**Supplementary Material**

Altitudinal shifts in forest birds in a Mediterranean mountain range: causes and conservation prospects

José Luis Tellería

**Contents**

Table S1. Mean changes in the altitudinal distribution of bird species in the Guadarrama Mountains between 1976–1980 and 2014–2015.

Table S1. Mean changes in the altitudinal distribution of bird species in the Guadarrama Mountains between 1976–1980 and 2014–2015. The results of a Student's t-test are reported as well as the mean factor scores of species in the PC1 (SHRUB) and PC2 (TREE) used to describe their habitat preferences (see text).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Period: 1976-1980 | | Period: 2014-15 | | Student's t |  |
|  | n | mean elevation ± SE | n | mean elevation ± SE | P | SHRUB/TREE |
| Sampling points | 135 | 1267.82 ± 30.65 | 124 | 1263.83 ± 31.97 | n.s. | 0.09/-0.03 |
| *Aegithalos caudatus* | 7 | 1237.14 ± 72.99 | 5 | 978.20 ± 101.14 | n.s. | 0.99/-0.63 |
| *Carduelis citrinella* | 30 | 1727.33 ± 35.01 | 10 | 1736.30 ± 53.79 | n.s. | -0.57/0.50 |
| *Certhia brachydactyla* | 30 | 1572.50 ± 54.72 | 33 | 1270.27 ± 50.86 | <0.001 | 0.01/0.36 |
| *Columba palumbus* | 22 | 1189.09 ± 88.65 | 36 | 1065.58 ± 45.21 | n.s. | 0.05/-0.41 |
| *Cyanistes caeruleus* | 24 | 1184.58 ± 50.20 | 47 | 1097.36 ± 32.54 | n.s. | 0.26/-0.30 |
| *Dendrocopos major* | 19 | 1569.47 ± 79.22 | 14 | 1527.86 ± 48.12 | n.s. | -0.08/0.81 |
| *Emberiza cia* | 13 | 1534.62 ± 82.28 | 6 | 1495.33 ± 116.63 | n.s. | 0.78/0.52 |
| *Emberiza cirlus* | 6 | 993.33 ± 46.09 | 6 | 1048.33 ± 85.73 | n.s. | 0.72/-0.82 |
| *Erithacus rubecula* | 57 | 1511.93 ± 36.47 | 46 | 1362.76 ± 33.85 | 0.004 | 0.23/0.58 |
| *Ficedula hypoleuca* | 5 | 1810.00 ± 29.50 | 8 | 1356.38 ± 74.78 | 0.001 | 0.09/0.20 |
| *Fringilla coelebs* | 101 | 1344.50 ± 36.41 | 97 | 1291.06 ± 32.32 | n.s. | -0.05/0.14 |
| *Garrulus glandarius* | 7 | 1588.57 ± 117.38 | 9 | 1268.67 ± 60.78 | 0.022 | 0.33/0.87 |
| *Hippolais polyglotta* | 11 | 1098.18 ± 55.03 | 8 | 1110.13 ± 37.64 | n.s. | 0.05/-0.77 |
| *Lanius senator* | 5 | 1010.00 ± 92.41 | 7 | 1079.86 ± 40.58 | n.s. | -0.64/-1.10 |
| *Linaria cannabina* | 7 | 1188.57 ± 103.17 | 9 | 937.56 ± 42.48 | 0.028 | 0.46/-0.71 |
| *Lophophanes cristatus* | 23 | 1659.13 ± 47.65 | 23 | 1456.22 ± 59.10 | 0.006 | -0.47/0.78 |
| *Loxia curvirostra* | 22 | 1776.36 ± 31.69 | 13 | 1672.77 ± 72.13 | n.s. | 0.16/0.54 |
| *Lullula arborea* | 37 | 1163.38 ± 53.14 | 22 | 1040.95 ± 66.78 | 0.016 | 0.34/-0.88 |
| *Luscinia megarhynchos* | 42 | 1042.02 ± 23.92 | 32 | 1014.94 ± 22.36 | n.s. | 0.27/-0.79 |
| *Miliaria calandra* | 12 | 1084.17 ± 39.91 | 17 | 1023.06 ± 21.15 | n.s. | -0.11/-0.99 |
| *Oriolus oriolus* | 16 | 922.19 ± 50.57 | 29 | 1011.45 ± 29.48 | n.s. | 0.39/-0.62 |
| *Parus major* | 26 | 1025.58 ± 44.78 | 29 | 1127.21 ± 30.08 | n.s. | 0.66/-0.06 |
| *Passer domesticus* | 7 | 962.86 ± 75.05 | 29 | 965.69 ± 23.56 | n.s. | 0.01/-0.97 |
| *Periparus ater* | 42 | 1699.29 ± 30.67 | 44 | 1574.61 ± 34.38 | 0.008 | -0.34/1.02 |
| *Phylloscopus bonelli* | 38 | 1251.84 ± 33.61 | 38 | 1242.45± 26.47 | n.s. | 0.51/0.17 |
| *Pica pica* | 45 | 895.00 ± 24.57 | 22 | 914.95 ± 31.67 | n.s. | -0.02/-1.00 |
| *Picus sharpey* | 44 | 1051.93 ± 51.24 | 16 | 1093.75 ± 46.05 | n.s. | 0.37/-0.19 |
| *Prunella modularis* | 25 | 1748.40 ± 36.59 | 6 | 1825.83 ± 32.29 | n.s. | 0.18/0.05 |
| *Regulus ignicapillus* | 12 | 1544.17 ± 52.23 | 21 | 1401.57 ± 56.89 | n.s. | -0.17/0.80 |
| *Regulus regulus* | 35 | 1718.57 ± 28.89 | 15 | 1585.47 ± 49.22 | 0.019 | -0.64/0.99 |
| *Carduelis citrinella* | 30 | 1727.33 ± 35.01 | 10 | 1736.30 ± 53.79 | n.s. | -0.57/0.50 |
| *Serinus serinus* | 53 | 1187.26 ± 42.56 | 48 | 1028.83 ± 22.46 | 0.002 | 0.20/-0.69 |
| *Sitta europaea* | 5 | 1574.00 ± 116.30 | 10 | 1389.20 ± 77.20 | n.s. | -0.01/0.94 |
| *Streptopelia turtur* | 16 | 892.50 ± 68.39 | 8 | 1013.63 ± 46.68 | n.s. | 0.57/-0.64 |
| *Sturnus unicolor* | 24 | 1044.79 ± 43.25 | 24 | 1035.63 ± 27.96 | n.s. | -0.26/-0.78 |
| *Sylvia atricapilla* | 6 | 1383.33 ± 42.87 | 30 | 1295.03 ± 41.55 | n.s. | 0.13/0.55 |
| *Sylvia borin* | 14 | 1337.14 ± 57. 93 | 18 | 1166.67 ± 27.33 | 0.008 | 0.24/-0.28 |
| *Sylvia cantillans* | 11 | 901.82 ± 38.56 | 16 | 934.81 ± 31.15 | n.s. | 0.81/-0.75 |
| *Sylvia communis* | 20 | 1169.25 ± 42.24 | 5 | 1105.60 ± 15.86 | n.s. | -0.51/-0.91 |
| *Sylvia hortensis* | 5 | 1020.00 ± 52.54 | 6 | 1000.00 ± 49.04 | n.s. | 0.42/-0.80 |
| *Troglodytes troglodytes* | 20 | 1500.00 ± 57.01 | 26 | 1286.77 ± 54.77 | 0.017 | 0.28/0.56 |
| *Turdus merula* | 75 | 1403.93 ± 38.59 | 49 | 1143.80 ± 30.46 | <0.001 | 0.33/-0.10 |
| *Turdus viscivorus* | 35 | 1461.86 ± 47.57 | 6 | 1353.33 ± 135.43 | n.s. | -0.66/0.37 |