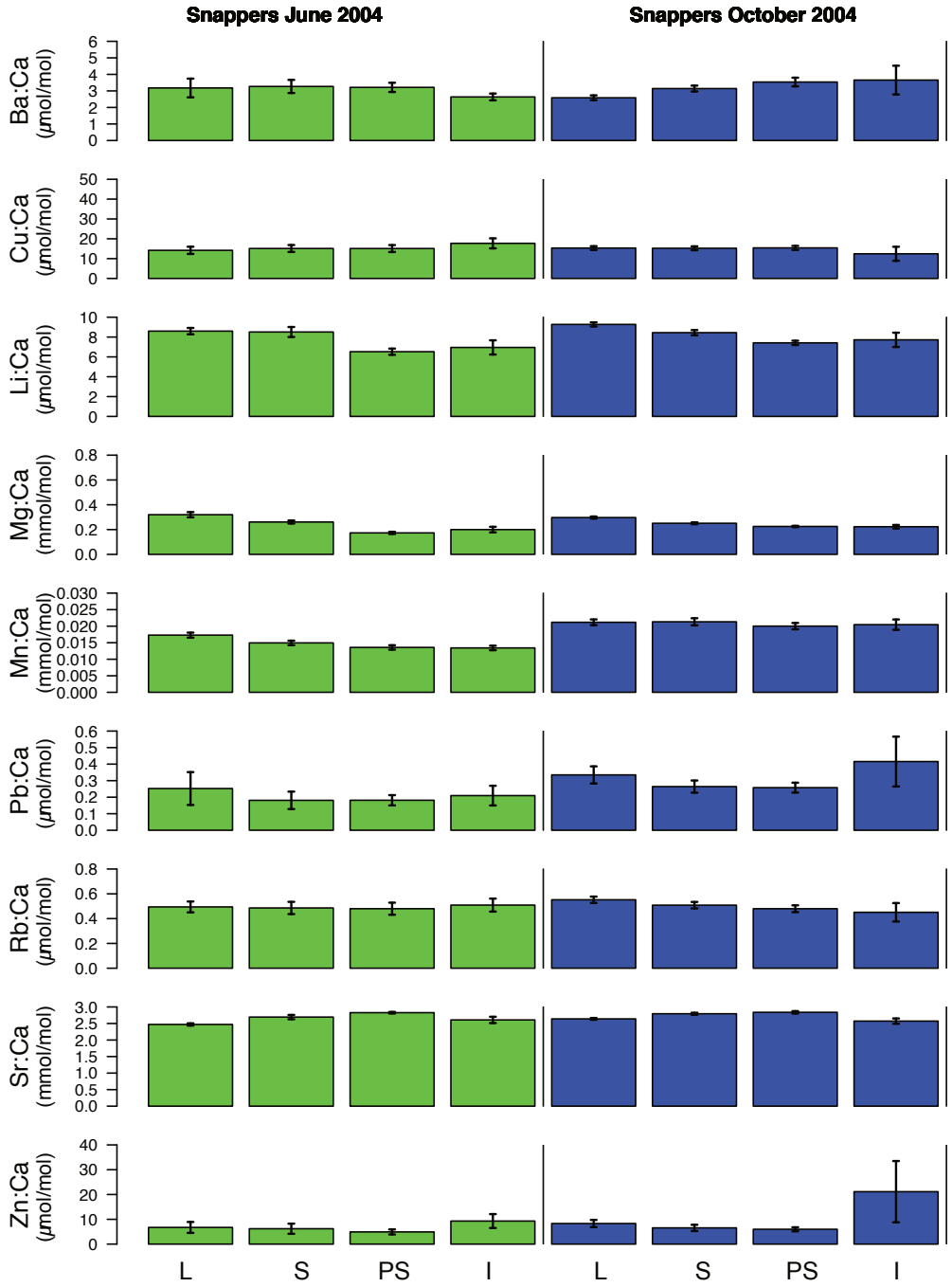

Figure S3. Average ± standard error of element to calcium ratios per juvenile size classes for yellow snapper collected in June of 2004 (green) and October of 2004 (blue) from the Gulf of California. Larvae (L) < 2cm, Settler (S): 2-4 cm, Post-Settler (PS): 4-10 cm, and Immature (I): 10-20 cm for yellow snappers.

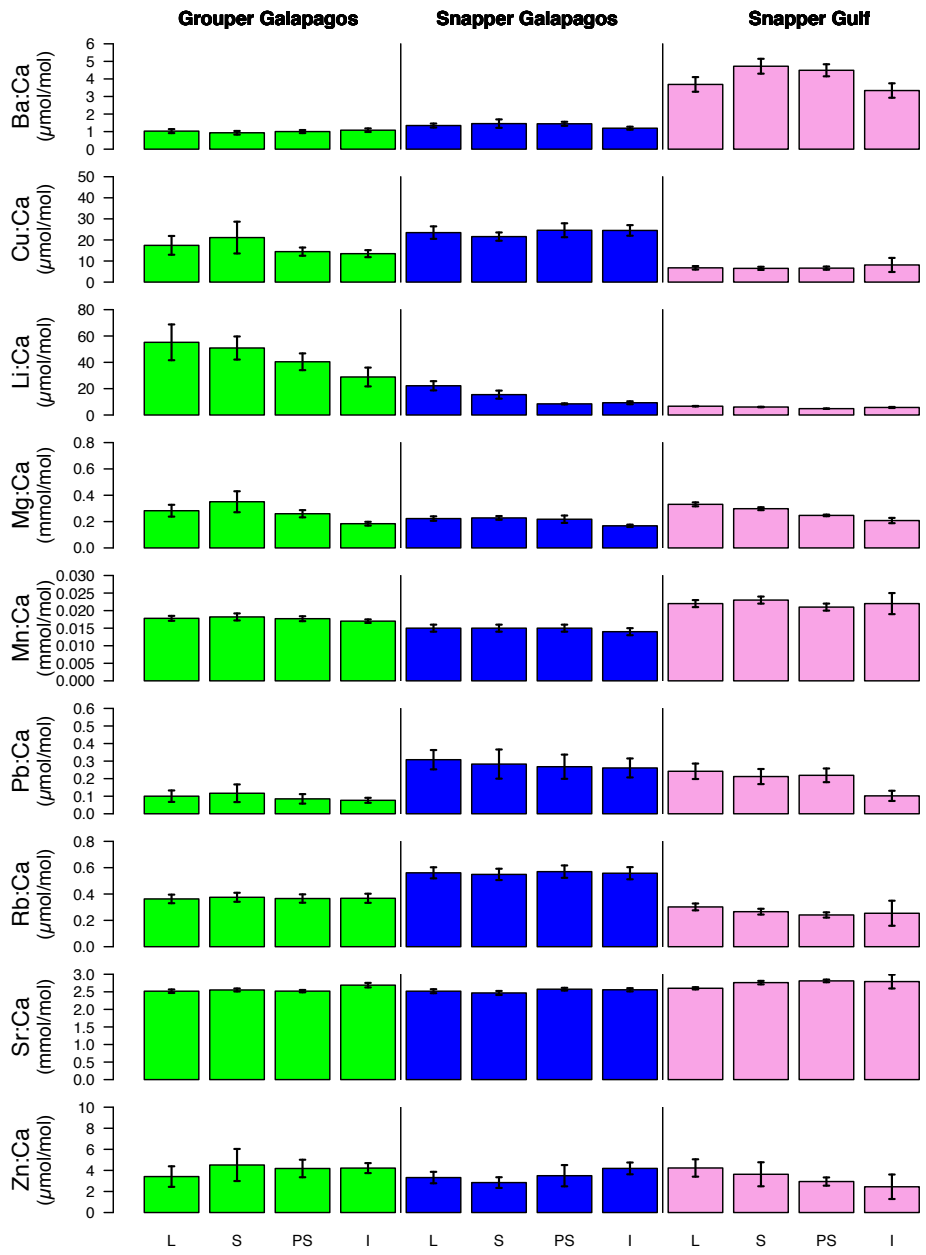

Figure S4. Average ± standard error of element to calcium ratios per juvenile size class for sailfin grouper from Galápagos (green), yellow snapper from Galápagos (blue) and yellow snappers from the Gulf of California (pink) that co-occurred within the same time window (n=97). Larvae (L) < 2cm, Settler (S): 2-4 cm, Post-Settler (PS): 4-10 cm, and Immature (I): 10-20 cm for yellow snappers and Larvae (L) < 2.5cm, Settler (S): 2.5 – 3.5 cm, Post-Settler (PS): 3.5 - 15 cm, and Immature (I): 15-65 cm for sailfin groupers.

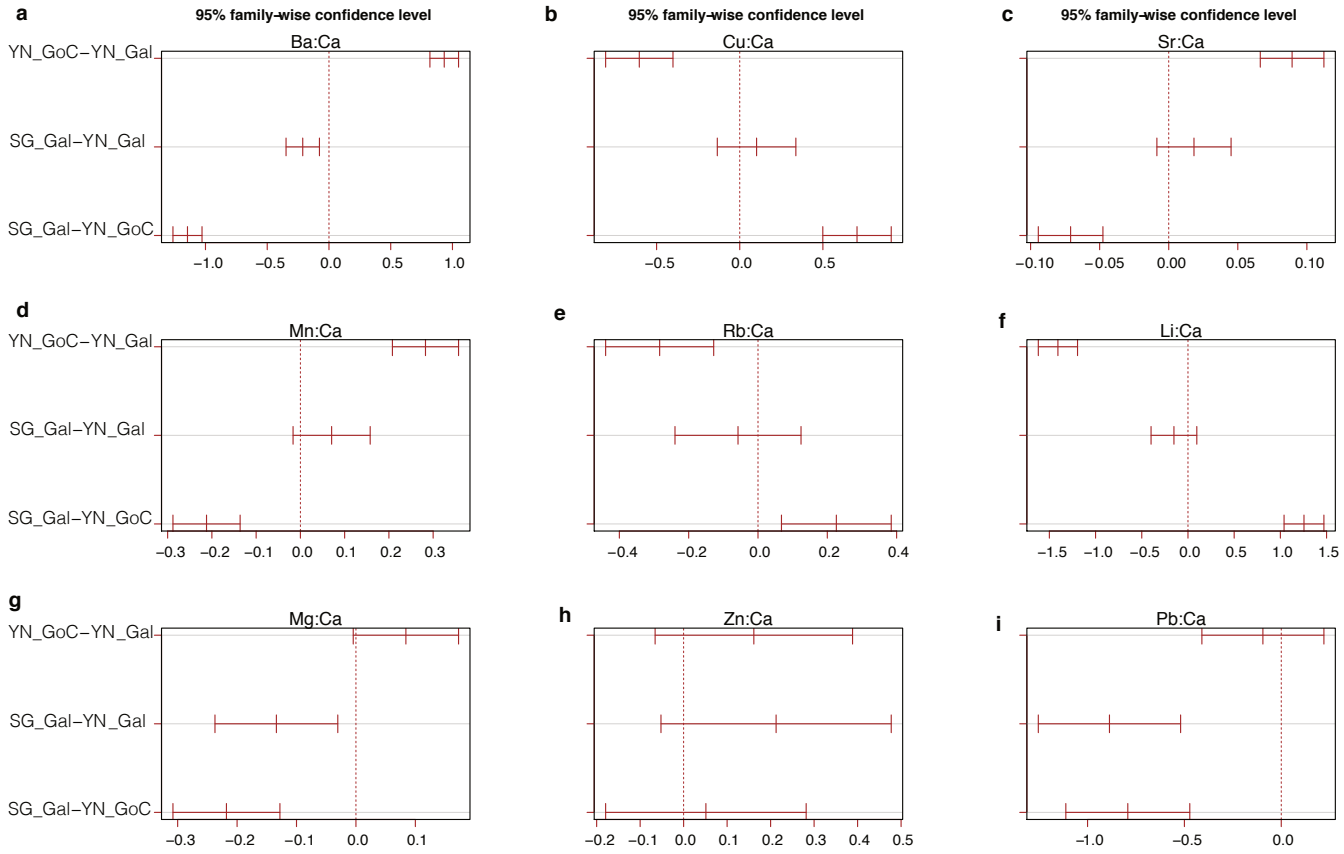

Figure S5. Tukey simultaneous confidence intervals for univariate ANOVAs comparing trace elemental ratios (Me:Ca) among otoliths of yellow snappers from the Gulf of California (YN_GoC), yellow snappers from Galápagos (YN_Gal), and sailfin groupers from Galápagos (SG_Gal). If a 95% confidence interval does not contain zero, the corresponding means are significantly different.

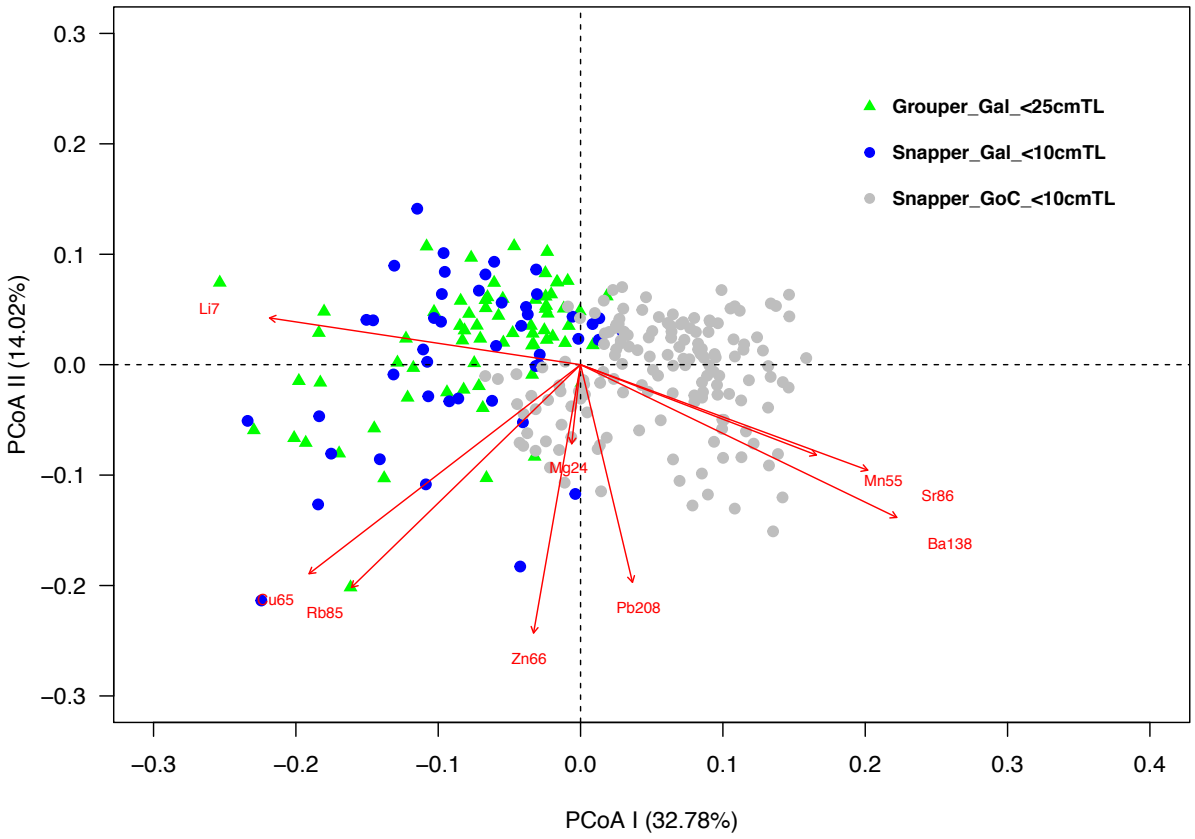

Figure S6. Principal Coordinate Analysis (PCoA) of fish otoliths from Galápagos (Gal) and the Gulf of California (GoC). Each symbol represents the elemental ratios (Me:Ca) of the juvenile stage of a single otolith (i.e. representing mangrove waters) across different cohorts. Environmental vector correlations are included to indicate relationships between trace element ratios (Me:Ca) and PCoA axes. Yellow snappers included are below 10 cm of total length, and sailfin groupers are below 25 cm of total length.