Cat abundance

Cats were detected on transects at 24 of 53 sites, totaling 53 detections of 42 individuals. Forty-four individual cats were detected on cameras at 25 of 48 sites. Cats were detected on camera at 10 sites where no cats were detected by transect, and cats were detected by transect at 6 sites where no cats were detected by camera (plus an additional 3 sites that did not receive camera deployments). Combined between both methods, cats were detected at 34 of 53 sites.

Cat abundance was higher at intermediate levels of urbanization. For transect data, all three quadratic response models received substantially more support than linear response models (Table 6). Impervious surface was the best-supported urbanization measure for transect data. For camera data, quadratic response to canopy cover received the most support (Table 7). Linear responses to urbanization received a greater proportion of support from camera models compared to transects, however, with linear responses to canopy cover and impervious surface receiving substantial support (AICc < 2, Burnham and Anderson 2003).

Additional models including the best-supported urbanization measure were compared for each dataset to examine the influence of human demographic variables on cat abundance. For both model sets, the best supported model was the quadratic form of the urbanization variable plus percentage of the site’s census tract population with at least a high school degree (transects, Table 8; cameras, Table 9). For both model sets, there was a negative relationship between cat abundance and educational attainment and a negative quadratic relationship between cat abundance and urbanization (Table 10). The linear term of impervious surface was positively related to cat abundance in transect models, and the linear term of canopy cover was negatively related to cat abundance in camera models (Table 10).

Predicted cat abundance measures from candidate models were used to find model-averaged estimates of cat density at transect sites (Figure 2). Average density across sites was 5.12 cats/ha.

Table 2. Transect-derived models of urbanization influence on cat abundance ranked by degree of support. K is the number of estimated parameters. AICcwt is the AICc weight.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Model λ formula | K | AICc | ΔAICc | AICcwt | Log-likelihood |
| imp + imp2 | 9 | 457.18 | 0 | 0.59 | -217.50 |
| density + density2 | 9 | 458.18 | 1.00 | 0.36 | -218.00 |
| can + can2 | 9 | 462.16 | 4.98 | 0.05 | -219.99 |
| can | 8 | 467.05 | 9.87 | 0.00 | -223.89 |
| imp | 8 | 468.35 | 11.17 | 0.00 | -224.54 |
| density | 8 | 468.76 | 11.58 | 0.00 | -224.74 |

Table 3. Camera-derived candidate models of the influence of urbanization on cat abundance ranked by degree of support. K is the number of estimated parameters. AICcwt is the model’s AICc weight.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Model λ formula | K | AICc | ΔAICc | AICcwt | Log-likelihood |
| can + can2 | 6 | 691.20 | 0 | 0.35 | -338.58 |
| can | 5 | 691.93 | 0.73 | 0.24 | -340.25 |
| imp | 5 | 692.84 | 1.64 | 0.15 | -340.71 |
| density | 5 | 693.40 | 2.20 | 0.12 | -340.99 |
| imp + imp2 | 6 | 693.65 | 2.45 | 0.10 | -339.80 |
| density + density2 | 6 | 695.66 | 4.45 | 0.04 | -340.80 |

Table 4. Transect-derived candidate models of the influence of urbanization and human demographics on cat abundance ranked by degree of support. K is the number of estimated parameters. AICcwt is the model’s AICc weight.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Model λ formula | K | AICc | ΔAICc | AICcwt | Log-likelihood |
| imp + imp2 + eduHS | 10 | 453.88 | 0 | 0.49 | -214.32 |
| imp + imp2 + eduC | 10 | 456.44 | 2.56 | 0.14 | -215.60 |
| imp + imp2 + inc | 10 | 456.93 | 3.06 | 0.11 | -215.85 |
| imp + imp2 | 9 | 457.18 | 3.30 | 0.09 | -217.50 |
| imp + imp2 + marred | 10 | 457.22 | 3.35 | 0.09 | -215.99 |
| imp + imp2 + inc + inc2 | 11 | 458.29 | 4.41 | 0.05 | -214.93 |
| imp + imp2 + age | 10 | 459.87 | 5.99 | 0.02 | -217.32 |
| imp + imp2 + age + age2 | 11 | 463.07 | 9.19 | 0.00 | -217.31 |

Table 5. Camera-derived candidate models of the influence of urbanization and human demographics on cat abundance ranked by degree of support. K is the number of estimated parameters. AICcwt is the model’s AICc weight.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Model λ formula | K | AICc | ΔAICc | AICcwt | Log-likelihood |
| can + can2 + eduHS | 7 | 690.90 | 0 | 0.32 | -337.05 |
| can + can2 | 6 | 691.20 | 0.30 | 0.28 | -338.58 |
| can + can2 + eduC | 7 | 692.83 | 1.93 | 0.12 | -338.01 |
| can + can2 + marred | 7 | 693.46 | 2.56 | 0.09 | -338.33 |
| can + can2 + age | 7 | 693.87 | 2.97 | 0.07 | -338.54 |
| can + can2 + inc | 7 | 693.90 | 3.00 | 0.07 | -338.55 |
| can + can2 + age + age2 | 8 | 696.63 | 5.73 | 0.02 | -338.47 |
| can + can2 + inc + inc2 | 8 | 696.72 | 5.82 | 0.02 | -338.51 |

Table 6. Beta and standard error estimates of the influence of urbanization and human demographic variables on cat abundance. The urbanization measure (Urban) used in transect models was impervious surface. The urbanization measure used in camera models was canopy cover. Urbanization variable β and SE estimates are averaged by model weight. eduHS refers to the percent of a census tract population with at least a high school diploma.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Urban | |  | Urban2 | |  | eduHS | |
| Model set |  |  |  |  |  |  |  | SE |
| Transect | 1.54 | 0.52 |  | -1.53 | 0.52 |  | -0.46 | 0.17 |
| Camera | -0.26 | 0.25 |  | -0.42 | 0.27 |  | -0.30 | 0.17 |

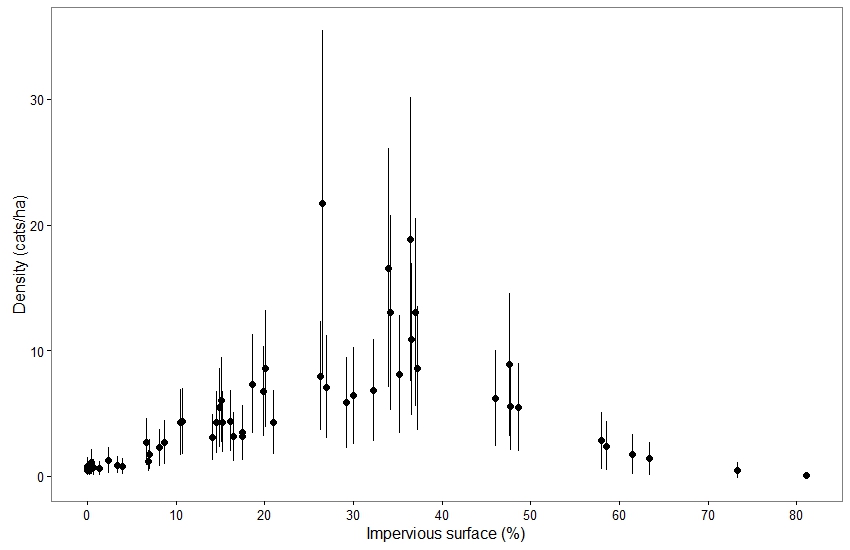


Figure 2. Model-averaged estimates of cat density at study sites by impervious surface percentage. Error bars are model-averaged standard errors.

Burnham, K.P., Anderson, D.R., 2003. Model selection and multimodel inference: a practical information-theoretic approach. Springer Science & Business Media.