Assessing the Impact of Browsing Game Species on Forest Regeneration on the Basis of Systematic Random Sampling

by:

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What are "Browsing Game species"?

Ungulate species (Cervidae and Bovidae):

- Roe Deer (*Capreolus capreolus*)
- Red Deer (*Cervus elaphus*)
- Fallow Deer (*Dama dama*)
- Moufflon (*Ovis musimon)*
- Chamois (*Rupicapra rupicapra*)

Hare (*Lepus europaeus*)

Wild Rabbit (*Oryctolagus cuniculus)*

Impacts caused by browsing game species:

- **Loss or devaluation of natural regeneration potentials and abilities**

- **Reduction of tree species diversity by selective browsing**

- **Economical damages by delays in growth and increment rates and aspired wood quality**
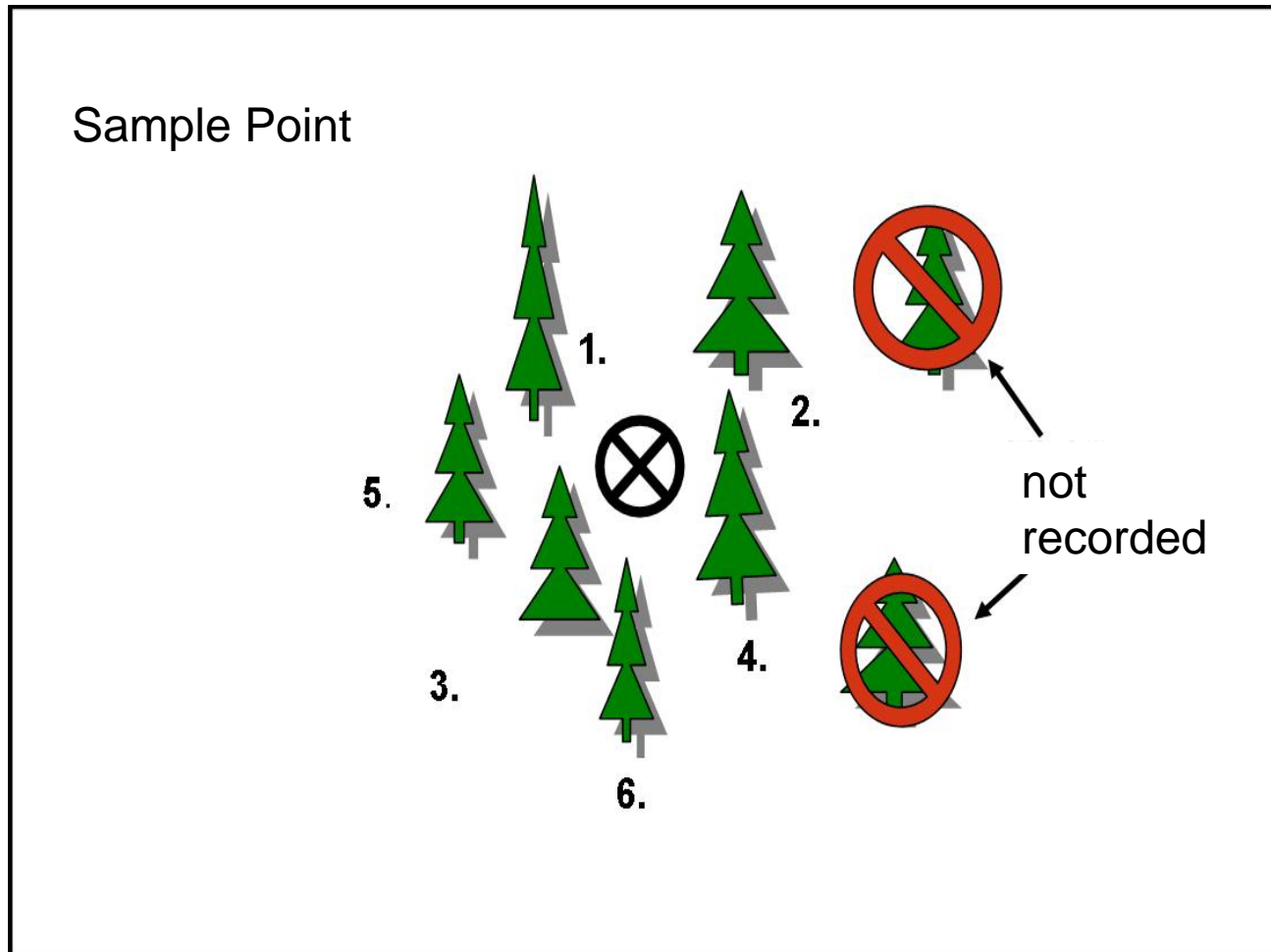
How to measure

browsing impact?

- **On a systematic basis with statistical methods (e.g.: rasterpoints or transects)**

- **Categorization of browsing intensity**

- **Recording of all affected tree species**

Sampling on rasterpoints (I):
(*Systematic random sampling*)

Raster projected on a forest stand map

Sampling on rasterpoints (II):
(*Systematic random sampling*)

Sample Point

Categorization of browsing intensity (I):

- **Level 1 (unaffected)**
  Beech (*Fagus sylvatica*) and Douglas Fir (*Pseudotsuga menziesii*):
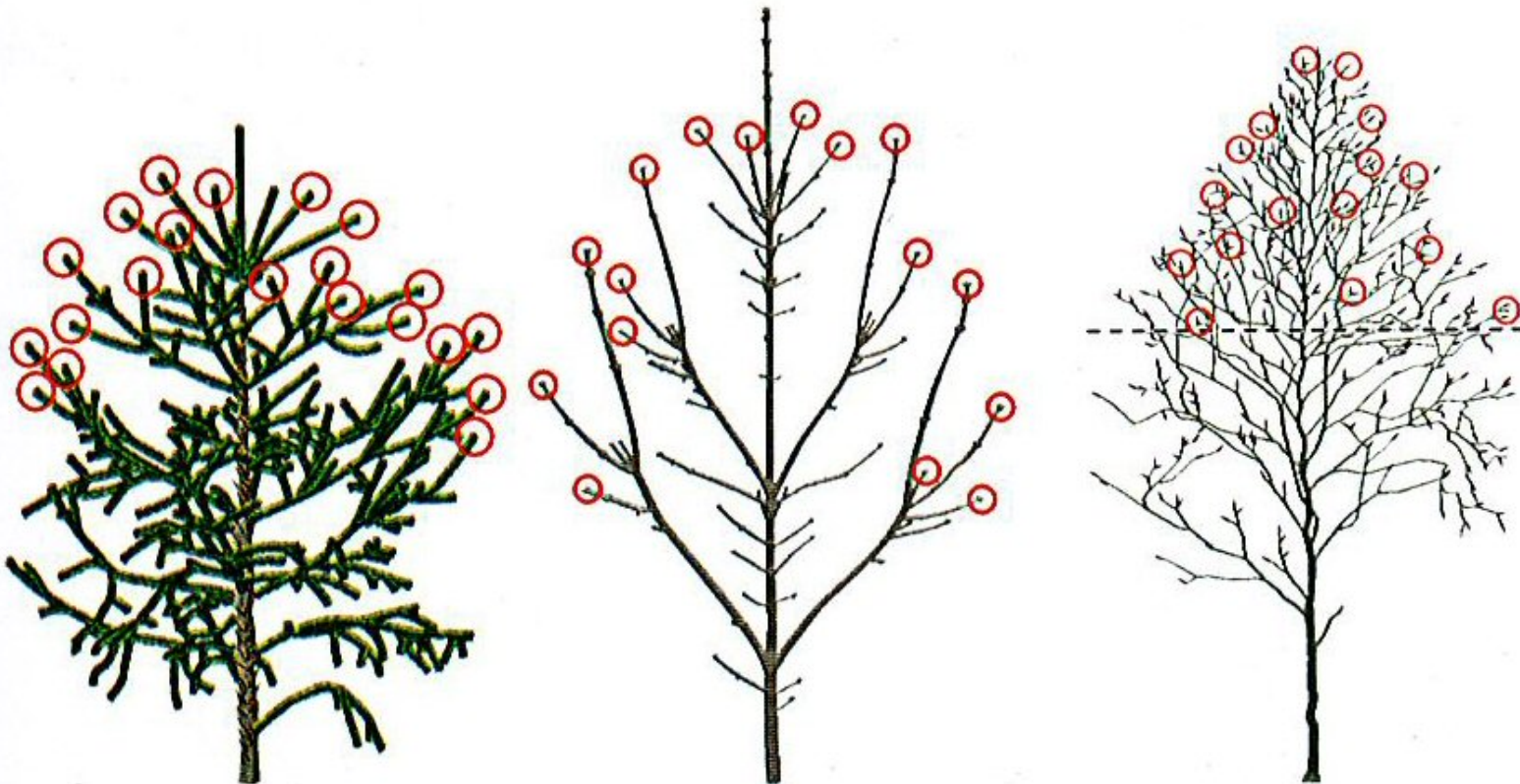
Categorization of browsing intensity (II):

- **Level 2 (slightly affected)**

  Illustration of seedlings with slight damages:
  Spruce (*Picea sp.*) Maple (*Acer sp.*) Beech (*Fagus sylv.*)
  (*Pollanschütz, 2002*)

Categorization of browsing intensity (II):

- **Level 2 (slightly affected)**
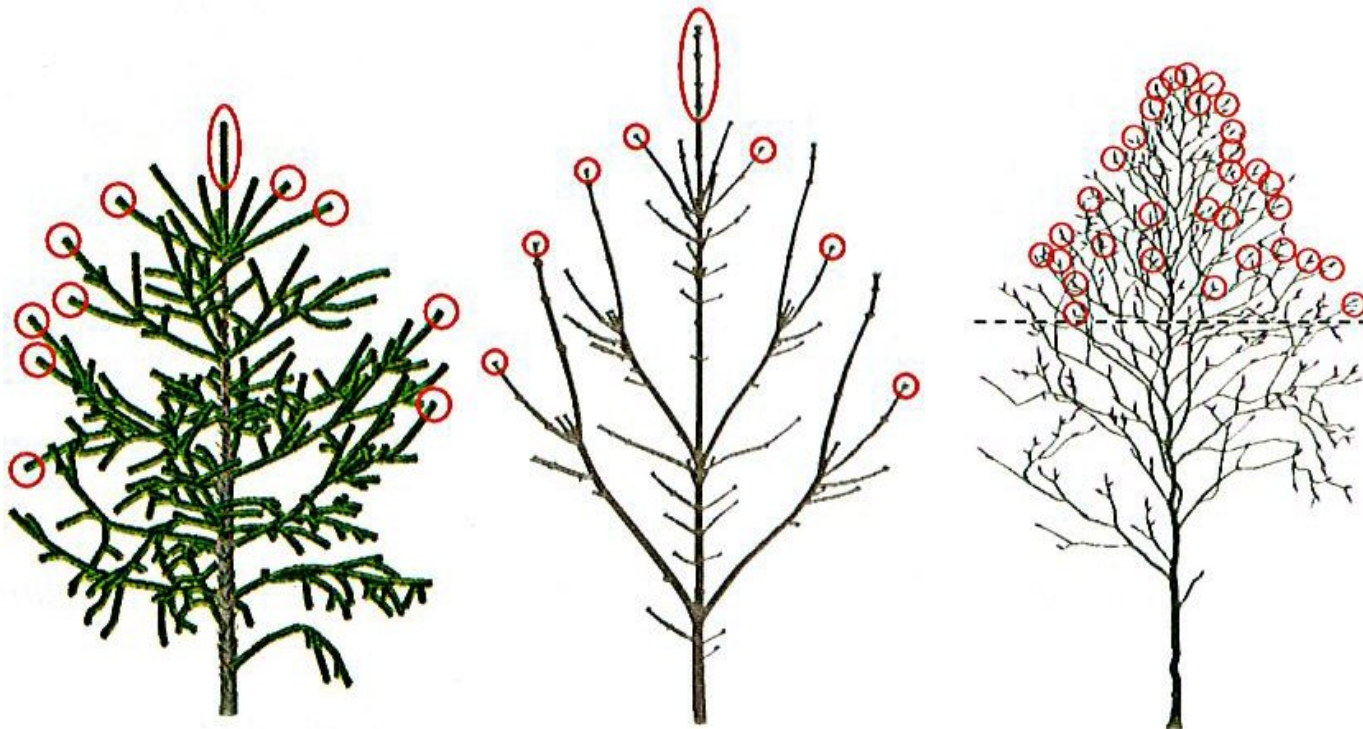 **Beech (*Fagus sylvatica*) and Douglas Fir (*Pseudotsuga menziesii*):**

Categorization of browsing intensity (III):

- **Level 3 (moderately affected)**

  Illustration of seedlings with moderate damages:
  Spruce (*Picea sp.*) Maple (*Acer sp.*) Beech (*Fagus sylv.*)
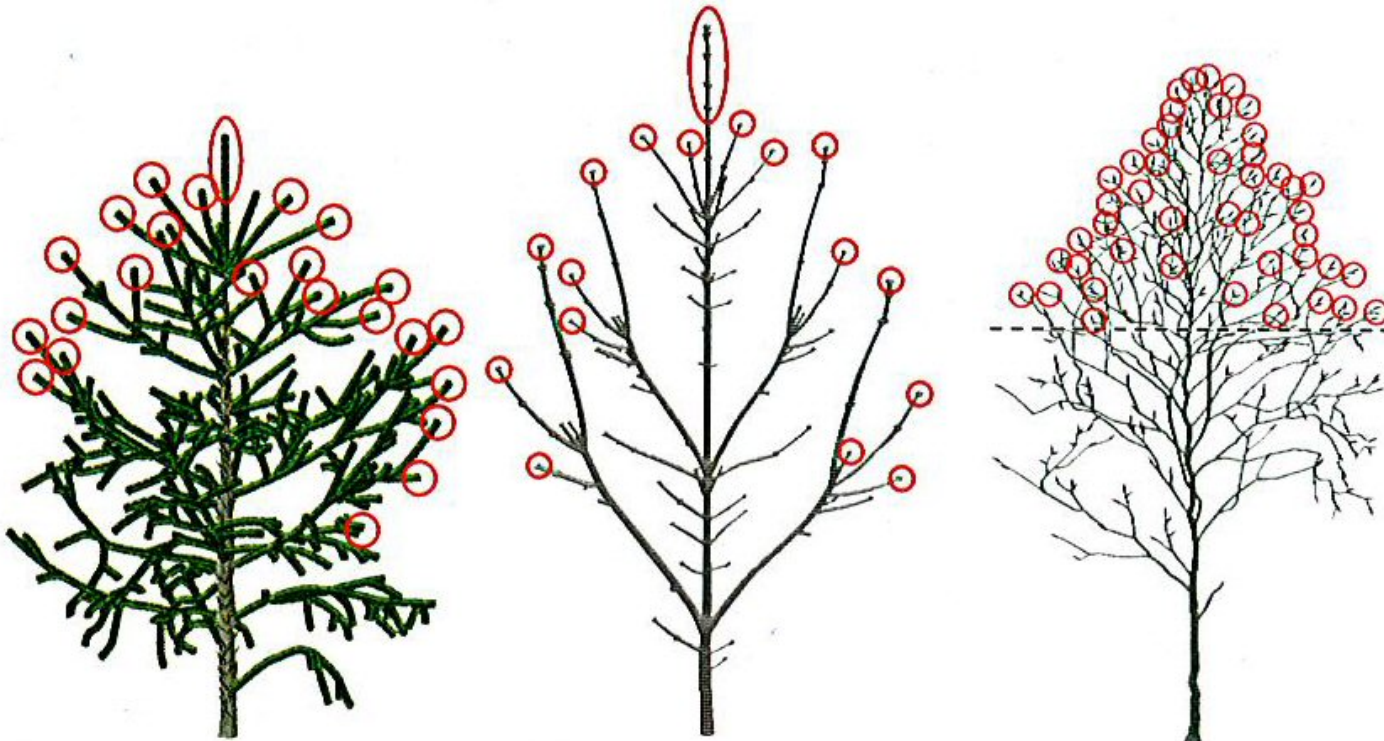 **(*Pollanschütz, 2002*)**

Categorization of browsing intensity (IV):

- **Level 4 (strongly affected)**

  Illustration of seedlings with extensive damages:
  Spruce (*Picea sp*.) Maple (*Acer sp*.) Beech (*Fagus sylv*.)
  (*Pollanschütz, 2002*)

Categorization of browsing intensity (IV):

- **Level 4 (strongly affected)**
  Beech (*Fagus sylvatica*) and Douglas Fir (*Pseudotsuga menziesii*):

Categorization of browsing intensity (V):

- **Level 5 (dead)**
  Beech (*Fagus sylvatica*) and Douglas Fir (*Pseudotsuga menziesii*):

<u>Case Study (I):</u>

- **Forest complex of 30 ha of 70-100 year old pine forest**

- **Underplanting of more than 60.000 seedlings (Mostly Beech and Douglas Fir) in 2006**

- **Strongly affected by browsing of Roe and Fallow Deer**

Case Study (II):

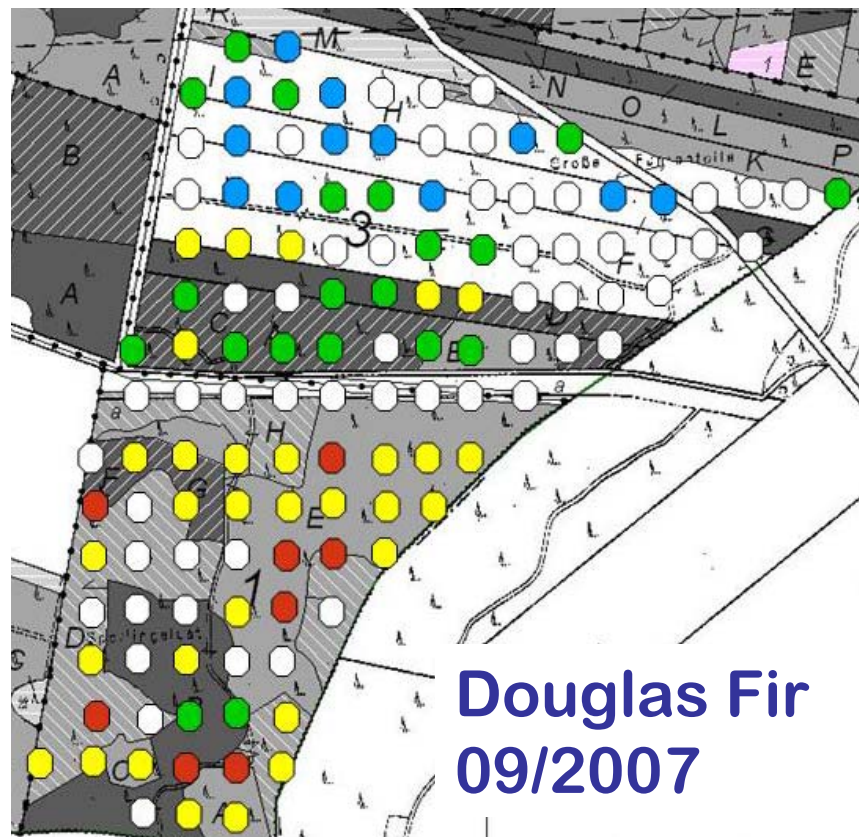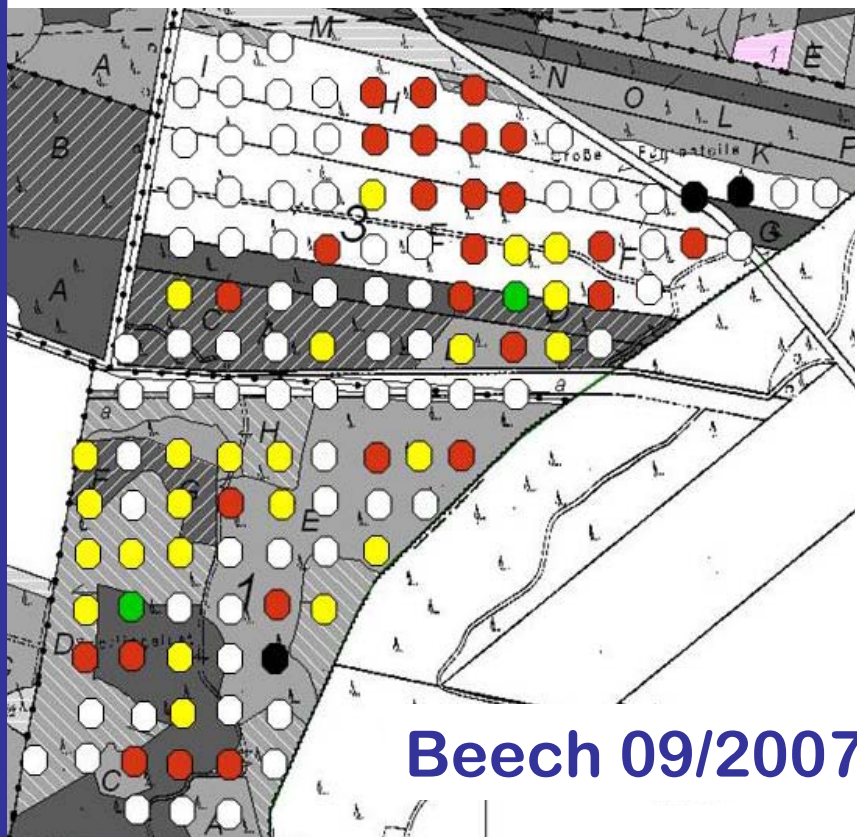- 2 independent recordings (September + April)

- Sampling on raster points on 50x50 (100x100m) => 125 (37) points

- 6 seedlings per raster point =>750 (222) seedlings

Case Study (III):

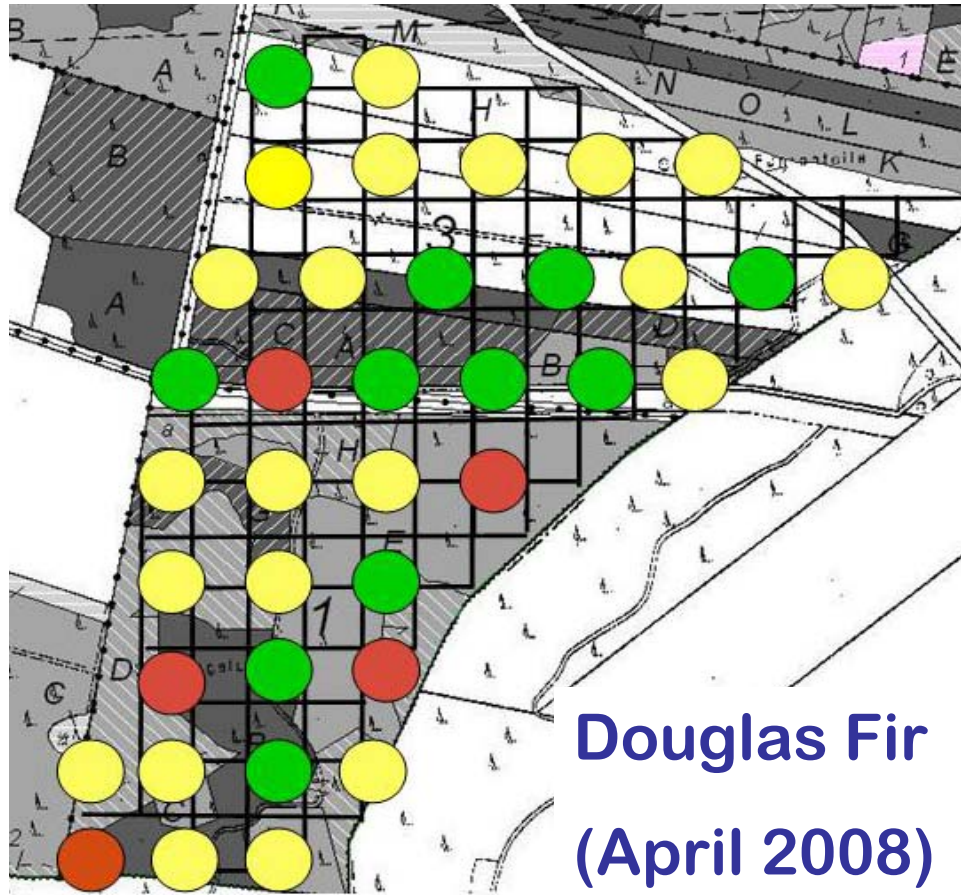## Projection of mean values :

Beech   **Douglas Fir**

Beech 09/2007

Douglas Fir 09/2007

Case Study (IV):
Projection of mean values :

Douglas Fir

(April 2008)

Case Study (V):

Results and Findings:

- **Browsing impact extends the tolerable amount**

  $\Rightarrow$ **Economic damage**

- **Spatial distribution of damages detectable**

  $\Rightarrow$ **Punctual concentration of browsing**

Case Study (VI):

Recommended measures to reduce damage:

- **Population control measures of roe deer by effective hunting strategies**

- **Use of biological/chemical repellents**

- **Fencing of the most affected areas**

Used Literature and other Sources:

- **ANONYMUS: Anleitung zur Erhebung von Verbiss- und Schälschäden, Ministerium für Umwelt und Forsten, Rheinland-Pfalz, 2004**

- **POLLANSCHÜTZ, J.: Hilfsmittel zur Erhebung und Bewertung von Verbiß und Fegeschäden, FBVA Wien, 2002**

- **PRODAN, M.: Holzmeßlehre. Frankfurt a. M., Sauerländer Verlag. 1965.**