

### Text S1

We compared four methods of trophic position estimation. First, we used  $\delta^{15}\text{N}_{\text{Glu}}$  and  $\delta^{15}\text{N}_{\text{Phe}}$  as single representative AAs for  $\delta^{15}\text{N}_{\text{tr}}$  and  $\delta^{15}\text{N}_{\text{sr}}$ , respectively, following Chikaraishi et al. (2009). We used a TEF value of 7.6 and  $\beta$  value of 3.4, reflecting mean estimated TEF values for secondary consumers (Peterson & Fry 2003). Second, we used a  $\beta$  value of 3.6 and TEF value of 5.7 *sensu* Bradley et al. (2015). These values were calculated specifically for marine teleost fishes and similar to those generated in other meta analyses (e.g., McMahon & McCarthy 2016). These  $\beta$  and TEF values are also within the range of those generated by Nielsen et al. (2015) for animals that excrete ammonium ( $\text{NH}_4^+$ ), i.e. marine teleosts. Third, instead of using single representative source and trophic AAs, we took an average of three representative source AAs (Gly, Phe, Lys) to represent  $\delta^{15}\text{N}_{\text{sr}}$  and three trophic AAs (Ala, Leu, Glu) to represent  $\delta^{15}\text{N}_{\text{tr}}$  (*sensu* McCarthy et al. 2007, Bradley et al. 2015, Nielsen et al. 2015). Fourth, we replaced  $\delta^{15}\text{N}_{\text{sr}}$  and  $\delta^{15}\text{N}_{\text{tr}}$  with weighted means for three source (Gly, Phe, Lys) and three trophic (Ala, Leu, Glu) AAs, respectively, using the following equation from Hayes et al. (1989):

$$\delta^{15}\text{N}_{\overline{x_w}} = \frac{\sum \frac{\delta^{15}\text{N}_x}{\sqrt{\sigma_x^2}}}{\sum \frac{1}{\sqrt{\sigma_x^2}}}$$

where  $\delta^{15}\text{N}_x$  is the nitrogen isotopic composition of a specified AA within the grouping, and  $\sigma_x$  is the standard deviation of the specific AA. The equation we used for trophic position in comparative analyses among sampling sites was:

$$\text{TP} = \left( \frac{\delta^{15}\text{N}_{\overline{x_w}} - \delta^{15}\text{N}_{\overline{x_w}} - 3.6}{5.7} \right) + 1$$

where  $\delta^{15}\text{N}_{\overline{x_w}}$  and  $\delta^{15}\text{N}_{\overline{x_w}}$  are the weighted means of trophic and source AAs, respectively.

We observed a wide range in trophic position estimates using AA-CSIA, depending on the input values for  $\delta^{15}\text{N}_{\text{source}}$ ,  $\delta^{15}\text{N}_{\text{trophic}}$ , TEF, and  $\beta$  (Fig. S1; Table S2). For all individuals, trophic position estimates between methods varied as much as 0.696 to 1.570, and differed on average by 1.037. An ANOVA indicated significant differences ( $p < 0.001$ ) between trophic position estimations. Pairwise comparisons using Tukey's HSD indicated significant differences between all methods except the weighted means and trophic position averages approach (Table S3).

### Supplemental Tables and Figures

Table S1. Species, number of individuals (N), locality, and sampling year for species used as baseline nitrogen samples.

Species	Common Name	N	Locality	Year
<i>Perna perna</i>	Mussel	5	Ponta do Ouro, Mozambique	2015
<i>Perna</i> sp.	Mussel	4	La Digue Island, Seychelles	2016
Gastropoda sp.	Limpet	2	St. Joseph's Atoll, Seychelles	2016
<i>Pinna muricata</i>	Prickly Pen	1	St. Joseph Atoll, Seychelles	2016
<i>Perna</i> sp.	Mussel	3	Anse Baleine, Mahé, Seychelles	2017
<i>Tetraclita</i> sp.	Barnacle	1	Anse Baleine, Mahé, Seychelles	2017
<i>Pinna muricata</i>	Prickly Pen	2	St. Joseph Atoll, Seychelles	2017
<i>Pinctada margaritifera</i>	Pearl Oyster	3	Providence Atoll, Seychelles	2017
<i>Perna perna</i>	Mussel	2	Ponta do Ouro, Mozambique	2017
Gastropoda sp.	Limpet	2	Police Bay, Mahé, Seychelles	2017

Table S2. Tukey HSD pairwise comparisons of trophic position estimation methods indicating differences in means between methods (Diff\_means), the lower end point of the interval (Lower), the upper end point of the interval (Upper), and the *p*-value after an adjustment for multiple comparisons (*p*\_adj).

	Diff means	Lower	Upper	<i>p</i> adj
TP_SingleAA – TP_Avgs	-0.187	-0.330	-0.044	0.005
TP_Chikaraishi – TP_Avgs	-0.911	-1.054	-0.768	0.000
TP_WtMns – TP_Avgs	0.054	-0.089	0.197	0.765
TP_Chikaraishi – TP_SingleAA	-0.724	-0.867	-0.581	0.000
TP_WtMns – TP_SingleAA	0.241	0.098	0.384	0.000
TP_WtMns – TP_Chikaraishi	0.965	0.822	1.108	0.000

Table S3. Mean bulk  $\delta^{15}\text{N}$  and bulk  $\delta^{13}\text{C}$  values with standard deviations, as well as minimum and maximum  $\delta^{13}\text{C}$  of baseline samples the following sampling localities: Mahé (MAHE), Ponta do Ouro (PDO), Providence (PROV), and St. Joseph (STJO).

	Mean $\delta^{15}\text{N} \pm \text{SD}$	Mean $\delta^{13}\text{C} \pm \text{SD}$	Min $\delta^{13}\text{C}$ – Max $\delta^{13}\text{C}$
<b>MAHE</b>			
Barnacle			
2017	$13.680 \pm 0.169$	$-14.436 \pm 0.595$	-14.847 – -13.754
Limpet			
2016	$1.181 \pm 0.182$	$-8.586 \pm 0.766$	-9.128 – -8.045
Mussel			
2016	$6.572 \pm 0.240$	$-12.765 \pm 0.400$	-13.287 – -12.379
2017	$6.659 \pm 0.341$	$-13.778 \pm 0.977$	-14.803 – -12.856
<b>PDO</b>			
Mussel			
2015	$6.561 \pm 0.077$	$-18.482 \pm 0.699$	-19.021 – -17.553
2016	$12.922 \pm 0.052$	$-16.933 \pm 0.052$	-16.970 – -16.895
2017	$6.796 \pm 0.108$	$-18.198 \pm 0.405$	-18.659 – -17.901
<b>PROV</b>			
Oyster			
2017	$7.991 \pm 0.538$	$-12.591 \pm 0.255$	-12.793 – -12.304
<b>STJO</b>			
Mussel			
2016*	12.614	-10.378	-10.378 – -10.378
Snail			
2016	$10.229 \pm 1.680$	$-13.351 \pm 0.032$	-13.373 – -13.328

\*Unable to calculate SD due to low sample size (N = 1).

Figure S1. Plot of trophic position versus  $\delta^{13}\text{C}$  for four sampling localities (PDO: Ponta do Ouro; MAHE: Mahé; STJO: St. Joseph Atoll; PROV: Providence Atoll). Trophic position values were generated using four methods: weighted means of three source and three trophic AAs (TP\_WtMn), single representative source and trophic AAs using modified values of TEF and  $\beta$  (TP\_SingleAA), averages of three source and three trophic AAs (TP\_Avgs), and single representative source and trophic AAs using TEF and  $\beta$  values from Chikaraishi et al. 2009 (TP\_Chikaraishi).

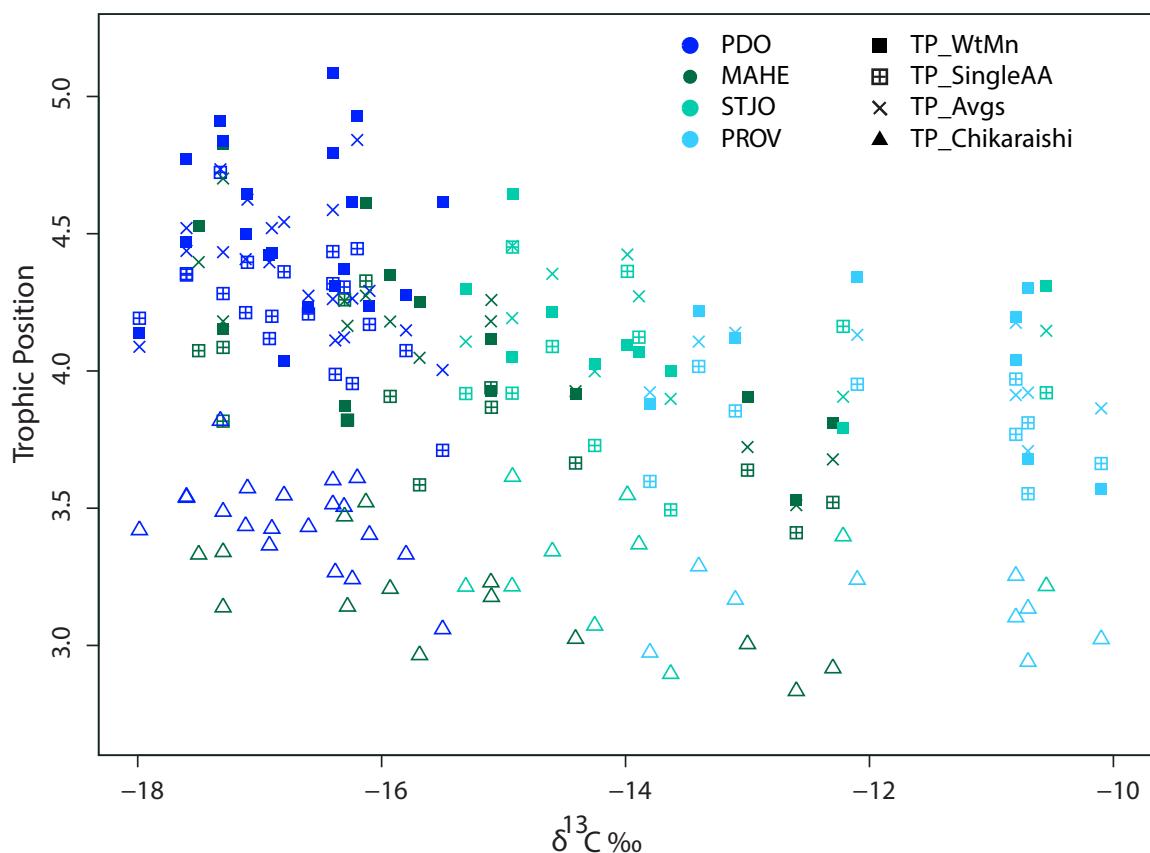


Figure S2. Baseline AA-CSIA trophic position versus  $\delta^{13}\text{C}$  indicating mussel (M) or snail (S) samples for the following sampling localities: Mahé (MAHE), Ponta do Ouro (PDO), Providence Atoll (PROV) and St. Joseph Atoll (STJO).

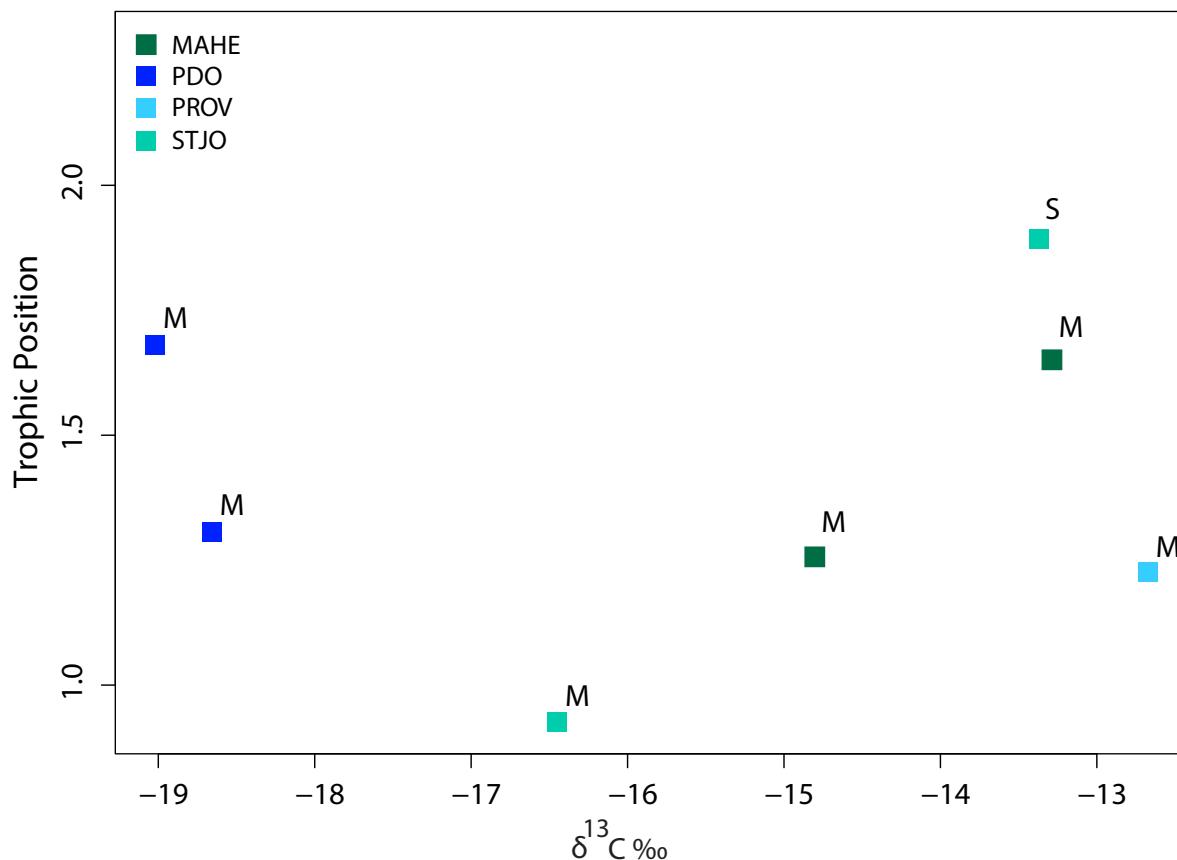


Figure S3. Relationships between bulk  $\delta^{15}\text{N}$  and  $\delta^{15}\text{N}$  from the source amino acid phenylalanine ( $\delta^{15}\text{N}_{\text{phe}}$ ) from four sampling localities: Mahé (MAHE), Ponta do Ouro (PDO), Providence Atoll (PROV), and St. Joseph Atoll (STJO) and all localities combined (black dashed line). We observed a significant correlation between bulk  $\delta^{15}\text{N}$  and  $\delta^{15}\text{N}_{\text{phe}}$  in Ponta do Ouro ( $r^2 = 0.445, p = 0.001$ ) and for all localities combined ( $r^2 = 0.252, p < 0.001$ ).

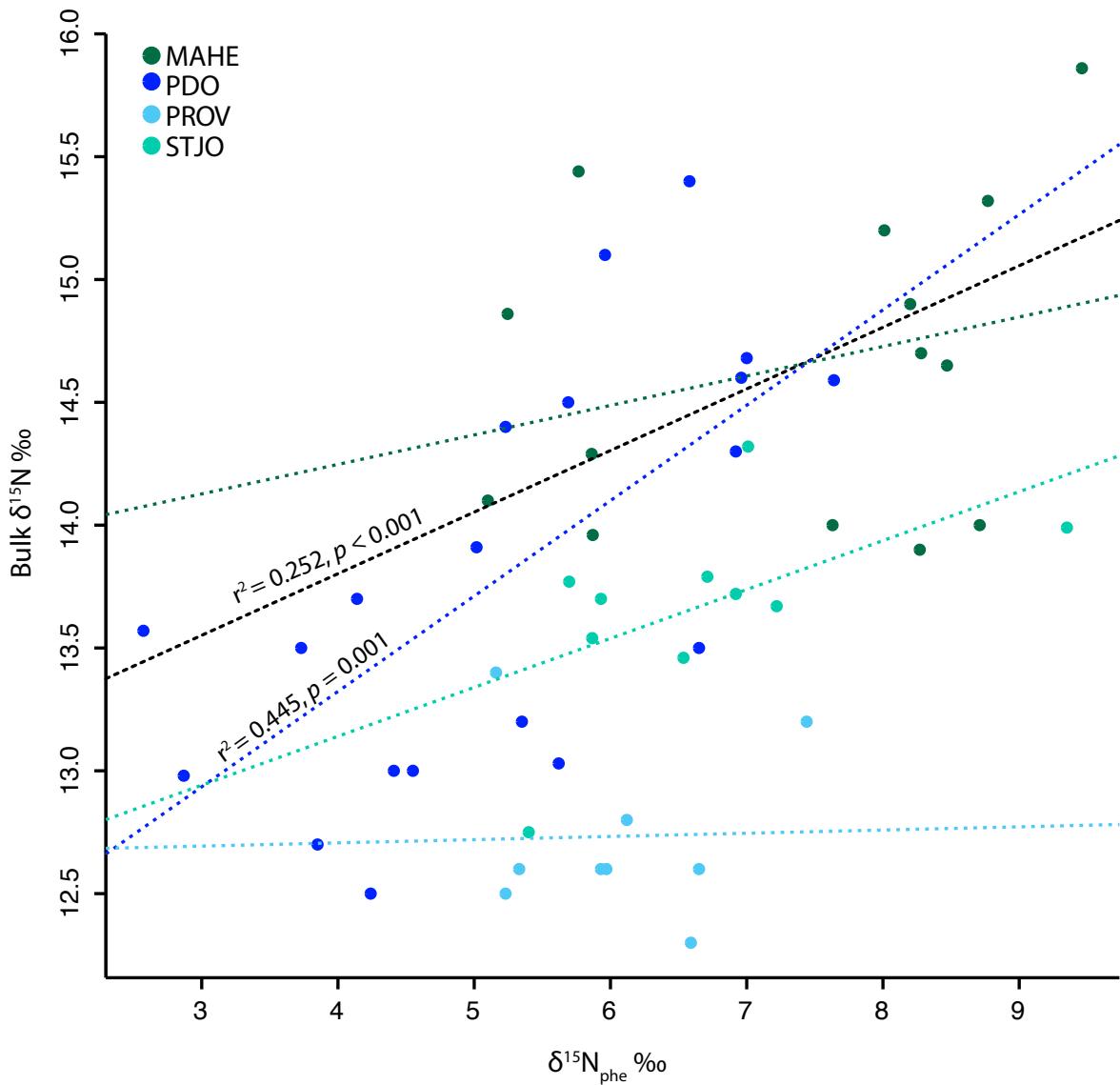
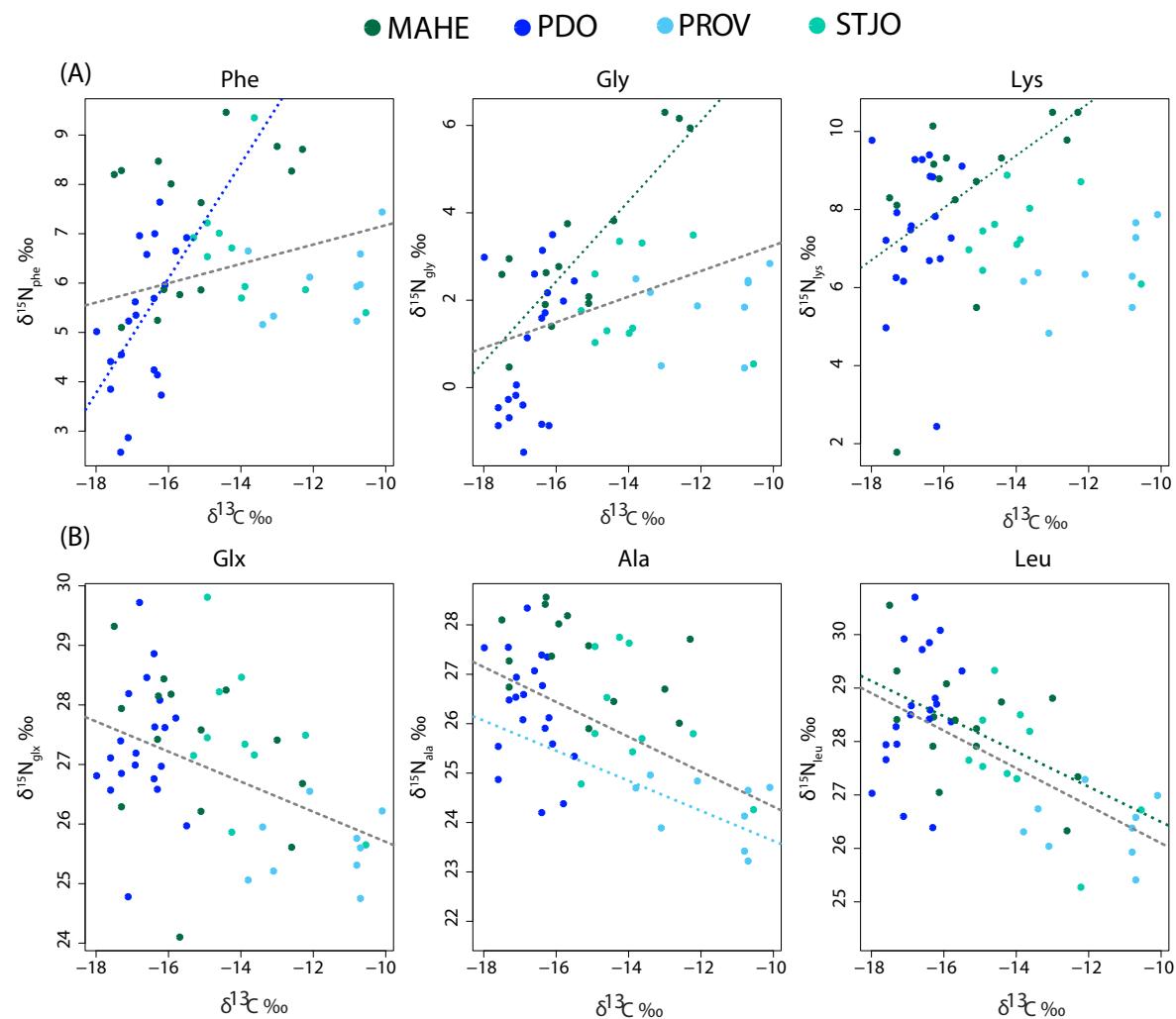


Figure S4. Source (A) and trophic (B) amino acids  $\delta^{15}\text{N}$  versus  $\delta^{13}\text{C}$  for four sampling localities: Mahé (MAHE), Ponta do Ouro (PDO), Providence Atoll (PROV) and St. Joseph (STJO). Dashed lines indicate fitted linear models by location (colored) or all locations combined (gray) and are displayed only when the model was significant ( $p < 0.05$ ). Amino acids are abbreviated as follows: Phe (phenylalanine); Gly (glycine), Lys (lysine), Glx (glutamine/glutamic acid), Ala (alanine), and Leu (leucine).



## References

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