***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.



**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) |

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