Analyse fine de l’utilisation de l’habitat estival et du comportement de quête alimentaire du cerf de Virginie à l’île d’Anticosti

Fine-scale analysis of summer habitat use and foraging behavior of white-tailed deer does on Anticosti Island

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Foraging behavior

Maximizing energy gain

Minimizing energy expenditures
Summer : a critical season

Growth and body reserves

Mortality
Trade-off

Food

Cover

Interspersion
Habitat selection: a hierarchical process

Landscape

Home range

Within the home range

Plant
Anticosti Island

Lack of predation
High deer density

A change in the trade-off between food and cover?
Objectives

Analyze summer habitat use of white-tailed deer at different spatial and temporal scales in an integrated forest wildlife management perspective

To assess the influence of food, cover and their interspersion on foraging behavior of females
Objectives

$H_1$: Summer habitat selection is function of food availability but not of cover.

$H_2$: Summer habitat selection is function of food availability, cover and their interspersion.
Presentation outline

Home range scale

Within the home range

Season
Methods: GPS collars

Summer 2001
Summer 2002

n=19

Fix / 2 h

Activity counters
**Home range**

**Core area**

- **Home range** (95% MCP)
  - 42 ± 6 ha

- **Core area** (80% clusters)
  - 10± 1 ha

[Image of deer in background]
Results: Home range scale

No relation between home range size and food availability

No relation between home range size and cover availability

\[ P = 0.78 \quad R^2 = 0.004 \]

No relation between home range size and food availability

\[ P = 0.16 \quad R^2 = 0.11 \]
Results: Within the home range

Manly’s standardised ratio

\[ \text{Manly’s standardised ratio} = \frac{\text{fix in habitat A} / \text{fix in ALL habitats}}{\% \text{ habitat A in the home range}} \]

\[ \sum \text{ all ratios for one animal} \]

General linear mixed models

Deer, year: random factor

Period of the summer

Pairwise comparisons

Manly et al. 1993
**Results: Within the home range**

<table>
<thead>
<tr>
<th></th>
<th>Peatlands</th>
<th>Clear-cuts</th>
<th>Forests</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use</strong></td>
<td>49 ± 7%</td>
<td>37 ± 7%</td>
<td>42 ± 6%</td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td>39 ± 6 %</td>
<td>25 ± 6 %</td>
<td>49 ± 5 %</td>
</tr>
</tbody>
</table>
Results: Within the home range

Habitat ranking during the whole summer

<table>
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<th>Clear-cuts</th>
<th>Forests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardised ratio</td>
<td>0.48 ± 0.05</td>
<td>0.49 ± 0.07</td>
<td>0.33 ± 0.05</td>
</tr>
</tbody>
</table>

Pairwise comparisons
- Peatlands-Forest $P = 0.04$
- Peatlands-Clear-cuts $P = 0.70$
- Forest-Clear-cuts $P = 0.01$
Results: Within the home range

Habitat selection through summer

Habitat X week  $P < 0.0001$

![Graph showing habitat selection through summer with standardised ratios for Clear-cuts, Peatlands, and Forests.](image)
Summary: Within the home range

Habitat selection at a finer scale than the forest map
Sampling design

High use (Core area; 80% clusters)

\[ n = 20 \]

Low use

\[ n = 20 \]
Methods: Fields surveys

- **FOOD**
  - % Cover

- **COVER**
  - Vertical cover
  - Concealment cover

- **INTERSPERSION**
  - Distance to forest-cover edge
**Results: Within the home range**

Logistic regression

| Effect                     | Estimate | t value | Pr > |t| |
|----------------------------|----------|---------|-----|---|
| Intercept                  | -1.33    | -6.39   | < 0.0001 |
| % cover HERBS              | 0.01     | 4.29    | < 0.0001 |
| Vertical cover             | -0.09    | -6.10   | < 0.0001 |
| Concealment cover          | -0.08    | -8.72   | < 0.0001 |

**Variables not included in the model:**

| % cover deciduous SHRUBS   | Balsam fir basal area |
| % cover of balsam fir regeneration | Spruce basal area |
| Distance to forest-cover edge |

Variables included in the best model:
Results: Within the home range

FOOD

% cover HERBS

Clear-cuts

Forests

Peatlands

Low use

High use

Use $P = 0.02$

Habitat $P = 0.005$

Habitat X use $P = 0.64$
Results: Within the home range

COVER

- **Low use**
- **High use**

<table>
<thead>
<tr>
<th>% Canopy closure</th>
<th>Forests</th>
<th>Clear-cuts</th>
<th>Peatlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
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<td>0</td>
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</table>

Concealment cover (m)

- **Use** $P = 0.06$
- **Habitat** $P < 0.0001$
- **Habitat X use** $P = 0.0001$
Results: Habitat selection and behavior

Foraging

Resting

Through summer
Results: Habitat selection and behavior

Foraging

Habitat $P = 0.03$

Peatlands = Clear-cuts > Forests

Resting

Habitat $P = 0.05$

Peatlands > Clear-cuts = Forests
**Results**: Habitat selection and behavior

**Foraging**

Habitat X week $P < 0.0001$

**Resting**

Habitat X week $P < 0.0001$

- Through summer
Summary

Home range scale

No influence of FOOD or COVER on home range size

Within the home range

Selection for open habitat

Influence of the period of the summer
Summary

*Home range scale*

*Within the home range*

Influence of FOOD and COVER on habitat selection

- Food availability: HIGHER
- Canopy closure: LOWER
- Concealment cover: HIGHER
Summary

Home range scale

Within the home range

No influence of behavior on habitat selection
Management and fine scale analysis of habitat use

Forest cover is important

Diversity of habitat for the summer
CHAIRE de recherche industrielle CRSNG-Produits forestiers Anticosti Université Laval
Results: Within the home range

Habitat selection and the period of the day

Habitat X Period $P = 0.003$

- Clear-cuts
- Peatlands
- Forests