

Supplementary material

Appendix 1

Table A1. Summary of occurrence data for straight-billed reedhaunter (*Limnocitites rectirostris*) and eryngo species (*Eryngium* spp.).

| Species | Total number of records | Records in March- August (%) | Records in September- February (%) | Years of coverage | Resolution |
|-------------------------|-------------------------------|------------------------------------|--|----------------------|------------|
| <i>L. rectirostris</i> | 166 | 30.3 | 69.7 | 1841–2017 | 10 km |
| <i>E. eburneum</i> | 57 | 24.4 | 75.6 | 1970–2016 | 10 km |
| <i>E. horridum</i> | 69 | 14.8 | 85.2 | 1954–2015 | 10 km |
| <i>E. pandanifolium</i> | 107 | 26.0 | 74.0 | 1949–2016 | 10 km |

Table A2. Percent contribution PC and permutation importance PI (%) of environmental predictors for eryngo SDMs. BIO1: annual mean temperature, BIO2: mean diurnal range (mean of monthly (maximum temperature – minimum temperature)), BIO5: maximum temperature of warmest month, BIO7: temperature annual range, BIO8: mean temperature of wettest quarter, BIO12: annual precipitation, BIO14: precipitation of driest month, BIO16: precipitation of wettest quarter, BIO18: precipitation of warmest quarter. Values in bold show the greatest values.

| Environmental variable | <i>E. eburneum</i> | | <i>E. horridum</i> | | <i>E. pandanifolium</i> | |
|------------------------|--------------------|-------------|--------------------|-------------|-------------------------|-------------|
| | PC | PI | PC | PI | PC | PI |
| BIO14 | 99.6 | 90.2 | 55.6 | 1.6 | 64.6 | 2.4 |
| BIO18 | 0.3 | 7.2 | 31.7 | 51.9 | 0.4 | 0.1 |
| BIO16 | 0.1 | 0.7 | 0.0 | 1.0 | 1.7 | 36.0 |
| BIO5 | 0.0 | 1.9 | 0.0 | 0.0 | 6.0 | 6.2 |
| BIO8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 |
| BIO7 | 0.0 | 0.0 | 0.0 | 0.5 | 0.9 | 0.1 |
| BIO2 | 0.0 | 0.0 | 0.0 | 0.0 | 5.0 | 4.5 |
| BIO1 | 0.0 | 0.0 | 7.2 | 22.7 | 0.7 | 0.6 |
| BIO12 | 0.0 | 0.0 | 5.5 | 22.3 | 20.3 | 50.2 |

Table A3. Percent contribution PC and permutation importance PI (%) of environmental predictors for straight-billed reedhaunter SDMs. BIO1: annual mean temperature, BIO2: mean diurnal range (mean of monthly (maximum temperature – minimum temperature)), BIO3: isothermality $100 \times (\text{BIO2}/\text{BIO7})$, BIO5: maximum temperature of warmest month, BIO7: temperature annual range, BIO8: mean temperature of wettest quarter, BIO9: mean temperature of driest quarter, BIO10: mean temperature of warmest quarter, BIO12: annual precipitation, BIO13: precipitation of wettest month. Values in bold show the greatest values.

| Environmental variable | Model with climate + biotic interactions | | Model with climate only | |
|-------------------------|--|-------------|-------------------------|-------------|
| | PC | PI | PC | PI |
| <i>E. eburneum</i> | 33.7 | 60.3 | - | - |
| BIO8 | 31.8 | 18.6 | 46.0 | 19.3 |
| BIO3 | 9.5 | 10.2 | 10.8 | 15.2 |
| <i>E. horridum</i> | 9.2 | 0.0 | - | - |
| BIO1 | 5.2 | 0.3 | 13.7 | 2.8 |
| BIO13 | 3.3 | 7.5 | 2.8 | 18.6 |
| BIO7 | 2.1 | 0.0 | 0.5 | 0.2 |
| BIO5 | 2.0 | 0.0 | 1.5 | 0.0 |
| BIO10 | 1.9 | 3.0 | 3.3 | 10 |
| BIO2 | 1.3 | 0.0 | 16.4 | 7.9 |
| <i>E. pandanifolium</i> | 0.1 | 0.0 | - | - |
| BIO9 | 0.0 | 0.0 | 1.4 | 9.7 |
| BIO12 | 0.0 | 0.0 | 3.5 | 16.1 |

Figure A1. Important predictors for straight-billed reedhaunter SDM using climatic variables only. Jackknife tests of environmental variable importance in SDMs relative to all environmental variables (black bars) for each predictor variable alone (dark gray bars), and the drop in training gain when the variable is removed from the full model (light gray bars) is shown in (A) and response curve of the most important predictor is shown in (B). BIO1: annual mean temperature, BIO2: mean diurnal range (mean of monthly (maximum temperature – minimum temperature)), BIO3: isothermality $100 \times (\text{BIO2}/\text{BIO7})$, BIO5: maximum temperature of warmest month, BIO7: temperature annual range, BIO8: mean temperature of wettest quarter, BIO9: mean temperature of driest quarter, BIO10: mean temperature of warmest quarter, BIO12: annual precipitation, BIO13: precipitation of wettest month. Gray bands depict one standard deviation.

