



Individual specialization in Falkland Islands southern elephant seal (*Mirounga leonina*) using stable isotopes of skin and fur

BE12

Diego Rita¹ (diegorita@ub.edu), Massimiliano Drago¹ (m.drago@ub.edu), Filippo Galimberti² (fil_esrg@eleseal.org) and Lluís Cardona¹ (luis.cardona@ub.edu)

¹Institute of Biodiversity Research (IRBio). Faculty of Biology. University of Barcelona. Spain.
²Elephant Seal Research Group, Sea Lion Island, Falkland Islands

Introduction & Methods

Individual specialization is an advantageous strategy which reduce specific competition.

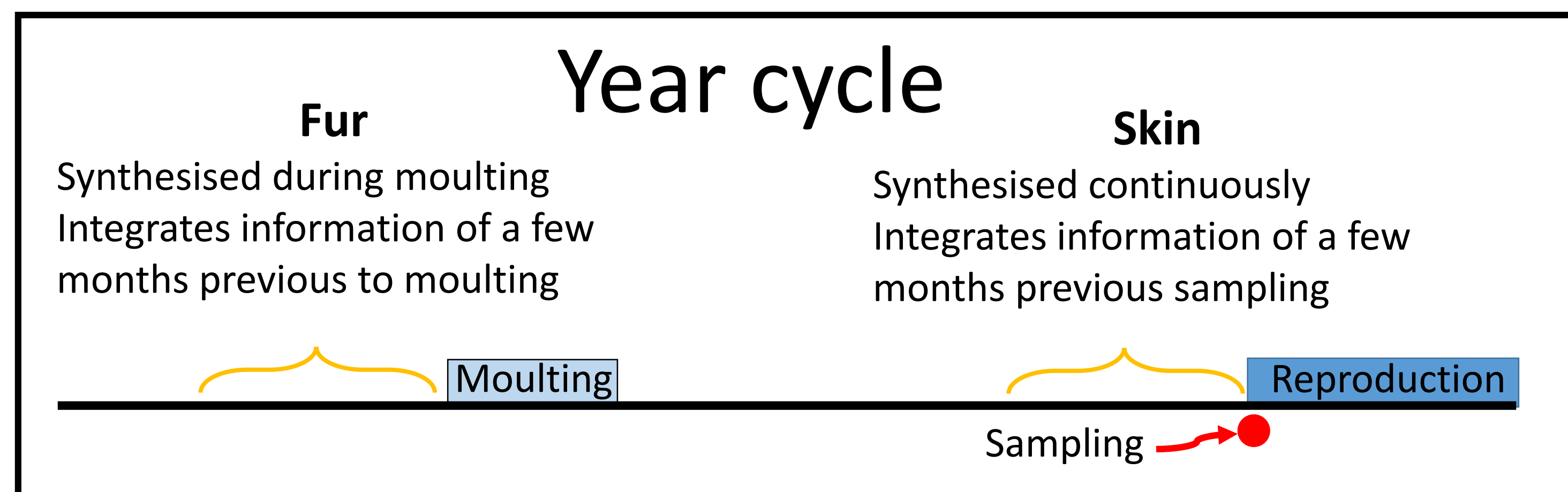
However, in a changing environment the specialization may reduce adaptability if the individual is incapable of reversing it.¹

Southern elephant seal (*Mirounga leonina*) is an individual specialists species with two distinct feeding periods: one before moulting and one before reproduction.²

Since moulting and reproduction have different physiological demands, the optimal foraging strategy should be different in each foraging period → If *M. leonina* is capable of reversing the individual specialization, fur and skin should have different isotopic signals.

-We analysed **carbon and nitrogen stable isotopes** ($\delta^{13}C$ and $\delta^{15}N$, respectively) in skin and fur samples of 47 *M. leonina* individuals.

-The **individual specialization index (S)** of each individual was calculated as the ratio between the variability within the individual tissues and the variability of all the population.



Objectives:

- Assess the short-term reversibility of the individual specialization.
- Identify feeding grounds of Falkland *M. leonina*.
- Measure the individual specialization degree of Falkland southern elephant seals.

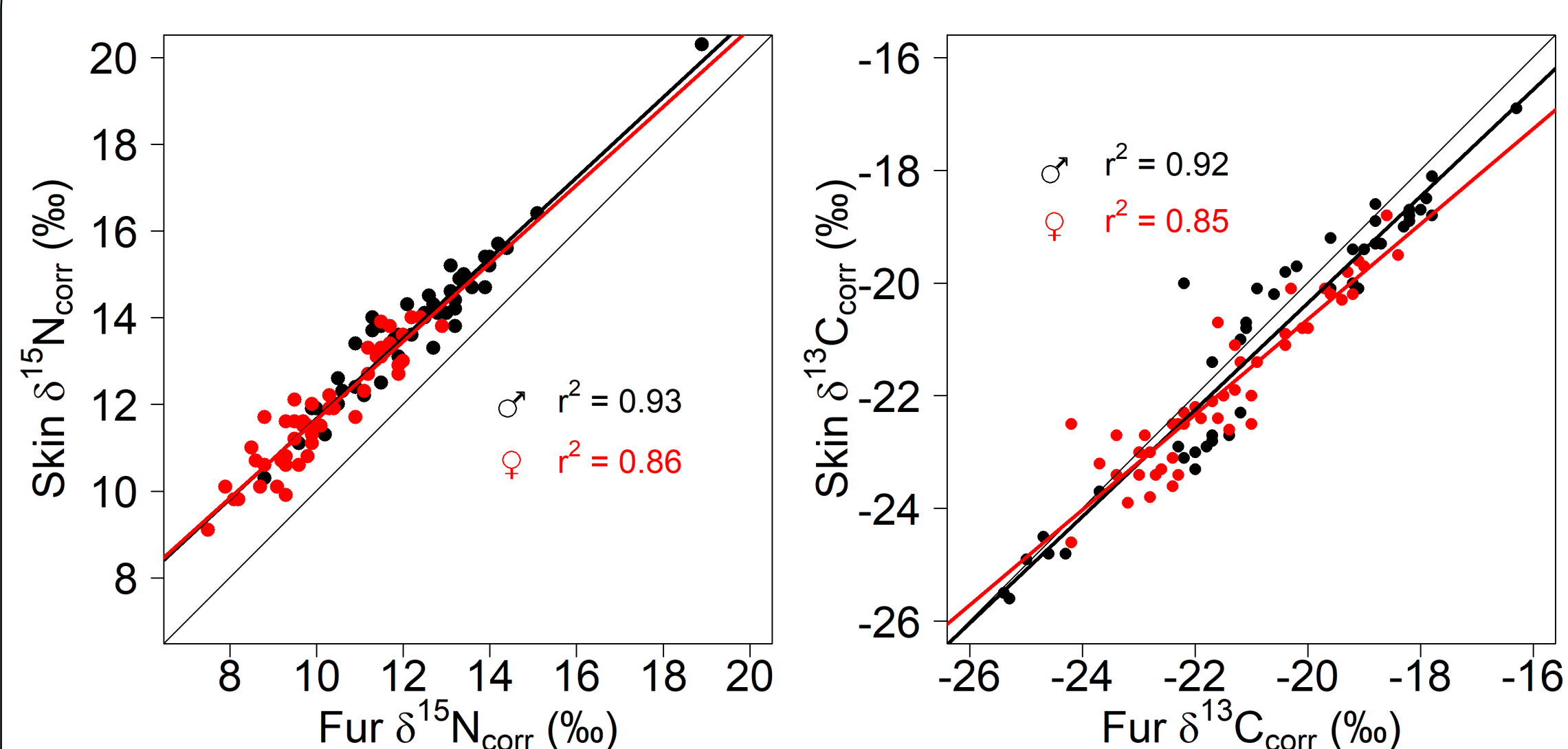


Fig. 1 Correlation of tissue corrected nitrogen (top) and carbon (bottom) stable isotopes between the two tissues. The **high correlation** between the tissues indicate that each individual follows the **same feeding strategy in both periods**. There is a higher $\delta^{15}N$ ratio in the skin than in the fur. Either all the animals fed consistently at a higher trophic level before reproduction or the tissue discrimination factors used were imprecise.

Results & Discussion

Fig. 2 Frequency distribution of the specialization index (S). The Falkland *M. leonina* population has a **high individual specialization** despite the different physiological requirements across the year. For comparison, the median S of 1000 randomly simulated population is shown.

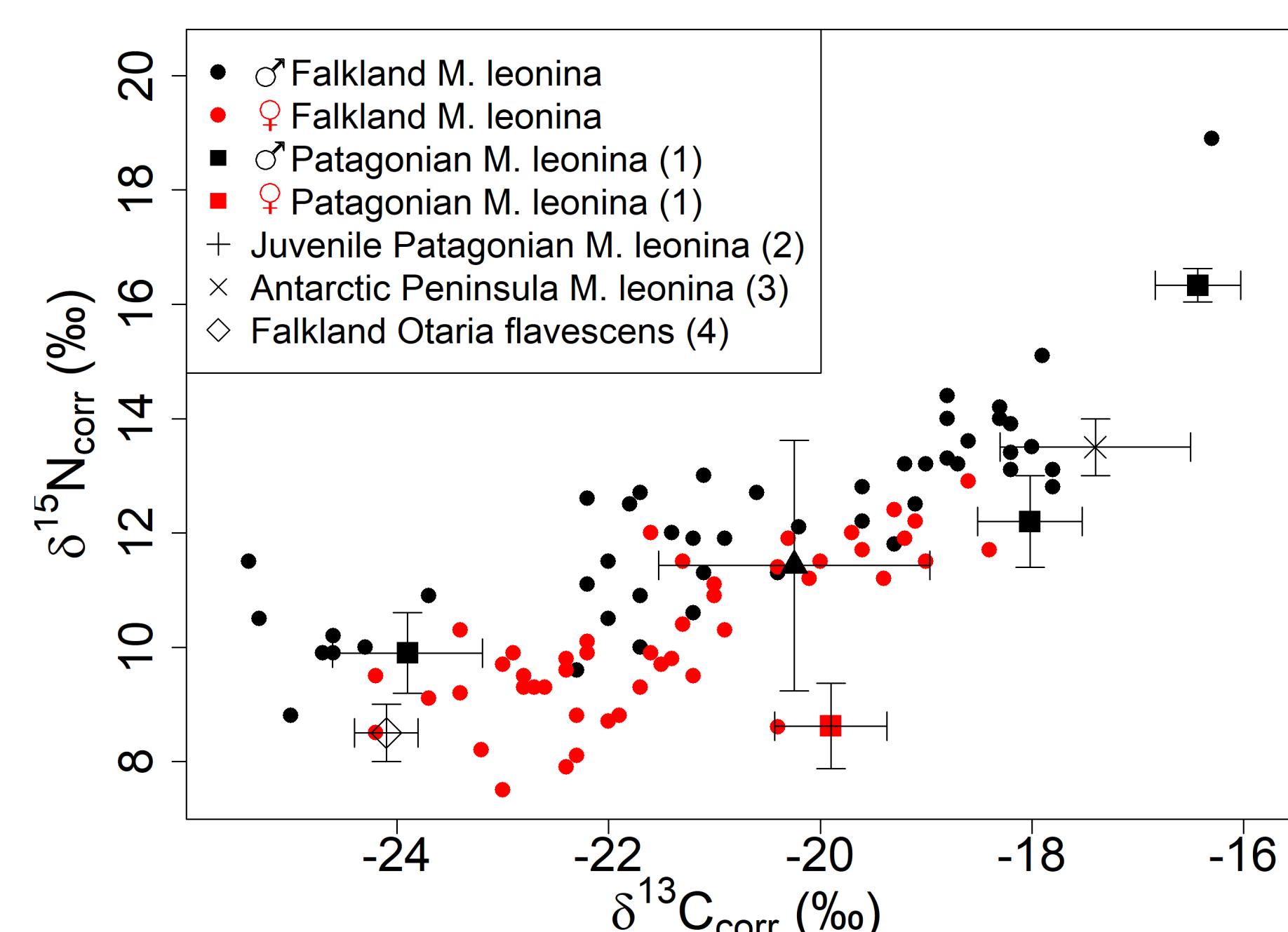
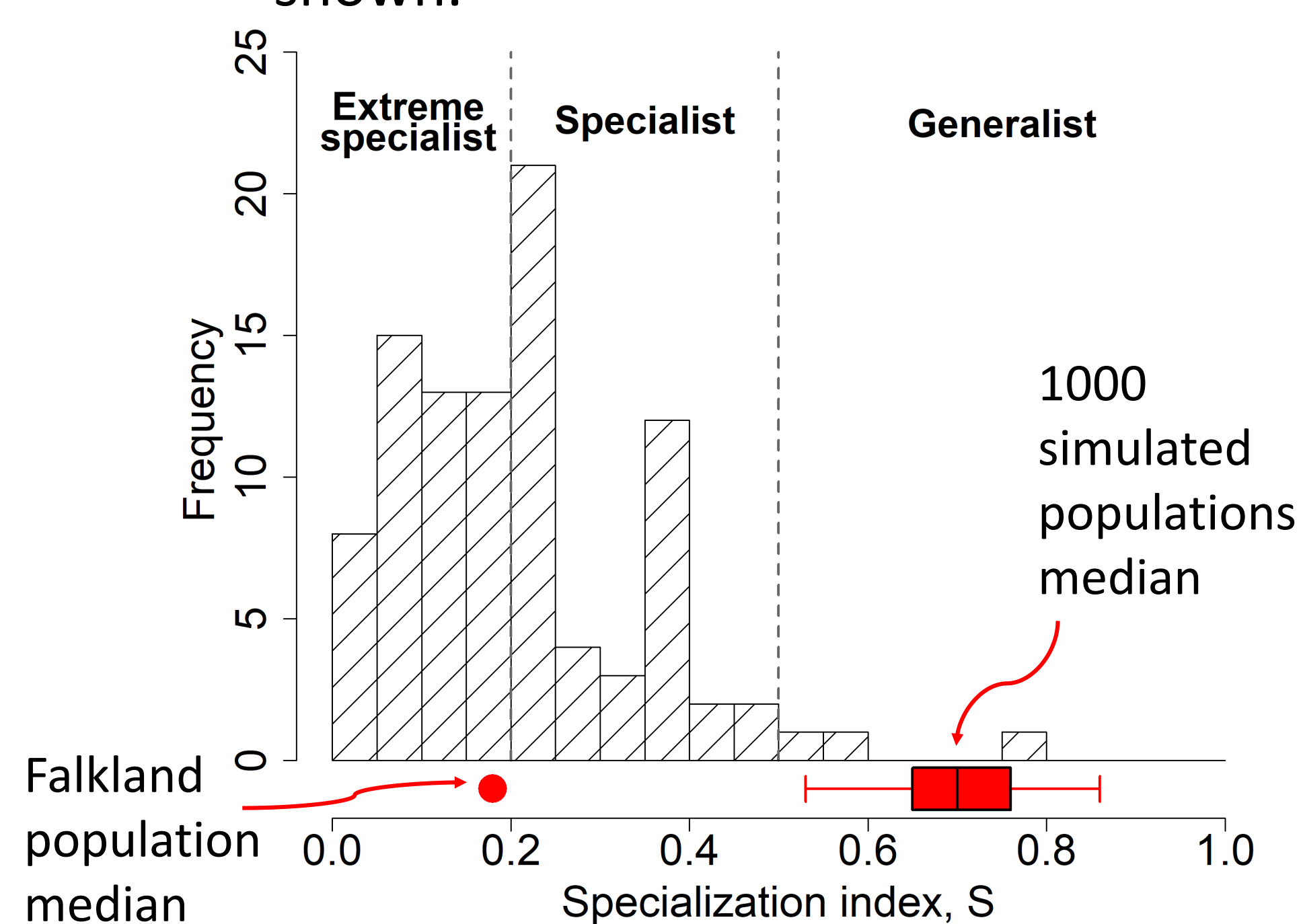


Fig. 3 Tissue corrected nitrogen and carbon stable isotopes of the sampled population and other pinniped populations. The Falkland *M. leonina* has the **largest recorded variability** in foraging strategies. The Falkland *M. leonina* population may have **similar foraging strategies** than the Falkland *O. flavescens* and some **male *M. leonina*** from the Patagonian population and the Antarctic Peninsula population.

Data were obtained from: (1) Lewis et al, 2006; (2) Eder et al, 2010; (3) Hückstädt et al. 2012 and (4) Baylis et al, 2015

Conclusions

- The individual specialization of the Falkland elephant seal population is very high.
- The only short term adaptation due to difference in physiological requirement seems to be an increase in the trophic level. Although that could be an artefact of the tissue discrimination factor correction.
- Some individuals of this population could be interacting with other pinniped populations such as the Falkland sea lion and the southern elephant seals from Antarctic Peninsula and Patagonia.

Bibliography

1. Mery F, Burns JG (2010) Behavioural plasticity: an interaction between evolution and experience. *Evol Ecol* 24: 571–583
2. Hückstädt LA, Koch PL, McDonald BI, et al. (2012) Stable isotope analyses reveal individual variability in the trophic ecology of a top marine predator, the southern elephant seal. *Oecologia* 169: 395–406

Acknowledgements

This research was funded by the Fundació Zoo Barcelona through the project "Amenazas para la conservación del Elefante marino del sur (*Mirounga leonina*) en el Atlántico meridional derivadas de la pesca comercial" and the Elephant Seal Research Group (www.eleseal.org). The fieldwork and sampling were authorized by the Falkland Islands Government Environmental Planning Department under the permit N° R11/2007.