



Sampling of saproxylic beetles and polyporous fungi in boreal forests

Juha Siitonen

Finnish Forest Research Institute,
Vantaa Research Unit



Aims of the presentation

- What does it take to inventory
 - saproxylic beetles
 - polyporesoccurring in one boreal forest stand?
- Would it be methodologically possible, relevant and affordable to sample these groups for the purpose of large-scale biodiversity monitoring?

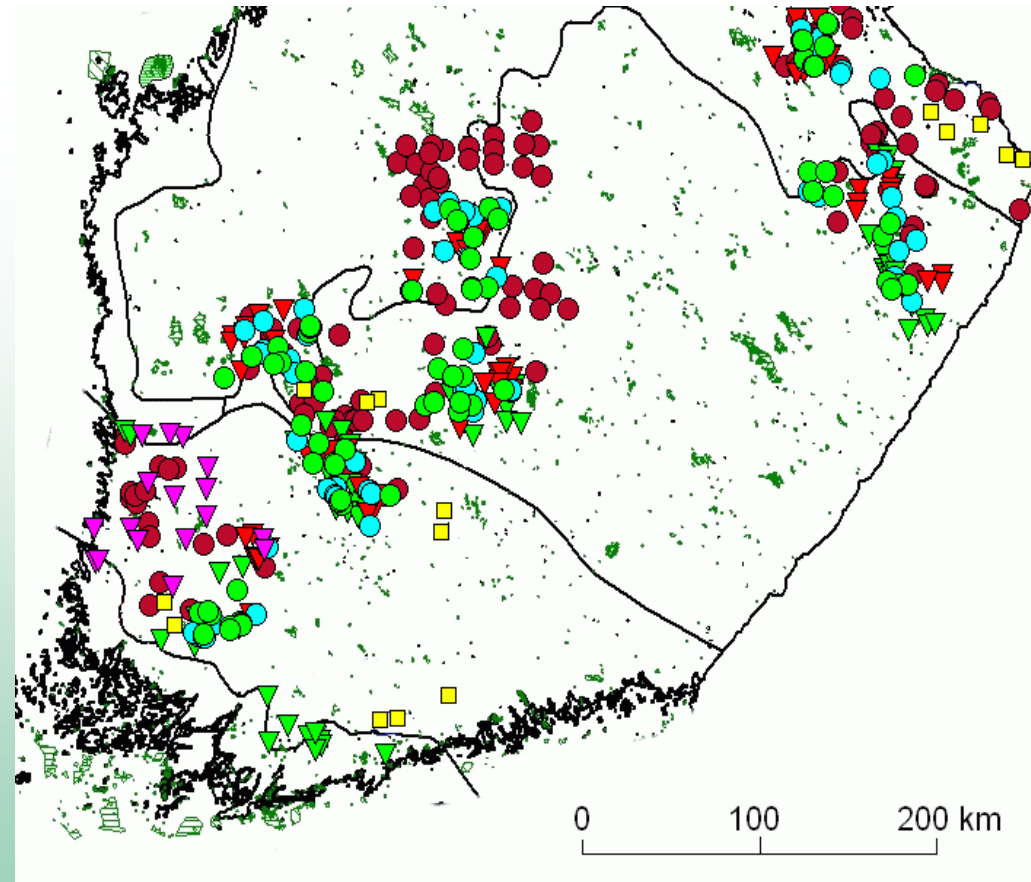


Background

- Forest Focus, national pilot project "*Assessing and monitoring biodiversity in boreal forests*" in 2005–2007
- related project with national funding 2002–

Study areas and sites

- four regions in SW-NE direction across s. Finland
- a total of over 500 stands have been inventoried in 2002–2005
- different types of forest each year



Study sites

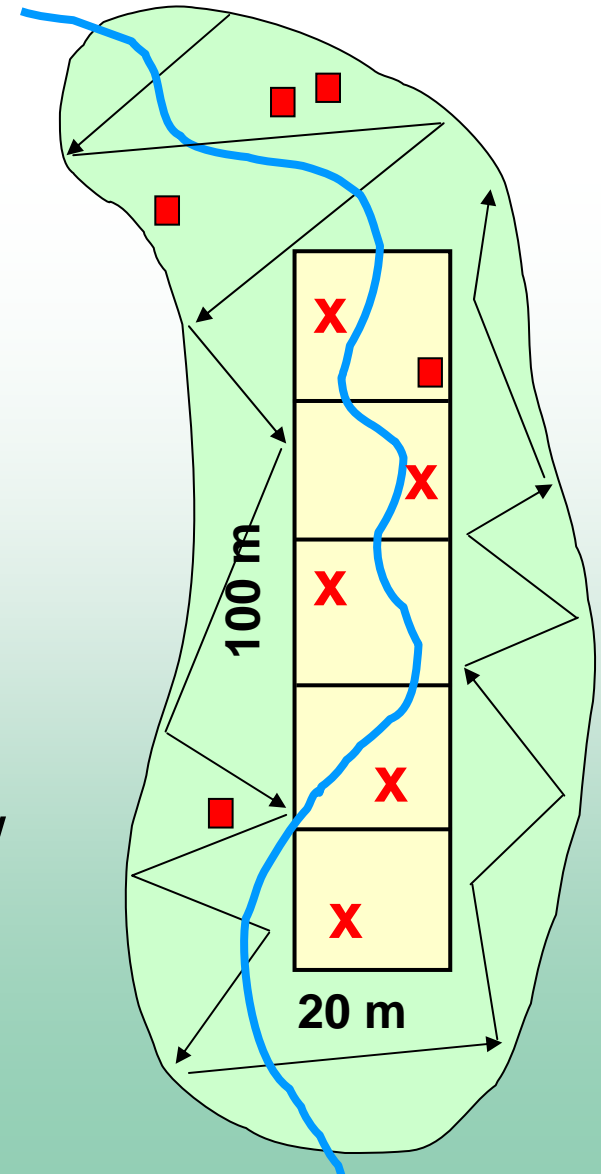
different types of forest including



Measurement of stand characteristics and species inventories

In each stand

- 20 x 100 m (0.2 ha) sample plot
- living and dead trees, cut stumps
- epiphytic lichens
- polypores
- beetles
 - 5 window traps (X) and 5 trunk-window traps (■)





Pooled materials

	Individuals / records	Species
Beetles	320,000	1500
Polypores	25,500	157
Lichens	33,000	98

Saproxylic beetles, sampling methods

- freely hanging window-flight traps
- trunk window traps

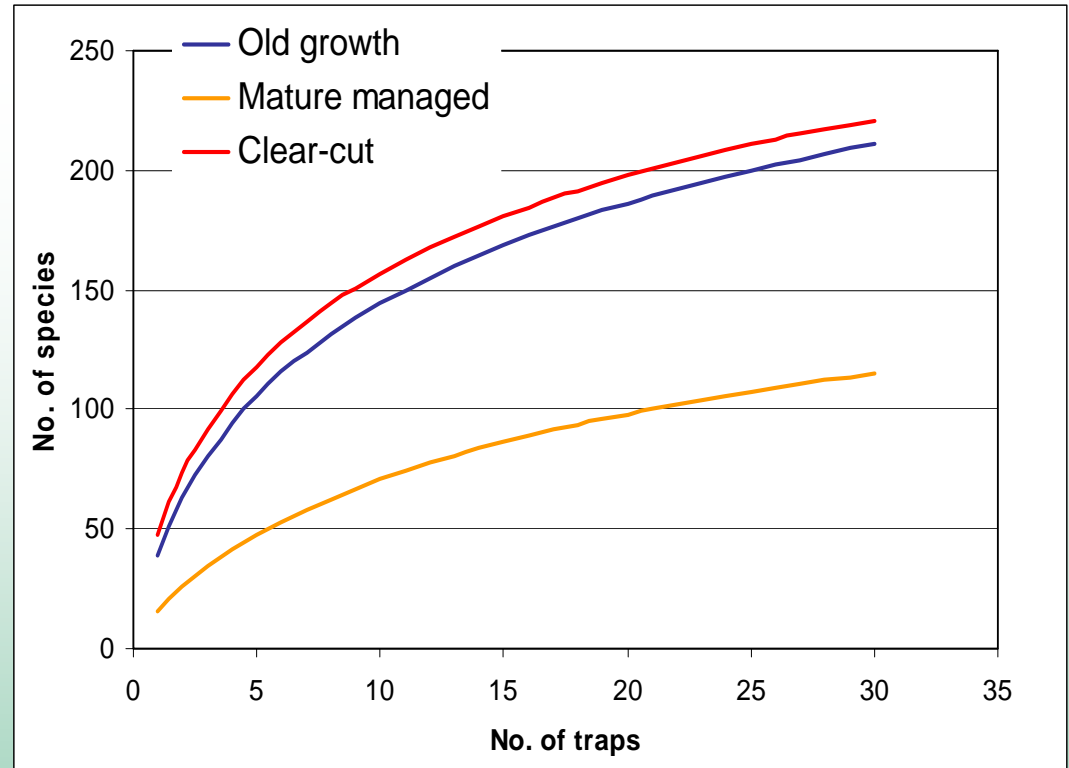


Effect of trap type and number of traps on the cumulative number of beetle species

- three stand types: 3 old growth, 3 mature managed, 3 clear-cut with retention trees
 - three trap types
 - ten traps of each type per stand
- ⇒ a total of 270 traps
- ⇒ 46,598 individuals of 869 species

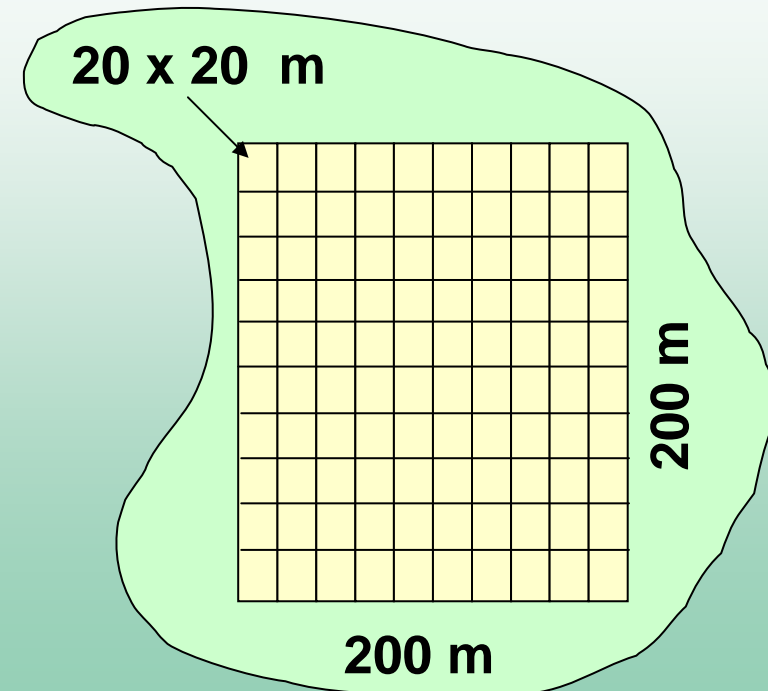
Species accumulation curves, saproxylic beetles

- example: old growth mature managed, clear cut with retention
- accumulation curves differ
- a set of 10 traps will catch
 - 600–2000 individuals
 - 44–58% of species present



Effect of plot size on the cumulative number of polypore species

- effects of stand type and inventoried area on the cumulative number of polypore species
 - six forests including old-growth and mature managed stands
 - a total area of 4 ha inventoried in each stand using a grid of 20 x 20 m plots
- ⇒ 8100 records of 129 species





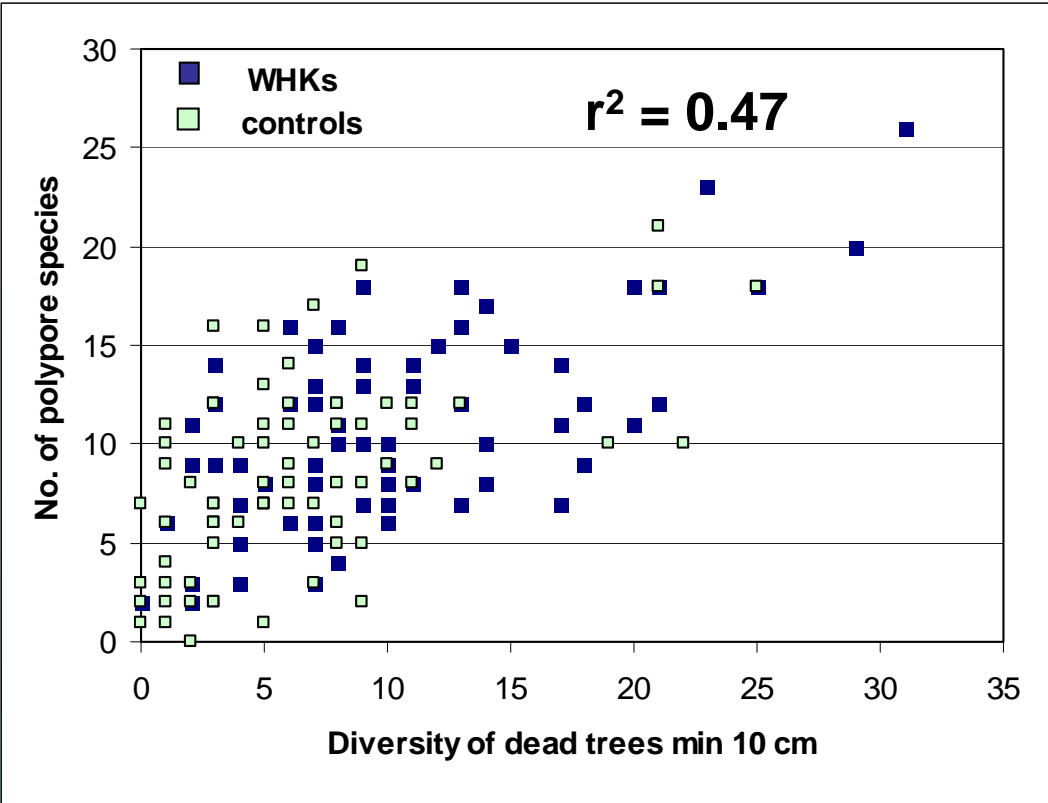
Species accumulation curves, polypores

- example: old growth vs. mature managed
- accumulation curves differ
- 50% of species present observed in:
 - old growth 0.34 ha
 - managed 0.62 ha



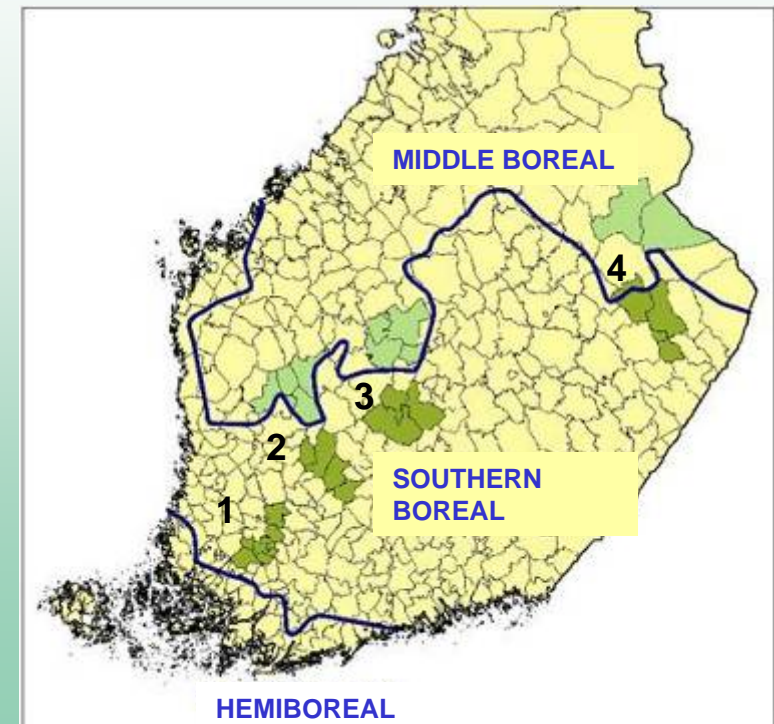
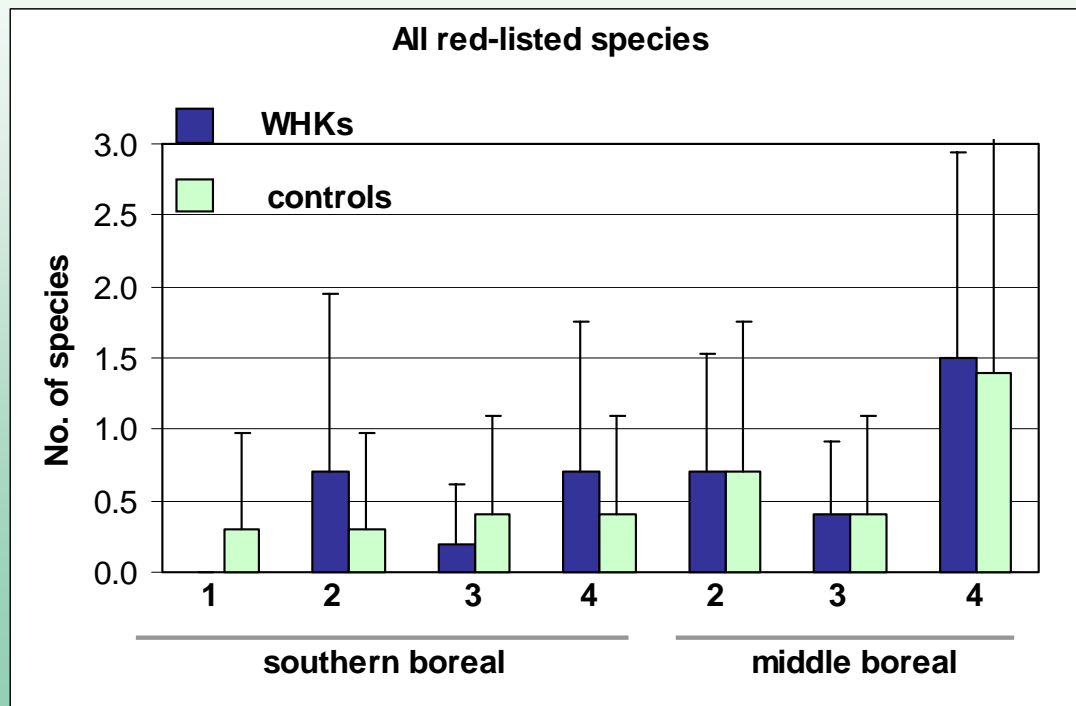
Dead wood and saproxylic species

- dead-wood variables generally explain a large proportion of variation in species richness
- example: diversity of dead wood and polypores



Dead wood and saproxylic species

- Isn't it then sufficient to monitor simply the amount and quality of dead wood?
- large regional differences in species richness and, particularly, in the occurrence of red-listed species!
⇒ extinction debt connected to land use history





Perennial polypores as a potential indicator group?

- total no. of polypore species in Europe 335
- of which ca. 25% perennial \Rightarrow ca. 85 species
- inventory is possible throughout the year
- not sensitive to short-term variation in precipitation (unlike annual species)
- Could the number of annual species and total species richness be predicted using perennial species?



Conclusions, beetles

- It is relatively easy to standardize and perform beetle sampling so that a desired proportion of species present will be caught
- However, very large samples in terms of individuals are needed
 - ⇒ identification is time consuming
 - ⇒ expensive ⇒ rests on narrow expert basis
- Not feasible for large-scale monitoring

Conclusions, polypores

- It is very easy to standardize and perform polypore sampling so that a desired proportion of species present will be observed
- Perennial species can be used as a surrogate for the total assemblage
 - ⇒ rapid fieldwork and identification
 - ⇒ inexpensive ⇒ sufficient expert basis?
- One of the few taxa suitable for large-scale monitoring ⇒ worthwhile considering?



Acknowledgements

Jenni Hottola

Sampsa Lommi

Auli Immonen

Jaakko Mattila

Martti Kuusinen

Juhani Mäkinen

Ministry of Agriculture and Forestry

Ministry of Environment

EU, Forest Focus monitoring programme