|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| length(m) | mass(kg) | *FMR*daily, WM(MJ/day) | cost(% of *FMR*daily, WM) | *FMR*daily, Nagy (MJ/day) | cost(% of *FMR*daily, Nagy) |
|  |  |  | breach | lunge |  | breach | lunge |
| 7.8 | 7000 | 190 | 0.5 | 0.4 | 1100 | 0.08 | 0.06 |
| 10.5 | 17000 | 280 | 1.0 | 0.4 | 2300 | 0.12 | 0.05 |
| 12.7 | 30000 | 360 | 1.0 | 0.4 | 3700 | 0.10 | 0.04 |
| 14.7 | 46000 | 440 | 2.2 | 0.6 | 5200 | 0.19 | 0.05 |
| 14.8 | 46000 | 440 | 2.3 | 0.8 | 5200 | 0.20 | 0.07 |

**Table S1A. Lower and upper bounds of daily Field Metabolic Rate (*FMR*daily) for five humpback whales across a range of sizes.** *FMR*daily, WM was calculated using the equation for marine mammal *FMR*daily proposed by Williams and Maresh (2015). *FMR*daily, Nagy was calculated using the equation for terrestrial mammal *FMR*daily proposed by Nagy (2005) and multiplied by 1.5. The cost of a high-performance breach and a single high-performance lunge are expressed as percentage of daily energy budget.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| species | length (m) | width (m) | mass (kg) | *Tacc* (s) | *Tplat* (s) | *Ui* (m/s) | *Uf* (m/s) | *aavg, acc* (m/s2) |
|  |  |  |  | breach | lunge | breach | lunge | breach | lunge | breach | lunge | breach | lunge |
| humpback | 7.8 | 1.4 | 7000 | 8.0 | 4.7 | 0.0 | 2.1 | 1.6 | 1.8 | 6.2 | 5.3 | 0.6 | 0.7 |
| humpback | 10.5 | 2.3 | 17000 | 8.1 | 4.7 | 0.0 | 0.0 | 1.6 | 1.8 | 7.1 | 5.0 | 0.7 | 0.7 |
| humpback | 12.7 | 2.3 | 30000 | 5.6 | 2.9 | 3.5 | 0.0 | 1.8 | 2.8 | 6.0 | 5.0 | 0.8 | 0.8 |
| humpback | 14.7 | 2.7 | 46000 | 8.5 | 3.3 | 0.0 | 0.0 | 1.5 | 2.0 | 8.2 | 4.8 | 0.8 | 0.9 |
| humpback | 14.8 | 2.8 | 46000 | 12.7 | 6.1 | 0.0 | 0.0 | 1.8 | 1.8 | 8.1 | 5.4 | 0.5 | 0.6 |
| blue | 25.2 | 2.9 | 104000 | - | 9.7 | - | 0.0 | - | 1.7 | - | 5.7 | - | 0.4 |

**Table S1B. Kinematic and morphological parameters used to calculate the energetics of breaching and lunge feeding.**