**Supporting Information.** Joel S. Ruprecht, Charlotte E. Eriksson, Tavis D. Forrester, Darren A. Clark, Michael J. Wisdom, Mary M. Rowland, Bruce K. Johnson, and Taal Levi. *Ecological Applications*.

**Appendix S4**: Tables including measures of central tendency, credible intervals, and coefficients of variation for density estimation models for black bears, bobcats, cougars, and coyotes. Models include spatial count (SC), spatial mark resight (SMR), generalized spatial mark resight (gSMR), spatial capture recapture (SCR), and a novel hybrid model combining SCR and gSMR. Each model is fit with and without global positioning system (GPS) collar data from a subset of individuals within each population.

**Table S1**: Density estimates for black bears across a suite of models. Densities are presented as the number of animals per 100 km2. HPDI = highest posterior density interval. BCI=Bayesian Credible Interval. CV=coefficient of variation.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Mean | Median | Mode | SD | Lower 95% HPDI | Upper 95% HPDI | Lower 95% BCI | Upper 95% BCI | CV |
| SC | 56.01 | 58.36 | 66.69 | 14.16 | 30.87 | 78.04 | 26.46 | 76.29 | 0.25 |
| SC + GPS | 4.49 | 3.71 | 2.70 | 2.87 | 0.43 | 10.93 | 0.94 | 12.14 | 0.64 |
| SMR | 6.30 | 6.05 | 5.32 | 2.54 | 2.03 | 11.32 | 2.30 | 12.06 | 0.40 |
| SMR + GPS | 10.05 | 9.91 | 8.35 | 2.70 | 5.74 | 15.10 | 5.42 | 14.91 | 0.27 |
| gSMR | 6.94 | 6.75 | 5.72 | 2.52 | 2.69 | 12.25 | 2.61 | 12.21 | 0.36 |
| gSMR + GPS | 8.16 | 8.12 | 7.54 | 1.82 | 4.80 | 11.75 | 4.68 | 11.71 | 0.22 |
| SCR | 6.72 | 6.20 | 4.41 | 2.95 | 2.19 | 12.32 | 2.54 | 12.90 | 0.44 |
| SCR + GPS | 11.23 | 10.7 | 9.11 | 3.36 | 5.97 | 18.41 | 6.08 | 18.56 | 0.30 |
| SCR + gSMR | 6.65 | 6.51 | 6.01 | 2.21 | 3.00 | 10.78 | 3.12 | 11.13 | 0.33 |
| SCR + gSMR + GPS | 7.72 | 7.62 | 7.49 | 1.37 | 5.08 | 10.44 | 5.35 | 10.82 | 0.18 |

**Table S2**: Density estimates for bobcats across a suite of models. Densities are presented as the number of animals per 100 km2. HPDI = highest posterior density interval. BCI=Bayesian Credible Interval. CV=coefficient of variation and is calculated as the posterior standard deviation divided by the posterior mean. Results are not presented for the SC model because it did not fully converge.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Mean | Median | Mode | SD | Lower 95% HPDI | Upper 95% HPDI | Lower 95% BCI | Upper 95% BCI | CV |
| SC | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| SC + GPS | 7.53 | 5.81 | 3.83 | 5.39 | 0.82 | 20.31 | 1.31 | 21.79 | 0.72 |
| SMR | 9.54 | 8.44 | 7.24 | 4.78 | 2.62 | 20.07 | 3.03 | 20.64 | 0.50 |
| SMR + GPS | 8.06 | 7.37 | 6.15 | 3.49 | 2.13 | 15.48 | 2.87 | 17.28 | 0.43 |
| gSMR | 8.45 | 8.03 | 7.18 | 3.70 | 1.72 | 14.99 | 2.62 | 16.38 | 0.44 |
| gSMR + GPS | 8.10 | 7.37 | 6.71 | 3.46 | 2.54 | 14.82 | 3.36 | 17.44 | 0.43 |
| SCR | 13.29 | 12.94 | 12.14 | 2.55 | 8.60 | 18.02 | 9.25 | 18.84 | 0.19 |
| SCR + GPS | 12.03 | 11.96 | 12.10 | 2.03 | 8.27 | 15.97 | 8.44 | 16.22 | 0.17 |
| SCR + gSMR | 12.33 | 12.12 | 11.87 | 2.10 | 8.44 | 16.46 | 8.68 | 16.87 | 0.17 |
| SCR + gSMR + GPS | 11.75 | 11.63 | 11.46 | 1.73 | 8.52 | 14.99 | 8.76 | 15.32 | 0.15 |

**Table S3**: Density estimates for cougars across a suite of models. Densities are presented as the number of animals per 100 km2. HPDI = highest posterior density interval. BCI=Bayesian Credible Interval. CV=coefficient of variation and is calculated as the posterior standard deviation divided by the posterior mean.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Mean | Median | Mode | SD | Lower 95% HPDI | Upper 95% HPDI | Lower 95% BCI | Upper 95% BCI | CV |
| SC | 46.07 | 44.39 | 37.41 | 13.81 | 25.68 | 74.69 | 23.02 | 72.62 | 0.30 |
| SC + GPS | 1.14 | 0.66 | 0.31 | 1.31 | 0.08 | 4.21 | 0.12 | 5.35 | 1.14 |
| SMR | 2.36 | 2.26 | 2.04 | 1.08 | 0.27 | 4.37 | 0.59 | 4.88 | 0.46 |
| SMR + GPS | 1.76 | 1.72 | 1.71 | 0.57 | 0.74 | 2.89 | 0.82 | 3.08 | 0.33 |
| gSMR | 2.37 | 2.26 | 2.15 | 0.84 | 0.86 | 3.94 | 1.09 | 4.49 | 0.36 |
| gSMR + GPS | 1.71 | 1.68 | 1.61 | 0.50 | 0.82 | 2.69 | 0.86 | 2.77 | 0.29 |
| SCR | 1.51 | 1.26 | 0.44 | 1.05 | 0.23 | 3.64 | 0.30 | 4.24 | 0.69 |
| SCR + GPS | 2.00 | 1.89 | 1.73 | 0.70 | 0.66 | 3.34 | 0.89 | 3.64 | 0.35 |
| SCR + gSMR | 2.25 | 2.15 | 2.11 | 0.78 | 0.96 | 3.74 | 1.13 | 4.17 | 0.35 |
| SCR + gSMR + GPS | 1.92 | 1.85 | 1.75 | 0.55 | 0.89 | 2.98 | 1.03 | 3.18 | 0.29 |

**Table S4**: Density estimates for coyotes across a suite of models. Densities are presented as the number of animals per 100 km2. HPDI = highest posterior density interval. BCI=Bayesian Credible Interval. CV=coefficient of variation and is calculated as the posterior standard deviation divided by the posterior mean.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Mean | Median | Mode | SD | Lower 95% HPDI | Upper 95% HPDI | Lower 95% BCI | Upper 95% BCI | CV |
| SC | 107.87 | 107.57 | 106.94 | 21.02 | 70.49 | 146.94 | 66.07 | 144.65 | 0.19 |
| SC + GPS | 2.55 | 2.29 | 2.04 | 1.04 | 0.76 | 4.58 | 1.07 | 5.19 | 0.41 |
| SMR | 45.88 | 45.47 | 44.99 | 7.29 | 31.13 | 59.35 | 31.89 | 60.27 | 0.16 |
| SMR + GPS | 33.23 | 32.96 | 32.35 | 5.16 | 23.80 | 43.64 | 24.26 | 44.86 | 0.16 |
| gSMR | 41.29 | 40.89 | 40.06 | 5.88 | 30.06 | 52.34 | 30.67 | 53.41 | 0.14 |
| gSMR + GPS | 31.95 | 31.74 | 31.45 | 4.23 | 23.65 | 39.98 | 24.26 | 40.59 | 0.13 |
| SCR | 33.42 | 33.24 | 32.80 | 3.39 | 27.17 | 40.28 | 27.31 | 40.69 | 0.10 |
| SCR + GPS | 25.38 | 25.24 | 25.02 | 2.58 | 20.83 | 30.48 | 20.97 | 30.90 | 0.10 |
| SCR + gSMR | 36.87 | 36.55 | 36.06 | 3.58 | 30.48 | 44.41 | 30.21 | 44.28 | 0.10 |
| SCR + gSMR + GPS | 27.63 | 27.59 | 27.51 | 2.46 | 23.03 | 32.41 | 23.03 | 32.55 | 0.09 |