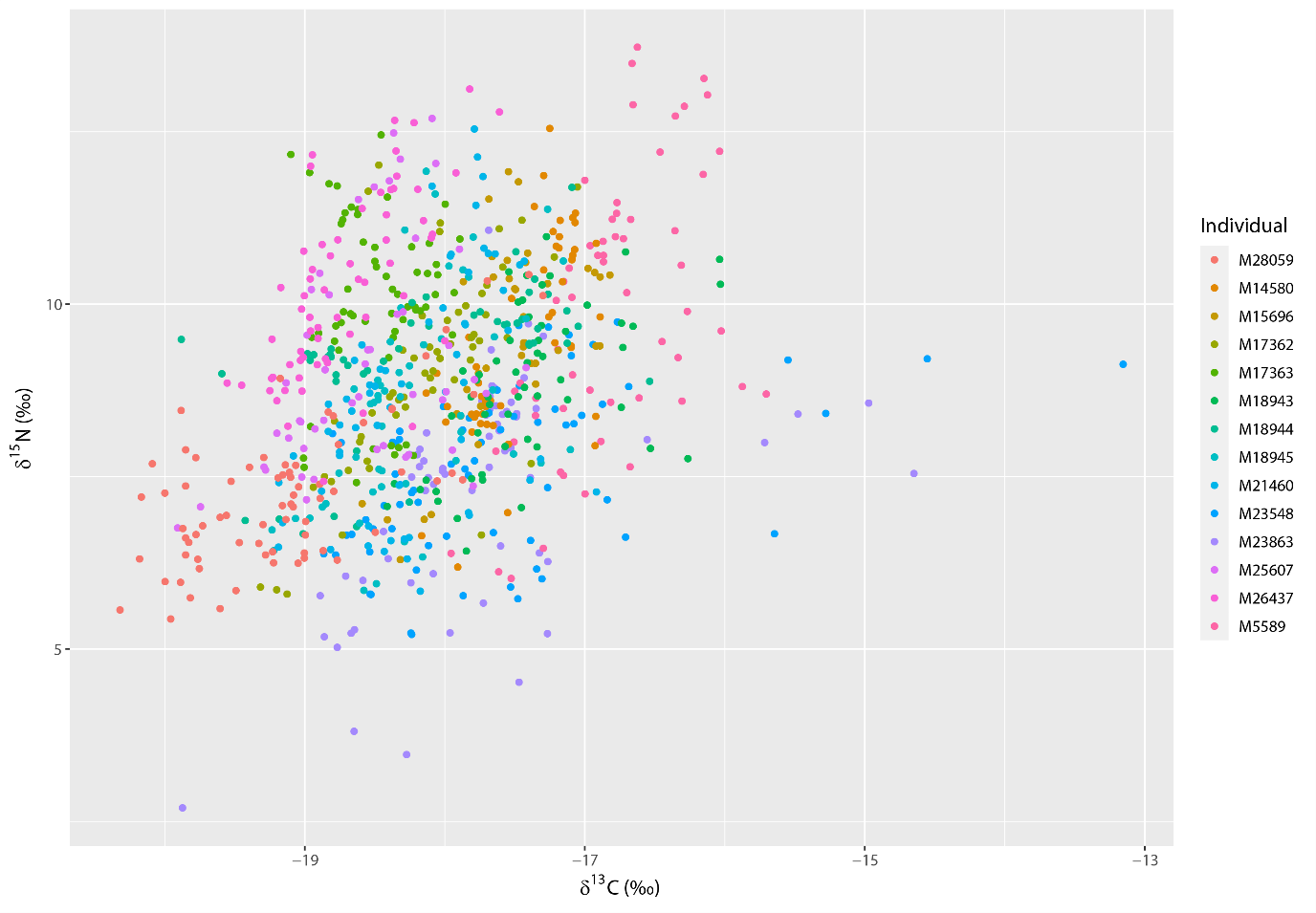
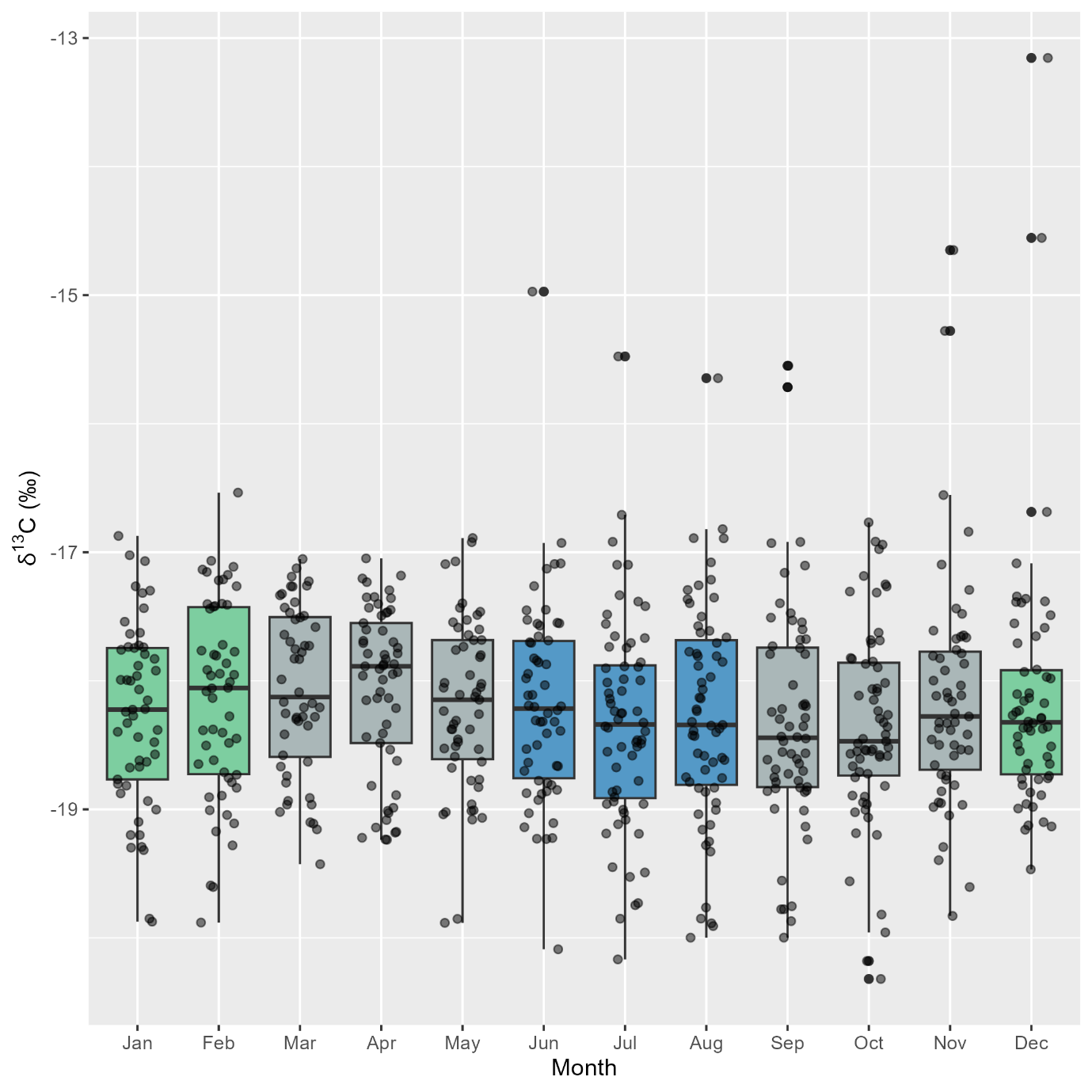
***Supplementary material***

**Supplementary Table 1.** Pygmy right whale baleen growth estimates. Plate position intervals represents the two nitrogen (*δ*15N) minimums used to estimate the growth rate of that cycle.

|  |  |  |
| --- | --- | --- |
| Individual ID | Plate position intervals | Growth rate (cm/year) |
| M18943 | 3 - 25 | 22.0 |
|  | 25 - 39 | 14.0 |
|  | 39 - 51 | 12.0 |
|  | | **16 ± 5.3** |
| M15696 | 8 - 24 | 16.0 |
|  | | **16.0** |
| M14580 | 22 - 44 | 22.0 |
|  | | **22.0** |
| M17363 | 2 - 27 | 25.0 |
|  | 27 - 38 | 11.0 |
|  | 38 - 57 | 19.0 |
|  | | **18.3 ± 7.0** |
| M17362 | 12 - 25 | 13.0 |
|  | 25 -42 | 17.0 |
|  | 42 - 52 | 10.0 |
|  | | **13.3 ± 3.5** |
| M18944 | 10 - 27 | 17.0 |
|  | | **17.0** |
| M18945 | 20 - 48 | 28.0 |
|  | | **28.0** |
| M21460 | 20 - 40 | 20.0 |
|  | 40 - 57 | 17.0 |
|  | | **18.5 ± 2.1** |
| M23548 | 10 - 22 | 12.0 |
|  | 22 - 45 | 23.0 |
|  | 45 - 69 | 24.0 |
|  | | **19.7 ± 6.7** |
| M23863 | 19 - 40 | 21.0 |
|  | 40 - 57 | 17.0 |
|  | | **19 ± 2.8** |
| M25607 | 5 - 29 | 24.0 |
|  | 29 - 50 | 21.0 |
|  | | **22.5 ± 2.1** |
| M26437 | 16 - 40 | 24.0 |
|  | | **24.0** |
| M28059 | 9 - 30 | 21.0 |
|  | 30 - 44 | 14.0 |
|  | | **17.5 ± 4.9** |
| M5589 | 15 - 34 | 19.0 |
|  | 34 -51 | 17.0 |
|  | | **18 ± 1.4** |
| Species average: | | **18.5 ± 4.8** |



**Supplementary Figure 1.** Isoscape of nitrogen (*δ*15N) and carbon (*δ*13C) bulk stable isotope values for all individuals (n = 14).



**Supplementary Figure 2**. Intra-annual variation in *δ*13C stable isotope values for adult pygmy right whales (n = 12 whales, 692 sequentially sampled points along baleen) grouped by month (Bartlett test: p = 0.06). Points represent individual values for the 12 individuals that had stranding dates. Box plots show median and 95% confidence intervals. Green = summer, blue = winter, and grey = autumn and spring.

A picture containing screenshot

Description automatically generated

**Supplementary Figure 3.** Relationship between *δ*15N values in the baleen of both female (purple) and male (orange) pygmy right whales and SST with no lag. Females showed a positive trend and males a negative trend between *δ*15N values and SST at both the eastern GAB (pictured here) and Bonney Upwelling, though these results were statistically non-significant (p = 0.23, p = 0.23 respectively).

**Supplementary Table 2.** Estimated baleen growth rates.

|  |  |  |
| --- | --- | --- |
| Species | Growth rate (cm/year) | Source |
| Blue whale (*Balaenoptera musculus*) | 13.5 - 15.5±2.2 | (Busquets-Vass et al., 2017; Trueman et al., 2019) |
| Humpback whale (*Megaptera novaeangliae*) | 12-20 | (Eisenmann et al., 2016) |
| Fin whale (*Balaenoptera physalus*) | 20±2.6 | (Bentaleb et al., 2011) |
| Common minke whale (*Balaenoptera acutorostrata*) | 12.9 | (Mitani et al., 2006) |
| Bowhead whale (*Balaena mysticetes*) | ~20 | (Matthews & Ferguson, 2015; Schell et al., 1989a, 1989b) |
| Southern right whale (*Eubalaena australis*) | ~27 | (Best & Schell, 1996) |
| Sei whale (*Balaenoptera borealis)* | 10-16.5 | (Reiss et al., 2020) |
| North Atlantic right whale (*Eubalaena glacialis*) | 24 | (Hunt et al., 2016; Lysiak et al., 2018; Lysiak, 2009) |

**References**

Bentaleb, I., Martin, C., Vrac, M., Mate, B., Mayzaud, P., Siret, D., De Stephanis, R., & Guinet, C. (2011). Foraging ecology of Mediterranean fin whales in a changing environment elucidated by satellite tracking and baleen plate stable isotopes. *Marine Ecology Progress Series, 438*, 285-302. https://doi.org/10.3354/meps09269

Best, P. B., & Schell, D. M. (1996). Stable isotopes in southern right whale (Eubalaena australis) baleen as indicators of seasonal movements, feeding and growth. *Marine Biology, 124*(4), 483-494. https://doi.org/10.1007/BF00351030

Busquets-Vass, G., Newsome, S., Calambokidis, J., Serra-Valente, G., Jacobsen, J., Aguíñiga-García, S., & Gendron, D. (2017). Estimating blue whale skin isotopic incorporation rates and baleen growth rates: Implications for assessing diet and movement patterns in mysticetes. *PLoS One, 12*(5). https://doi.org/10.1371/journal.pone.0177880

Eisenmann, P., Fry, B., Holyoake, C., Coughran, D., Nicol, S., & Bengtson Nash, S. (2016). Isotopic evidence of a wide spectrum of feeding strategies in Southern Hemisphere humpback whale baleen records. *PLoS One, 11*(5). https://doi.org/10.1371/journal.pone.0156698

Hunt, K. E., Lysiak, N. S., Moore, M. J., & Rolland, R. M. (2016). Longitudinal progesterone profiles in baleen from female North Atlantic right whales (Eubalaena glacialis) match known calving history. *Conservation Physiology, 4*(1). https://doi.org/10.1093/conphys/cow014

Lysiak, N. S., Trumble, S. J., Knowlton, A. R., & Moore, M. J. (2018). Characterizing the duration and severity of fishing gear entanglement on a North Atlantic right whale (Eubalaena glacialis) using stable isotopes, steroid and thyroid hormones in baleen. *Frontiers in Marine Science, 5*, 168. https://doi.org/10.3389/fmars.2018.00168

Lysiak, N. S. J. (2009). *Investigating the migration and foraging ecology of North Atlantic right whales with stable isotope geochemistry of baleen and zooplankton*. ProQuest.

Matthews, C. J., & Ferguson, S. H. (2015). Seasonal foraging behaviour of Eastern Canada-West Greenland bowhead whales: an assessment of isotopic cycles along baleen. *Marine Ecology Progress Series, 522*, 269-286. https://doi.org/10.3354/meps11145

Mitani, Y., Bando, T., Takai, N., & Sakamoto, W. (2006). Patterns of stable carbon and nitrogen isotopes in the baleen of common minke whale Balaenoptera acutorostrata from the western North Pacific. *Fisheries Science, 72*(1), 69-76. https://doi.org/10.1111/j.1444-2906.2006.01118.x

Reiss, L., Häussermann, V., & Mayr, C. (2020). Stable isotope records of sei whale baleens from Chilean Patagonia as archives for feeding and migration behavior. *Ecology and Evolution, 10*(2), 808-818. https://doi.org/10.1002/ece3.5939

Schell, D., Saupe, S., & Haubenstock, N. (1989a). Bowhead whale (Balaena mysticetus) growth and feeding as estimated by δ13C techniques. *Marine Biology, 103*(4), 433-443. https://doi.org/10.1007/BF00399575

Schell, D., Saupe, S., & Haubenstock, N. (1989b). Natural isotope abundances in bowhead whale (Balaena mysticetus) baleen: markers of aging and habitat usage. In *Stable isotopes in ecological research* (pp. 260-269). Springer. https://doi.org/10.1007/978-1-4612-3498-2\_15

Trueman, C. N., Jackson, A. L., Chadwick, K. S., Coombs, E. J., Feyrer, L. J., Magozzi, S., Sabin, R. C., & Cooper, N. (2019). Combining simulation modeling and stable isotope analyses to reconstruct the last known movements of one of Nature’s giants. *PeerJ, 7*, e7912. https://doi.org/10.7717/peerj.7912