



# Epiphyte diversity in native and plantation forests

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# Function of talk

- Introduce the epiphyte component of the **PLANFORBIO ForestBio** project
- Present species richness (SR) data for 6 forest types

# Epiphytes – tree life

- **Mosses, liverworts & lichens**
- Epiphytes grow on trees, they live on bark and use trees for support
- Many of different groups of plants & fungi are epiphytes
- Woody plants, lianes (climbers), herbs (forbs), ferns, mosses, liverworts, lichens, [*algae, lichenicolous fungi, ascomycetes, basidiomycetes, mitosporic fungi, myxomycetes*]

# Why study epiphytes

- Major component of forest 'plant' biodiversity. Lots of species.
- Epiphytes are indicators that are sensitive to climate, air pollution, forest history
- Understudied – still very little ecological data on epiphytes in Ireland.

# Methods – quadrat recording

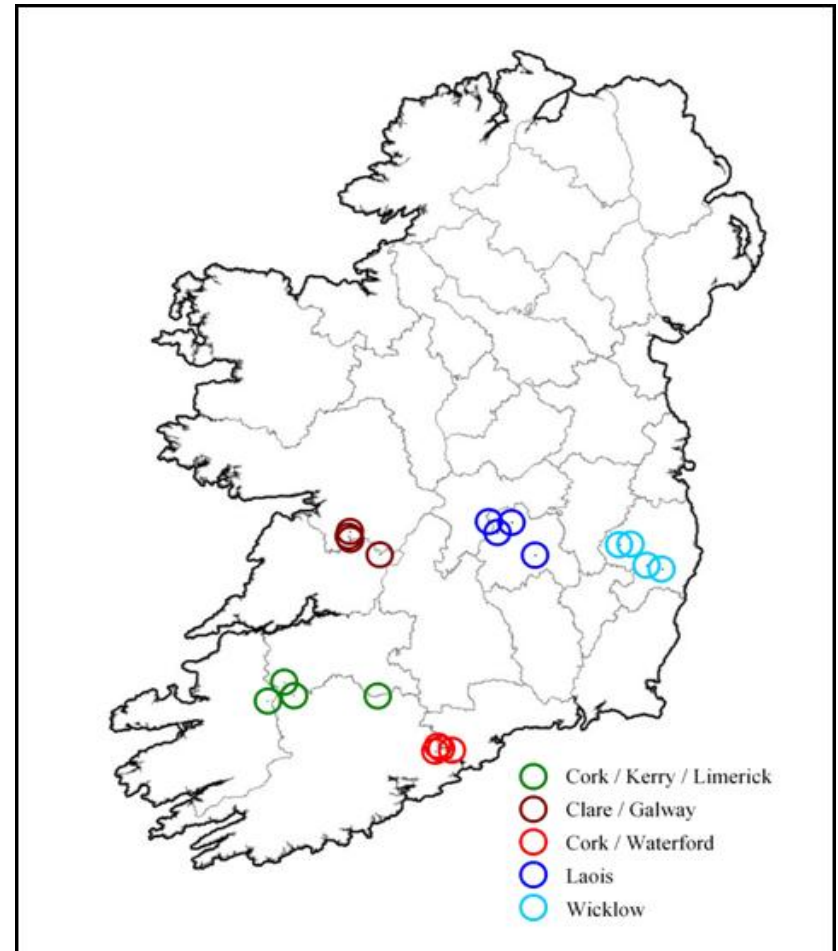
- 10m x 10m x 2m plots – macro-plots
- Linked directly to **ForestBio** ground flora dataset
- All epiphytes recorded on DAFOR scale with substrate: host tree(s)
- 6 forest types, 5 sites each type, 3 plots per site

# Forest Types

- Reforestation sitka spruce plantation sites
  - Pre-thicket
  - Thicket
  - Mid-rotation
  - Mature
- Oak-dominated oak-holly-birch (**WN1\***)
- Ash-dominated oak-ash-hazel (**WN2\***)
- \* vegetation type codes of Fossitt (2000)

# Sitka spruce plantations

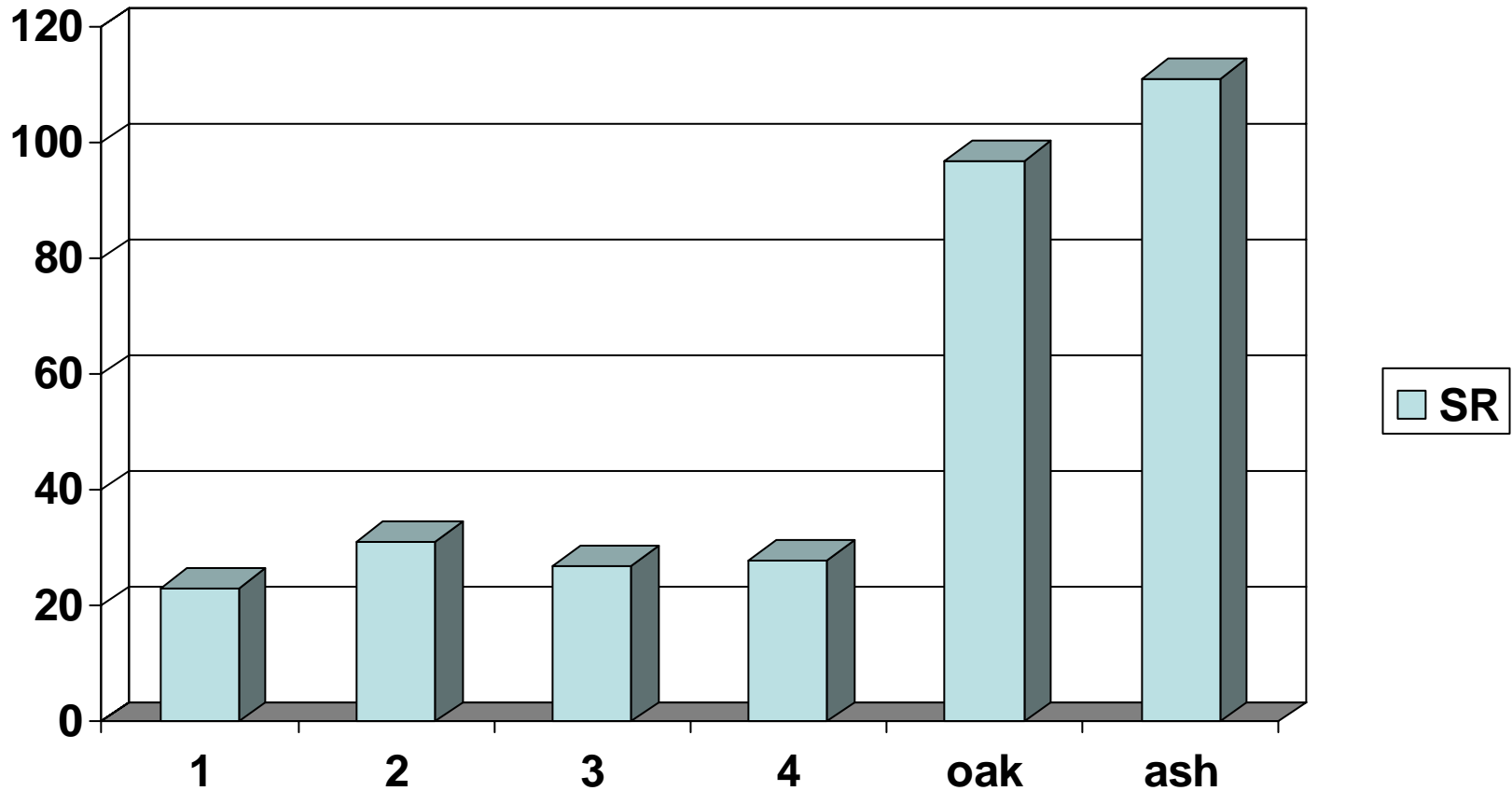
- 20 sites across Ireland
- Reforestation plantations in 5 clusters – east, midlands, mid-west, south-west, south Ireland



# Species Richness (SR) data for 1,500 m<sup>2</sup> of 6 forest types

- Sitka spruce forests
  - 1 Pre-thicket
  - 2 Thicket
  - 3 Mid-rotation
  - 4 Mature
- 52 (**for 6,000 m<sup>2</sup>**)
  - **23 (all 1,500 m<sup>2</sup>)**
  - **31**
  - **27**
  - **28**
- Oak (WN1) forests
- Ash (WN2) forests
- **97 (all 1,500 m<sup>2</sup>)**
- **111**

# Species Richness (SR) data for 1,500 m<sup>2</sup> of 6 forest types

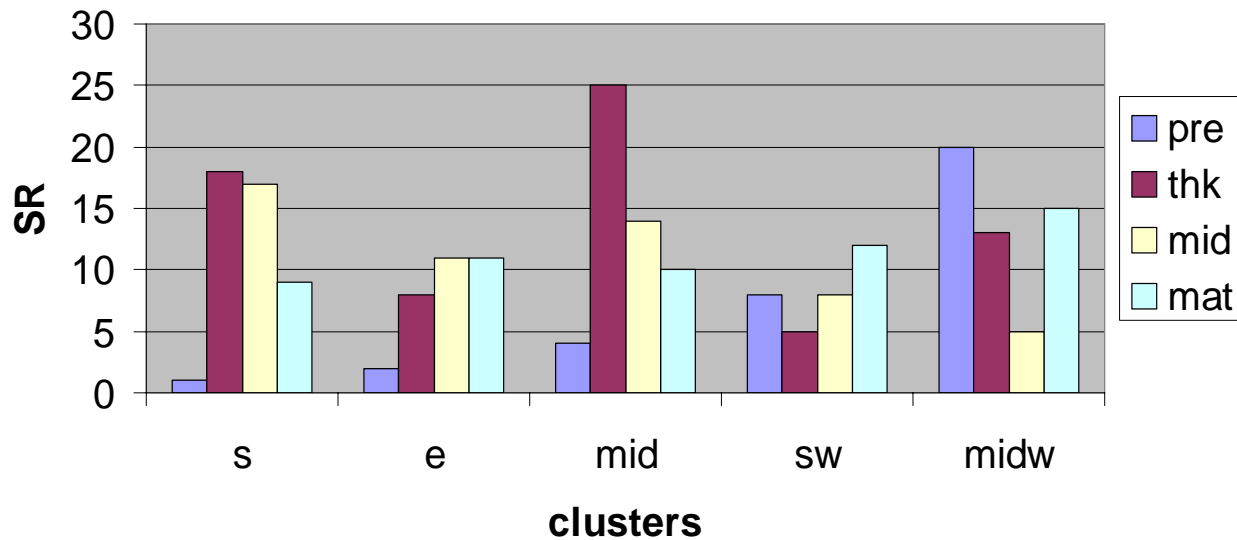


# Interpretation of SR data

- Low diversity in Sitka spruce plantations
- High diversity in WN1 and WN2 native woods
  
- Merchantable timber – low diversity
- Conservation use – high diversity

# Species Richness (SR) by site (300 m<sup>2</sup>)

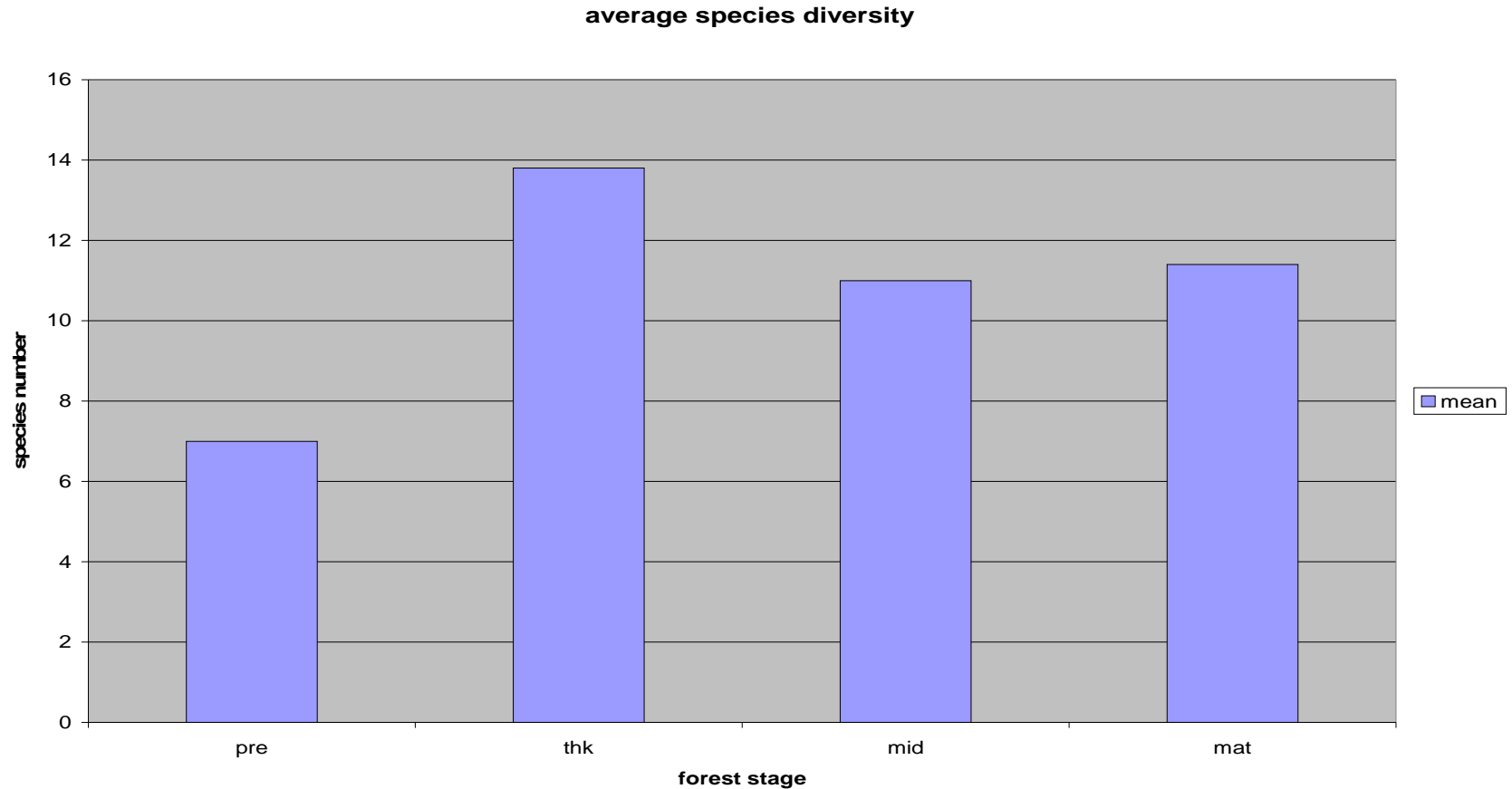
sitka spruce forest stage & cluster



# Interpreting SR of Sitka spruce forests

- Species Richness (SR)
  - 1-25 species per site (300 m<sup>2</sup>)
  - 20-30 species per forest stage (1,500 m<sup>2</sup>)
  - 52 species in the study (6,000 m<sup>2</sup>)
- Regional pattern
  - Pre-thicket – low SR in **east, south & midlands**
  - Pre-thicket – high SR in **mid-west**
  - Thicket – high SR in **south & midlands**

# Sitka spruce forest average SR by stage (300m<sup>2</sup>)

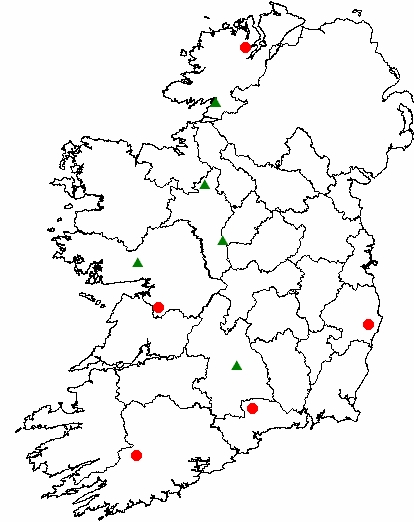


# Interpreting average SR over forest cycle

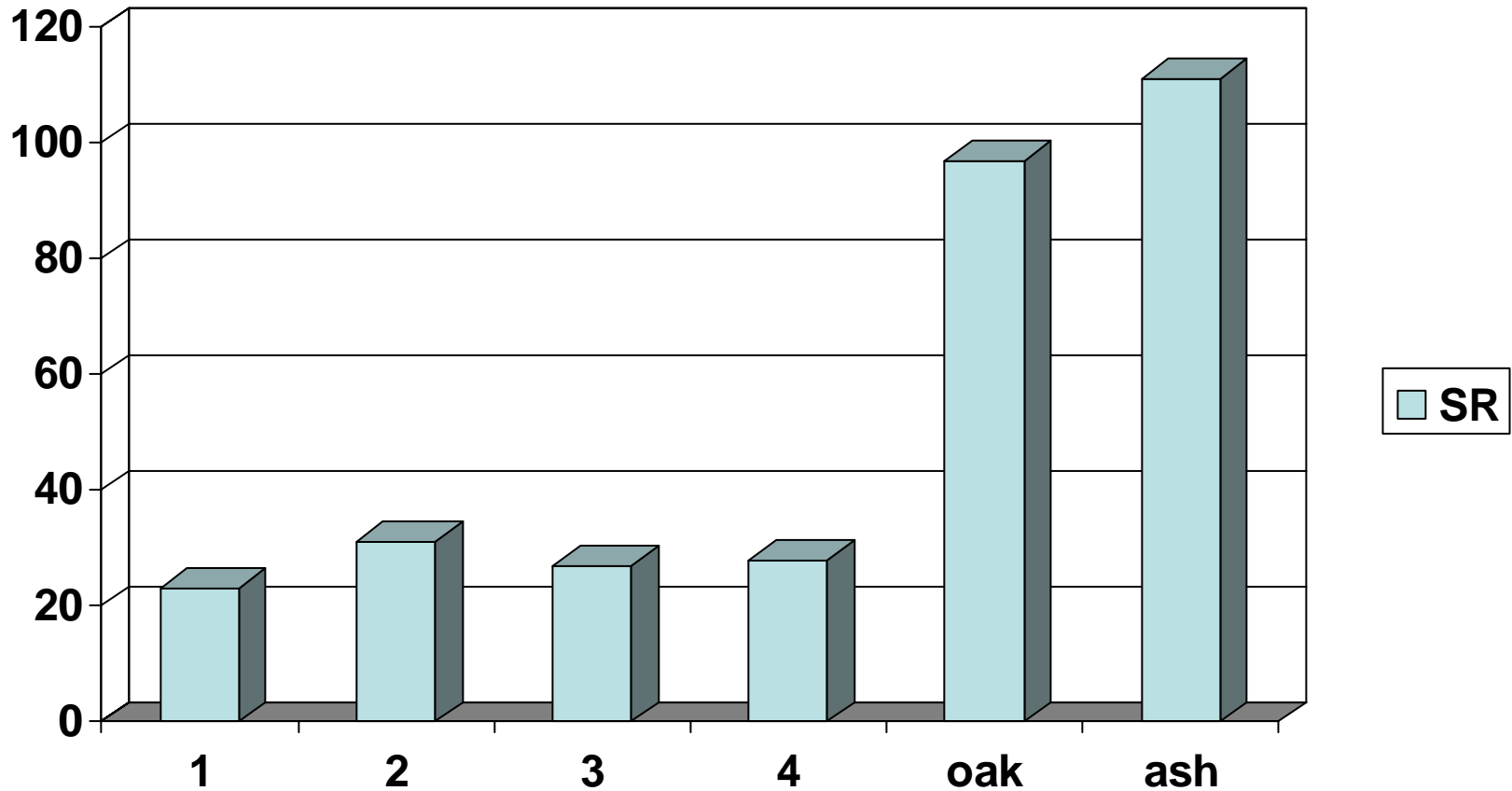
- Pre-thicket – low SR
- Thicket – moderate
- Mid-rotation – slight drop
- Mature – no change, low standard deviation, more predictable flora
- Species accumulation over time is true in early stages, however 10x10x2 method under-samples site diversity (climbed tree SR) in late stages

# Native wood site map

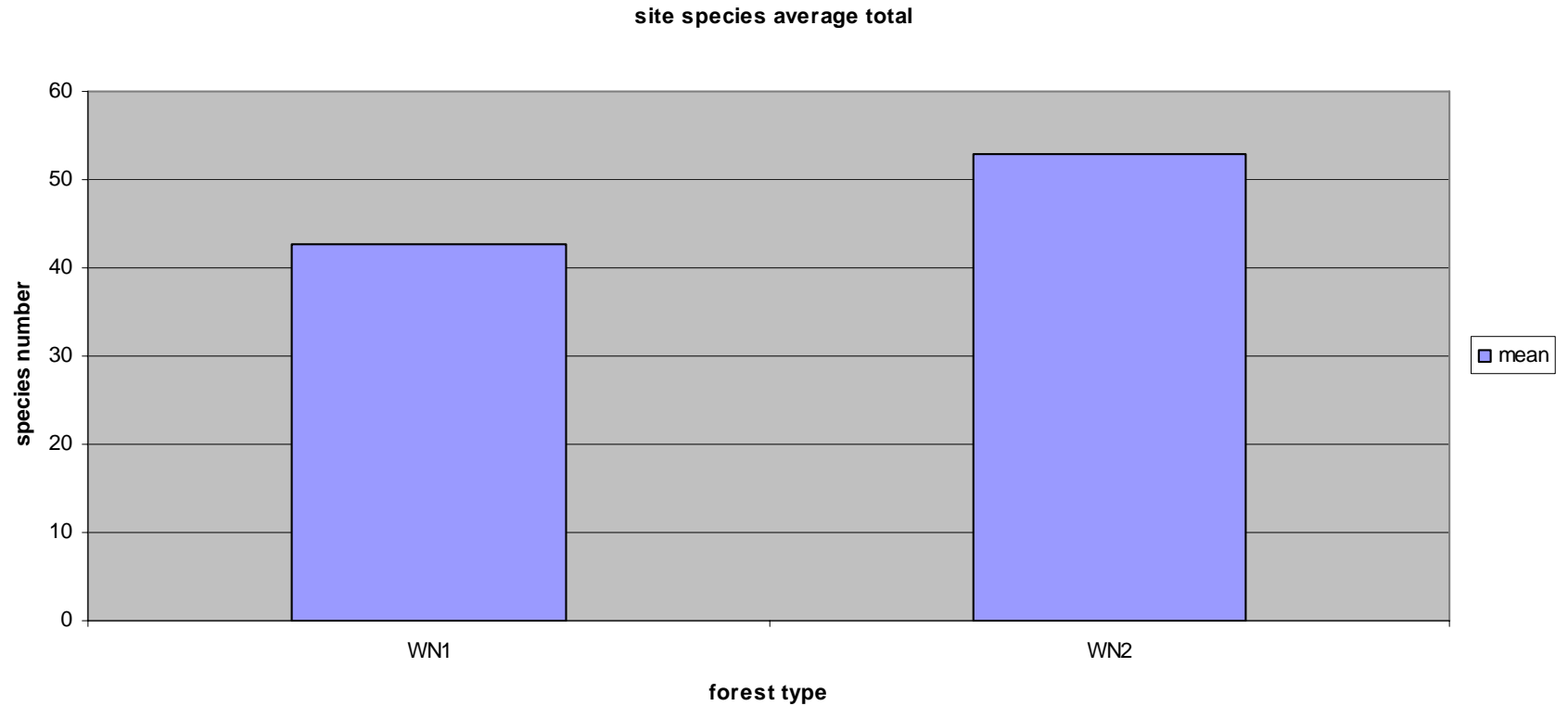
- Donegal WN1 & WN2
- Roscommon 2 WN2
- Galway WN1 & WN2
- Tipperary WN2
- Cork WN1
- Waterford WN1
- Wicklow WN1



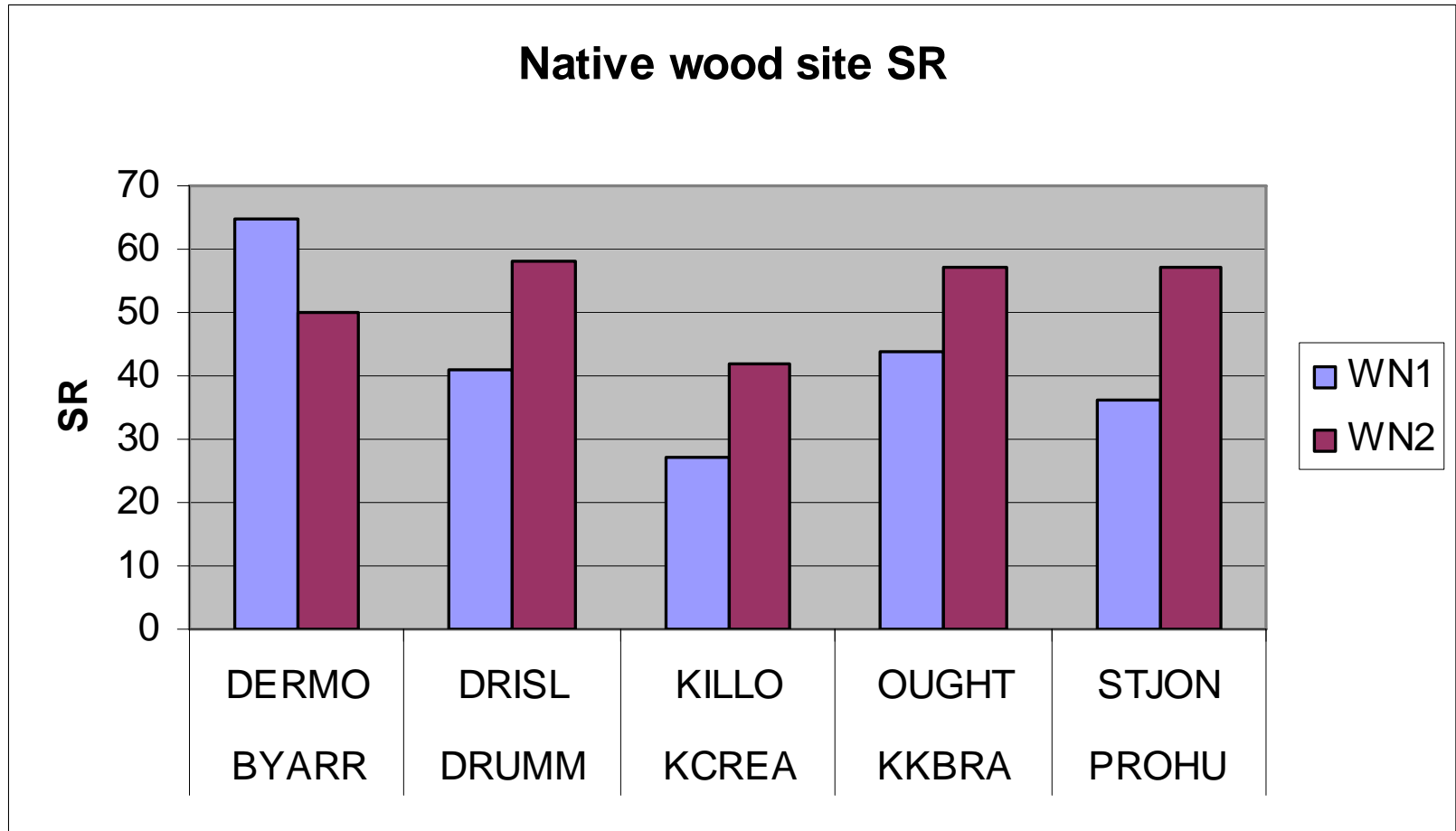
# Species Richness (SR) data for 1,500 m<sup>2</sup> of 6 forest types



# Native wood average SR per site 300 m<sup>2</sup>



# Native wood SR (300 m<sup>2</sup>)



# Interpreting SR in native woods

- Species Richness (SR)
  - 27 - 65 species per site (300 m<sup>2</sup>)
  - 43 - 53 species (average SR per site 300 m<sup>2</sup>)
  - 97 - 111 species per forest type (1,500 m<sup>2</sup>)
  - >140 species in the study (3,000 m<sup>2</sup>)
- Regional pattern
  - Oak WN1 – high SR in **north-west** (BYARR)
  - Ash WN2 – low SR in **midlands** (KILLO)
  - Data from 2008 should clarify pattern

# Site properties that enhance epiphyte diversity

- High diversity
  - Ash, Oak
  - shrub layer
  - Moderate light levels
  - Rain throughfall & stemflow complex
  - Old native woodland sites (1830-40s)
  - Tree canopy gap dynamics
  - NWFP use
- Low diversity
  - Sitka Spruce
  - no shrub layer
  - Low light levels in mid-rotation
  - Rain throughfall & stemflow attenuated
  - Restock non-native plantations
  - Clear-fell forestry
  - Merchantable timber

# Epiphyte study – future directions

- Analysis of 2007 datasets
- Norway Spruce mixes in 2008
- More Native woods in 2008
- Tree climbing

# Acknowledgements

- Coillte & forest owners
- COFORD for funding
- OPW National Botanic Gardens for career break
- PLANFORBIO team
- ForestBio team