Supporting Information

13/05/2019

Fielding. M.F., J.B. Buettel, H. Nguyen and B.W. Brook. 2019. Ravens exploit wildlife roadkill and agricultural landscapes but do not affect songbird assemblages. Emu – Austral Ornithology.

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| **Birds of prey** |  | **Honeyeaters cont.** |  | **Shorebirds & waders** |
| Australian hobby |  | Yellow wattlebird |  | Dotterels |
| Brown falcon |  | Yellow-throated honeyeater |  | Godwits |
| Brown goshawk |  |  |  | Grebes |
| Collared sparrowhawk |  | **Introduced** |  | Greenshanks |
| Grey goshawk |  | Common blackbird |  | Gulls |
| Masked owl |  | Common starling |  | Knots |
| Nankeen kestrel |  | Eurasian skylark |  | Lapwings & plovers |
| Peregrine falcon |  | European greenfinch |  | Oystercatchers |
| Southern boobook |  | House sparrow |  | Sandpipers |
| Swamp harrier |  | Rock dove (feral pigeon) |  | Snipes |
| Wedge-tailed eagle |  | Spotted turtle-dove |  | Stints |
| Whistling kite |  |  |  | Terns |
| White-bellied sea-eagle |  | **Kingfishers** |  | Turnstones |
|  |  | Azure kingfisher |  |  |
| **Cockatoos** |  | Laughing kookaburra |  | **Swallows** |
| Galah |  |  |  | Tree martin |
| Little corella |  | **Pardalotes** |  | Welcome swallow |
| Long-billed corella |  | Spotted pardalote |  |  |
| Sulphur-crested cockatoo |  | Forty-spotted pardalote |  | **Swifts & swiftlets** |
| Yellow-tailed black-cockatoo |  | Striated pardalote |  | Fork-tailed swift |
|  |  |  |  | White-throated needletail |
| **Cuckoos** |  | **Parrots** |  |  |
| Fan-tailed cuckoo |  | Blue-winged parrot |  | **Thrushes** |
| Horsfield's bronze-cuckoo |  | Eastern ground parrot |  | Bassian thrush |
| Pallid cuckoo |  | Eastern rosella |  |  |
| Shining bronze-cuckoo |  | Green rosella |  | **Warblers** |
|  |  | Musk lorikeet |  | Clamorous reed warbler |
| **Cuckoo-shrikes** |  | Orange-bellied parrot |  | Golden-headed cisticola |
| Black-faced cuckoo-shrike |  | Swift parrot |  | Little grassbird |
|  |  |  |  |  |
|  |  |  |  |  |
| **Fairy-wrens** |  | **Pigeons** |  | **Waterbirds** |
| Southern emu-wren |  | Brush bronzewing |  | Australian pelican |
| Superb fairy-wren |  | Common bronzewing |  | Black swan |
|  |  |  |  | Cape Barren goose |
| **Finches** |  | **Pipits** |  | Coots |
| Beautiful firetail |  | Australian pipit |  | Cormorants |
| European goldfinch |  |  |  | Ducks |
|  |  | **Robins** |  | Dusky moorhen |
| **Flycatchers & fantails** |  | Dusky robin |  | Egrets |
| Grey fantail |  | Flame robin |  | Herons |
| Satin flycatcher |  | Pink robin |  | Nankeen night-heron |
|  |  | Scarlet robin |  | Purple swamphen |
| **Frogmouths & nightjars** |  |  |  | Rails |
| Australian owlet-nightjar |  | **Scrubwrens & thornbills** |  | Tasmanian native hen |
| Tawny frogmouth |  | Yellow-rumped thornbill |  |  |
|  |  | Tasmanian thornbill |  | **Whistlers & shrike-thrushes** |
| **Ground-dwellers** |  | Brown thornbill |  | Golden whistler |
| Brown quail |  | Tasmanian scrubwren |  | Grey shrike-thrush |
| Spotted quail-thrush |  | Striated fieldwren |  | Olive whistler |
| Superb lyrebird |  | Scrubtit |  |  |
|  |  |  |  | **White-eyes** |
| **Honeyeaters** |  | **Seabirds** |  | Silver-eye |
| Black-headed honeyeater |  | Albatrosses |  |  |
| Crescent honeyeater |  | Fulmars |  | **Woodswallows** |
| Eastern spinebill |  | Gannets |  | Dusky woodswallow |
| Little wattlebird |  | Penguins |  |  |
| New Holland honeyeater |  | Petrels |  |  |
| Noisy miner |  | Prions |  |  |
| Strong-billed honeyeater |  | Shearwaters |  |  |
| Tawny-crowned honeyeater |  |  |  |  |
| White-fronted chat |  |  |  |  |

Table S1. Species groups used during surveys for species other than the ‘focal species’ based on taxonomy and ecological relatability.

Table S2. Predictor and response variables used in the models tested on the road and community data.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model structure for road data |  |  |  |  |
| On route – Single raven |  | All data – Single raven |  | All data – Group |
| Null |  | Null |  | Null |
| Vegetation |  | Urban |  | Urban |
| Roadkill |  | Farm |  | Farm |
| Roadkill + Vegetation |  | Forest |  | Forest |
| Roadkill \* Vegetation |  | Urban + farm |  | Urban + farm |
|  |  | Urban + forest |  | Urban + forest |
| On route - Group |  | Farm +forest |  | Farm + forest |
| Null |  |  |  | Season |
| Vegetation |  |  |  | Season + farm |
| Roadkill |  |  |  | Season + farm + forest |
| Roadkill + Vegetation |  |  |  | Season + farm + urban |
| Roadkill \* Vegetation |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model structure for community data | | |  |  |
| Diversity of native passerines |  | Total no. of native passerines |  | Total no. of all passerines |
| Null (includes Wind) |  | Null (includes Wind) |  | Null (includes Wind) |
| Urban |  | Urban |  | Urban |
| Farm |  | Farm |  | Farm |
| Forest |  | Forest |  | Forest |
| Urban + forest |  | Urban + forest |  | Urban + forest |
| Forest + farm |  | Forest + farm |  | Forest + farm |
| Raven |  | Raven |  | Raven |
| Raven + urban |  | Raven + urban |  | Raven + urban |
| Raven + forest |  | Raven + forest |  | Raven + forest |
| Raven + farm |  | Raven + farm |  | Raven + farm |
| Urban + traffic + human |  | Urban + traffic + human |  | Urban + traffic + human |
| Forest + traffic + human |  | Forest + traffic + human |  | Forest + traffic + human |
| Farm + traffic + human |  | Farm + traffic + human |  | Farm + traffic + human |
| Urban + human |  | Urban + human |  | Urban + human |
| Forest + human |  | Forest + human |  | Forest + human |
| Farm + human |  | Farm + human |  | Farm + human |
| Human |  | Human |  | Human |
| Forest |  | Forest |  | Forest |
| Introduced species |  | Introduced species |  |  |

Table S3. Out-of-sample predictions for six climate-based species distribution models fitted to the presence records (and pseudo-absence points) of the Forest Raven in Tasmania. For each model-species combination, the true skill statistic (TSS) and area under the receiver operator curve (AUC) are shown.GAM = generalised additive model; MARS = multivariate adaptive regression spline; BRT = boosted regression tree; RF = random forests; FDA = flexible discriminant analysis; MDA = mixture discriminant analysis

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | GAM | MARS | BRT | RF | FDA | MDA |
| AUC | 0.62 | 0.63 | 0.58 | 0.63 | 0.57 | 0.61 |
| TSS | 0.2 | 0.23 | 0.16 | 0.22 | 0.15 | 0.19 |

Table S4. Number of ravens observed on the eight routes with roadkill data (‘on route’) and in total. Percentages are calculated using the total number of birds for that column.

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Factor | On route | Total |
| Season | Spring | 91 (19.2%) | 156 (19.9%) |
|  | Summer | 92 (19.5%) | 151 (19.3%) |
|  | Autumn | 132 (27.9%) | 226 (28.9%) |
|  | Winter | 158 (33.4%) | 250 (31.9%) |
| Roadkill | Yes | 112 (23.7%) | N/A |
|  | No | 361 (76.3%) | N/A |
| Mean distance (m) | Farm | N/A | 118 |
|  | Forest | N/A | 70 |
|  | Urban | N/A | 2640 |
| Total birds |  | 473 | 783 |

Table S5. The mean total number of Forest Ravens, total number of Forest Ravens and other ‘focal species’, species richness of native passerines, total number of native passerines and total number of all passerines for each site type.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | High human  high nature | High human  low nature | Low human  high nature | Low human  low nature |
| Number of Forest Ravens | 0.8 | 1.1 | 7.1 | 7.0 |
| Number of Forest Ravens and other ‘focal species’ | 2.1 | 2.6 | 8.8 | 8.2 |
| Native passerine species richness | 2.8 | 2.0 | 3.6 | 2.6 |
| Total number of native passerines | 9.5 | 8.0 | 15.1 | 12.9 |
| Total number of all passerines | 9.5 | 14.6 | 17.3 | 25.8 |