

# Effects of power lines on moose (*Alces alces*) habitat selection, movements and feeding activity

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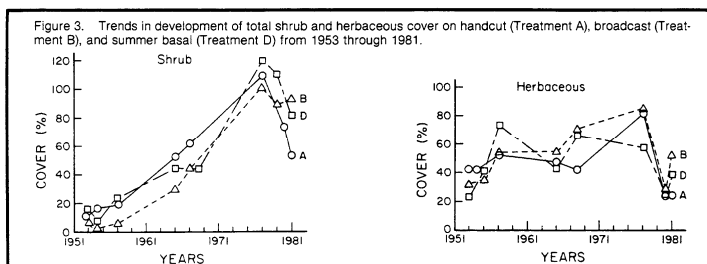


## Introduction

### Power line rights-of-way habitat

#### Cleared areas under power lines

- Lack of canopy cover
- Novel habitat (succession)



Bramble and Byrnes, 1982



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# Introduction Disturbance by power lines

- Noise
- Electromagnetic fields
- Visual distraction
- Functional habitat loss



Vistnes and Nellemann 2001, Flydal et al. 2010



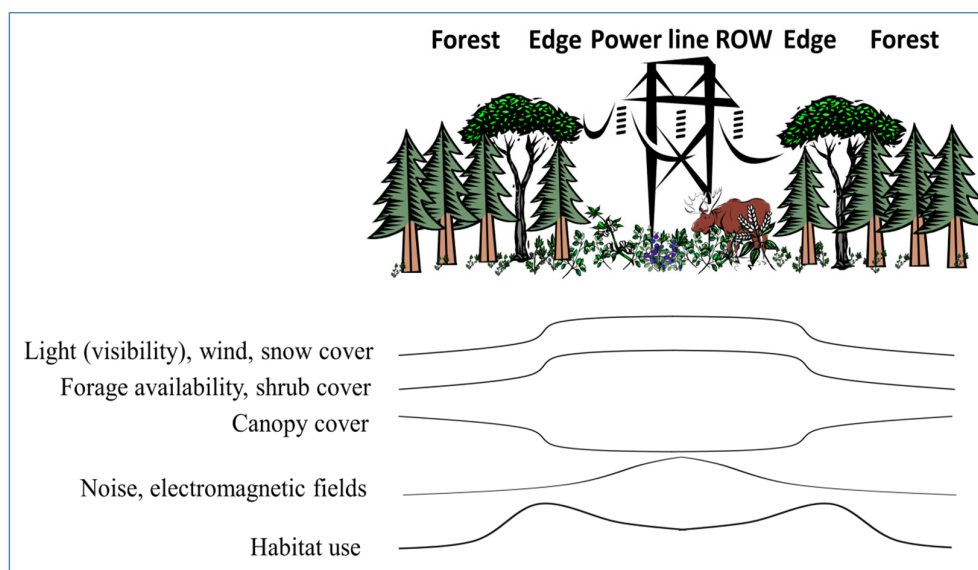
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# Introduction Possible effects on forest ungulates



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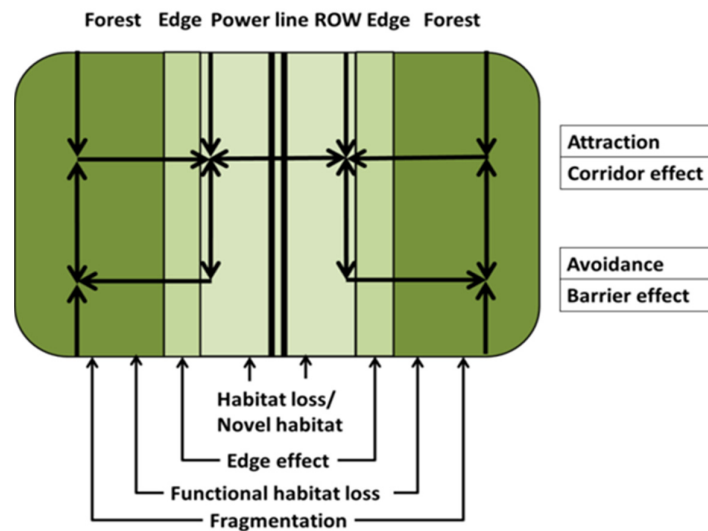
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# Introduction

## Implications for animal movement and habitat use



Bramble and Byrnes 1972, Joyal et al. (1984), Vistnes and Nellemann 2001, Vistnes et al. 2004, Pruett et al. 2009



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# Introduction

## Power lines and other linear features

	Roads	Power lines	Rivers
<b>Disturbance</b>	High	Intermediate	Low
<b>Food availability</b>	Varying		
<b>Shrub cover</b>	Low	Intermediate	Low

Cumulative impacts



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## Aims

- Find out if power lines and associated forest clearings
- (1) affect habitat quality for moose
- (2) cause barrier and corridor effects
- (3) and cause edge effects; in order to
- (4) propose possible mitigation measures
- In addition: compare power line effects to those of roads and rivers and examined their cumulative effects on moose movements

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## Methods

### Study species: moose (*Alces alces*)

- Largest living deer
- Home ranges: 5-11 km<sup>2</sup>
- Food limitations
- Hunting
- Traffic accidents



Moose feeding in a power line right-of-way in central Norway

Schwartz and Franzmann 2007, Bjørneraas et al. 2012, Ytrehus et al. 1999, Storaas et al. 2001



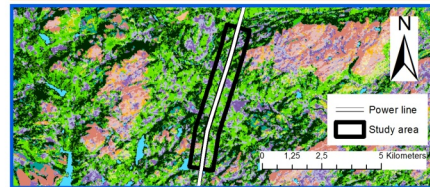
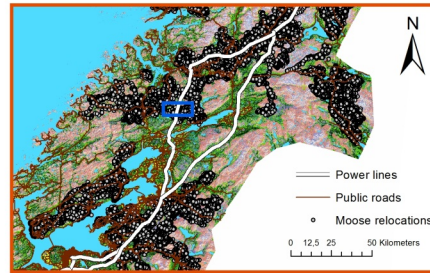


## Study areas

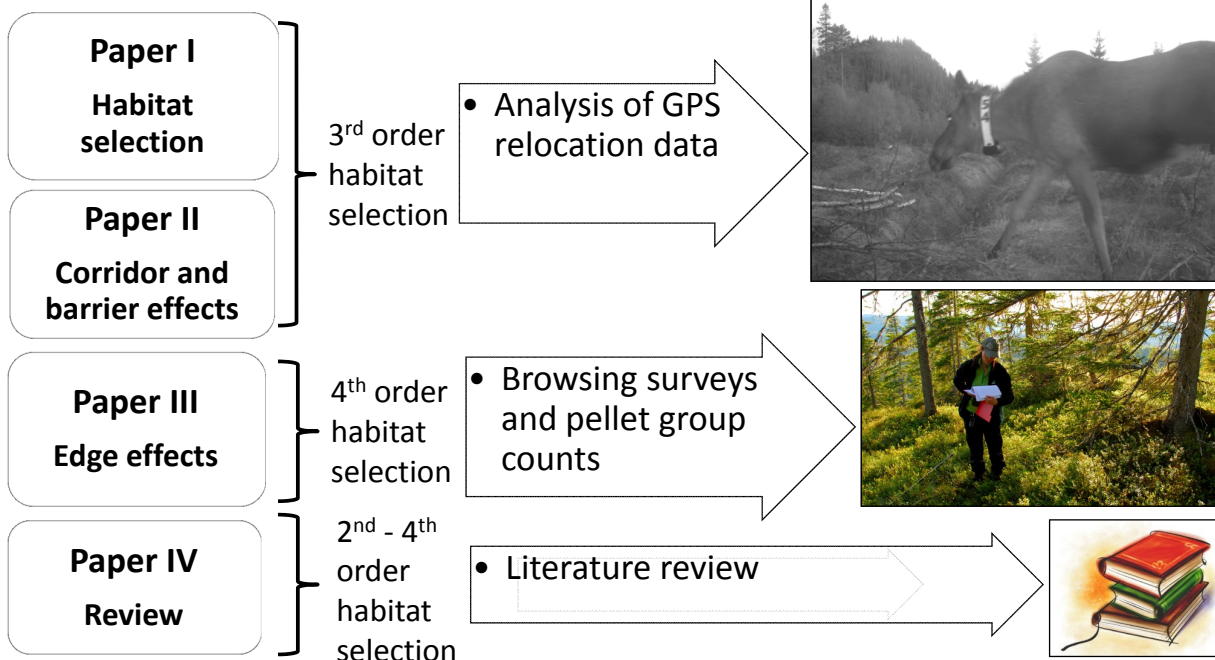
- Central Norway
- Boreal zone
- Forestry
- Agriculture



Granhus et al. 2012, Karlsen et al. 2006


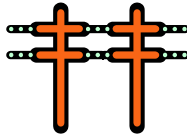




## Structure of the thesis



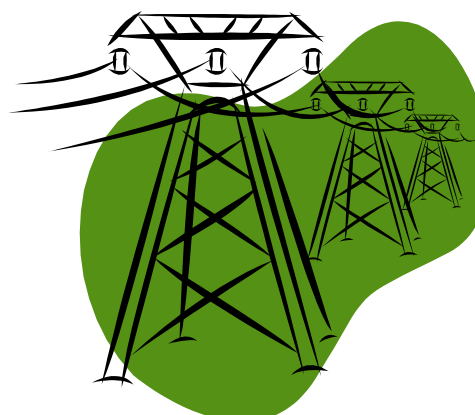
Johnson, 1980

# Thesis summary

<p><b>Paper I</b> Habitat loss/novel habitat</p>		<ul style="list-style-type: none"> <li>• Attraction towards power line ROWs in winter</li> <li>• Stronger road avoidance</li> </ul>
<p><b>Paper II</b> Corridor/barrier effects</p>		<ul style="list-style-type: none"> <li>• Moose avoid crossing linear forest gaps but not power lines</li> <li>• Less of a corridor effect compared to roads and rivers</li> </ul>
<p><b>Paper III</b> Edge effects</p>		<ul style="list-style-type: none"> <li>• Reduced habitat use and stem availability closer to power line right-of-way compared to surrounding forest</li> </ul>
<p><b>Paper IV</b> Review</p>		<ul style="list-style-type: none"> <li>• Possibility to provide attractive right-of-way habitat with alternative vegetation management to clear cutting</li> </ul>

## Conclusions/management implications

- Disturbance by the physical structure of power lines appeared to be of minor importance in contrast to roads
- Site-specific variations in food and cover availability may induce local avoidance by moose
- Possibility to increase food and cover availability in power line rights-of-way to reduce possible aversion effects



# Future prospects

- Combinations of linear features may increase barrier and corridor effects compared to single linear features
- Experimental studies (BAIC)
- Population impacts
- Optimal vegetation management
- Other species: small mammals, birds, mesopredators