

# Assessment and monitoring of forest-game balance: an enclosure experiment

LEHAIRE François, LICOPPE Alain, LEJEUNE Philippe

francois.lehaire@ulg.ac.be

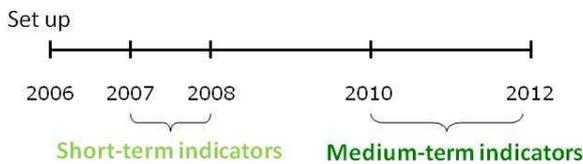
ULg - Gembloux Agro-Bio Tech - Unit of Forest and Nature Management

## Context

During the last decades, populations of large ungulates have largely increased, strengthening the pressure exerted by these species on forest vegetation. Therefore, monitoring this pressure has become unavoidable for sustainable forest management. Such monitoring requires a rigorous approach in order to evaluate objectively the balance between game population and forestry. The use of enclosure experiment offers an interesting solution to observe the effects of game populations on forest ecosystem. When objectives expected from forest management are clearly defined, enclosure experiments can effectively be used as a monitoring tool, to allow detecting unbalanced situations, for example, herbivore pressure threatening forest regeneration.

## Objectives

Our main aim was to compute a set of indicators characterizing the ecological changes due to large herbivores pressure on forest ecosystems. We identified 2 categories of ecological indicators: the short-term and the medium-term indicators. **Short-term indicators** require only two-year of monitoring to correctly quantify herbivore pressure whereas **medium-term indicators** require at least 4 years of monitoring.



## Results

We evaluated the relative efficiency of various indicators using 17 enclosures. The indicators in the below table allowed detecting significant differences between the two zones (Student's t test).

### Short-term indicators

Height *Rubus fruticosus* L.  
Seedling density  
Ground vegetation richness  
Regeneration richness  
Height *Rubus idaeus* L.

### Medium-term indicators

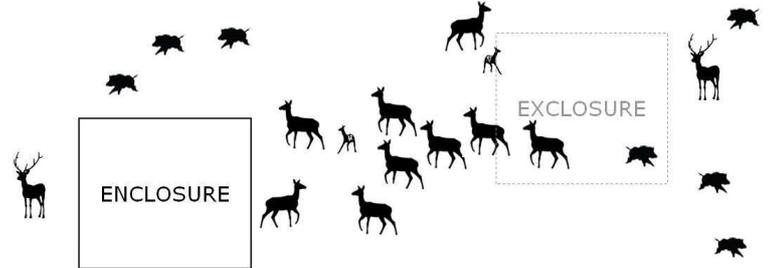
Total cover  
Height *Betulus* sp.  
Height *Fagus sylvatica* L.

## Conclusions

- Short-term indicators allow a rapid detection, but they are very sensitive to exogenous factors (climate changes, site conditions).
- Medium-term indicators, such as regeneration growth, require a longer monitoring period, but they are more robust than the short-term indicators.

## Experimental enclosure-exclosure

The monitoring tool combines on one side an **enclosure**, defined as "the real environment", fully accessible to herbivores and, on the other side an **exclosure**, which is the "control treatment", fenced and therefore unavailable to any large ungulates.



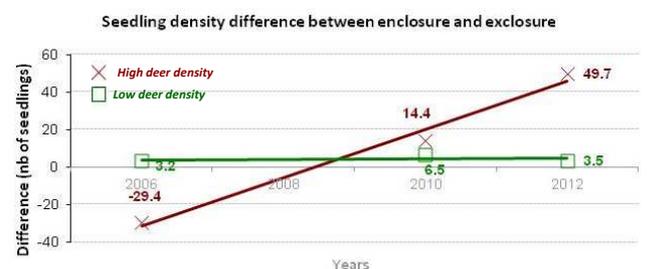
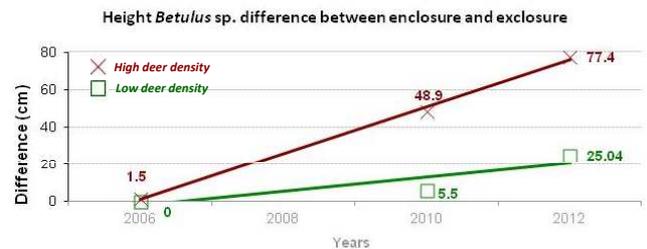
## Material

### Study site

The study site is located in Southern Belgium (Wallonia), in mixed beech and oak forests. The predominant vegetation type is the "*Luzulo-Fagetum*", typically found in acidophileous beech forests. The ungulate species of interest are red deer, roe deer, wild boar and mouflon.

### Sampling design

In 2006, enclosures and exclosures (4 x 4 m) were installed in 17 sites scattered in two zones with contrasted deer densities to assess indicators efficiency. Between 2006 and 2012, we performed floristic surveys and we recorded the height, density and cover of the understory vegetation of every plot.



## Perspectives

- Assessing potential long-term indicators (10, 15, 20 years)
- Validating indicators with new plots (15 in 2010, 60 in 2012 and 105 in 2013)



31<sup>st</sup> IUGB Congress  
27>29.08.13

IUGB 2013

INTERNATIONAL UNION OF GAME BIOLOGISTS - CONGRESS IUGB 2013 - BRUSSELS - BELGIUM

