**Body size, sex and high philopatry influence the use of agricultural land by Galapagos giant tortoises**

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Supplementary Table 1 Full model set to describe the relationship of factors influencing duration of time tortoises spent in the agricultural zone. Data are based on 113 farmland visits from 31 tortoises tracked during 2009–2018. Thetop models that were greater than 2 ΔAIC values than the null and within 5 ΔAIC values of the best model are denoted in bold. Models in the top set containing a parameter with CI that intersected zero are denoted by ΔAIC\* and were not included in the top set of significant models.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model | K | AIC | ΔAIC | AIC weight |
| **Size + species + month exit** | **6** | **653.31** | **0\*** | **0.23** |
| **Size + sex + month exit** | **6** | **653.86** | **0.55\*** | **0.17** |
| **Size** | **4** | **654.86** | **1.56** | **0.1** |
| **Size + species + month exit** | **7** | **655.26** | **1.95\*** | **0.09** |
| **Size + species** | **5** | **655.58** | **2.27\*** | **0.07** |
| **Sex + month exit + species** | **6** | **655.77** | **2.46\*** | **0.07** |
| **Sex × size** | **6** | **656.46** | **3.15\*** | **0.05** |
| **Size + month enter** | **5** | **656.55** | **3.24\*** | **0.04** |
| **Size + sex** | **5** | **656.78** | **3.47\*** | **0.04** |
| **Sex + species** | **5** | **656.95** | **3.64\*** | **0.04** |
| **Size × species** | **6** | **657.35** | **4.04\*** | **0.03** |
| **Size + species + sex** | **6** | **657.53** | **4.22\*** | **0.03** |
| **Sex** | **4** | **658.11** | **4.81** | **0.02** |
| Month enter × size | 6 | 658.38 | 5.07 | 0.02 |
| Null | 3 | 662.75 | 9.44 | 0 |
| Species | 4 | 663.12 | 9.81 | 0 |
| Month enter | 4 | 664.75 | 11.44 | 0 |
| Month enter + species | 5 | 665.04 | 11.73 | 0 |

Supplementary Table 2 The mean area of a tortoise’s utilization distribution (UD) from their maximum likelihood occurrence estimate, the mean proportion of individual farms taken up by the utilization area, and the mean number of farms used, per utilization distrubtion.Data were taken from 23 individuals (eight *Chelonoidis donfaustoi* and 15 *Chelonoidis porteri*) tracked in the agricultural area during 2009–2018.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Occurrence estimate | Mean ± SE area of utilization (ha) | | Mean ± SE proportion of farm used | | Mean ± SE number of farms visited | |
| ***Chelonoidis donfaustoi*** | | | | | | |
| **Alison** |  |  |  |  |  |  |
| 25% UD | 0.1696 | 0.0434 | 0.0018 | 0.0004 | 1.6667 | 0.2887 |
| 50% UD | 0.5170 | 0.1338 | 0.0054 | 0.0013 | 2.0000 | 0.0000 |
| 75% UD | 1.1850 | 0.3583 | 0.0123 | 0.0034 | 2.3333 | 0.2887 |
| 95% UD | 2.9935 | 1.0875 | 0.0304 | 0.0101 | 2.6667 | 0.2887 |
| 99% UD | 4.8511 | 1.8367 | 0.0488 | 0.0170 | 2.6667 | 0.2887 |
| **Sandra** |  |  |  |  |  |  |
| 25% UD | 0.0396 | 0.0043 | 0.0010 | 0.0004 | 1.5000 | 0.3536 |
| 50% UD | 0.0710 | 0.0336 | 0.0014 | 0.0006 | 1.2500 | 0.2500 |
| 75% UD | 0.1861 | 0.0991 | 0.0034 | 0.0010 | 1.5000 | 0.5000 |
| 95% UD | 0.6313 | 0.2986 | 0.0123 | 0.0041 | 1.5000 | 0.5000 |
| 99% UD | 0.9653 | 0.4844 | 0.0180 | 0.0057 | 1.5000 | 0.5000 |
| **Connor** |  |  |  |  |  |  |
| 25% UD | 0.0426 | 0.0173 | 0.0004 | 0.0002 | 1.0000 | 0.0000 |
| 50% UD | 0.0705 | 0.0275 | 0.0007 | 0.0003 | 1.0000 | 0.0000 |
| 75% UD | 0.1077 | 0.0428 | 0.0010 | 0.0004 | 1.0000 | 0.0000 |
| 95% UD | 0.2973 | 0.0605 | 0.0028 | 0.0006 | 1.0000 | 0.0000 |
| 99% UD | 0.5537 | 0.1105 | 0.0053 | 0.0011 | 1.0000 | 0.0000 |
| **Dennis** |  |  |  |  |  |  |
| 25% UD | 0.0671 | 0.0151 | 0.0020 | 0.0011 | 3.6667 | 0.2887 |
| 50% UD | 0.2255 | 0.0451 | 0.0076 | 0.0048 | 4.0000 | 0.5000 |
| 75% UD | 0.5652 | 0.1044 | 0.0179 | 0.0107 | 4.6667 | 0.2887 |
| 95% UD | 1.4530 | 0.3238 | 0.0399 | 0.0214 | 6.0000 | 0.5000 |
| 99% UD | 2.6424 | 0.6345 | 0.0655 | 0.0311 | 6.0000 | 0.5000 |
| **Fredy** |  |  |  |  |  |  |
| 25% UD | 0.1027 | 0.0193 | 0.0065 | 0.0055 | 1.3333 | 0.2887 |
| 50% UD | 0.3385 | 0.0584 | 0.0192 | 0.0156 | 1.3333 | 0.2887 |
| 75% UD | 0.7308 | 0.2295 | 0.0275 | 0.0198 | 1.6667 | 0.5774 |
| 95% UD | 1.5879 | 0.6858 | 0.0427 | 0.0251 | 2.6667 | 1.4434 |
| 99% UD | 3.2346 | 1.4119 | 0.0734 | 0.0327 | 2.6667 | 1.4434 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Occurrence estimate | Mean ± SE area of utilization (ha) | | Mean ± SE proportion of farm used | | Mean ± SE number of farms visited | |
| **Helber** |  |  |  |  |  |  |
| 25% UD | 0.0712 | 0.0231 | 0.0016 | 0.0007 | 2.5000 | 0.3536 |
| 50% UD | 0.1573 | 0.0548 | 0.0034 | 0.0015 | 3.5000 | 0.3536 |
| 75% UD | 0.2780 | 0.0927 | 0.0056 | 0.0021 | 5.0000 | 0.7071 |
| 95% UD | 0.8892 | 0.2539 | 0.0171 | 0.0049 | 5.5000 | 1.0607 |
| 99% UD | 1.5092 | 0.4001 | 0.0323 | 0.0078 | 6.5000 | 1.7678 |
| **Herbert** |  |  |  |  |  |  |
| 25% UD | 0.0548 | 0.0125 | 0.0011 | 0.0004 | 2.2000 | 0.2236 |
| 50% UD | 0.1794 | 0.0402 | 0.0036 | 0.0013 | 2.4000 | 0.2739 |
| 75% UD | 0.5278 | 0.1010 | 0.0112 | 0.0036 | 2.4000 | 0.2739 |
| 95% UD | 1.6170 | 0.2666 | 0.0337 | 0.0094 | 2.4000 | 0.2739 |
| 99% UD | 2.7904 | 0.4646 | 0.0554 | 0.0141 | 2.4000 | 0.2739 |
| **Jumbo** |  |  |  |  |  |  |
| 25% UD | 0.1765 | 0.0608 | 0.0015 | 0.0005 | 1.3333 | 0.2887 |
| 50% UD | 0.4713 | 0.1883 | 0.0043 | 0.0014 | 1.6667 | 0.2887 |
| 75% UD | 1.2759 | 0.5066 | 0.0116 | 0.0038 | 1.6667 | 0.2887 |
| 95% UD | 3.7233 | 1.4359 | 0.0345 | 0.0102 | 1.6667 | 0.2887 |
| 99% UD | 6.2473 | 2.3791 | 0.0580 | 0.0168 | 1.6667 | 0.2887 |
| ***Chelonoidis porteri*** | | | | | | |
| **Lore** |  |  |  |  |  |  |
| 25% UD | 0.1150 | 0.0335 | 0.0027 | 0.0008 | 1.2000 | 0.2236 |
| 50% UD | 0.1906 | 0.0660 | 0.0053 | 0.0016 | 2.3333 | 0.5164 |
| 75% UD | 0.5093 | 0.1397 | 0.0162 | 0.0043 | 2.8333 | 0.8612 |
| 95% UD | 1.6473 | 0.4166 | 0.0530 | 0.0124 | 3.1667 | 0.8010 |
| 99% UD | 2.8336 | 0.7895 | 0.0804 | 0.0198 | 3.5000 | 0.9354 |
| **Lucy** |  |  |  |  |  |  |
| 25% UD | 0.0651 | 0.0197 | 0.0020 | 0.0006 | 1.0000 | 0.0000 |
| 50% UD | 0.2167 | 0.0818 | 0.0068 | 0.0024 | 1.2500 | 0.2500 |
| 75% UD | 0.4209 | 0.1598 | 0.0202 | 0.0058 | 2.2500 | 0.9465 |
| 95% UD | 0.8786 | 0.3070 | 0.0794 | 0.0457 | 4.0000 | 1.3540 |
| 99% UD | 1.4385 | 0.4492 | 0.1128 | 0.0473 | 5.2500 | 1.6008 |
| **Mandy** |  |  |  |  |  |  |
| 25% UD | 0.0761 | 0.0195 | 0.0019 | 0.0005 | 1.5000 | 0.2887 |
| 50% UD | 0.1823 | 0.0499 | 0.0045 | 0.0013 | 2.5000 | 0.2887 |
| 75% UD | 0.5884 | 0.1271 | 0.0144 | 0.0036 | 2.5000 | 0.2887 |
| 95% UD | 1.7319 | 0.4110 | 0.0410 | 0.0106 | 3.2500 | 0.7500 |
| 99% UD | 3.1737 | 0.7514 | 0.0744 | 0.0198 | 3.5000 | 0.6455 |

*Supplementary Table 2, continued*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Occurrence estimate | Mean ± SE area of utilization (ha) | | Mean ± SE proportion of farm used | | Mean ± SE number of farms visited | |
| **Mariposa** |  |  |  |  |  |  |
| 25% UD | 0.6251 | 0.2211 | 0.0031 | 0.0011 | 1.0000 | 0.0000 |
| 50% UD | 1.6619 | 0.7474 | 0.0084 | 0.0036 | 1.2500 | 0.2500 |
| 75% UD | 3.4362 | 1.5522 | 0.0204 | 0.0065 | 1.5000 | 0.2887 |
| 95% UD | 11.9663 | 4.8434 | 0.0799 | 0.0184 | 1.5000 | 0.2887 |
| 99% UD | 22.0129 | 7.6655 | 0.1476 | 0.0270 | 1.5000 | 0.2887 |
| **Patty** |  |  |  |  |  |  |
| 25% UD | 0.0206 | 0.0159 | 0.0007 | 0.0003 | 2.0000 | 0.0000 |
| 50% UD | 0.0317 | 0.0149 | 0.0032 | 0.0017 | 3.5000 | 1.0607 |
| 75% UD | 0.0790 | 0.0226 | 0.0133 | 0.0032 | 7.5000 | 2.4749 |
| 95% UD | 0.3495 | 0.0899 | 0.0626 | 0.0132 | 9.5000 | 3.1820 |
| 99% UD | 0.7263 | 0.1837 | 0.1176 | 0.0208 | 11.0000 | 4.2426 |
| **Veronica** |  |  |  |  |  |  |
| 25% UD | 0.0698 | 0.0231 | 0.0123 | 0.0063 | 1.3333 | 0.2887 |
| 50% UD | 0.1901 | 0.0751 | 0.0325 | 0.0185 | 1.6667 | 0.5774 |
| 75% UD | 0.2081 | 0.0929 | 0.0317 | 0.0202 | 4.0000 | 1.3229 |
| 95% UD | 0.5104 | 0.1692 | 0.0585 | 0.0363 | 5.0000 | 1.3229 |
| 99% UD | 0.9369 | 0.2165 | 0.0717 | 0.0365 | 6.0000 | 1.7321 |
| **Yvonne** |  |  |  |  |  |  |
| 25% UD | 0.0833 | 0.0381 | 0.0013 | 0.0006 | 1.3333 | 0.2887 |
| 50% UD | 0.1917 | 0.0862 | 0.0029 | 0.0013 | 2.0000 | 0.8660 |
| 75% UD | 0.3305 | 0.1412 | 0.0053 | 0.0021 | 3.0000 | 0.5000 |
| 95% UD | 0.6896 | 0.2588 | 0.0114 | 0.0037 | 3.6667 | 0.5774 |
| 99% UD | 1.0073 | 0.3490 | 0.0171 | 0.0048 | 3.6667 | 0.5774 |
| **George** |  |  |  |  |  |  |
| 25% UD | 0.0327 | 0.0159 | 0.0004 | 0.0001 | 3.5000 | 0.3536 |
| 50% UD | 0.0753 | 0.0260 | 0.0013 | 0.0004 | 7.5000 | 0.3536 |
| 75% UD | 0.2275 | 0.0637 | 0.0039 | 0.0012 | 8.5000 | 1.0607 |
| 95% UD | 0.9406 | 0.2060 | 0.0211 | 0.0084 | 9.5000 | 1.0607 |
| 99% UD | 2.0320 | 0.3723 | 0.0422 | 0.0112 | 10.5000 | 0.3536 |
| **Harry** |  |  |  |  |  |  |
| 25% UD | 0.0833 | 0.0223 | 0.0015 | 0.0003 | 4.3333 | 1.2583 |
| 50% UD | 0.2132 | 0.0610 | 0.0038 | 0.0009 | 6.0000 | 2.6458 |
| 75% UD | 0.4573 | 0.1394 | 0.0091 | 0.0020 | 7.6667 | 3.1754 |
| 95% UD | 1.4251 | 0.3835 | 0.0355 | 0.0082 | 8.3333 | 3.3292 |
| 99% UD | 2.5742 | 0.5717 | 0.0672 | 0.0146 | 8.3333 | 3.3292 |

*Supplementary Table 2, continued*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Occurrence estimate | Mean ± SE area of utilization (ha) | | Mean ± SE proportion of farm used | | Mean ± SE number of farms visited | |
| **Karlitos** |  |  |  |  |  |  |
| 25% UD | 0.0295 | 0.0061 | 0.0001 | 0.0000 | 1.0000 | 0.0000 |
| 50% UD | 0.1175 | 0.0406 | 0.0006 | 0.0002 | 1.0000 | 0.0000 |
| 75% UD | 0.5043 | 0.1639 | 0.0025 | 0.0008 | 1.0000 | 0.0000 |
| 95% UD | 1.7495 | 0.4263 | 0.0087 | 0.0021 | 1.0000 | 0.0000 |
| 99% UD | 4.8664 | 1.2428 | 0.0241 | 0.0062 | 1.0000 | 0.0000 |
| **Sebastian** |  |  |  |  |  |  |
| 25% UD | 0.0560 | 0.0162 | 0.0008 | 0.0002 | 3.6667 | 0.2887 |
| 50% UD | 0.1598 | 0.0507 | 0.0023 | 0.0008 | 5.3333 | 0.7638 |
| 75% UD | 0.4916 | 0.1534 | 0.0072 | 0.0023 | 5.6667 | 0.7638 |
| 95% UD | 1.3898 | 0.4144 | 0.0203 | 0.0063 | 7.3333 | 0.2887 |
| 99% UD | 2.8727 | 0.7329 | 0.0419 | 0.0110 | 7.3333 | 0.2887 |
| **Sepp** |  |  |  |  |  |  |
| 25% UD | 0.0528 | 0.0086 | 0.0003 | 0.0000 | 1.0000 | 0.0000 |
| 50% UD | 0.2535 | 0.0443 | 0.0013 | 0.0002 | 1.0000 | 0.0000 |
| 75% UD | 0.9485 | 0.2008 | 0.0047 | 0.0010 | 1.0000 | 0.0000 |
| 95% UD | 3.7215 | 0.6605 | 0.0185 | 0.0033 | 1.0000 | 0.0000 |
| 99% UD | 8.6047 | 1.2541 | 0.0427 | 0.0062 | 1.0000 | 0.0000 |
| **Sir David** |  |  |  |  |  |  |
| 25% UD | 0.1509 | 0.0682 | 0.0036 | 0.0020 | 4.0000 | 1.4142 |
| 50% UD | 0.4072 | 0.1831 | 0.0120 | 0.0069 | 7.0000 | 2.1213 |
| 75% UD | 0.9148 | 0.3810 | 0.0277 | 0.0100 | 10.5000 | 1.7678 |
| 95% UD | 2.6503 | 1.1164 | 0.0780 | 0.0175 | 12.5000 | 1.7678 |
| 99% UD | 4.3093 | 1.7079 | 0.1375 | 0.0261 | 14.0000 | 2.1213 |
| **Steve Devine** |  |  |  |  |  |  |
| 25% UD | 0.1709 | 0.0341 | 0.0008 | 0.0002 | 1.0000 | 0.0000 |
| 50% UD | 0.7025 | 0.1161 | 0.0035 | 0.0006 | 1.0000 | 0.0000 |
| 75% UD | 1.4574 | 0.3551 | 0.0073 | 0.0017 | 1.3750 | 0.2588 |
| 95% UD | 4.2219 | 1.1246 | 0.0220 | 0.0053 | 1.6250 | 0.4581 |
| 99% UD | 8.9403 | 2.2231 | 0.0489 | 0.0099 | 1.6250 | 0.4581 |
| **Wacho** |  |  |  |  |  |  |
| 25% UD | 0.0438 | 0.0164 | 0.0057 | 0.0035 | 4.0000 | 0.0000 |
| 50% UD | 0.0720 | 0.0269 | 0.0093 | 0.0045 | 10.0000 | 1.4142 |
| 75% UD | 0.1452 | 0.0502 | 0.0210 | 0.0065 | 15.0000 | 0.7071 |
| 95% UD | 0.3910 | 0.1248 | 0.0612 | 0.0129 | 19.0000 | 1.4142 |
| 99% UD | 0.7058 | 0.2173 | 0.1201 | 0.0226 | 21.0000 | 2.1213 |
| ***All tortoises*** | | | | | | |
| 25% UD | 0.0984 | 0.0118 | 0.0022 | 0.0004 | 1.8289 | 0.1400 |
| 50% UD | 0.2501 | 0.0302 | 0.0059 | 0.0009 | 2.5432 | 0.2700 |
| 75% UD | 0.5621 | 0.0621 | 0.0142 | 0.0017 | 3.2805 | 0.3700 |
| 95% UD | 1.6191 | 0.1744 | 0.0437 | 0.0041 | 3.9268 | 0.4500 |
| 99% UD | 2.9097 | 0.2885 | 0.0779 | 0.0060 | 4.2317 | 0.5000 |

*Supplementary Table 2, continued*

Supplementary Table 3 Mean overlap in space use among visits for each tortoise (± mean maximum likelihood and 95% CI for the mean estimate). The analysis is based on 83 fitted continuous time movement models from 23 tortoises tracked in the agricultural zone during 2009–2018.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Tortoise | Sex | Farmland visits | Low | Maximum likelihood | High |
| ***C. donfaustoi*** |  |  |  |  |  |
| Alison | female | 3 | 0.880 | 0.992 | 1 |
| Sandra | female | 4 | 0.648 | 0.874 | 0.992 |
| Connor | male | 5 | 0.850 | 0.932 | 0.981 |
| Dennis | male | 3 | 0.167 | 0.558 | 0.971 |
| Fredy | male | 3 | 0.414 | 0.742 | 0.935 |
| Helber | male | 2 | 0.848 | 0.997 | 1 |
| Herbert | male | 5 | 0.589 | 0.838 | 0.953 |
| Jumbo | male | 3 | 0.522 | 0.923 | 1 |
| ***C. porteri*** |  |  |  |  |  |
| Lore | female | 7 | 0.236 | 0.532 | 0.843 |
| Lucy | female | 4 | 0.812 | 0.996 | 1 |
| Mandy | female | 4 | 0.767 | 0.984 | 1 |
| Mariposa | female | 4 | 0.703 | 0.989 | 1 |
| Patty | female | 2 | 0.635 | 0.978 | 1 |
| Veronica | female | 3 | 0.414 | 0.648 | 0.912 |
| Yvonne | female | 3 | 0.746 | 0.927 | 0.991 |
| George | male | 2 | 0.678 | 0.993 | 1 |
| Harry | male | 3 | 0.378 | 0.825 | 1 |
| Karlitos | male | 3 | 0.668 | 0.989 | 1 |
| Sebastian | male | 3 | 0.568 | 0.958 | 1 |
| Sepp | male | 5 | 0.659 | 0.984 | 1 |
| Sir David | male | 2 | 0.664 | 0.895 | 0.997 |
| Steve Devine | male | 8 | 0.710 | 0.971 | 1 |
| Wacho | male | 2 | 0.40 | 0.874 | 1 |
|  |  |  |  |  |  |
| *All tortoises* | | 3.609 | 0.607 | 0.887 | 0.982 |
| SD | | 1.525 | 0.189 | 0.137 | 0.037 |
| SE | | 0.318 | 0.040 | 0.029 | 0.008 |