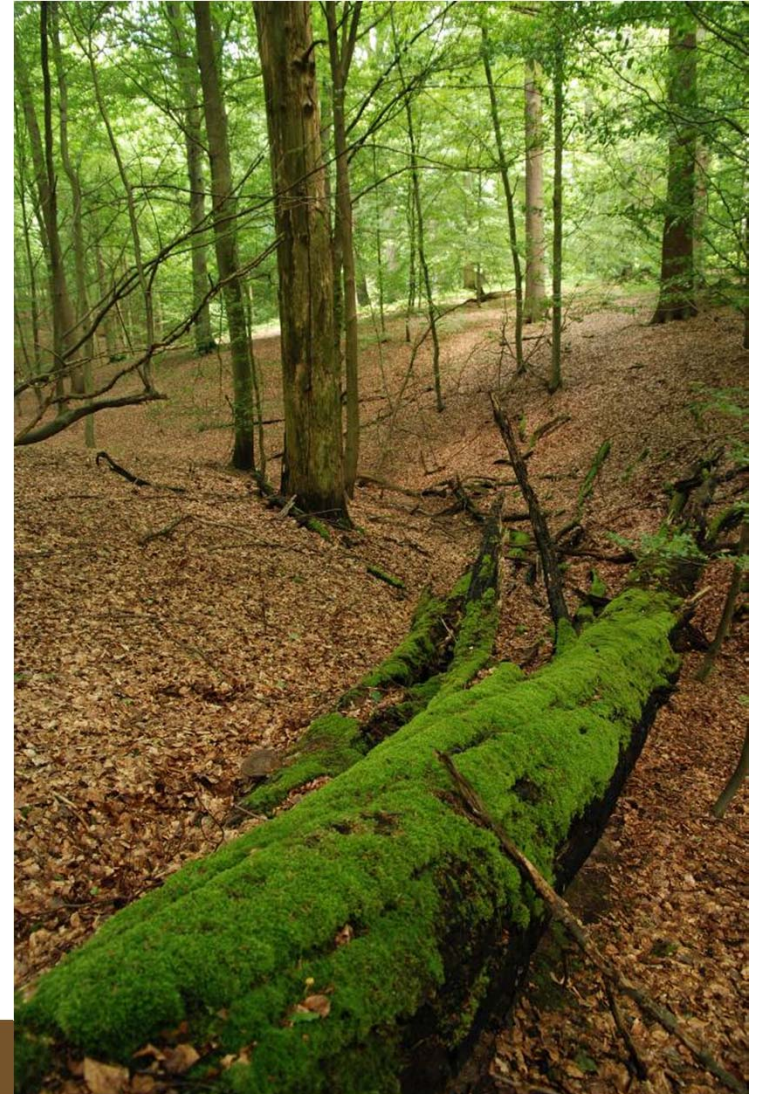


**Past and present state of dead wood and
senescent trees in the Sonian Forest (Belgium),
a woodland of great importance to kings and
emperors, and old-growth biodiversity**

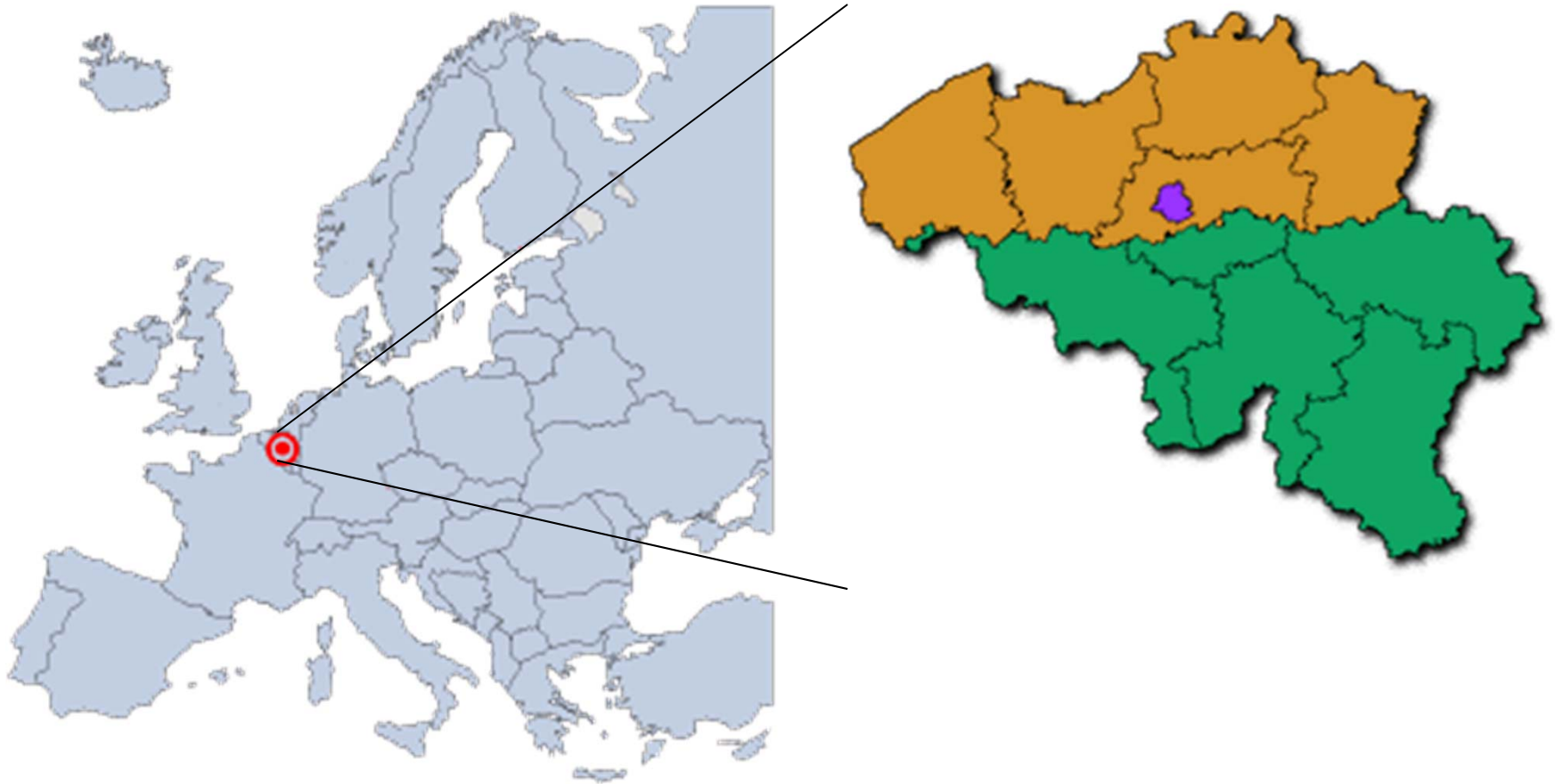
**Kris Vandekerkhove, Luc De Keersmaecker, Ruben Walley (†),
Anja Leyman, Frank Köhler & Luc Crevecoeur**

Outline

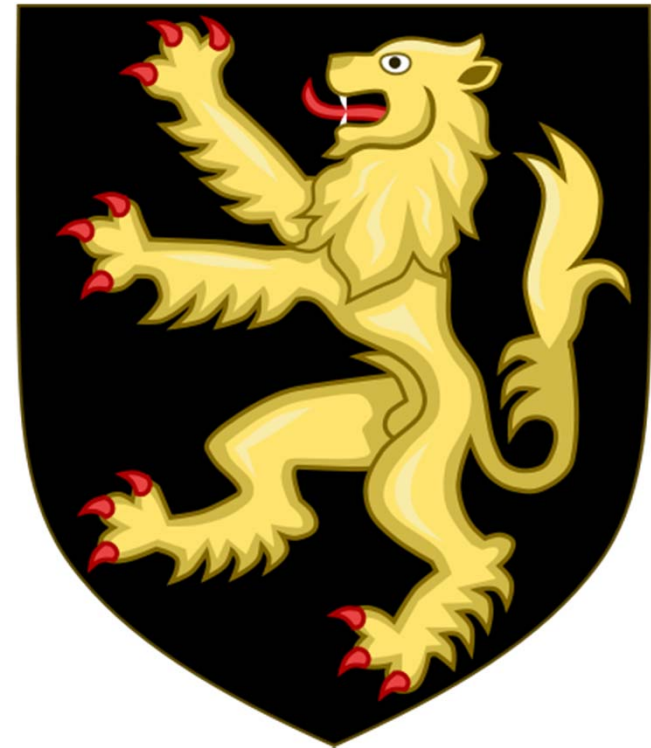
- 1. History of forest in Flanders and the duchy of Brabant
- 2. History of the Sonian Forest
- 3. Old growth elements :
past and present
- 4. Consequences for biodiversity
 - Fungi
 - Saproxylic beetles
- 5. Conclusions



1. History of forest in Flanders and the duchy of Brabant

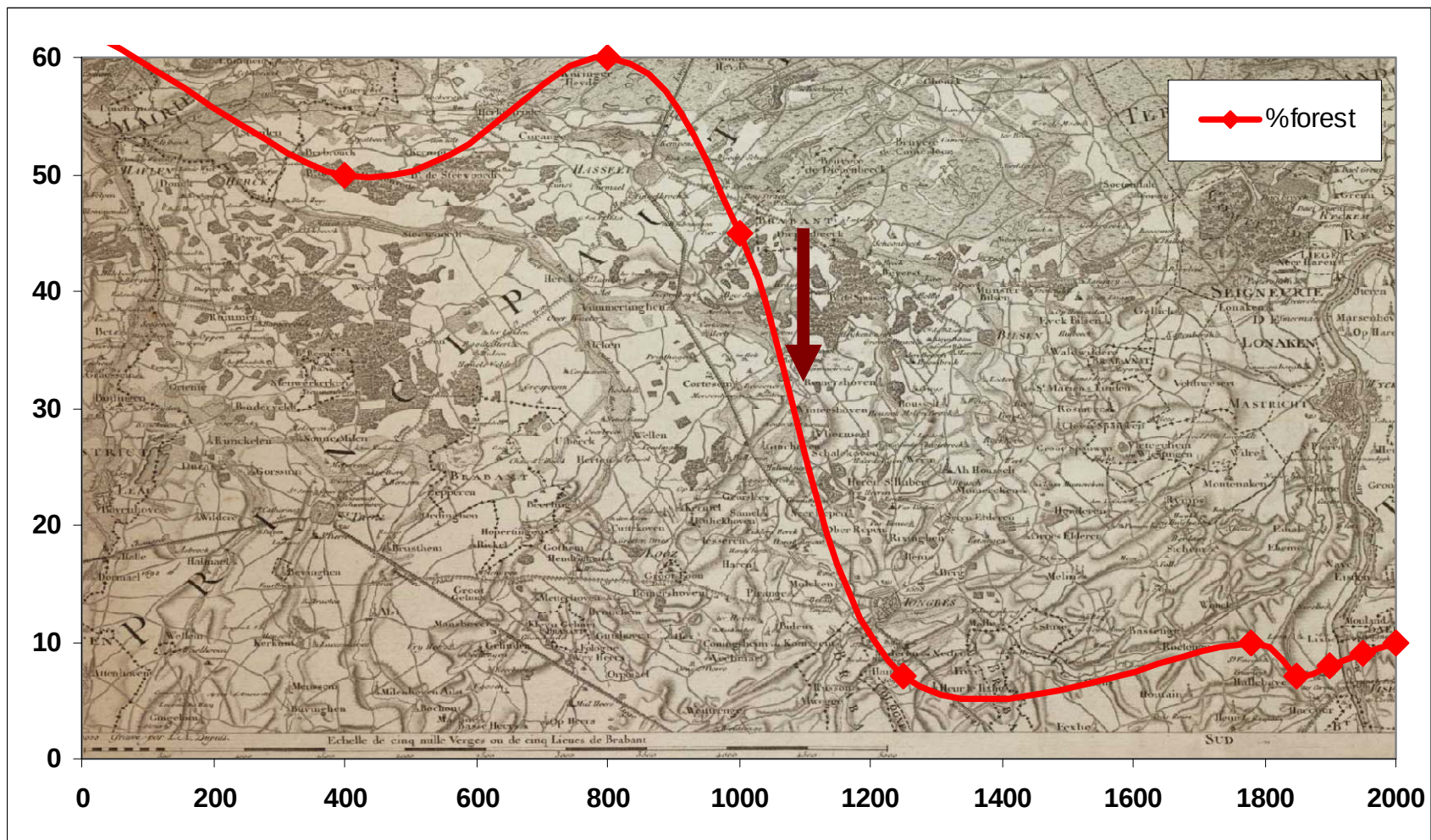


1. History of forest in Flanders and the duchy of Brabant

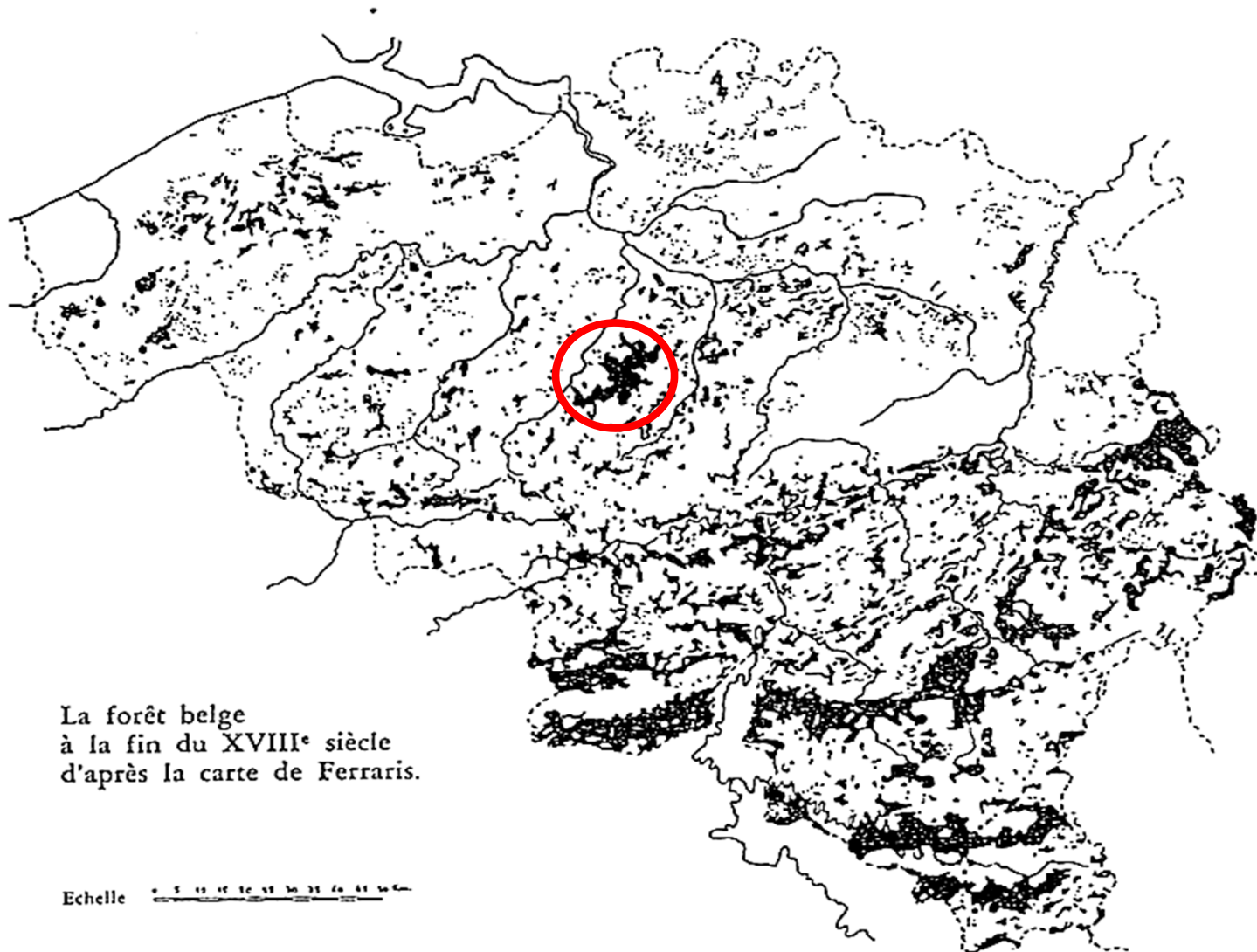


1. History of forest in Flanders and the duchy of Brabant

Almost 1000 years of low forest cover and intensive use !



1. History of forest in Flanders and the duchy of Brabant



2. History of the Sonian Forest



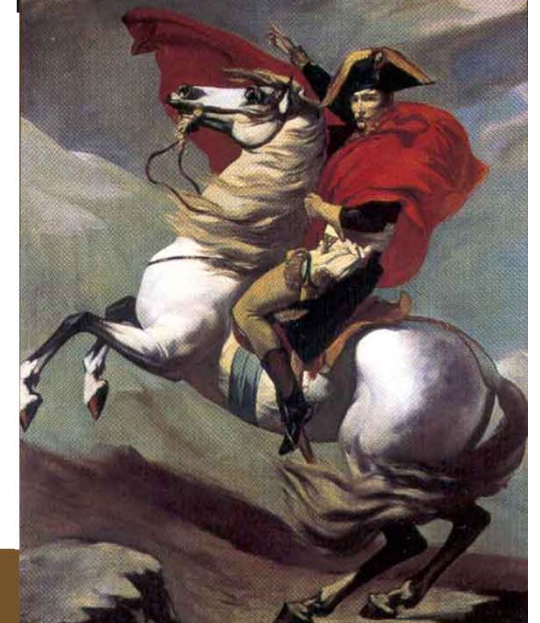
2. History of the Sonian Forest

- 12th century : belonged to the Dukes of Brabant
- 14th century : Dukes of Burgundy (Valois)
- 15th century : Habsburg emperors
 - Maximian of Austria
 - 16-17th Spanish Habsburgs : Emperor Charles V



2. History of the Sonian Forest

- 12th century : belonged to the Dukes of Brabant
- 14th century : Dukes of Burgundy
- 15th century : Habsburg emperors
 - Maximian of Austria
 - 16-17th Spanish Habsburgs : Emperor
 - 18th Austrian Habsburgs
- 1797 : 'nationalised' by French revolutionary council and French 'Empire'
- Since : state forest



2. History of the Sonian Forest



lingua'

- Extra income from grazing rights

3. Old-growth elements : past and present



3. Old-growth elements : past and present

Old-growth Characteristics :

- Large amounts of dead wood
- Ancient (overmature, monumental) trees

Bobiec (2002)



3. Old-growth elements : past and present

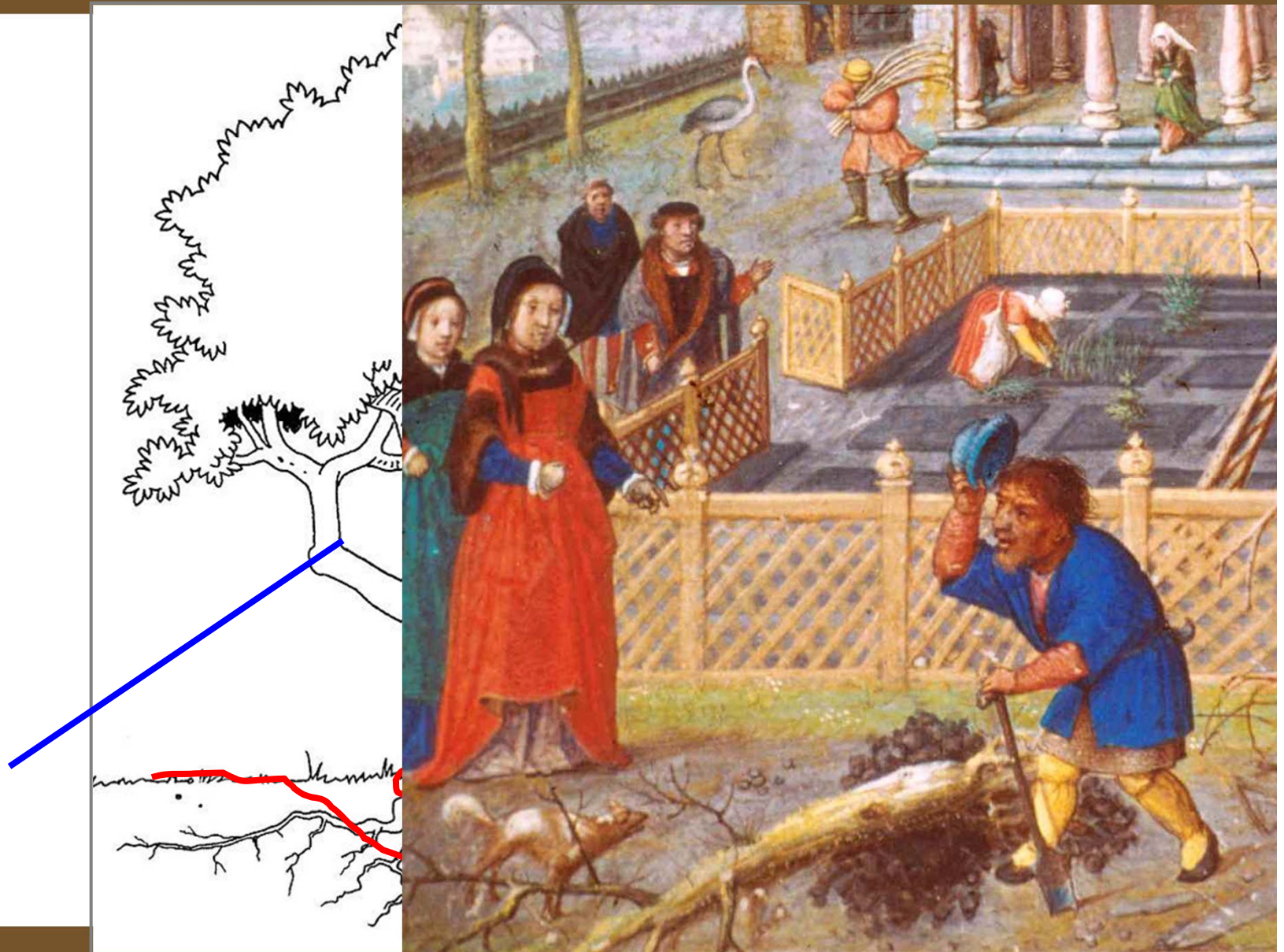
Middle ages – 19th century : very intensive forest management with removal of all dead wood (branches, stumps,...)



3. Old-growth elements : past and present



3. Old-growth elements : past and present



3. Old-growth elements : past and present

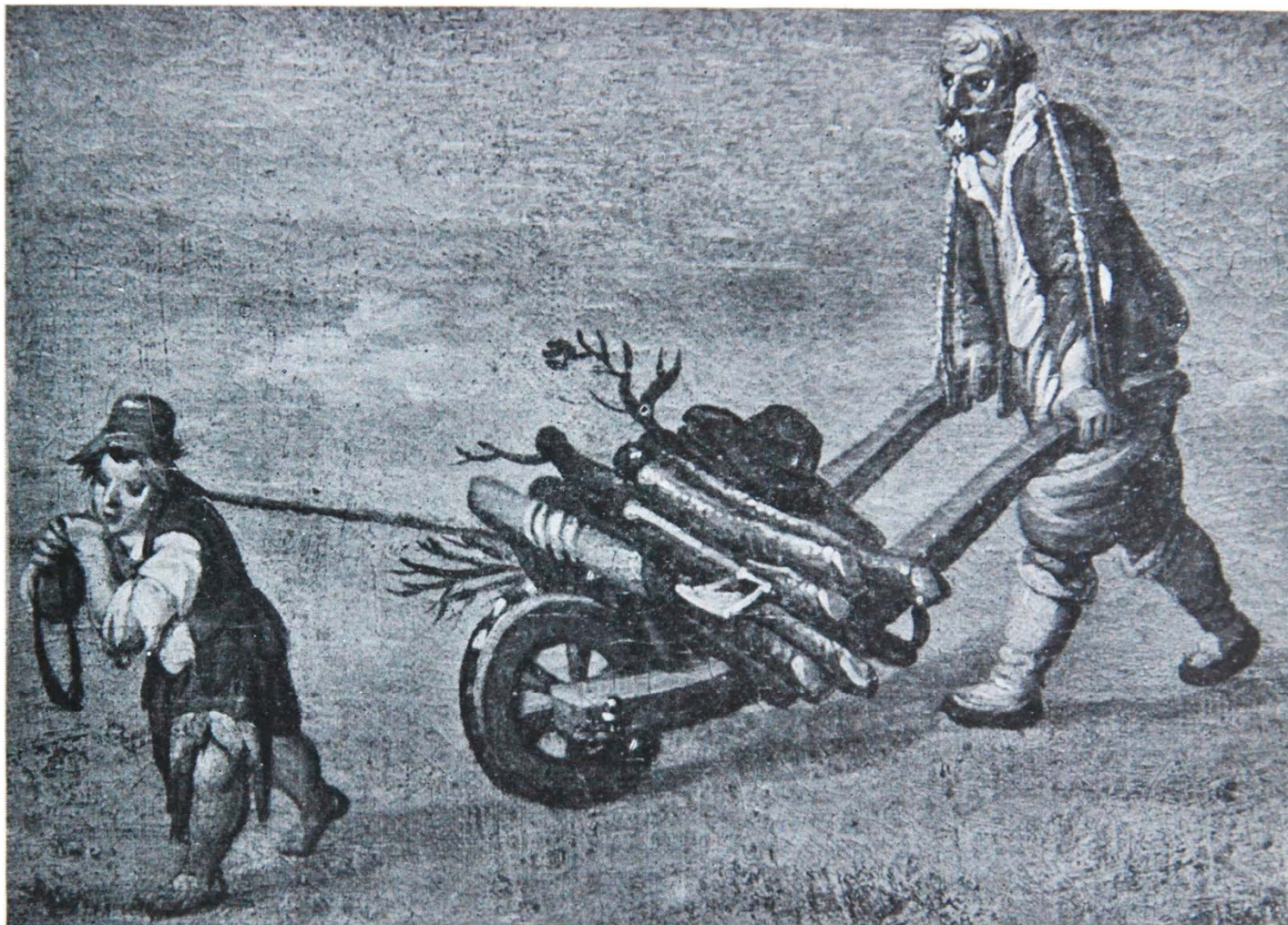


Fig. 253. — INDIGENTS BRUXELLOIS RAMENANT DU BOIS MORT RAMASSÉ DANS LA FORÊT DE SOIGNES. — Détail du tableau de Denis van Alsloot représentant une *Fête au Vivier d'Oie*.

3. Old-growth elements : past and present

Windtfellinkmeester
Maître des Chablis



3. Old-growth elements : past and present

- **Conclusion : absolutely NO dead wood !**
- **Overmature trees ??**
 - **Shelterwood system (in use until beginning of 20th century):**
30-50 trees (beech and oak) per ha
(seed trees) were spared for second and third rotation (= 200-300 year old!)

3. Old-growth elements : past and present

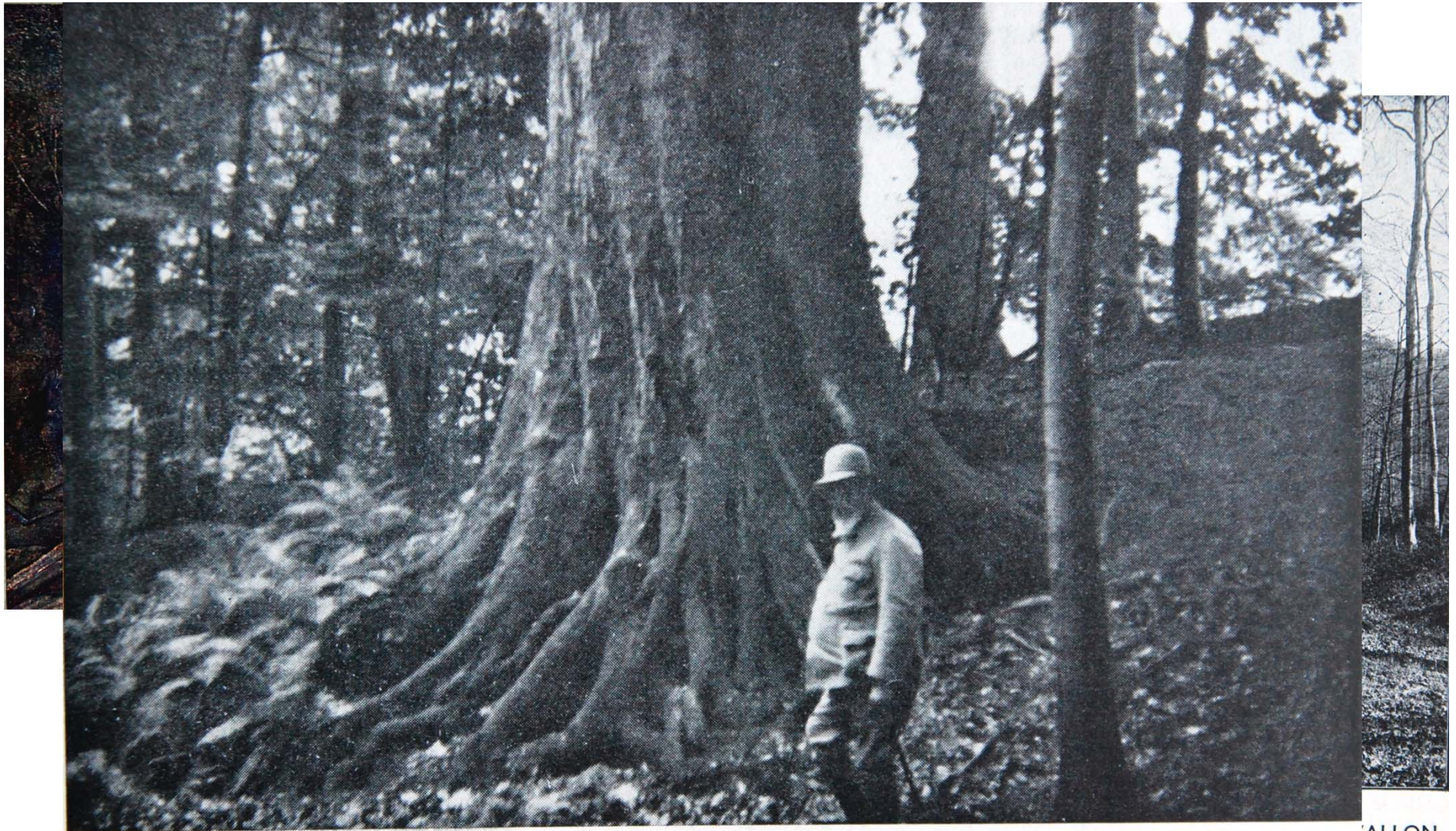


Fig. 265. — LE HÊTRE QUATRE FOIS CENTENAIRE DE RHODE-SAINT-GENÈSE, dans le domaine du comte de Jonghe d'Ardoye, ancienne parcelle sonienne.

ALLON
n hêtre

3. Old-growth elements : past and present

Ordinance of Emperor Charles V (12 october 1545) :
Specific zones reserved for hunting where trees were left
to grow old (probably going back to the 14th century)



*“... que les arbres du quartier de nostre forest de
Soignne, nômé Zadelberg contenant IIIIxx bôniers ou
plus côme entendons, pour aucunes années passées
sont fort tombez et encores tombent de jour en jour, et
ce à cause du vent et grant ancienneté iceulx
arbres, pour ce que de très longtemps nos prédécesseurs,
ducs et ducesses de Brabant, avoient deffendu de non
y mesurer, marquer, ne couper pour la beauté
d'iceulx arbres, lesquelz maintenant seichent et
tombent en grant nombre et quantité, tellement que
d'iceulx nous avons peu de prouffit et encores moins
en aurions en temps advenir’*



3. Old-growth elements : past and present

And new such zones should be installed

'... nous désirons, pour le plaisir et déduict de nous et noz successeurs ou temps advenir, que en nostre dicte forest de Soingne il ait des quartiers et lieux furniz de grant nombre de beaulx arbres, côme a esté parci devant ledict quartier de Zadelberch, et que entendons que pour ce faire il y a certains lieux et quartiers adce bien propices et convenables, et esquels il y a desia grans josnes arbres de faux, de bonne haulteur, grandeur et droicture côme au lieu de Diersdelle jusques à la Ketelheye, et derrière le Rouge Cloistre dessus Ouderghem, jusques au lieu nômé Flos. Nous vous mandons et ordonnons côme dessus que laissez doresenavant croistre lesdicts arbres et ne permectez mesurer, marquer ne abatre aucuns d'iceulx ne y mettre aucunes couppes ordinaires ni extraordinaires en aucune manière. Ains les laissez en leur nature et croissance jusques à la grandeur ou lieu des arbres dudict Zadelberch. Car nostre plaisir est tel...'

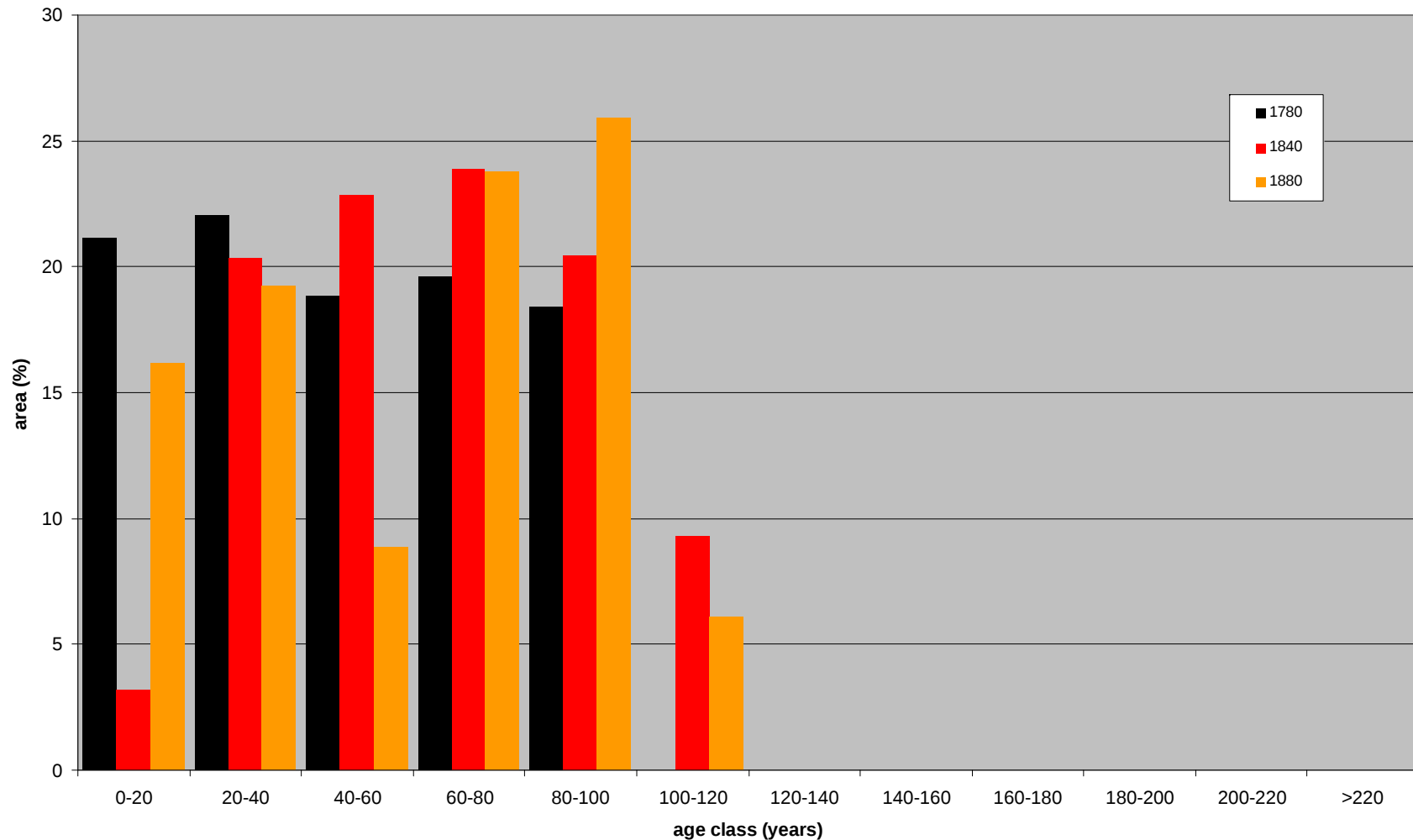
3. Old-growth elements : past and present

- *Last 100 years : change in management*
 - *‘immobility’ due to public pressure*



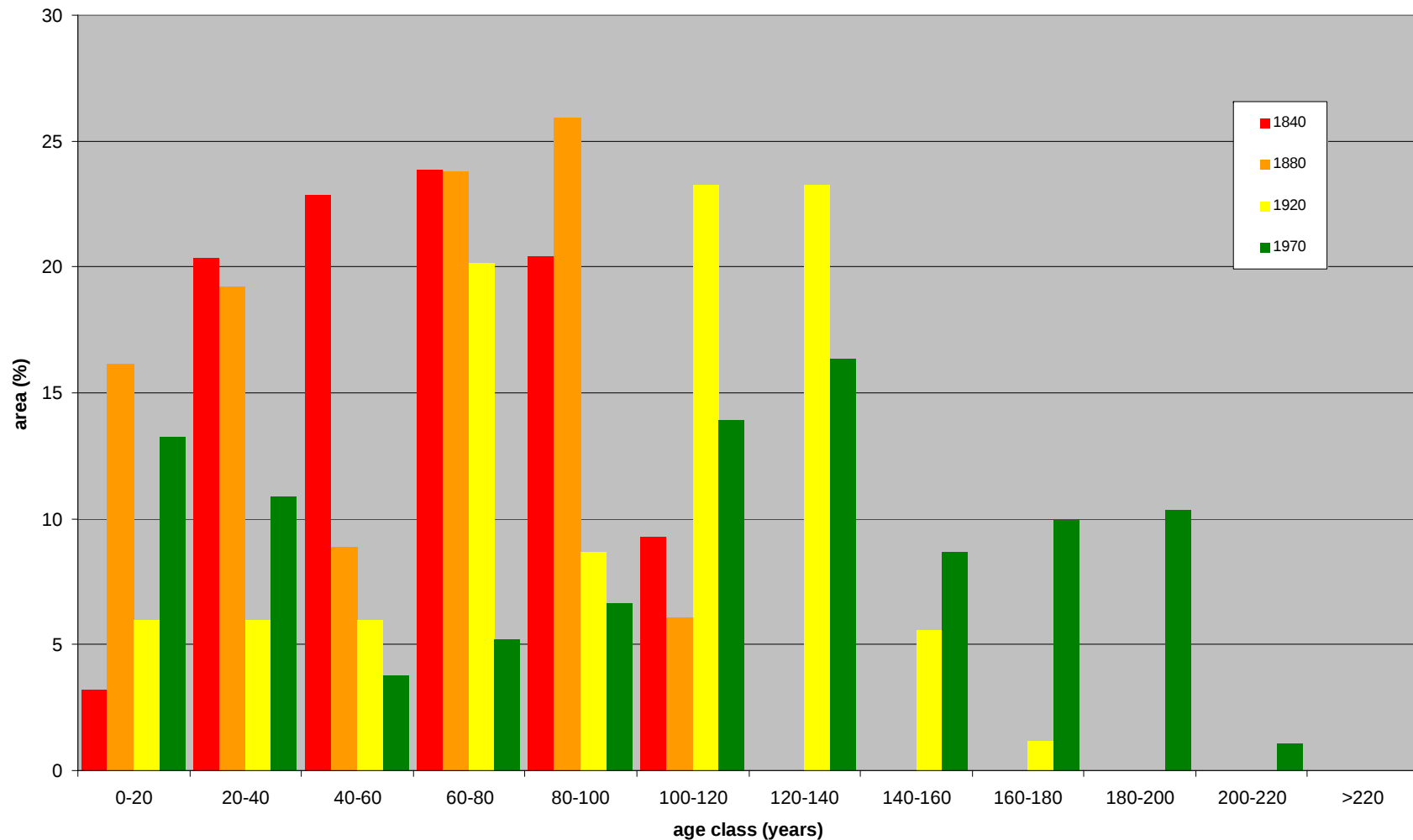
3. Old-growth elements : past and present

Age-class distribution



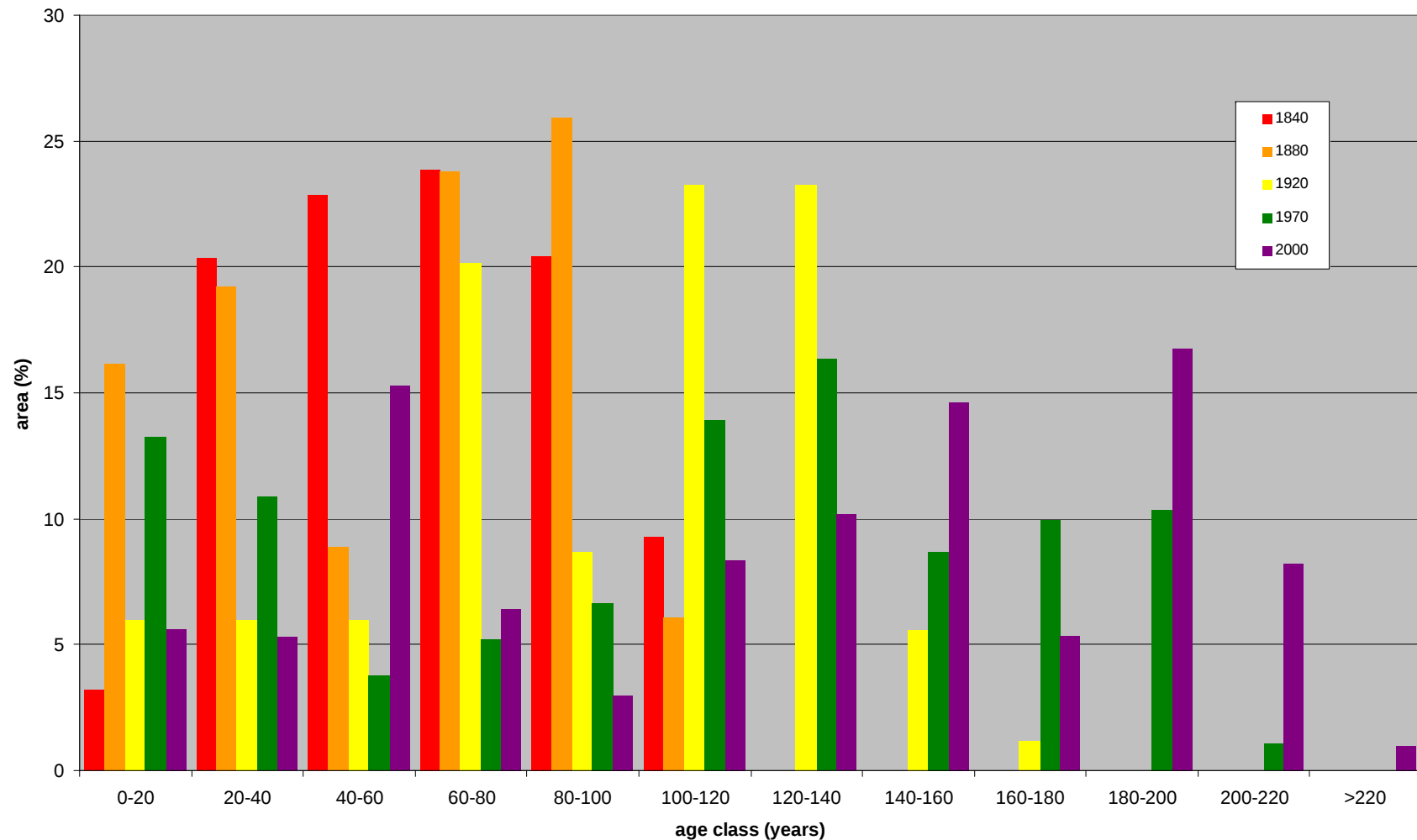
3. Old-growth elements : past and present

Age-class distribution



3. Old-growth elements : past and present

Age-class distribution

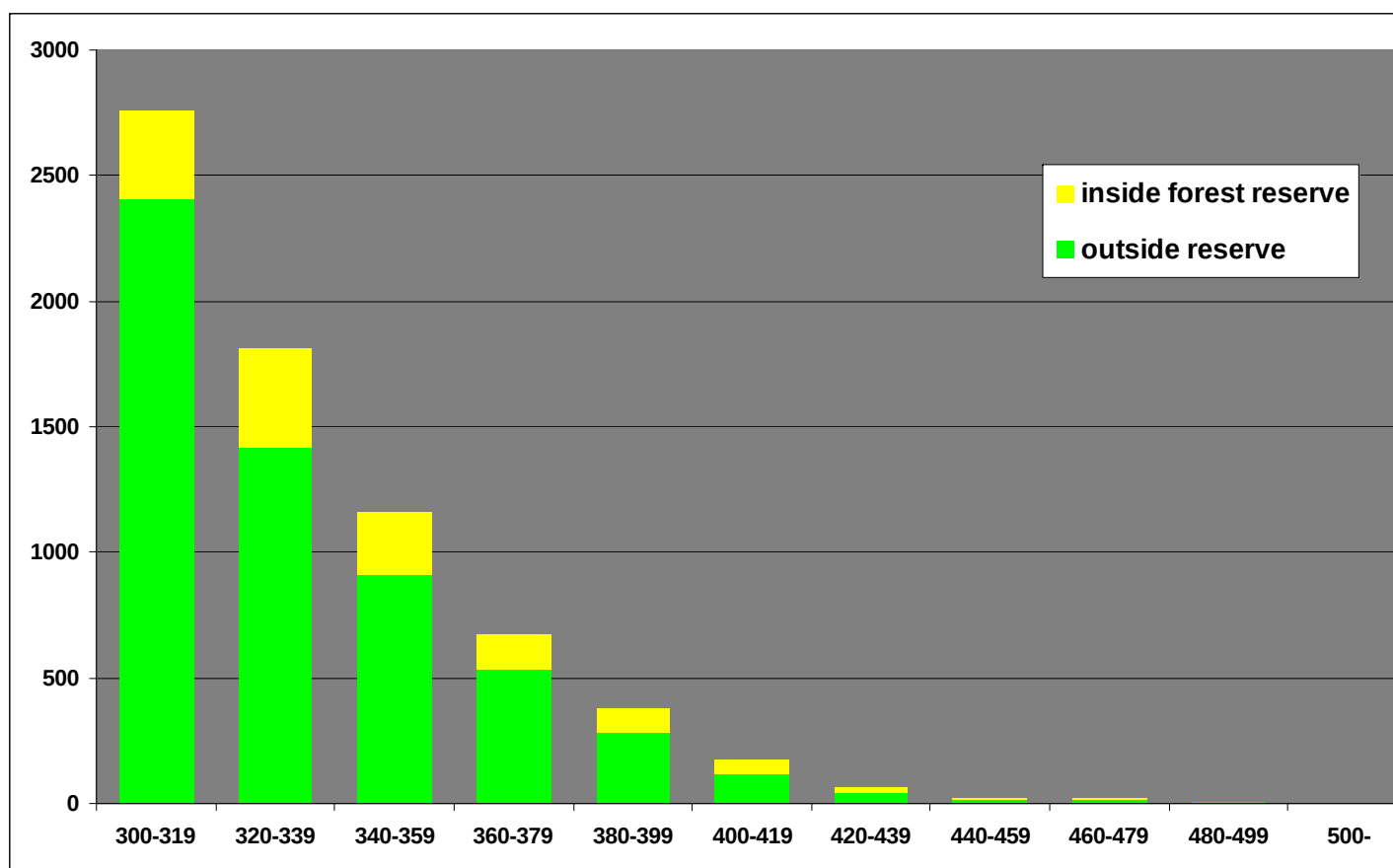


3. Old-growth elements : past and present

Inventory 2010 : 2500 ha of the forest

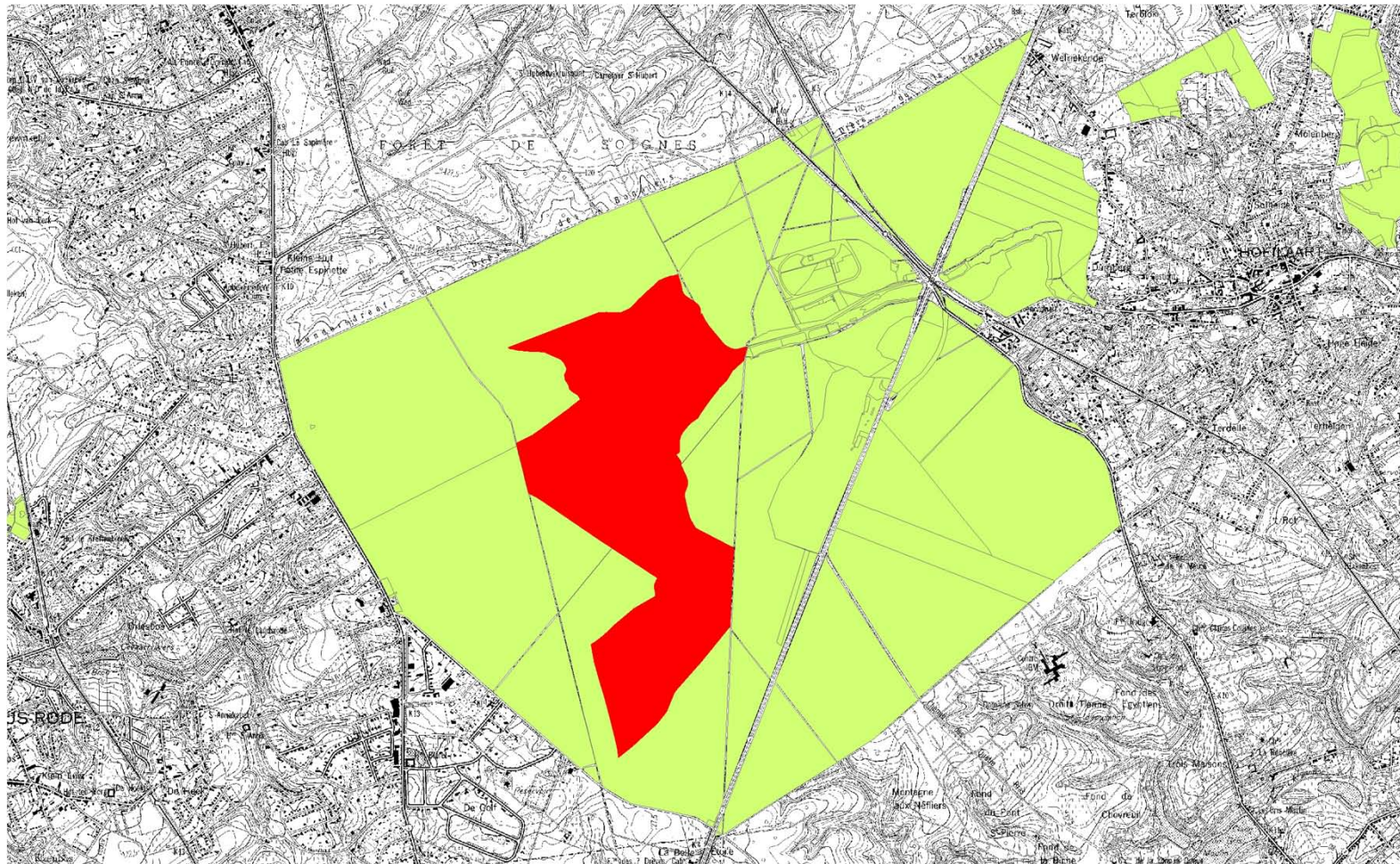
Overmature trees : > 3m girth : +7000 (+6000 beech; +500 oak)

> 4m : 288 trees;

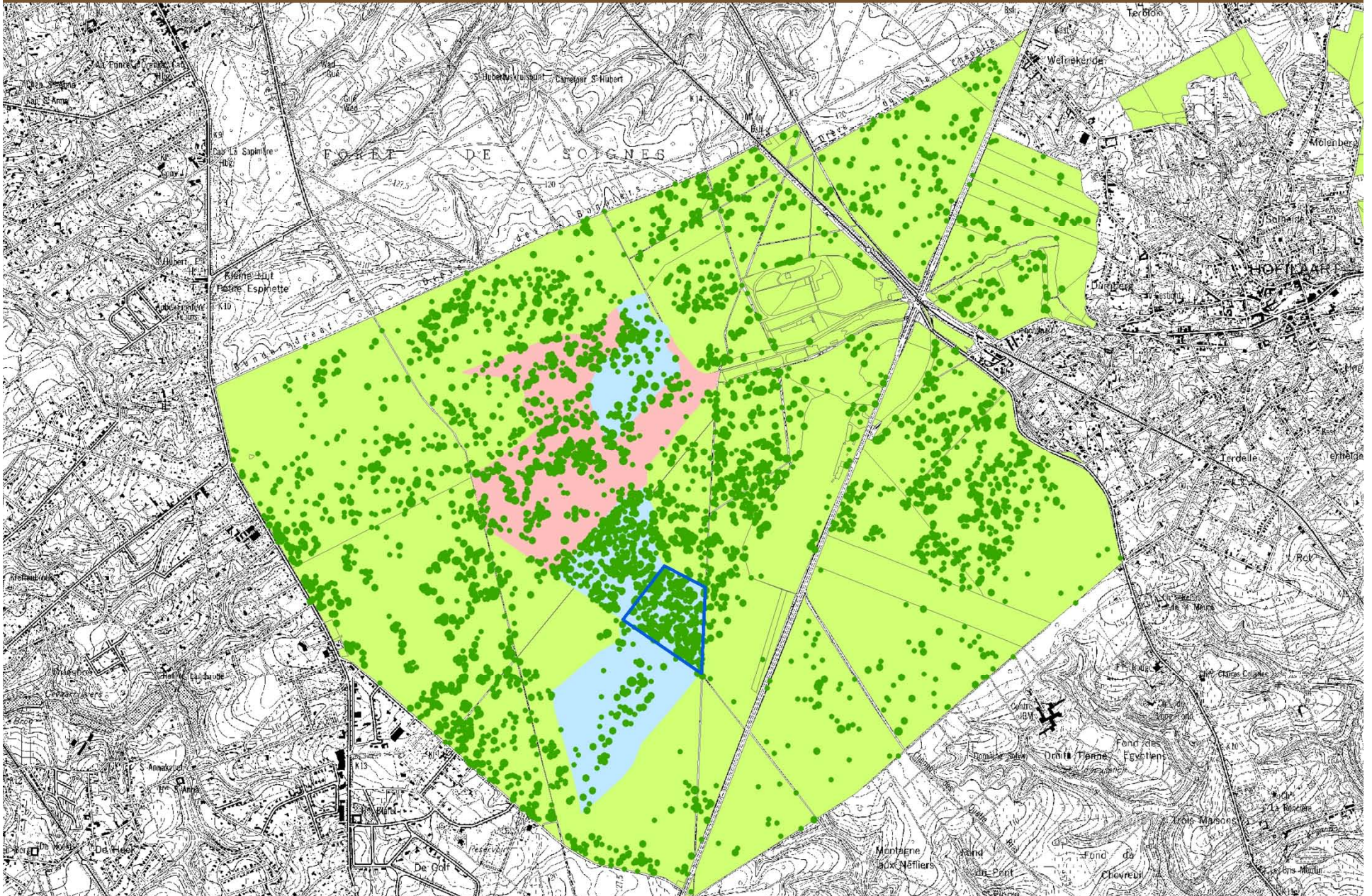


3. Old-growth elements : past and present

Strict forest reserve (1983 – 1995 – 2010)

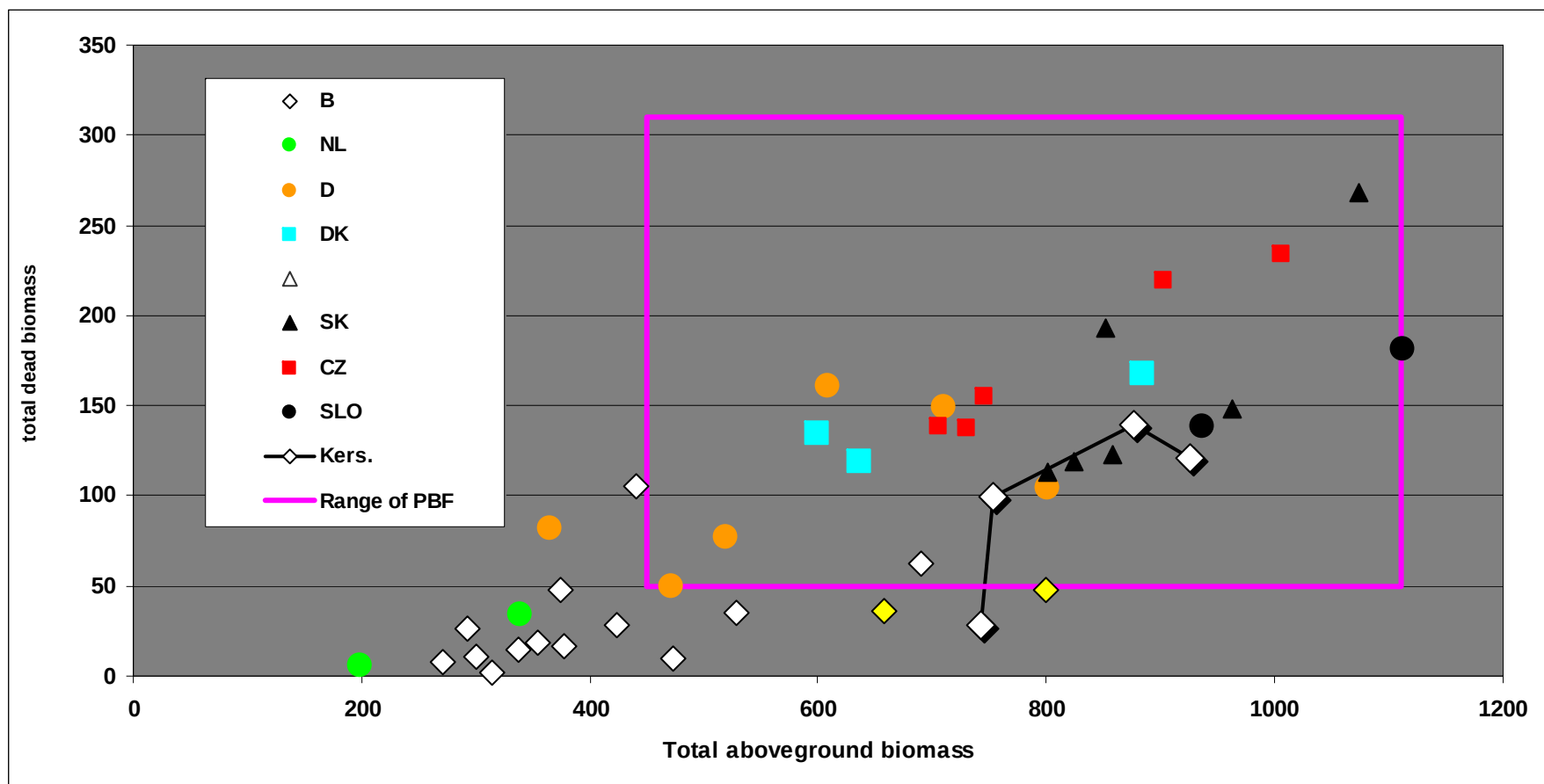


3. Old-growth elements : past and present



3. Old-growth elements : past and present

Dead wood : on average about 10 m³/ha ('reserved' trees)
'old core' of the forest reserve : 120-140 m³/ha



4. Consequences for biodiversity



4. Consequences for biodiversity

Old-growth related species : survivors and recolonisers

Survivors : Continuity and connectivity in suitable habitat / substrate

Recolonisers : potential depends on :

- dispersal limitations**
- availability (and density) of required habitat**

Did species dependent of 'old-growth characteristics manage to survive or recolonise the forest (especially in the 'secondary old growth' site) ?

4. Consequences for biodiversity

Fungi :

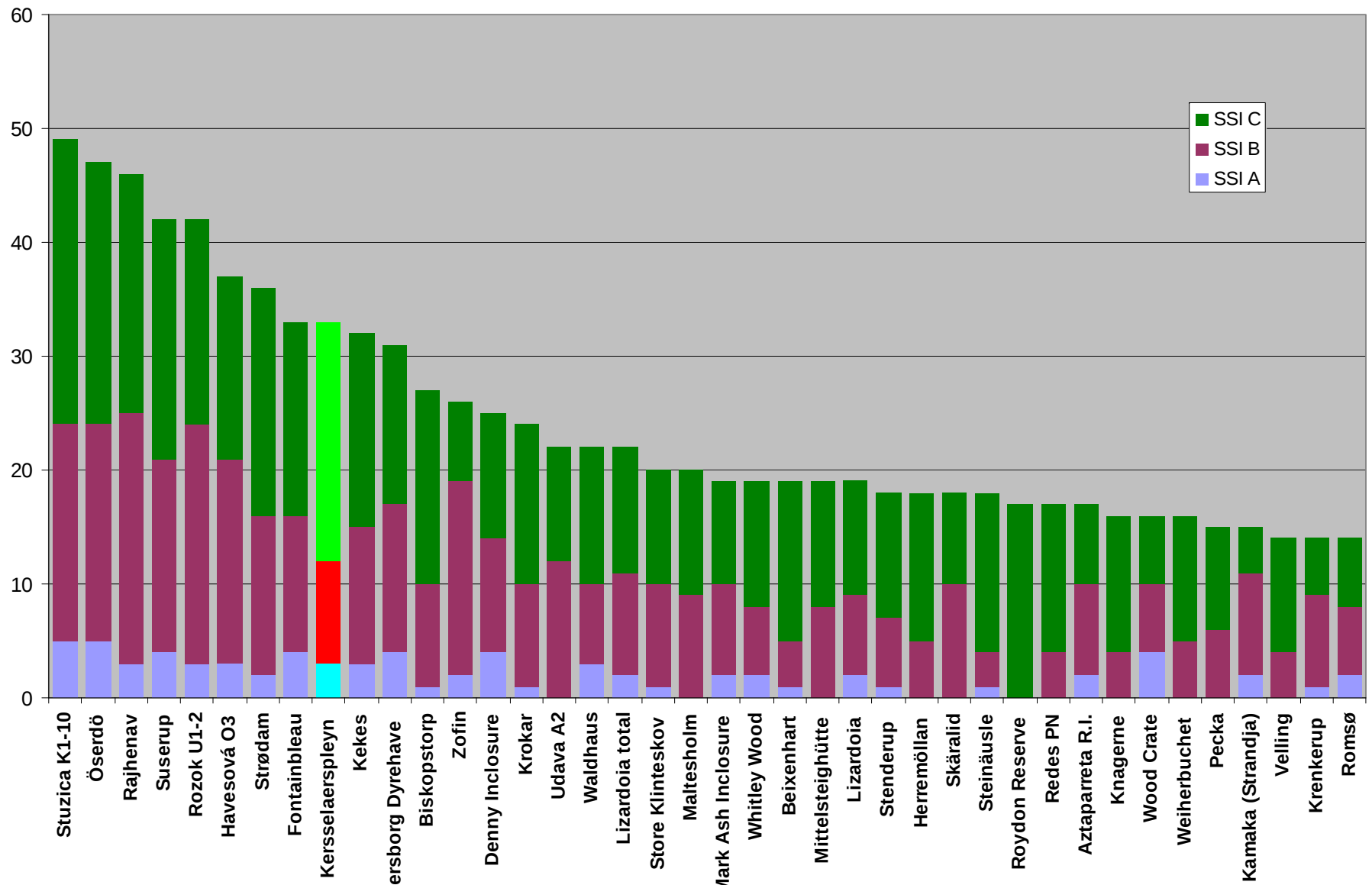
Good dispersal capacities

Recruitment requirements are very diverse



4. Consequences for biodiversity

Wood decaying fungi on beech : Species of Scientific Interest



4. Consequences for biodiversity

Some species have very specific substrate requirements (substrate with very low spatio-temporal availability : low probability)

Indicators of Ecological Integrity (spatio-temporal continuity of required habitat)

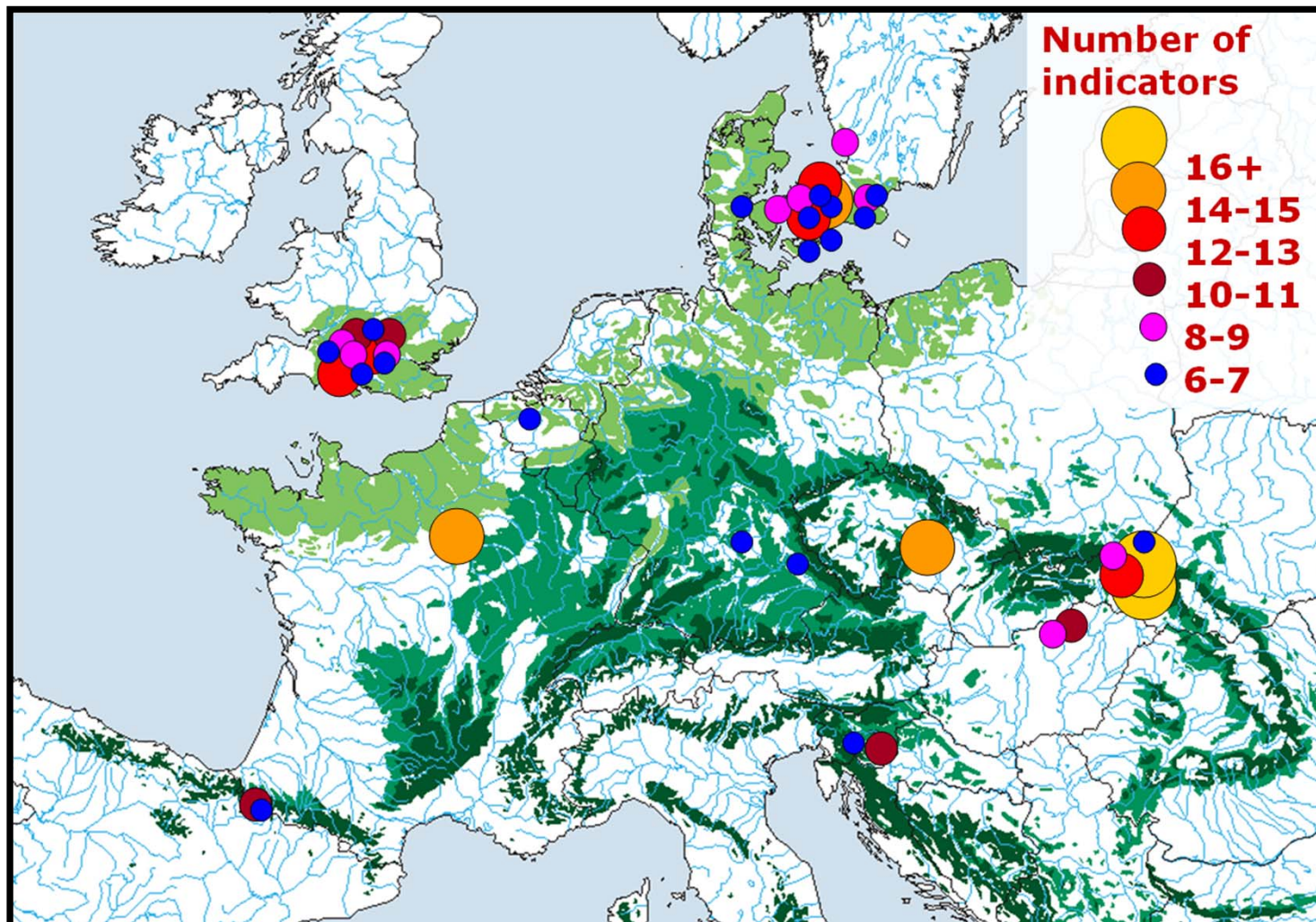
Christensen et al. (2005) EFI-proceedings 51
Odor et al. (2006) Biol.Cons. 131, 58-71

21 species – 12 known to occur in B



Aurantioporus alborubescens
Camarops tubulina
Ceriporiopsis gilvescens
Ceriporiopsis pannocincta
Climacodon septentrionalis
Dentipellis fragilis
Flammulaster limulatus
Flammulaster muricatus
Ganoderma pfeifferi
Hericium coralloides
Hericium erinaceus
Hohenbuehelia auriscalpium
Inonotus cuticularis
Ischnoderma resinsum
Lentinellus ursinus
Lentinellus vulpinus
Mycoacia nothofagi
Ossicaulis lignatilis
Pholiota squarrosoides
Pluteus umbrosus
Spongipellis delectans

4. Consequences for biodiversity



Other sites in B & NL : 1-4 spp

4. Consequences for biodiversity

Saproxylic beetles :

- Diverse in dispersal ability
- Diverse in habitat requirements



4. Consequences for biodiversity

Method :

2 year sampling : window traps 2x4; glue-rings 2x4;
light traps, active catch

Results after 1 year sampling :

>450 spp. of Coleoptera
>180 sp. Saproxylic beetles

German RL : >40 spp :
UK red data book : >50 spp



4. Consequences for biodiversity



4. Consequences for biodiversity

International comparison

Quality indicator systems developed for UK :

Saproxylic Quality Score (SQS) and Saproxylic Quality Index (SQI)
(*Fowles, Alexander, & Key, 1999*)

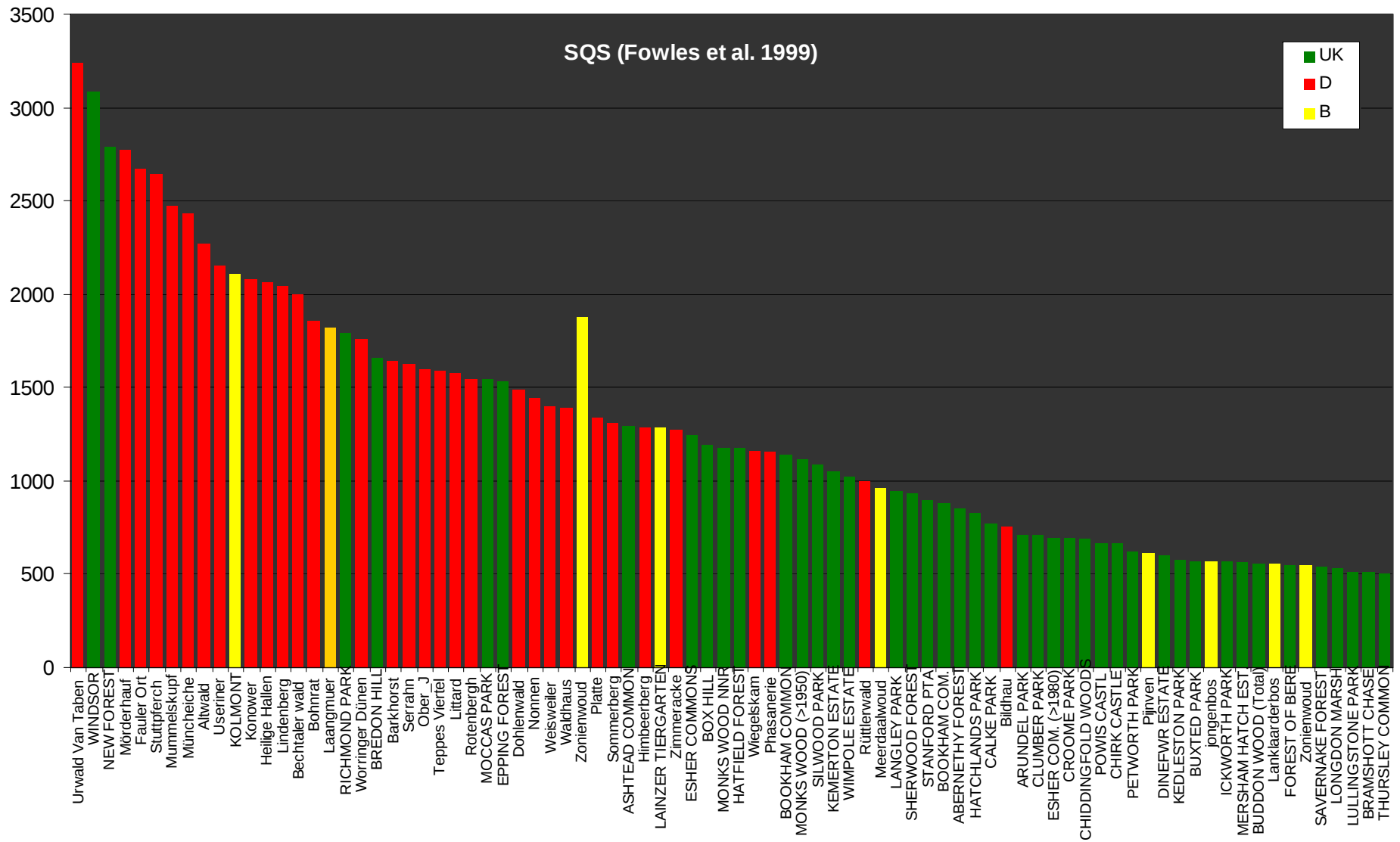
Index of Ecological Continuity (IEC)
(*Harding & Alexander 1994*)

Compared with >160 sites in Britain and >40 sites in Germany

Incomplete survey (one year) - include other old records

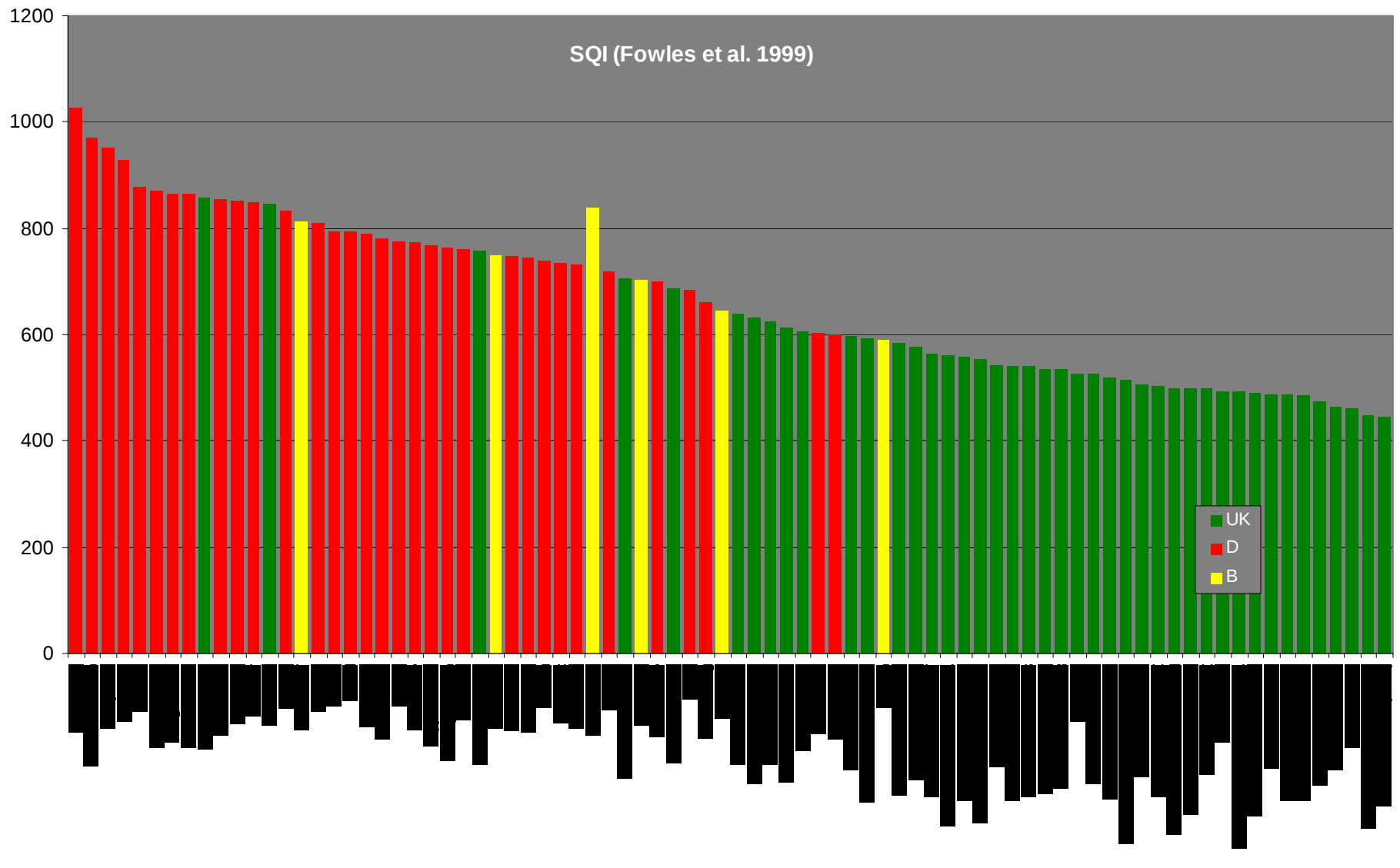
4. Consequences for biodiversity

Saproxylic Quality Score :



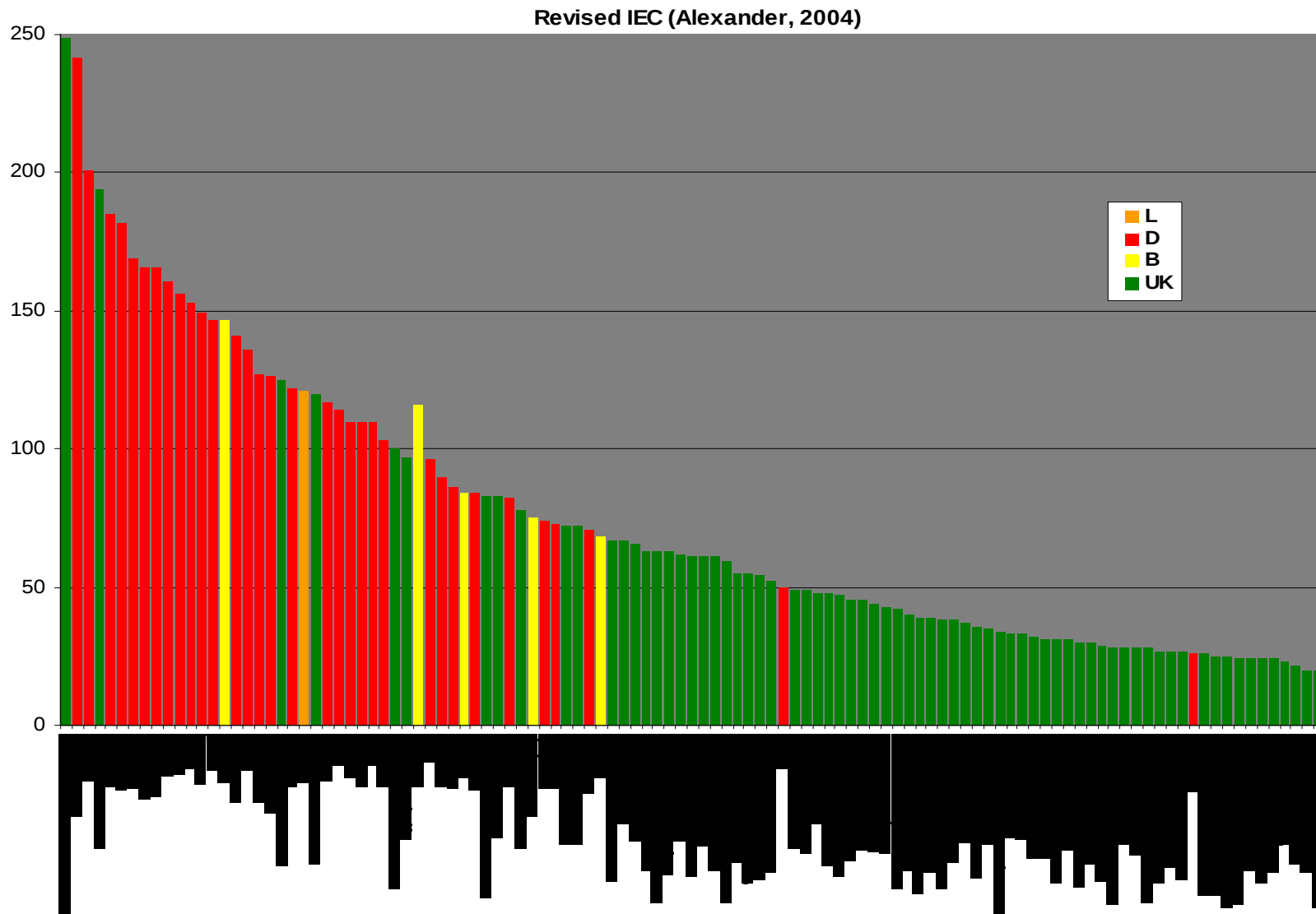
4. Consequences for biodiversity

Saproxylic Quality Index :



Old-growth species : survivors and recolonisers

Index of Ecological Continuity



4. Overall conclusion

In Flanders, 'old-growth elements' have been virtually absent from the intensively used, fragmented forests for centuries.

This was also the case in Sonian forest, be it that overmature trees have always been prominent

Now the forest contains extraordinary high densities of overmature trees (beech), and locally high amounts of dead wood

some preliminary results from fungi and beetle inventories confirm the high potential for biodiversity that could be derived from the specific history and current state of the site : the forest proves to be one of the most important hotspot-sites for old-growth related biodiversity in the Low Countries



Thank you