

# Long-term Browsing Impact around Diversionary Feeding Stations for Moose in Southern Norway

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## Background

Browsing ungulates provided with supplemental feed create a gradient in browsing pressure which is typically greatest near the feeding station and decreases as a function of distance from it<sup>1</sup>, but how browsing pressure changes over time is currently unknown. Moreover, high browsing pressure by moose (*Alces alces*) may have indirect effects on ecosystem functioning<sup>2</sup>.

## Methods

We quantified spatiotemporal changes in browsing pressure of moose on commercial and non-commercial tree species around 30 feeding stations (Fig. 1) after 5-10 years and 15-20 years of winter feeding. Browsing pressure was analyzed as a function of distance from feeding station using GAMM.

## Results

Despite 2-3 fold higher faecal pellet group numbers in the vicinity of feeding stations after 15-20 years of feeding, leader stem and lateral twig browsing within 200 m of feeding stations increased only on the commercially valuable Norway spruce (*Picea abies*), a species normally avoided by moose (Figs 2 & 3). Furthermore, leader stem browsing was high up to 1 km from feeding stations for most tree species (~60%) and did not decrease with increasing distance.

## Discussion

Our study indicates that as winter feeding continues over time, there is an increased risk of excessive browsing close to feeding stations which may lead to fine-scale resource depletion. Moreover, browsing remained high up to 1 km from feeding stations which can have important economic implications<sup>3</sup> and may negatively impact biodiversity in unproductive boreal forests<sup>4,5</sup>.

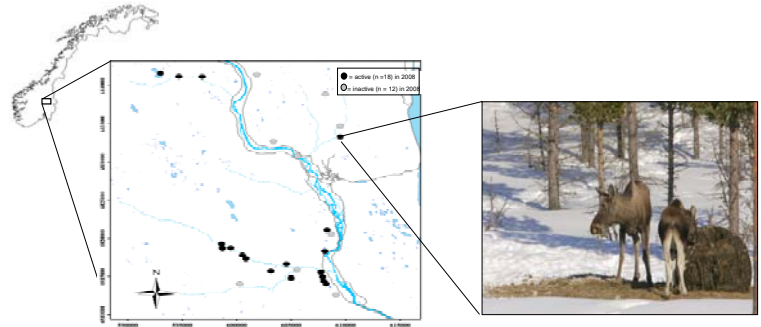


Figure 1

Map of the study area showing the spatial distribution of feeding stations (n = 30).

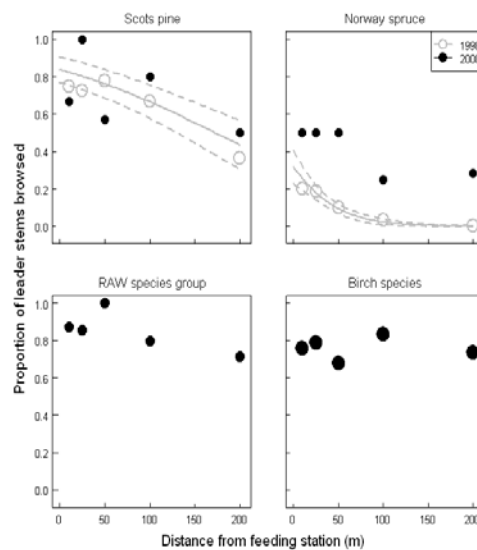


Figure 2

Mean and predicted proportion of species-specific leader stems browsed by moose up to 200 m from feeding stations in 1998 (5-10 years of feeding) and 2008 (15-20 years of feeding). Leader stem browsing on RAW species (Rowan, Aspen & Willow) and birch species (Silver & Downy birch) was not recorded in 1998.

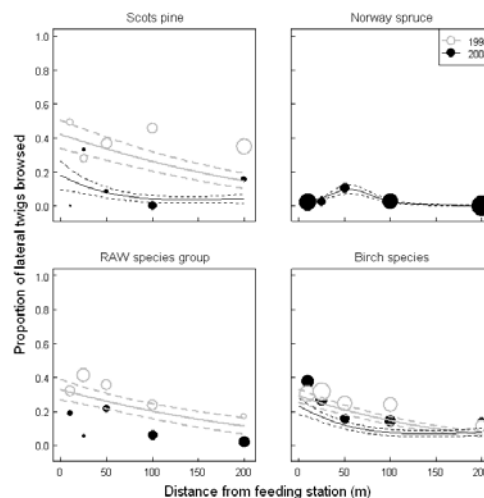


Figure 3

Mean and predicted proportion of species specific lateral twigs browsed by moose up to 200 m from feeding stations in 1998 (5-10 years of feeding) and 2008 (15-20 years of feeding). Lateral twig browsing on Norway spruce was absent in 1998.

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