

Habitat quality influences population distribution, individual space use and functional responses in habitat selection by a large herbivore

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Additional methods applied

To evaluate the quality of the results obtained by analyses based on the Brownian bridge movement model (BB) (Horne et al. 2007) we analysed habitat selection by applying step selection functions (SSFs) (Fortin et al. 2005) to the same data set. We paired each recorded moose location with a point in a random direction and at a randomly chosen distance between 30 m (beyond the focal pixel) and 2 km (the 99.5% quantile of the distance moved between locations two hours apart). The habitat at the observed locations (used) and the random locations (available) were recorded. We then examined the log odds for a habitat type to be selected relative to others by applying conditional logistic regression (Fortin et al. 2005).

Because the estimated home ranges may depend on the method applied (e.g., Huck et al. 2008), we also calculated home ranges using the non-parametric local convex hull (LCH) method (Getz and Wilmers 2004). We examined the relationship between habitat availability and the home range size estimates obtained by the LCH. We compared the results with the results from the BB home range analyses. The analyses were preformed in R for Windows version 2.11.1 1 (R Development Core Team 2010).

Comparison of the results

Examination of habitat selection by moose using contrasting methods (BB and SSF) gave similar results (Fig 3, Table ESM 1). Indeed, compared to the BB, the SSF gave a clearer evidence for selection of high quality forest types (high-productivity deciduous and coniferous forest) and avoidance of unproductive areas (bog and barren land). The SSF also

showed unambiguously that barren land was used less than any of the eight other habitat types ($\beta < 0$ and $P < 0.050$ compared with all other habitat types, table not shown). However, one important distinction was the use of agricultural land for males and females without young; the BB indicated some preference for this habitat type, whereas the SSF method did not.

We found very few qualitative differences between the home ranges analysed based on the LCH method and the BB method. Male home ranges estimated from the LCH method did not include a higher proportion of agricultural land than home ranges of females with young (95% CI: $-0.010, 0.025$), but included slightly more high-productivity deciduous forest than females without young (95% CI: $0.001, 0.002$). In addition, home range size of females with young decreased linearly ($edf = 1, P = 0.011$) with increasing proportion of high-productivity coniferous forest, in contrast to the non-linear, but still clear decrease found by the use of the BB approach. Lastly, male home ranges did not increase in size with increasing proportion of low-productivity coniferous forest ($P = 0.091$).

The avoidance of agricultural land found by the SSF may imply that the selection for cover is important also for females without young and males. However, the different results regarding selection of agricultural land is possibly caused by the low availability of this habitat in general (Fig. 4). Given the similar results from the different methods, the conclusions based on this study should not be biased due to the method applied.

References

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Table ESM 1. Results from step selection function (SSF) examining habitat selection by moose (*Alces alces*) in central-Norway. Values below zero indicate that the habitat type is less selected than high-productivity coniferous forest (i.e., the reference habitat). When high-productivity coniferous forest is selected the other habitat types have values significantly lower than zero. Data are from 25 male and 83 female moose from central Norway during the period June to August. For description of habitat types and number of moose per habitat, see Table 1.

Habitat	Males			Females with young			Females without young		
	β	SE	<i>P</i>	β	SE	<i>P</i>	β	SE	<i>P</i>
Deciduous forest, low-productivity	−0.71	0.08	<0.001	−0.43	0.03	<0.001	−0.59	0.14	<0.001
Deciduous forest, high-productivity	−0.03	0.06	0.642	−0.13	0.04	<0.001	0.09	0.11	0.391
Mixed forest, low-productivity	−0.55	0.07	<0.001	−0.53	0.03	<0.001	−0.72	0.09	<0.001
Mixed forest, high-productivity	−0.15	0.05	0.003	−0.23	0.03	<0.001	−0.30	0.10	0.002
Coniferous forest, low-productivity	−0.63	0.02	<0.001	−0.58	0.01	<0.001	−0.70	0.03	<0.001
Agricultural land	−0.74	0.04	<0.001	−0.80	0.03	<0.001	−0.85	0.06	<0.001
Bog	−1.02	0.03	<0.001	−1.13	0.02	<0.001	−0.75	0.04	<0.001
Barren land	−2.02	0.04	<0.001	−1.75	0.02	<0.001	−2.40	0.07	<0.001