Mountain goats (Oreamnos americanus) are highly valued by Alaskans and visitors for both consumptive and non-consumptive purposes. The Chugach National Forest in Alaska manages mountain goat habitat and works with the Alaska Department of Fish and Game to monitor their numbers on the Kenai Peninsula. These agencies developed a collaborative research project to collect information for the purpose of meeting their mountain goat management objectives of maintaining suitable habitat and sustaining healthy populations.

**Study Area and Data Used**

**Study Area**
Kenai Peninsula, Alaska

**Data**
Location data from GPS Collared Mountain Goats
GPS locations of 5 mountain goats during winter period of 2007
Landscape characteristics from various GIS layers
Elevation, Distance from escape terrain, aspect, VRM, Rock, Shrub

**Methods of Analysis**
Negative Binomial Regression and Discrete Choice Model
Negative binomial model accounts for number of times a goat appears in a particular cell
Discrete Choice model incorporates the distance travelled by a goat from one cell to another

**Model Estimation**
Negative Binomial Regression

\[
f(\lambda) = \ln(\lambda) = \beta \mathbf{x}
\]

where,

\[
P_y(\mathbf{x}) = \frac{\Gamma(y + \alpha)}{\Gamma(y) \Gamma(\alpha)} \left( \frac{\mathbf{a}^\alpha}{\mathbf{x}^\alpha} \right) y^{y-\alpha} \frac{\lambda^y}{y!}
\]

Discrete Choice Model

\[
P_y(\mathbf{x}) = \sum \exp(\beta \mathbf{x})
\]

**Results and Discussion**

Table 1 shows the regression coefficients from Discrete Choice (DC) and Negative Binomial (NB) models

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DC Model</th>
<th>NB Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-7.898(1.807)</td>
<td>0.042(0.017)</td>
</tr>
<tr>
<td>Distance</td>
<td>-0.024(0.0004)</td>
<td>-0.029(0.005)</td>
</tr>
<tr>
<td>DistEsc</td>
<td>-0.046(0.003)</td>
<td>-0.046(0.003)</td>
</tr>
<tr>
<td>Elevation</td>
<td>9.622(4.225)</td>
<td>9.622(4.225)</td>
</tr>
<tr>
<td>ElevationSq</td>
<td>-2.147(1.927)</td>
<td>-2.147(1.927)</td>
</tr>
<tr>
<td>VRM</td>
<td>0.042(0.017)</td>
<td>0.042(0.017)</td>
</tr>
<tr>
<td>Aspect</td>
<td>-0.486(0.080)</td>
<td>-0.486(0.080)</td>
</tr>
<tr>
<td>Shrub</td>
<td>1.009(0.168)</td>
<td>1.009(0.168)</td>
</tr>
<tr>
<td>Rock</td>
<td>1.082(0.255)</td>
<td>1.082(0.255)</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-5866(-1337)</td>
<td>-5866(-1337)</td>
</tr>
<tr>
<td>AIC</td>
<td>2730</td>
<td>2730</td>
</tr>
<tr>
<td>N</td>
<td>2128</td>
<td>5541</td>
</tr>
</tbody>
</table>

Significance codes: 0.001 ‘***’ 0.01 ‘**’ 0.05 ‘*’

**Conclusion**

Both DC and NB model predicts well the winter habitat use by mountain goat in the Kenai Peninsula. Based on the probability of use higher than 0.8, DC and NB models predict 93 and 86 percent for a goat, and 81 and 62 percent of the entire goat locations based on the output of a single goat model.

Managers at Chugach National Forest are believed to benefit from the output of this study in conserving the mountain goat habitat.

**Selected Literature**

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