



DiversiTree

Diversifying our woodlands to increase resilience

Collaborators



Project partners



“A diverse species composition should be maintained across the forest management unit so that no more than 65% of the area is allocated to a single species.....”



4 Challenges

1

How do woodland managers understand woodland diversity and what are their ambitions in relation to resilient future woods?

2

Can increased tree diversity increase microbial diversity on the tree leaves that increases resistance to diseases?

3

How can increased tree diversity support woodland biodiversity?

4

How do we implement and communicate management strategies to increase woodland resilience?



How can increased tree species diversity support woodland biodiversity?

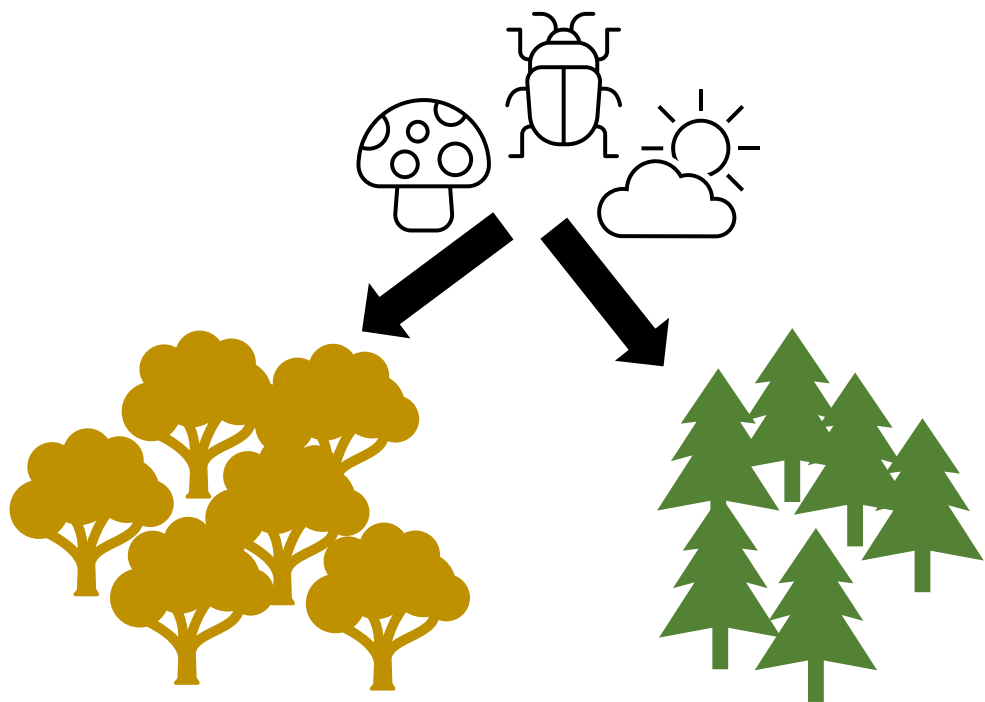
- Provide resilience
- Increase the biodiversity supported



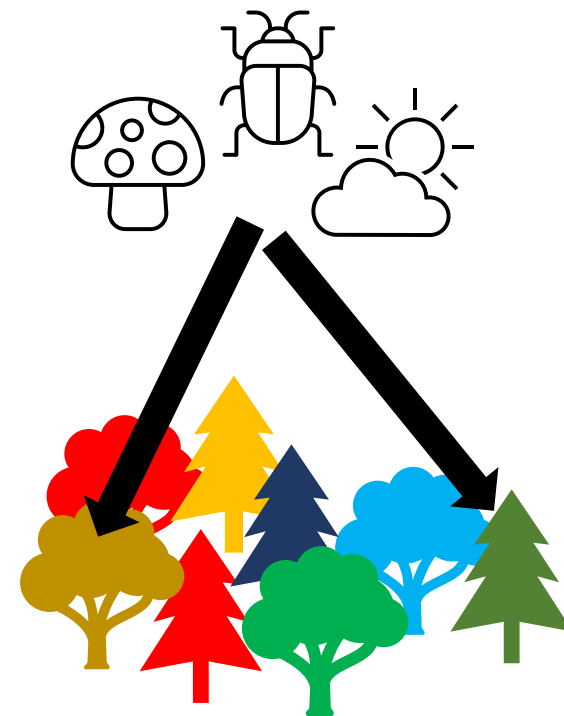
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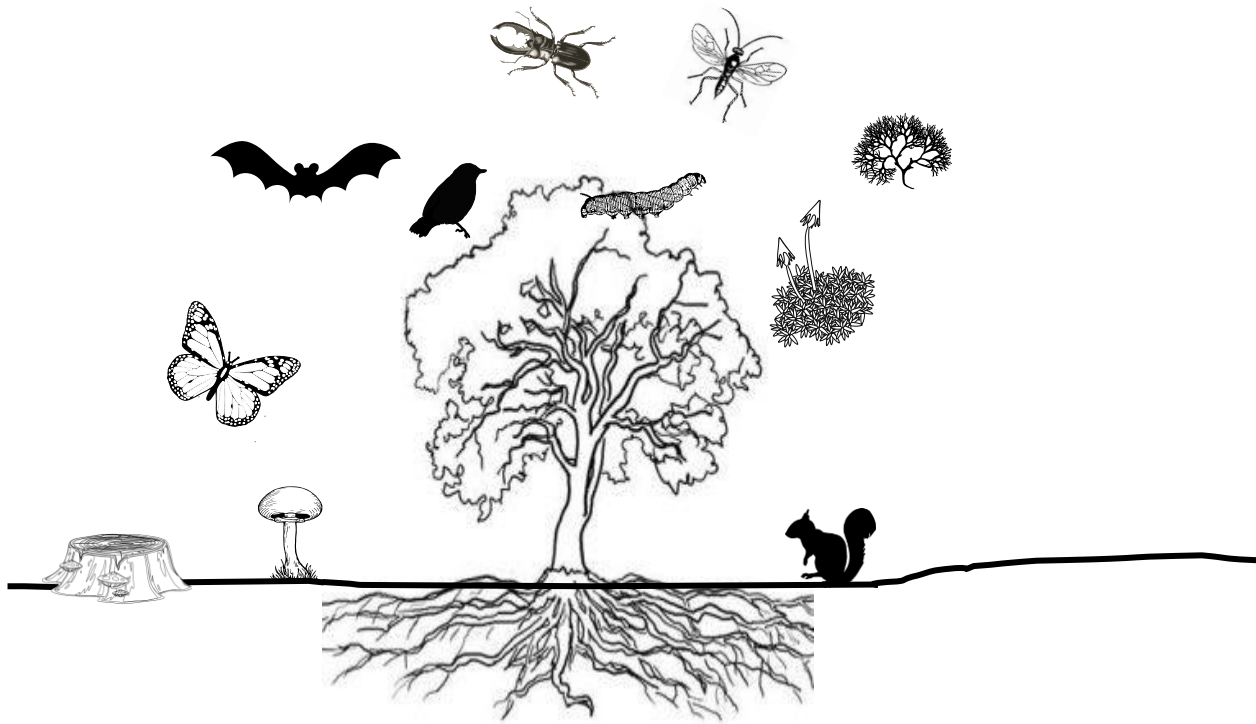


Current semi-natural and commercial woods



More diverse woods

What do we mean by associated biodiversity?



Uses the tree for:

- Food (e.g. invertebrates)
- Nesting/breeding (e.g. bats)
- Habitat (e.g. mosses, lichens)

Not all trees are equal: different tree species will support different biodiversity



Oak (sessile and pedunculate)

- Supports 2300 species across the UK
- 326 species only found on oak

Mitchell et al (2019) Biological Conservation



Ash

- Supports 953 species across the UK
- 44 species only found on ash

Mitchell et al (2014) Biological Conservation



Sitka spruce

- Supports 564 species across the UK
- 6 species only found on Sitka spruce

Mitchell et al (2025) Forestry



Scots pine

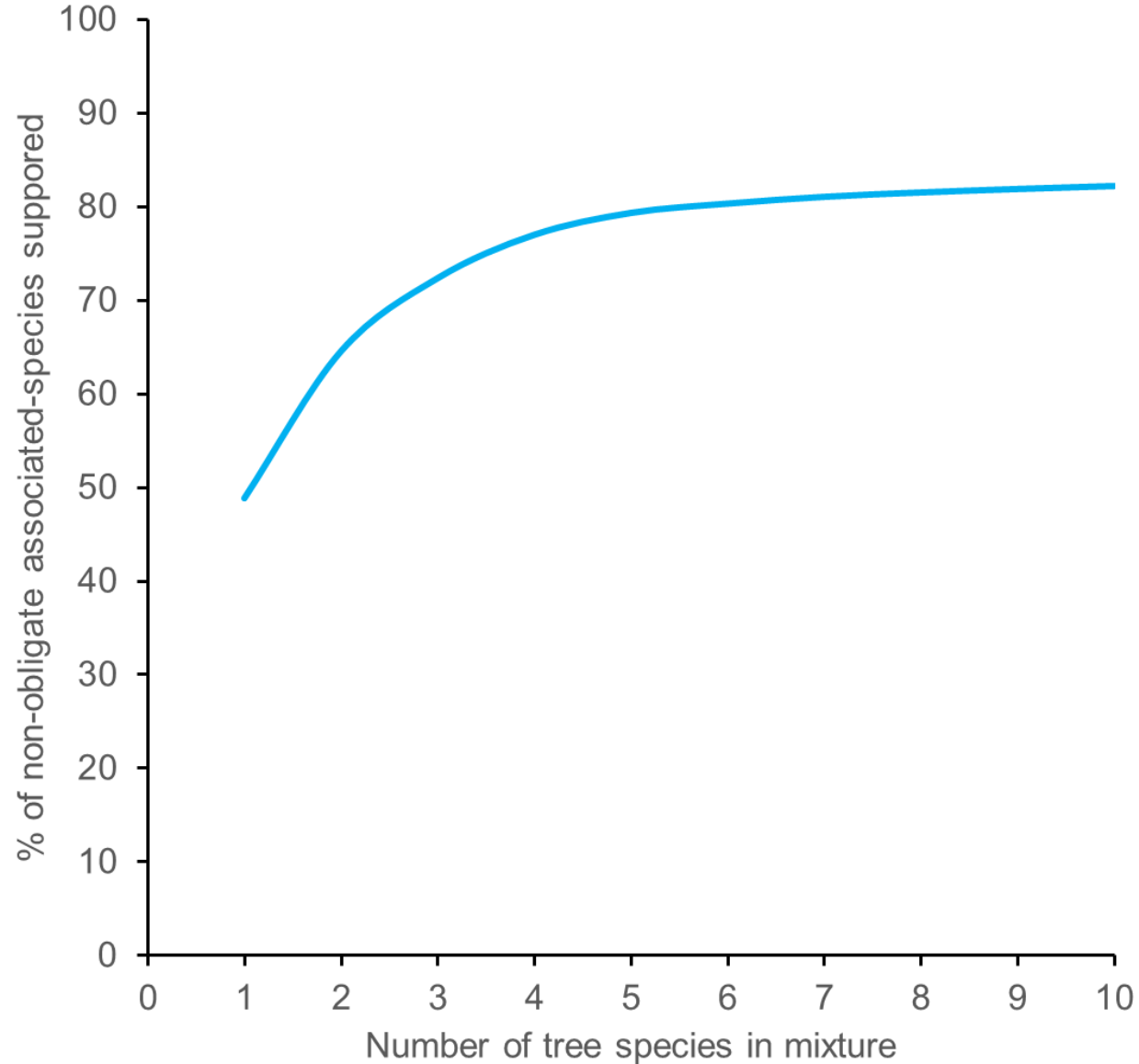
- Supports 1589 species across the UK
- 215 species only found on Scots pine

data not yet published

Do Tree species mix provide resilience?

- Lists of species found on four tree species
- For non-obligate species we know if they use 30-50 other tree species

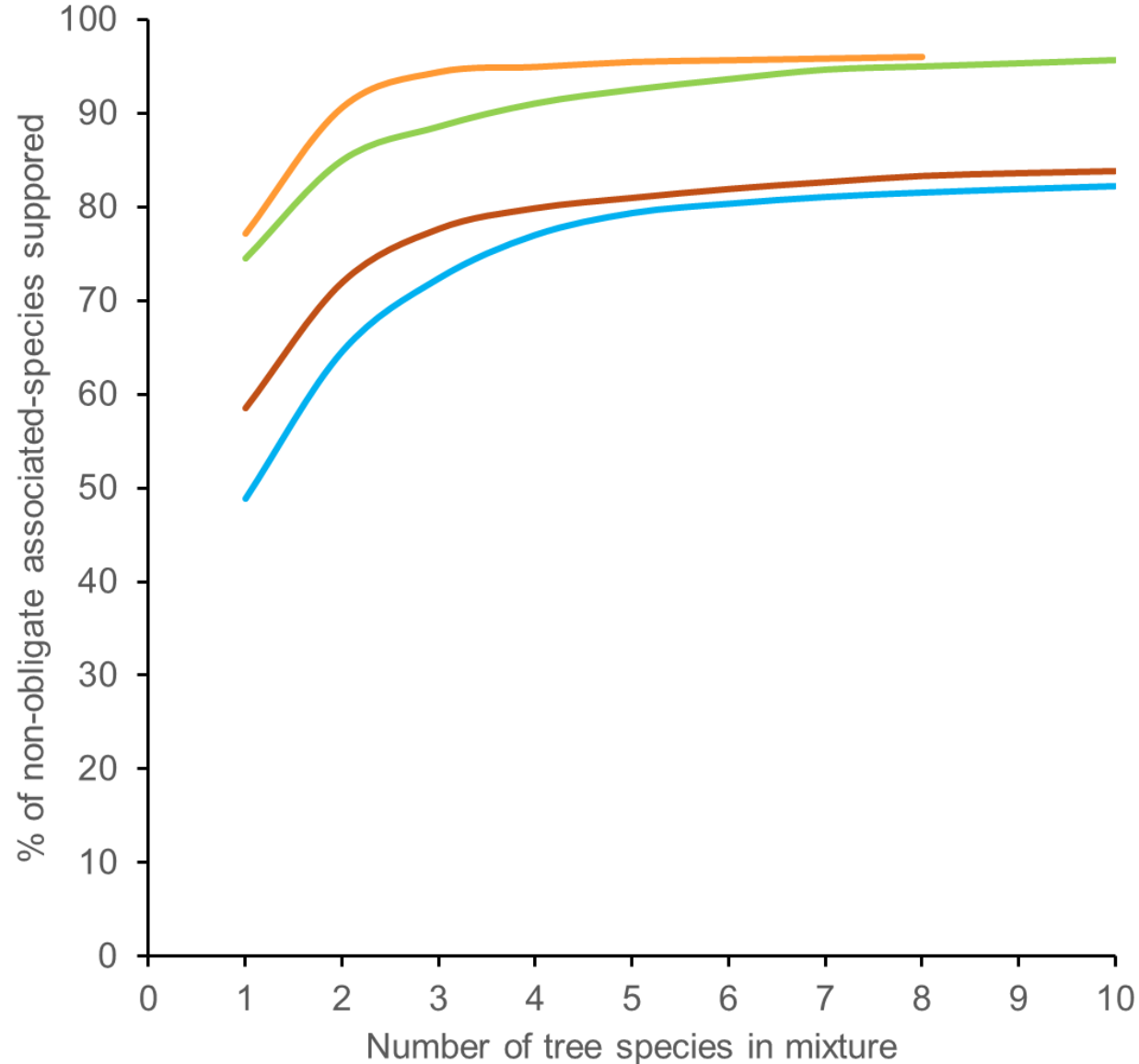
Resilience for associated species provided by tree mixtures



- Increased diversity does provide resilience for associated species that are not obligate

— Oak

Resilience for associated species provided by tree mixtures

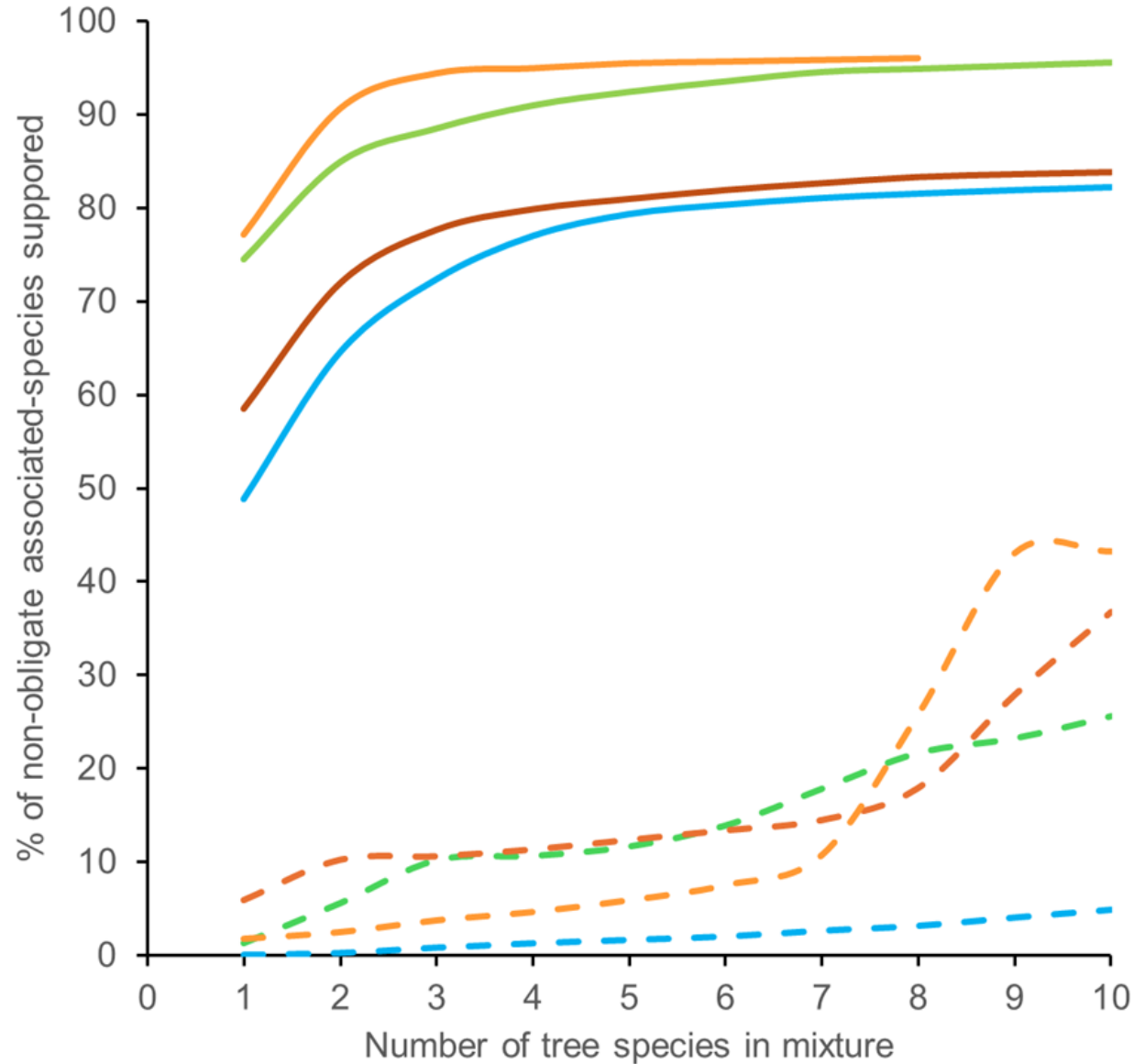


- Increased diversity does provide resilience for associated species that are not obligate

Oak
Scots pine

Ash
Sitka spruce

Resilience for associated species provided by tree mixtures



- Increased diversity does provide resilience for associated species that are not obligate
- Critical which tree species are in the mix



How can increased tree species diversity support woodland biodiversity?

- Provide resilience
- Increase the biodiversity supported



564 species associated with Sitka spruce

Mostly common species

6 species only found on Sitka spruce – non-natives

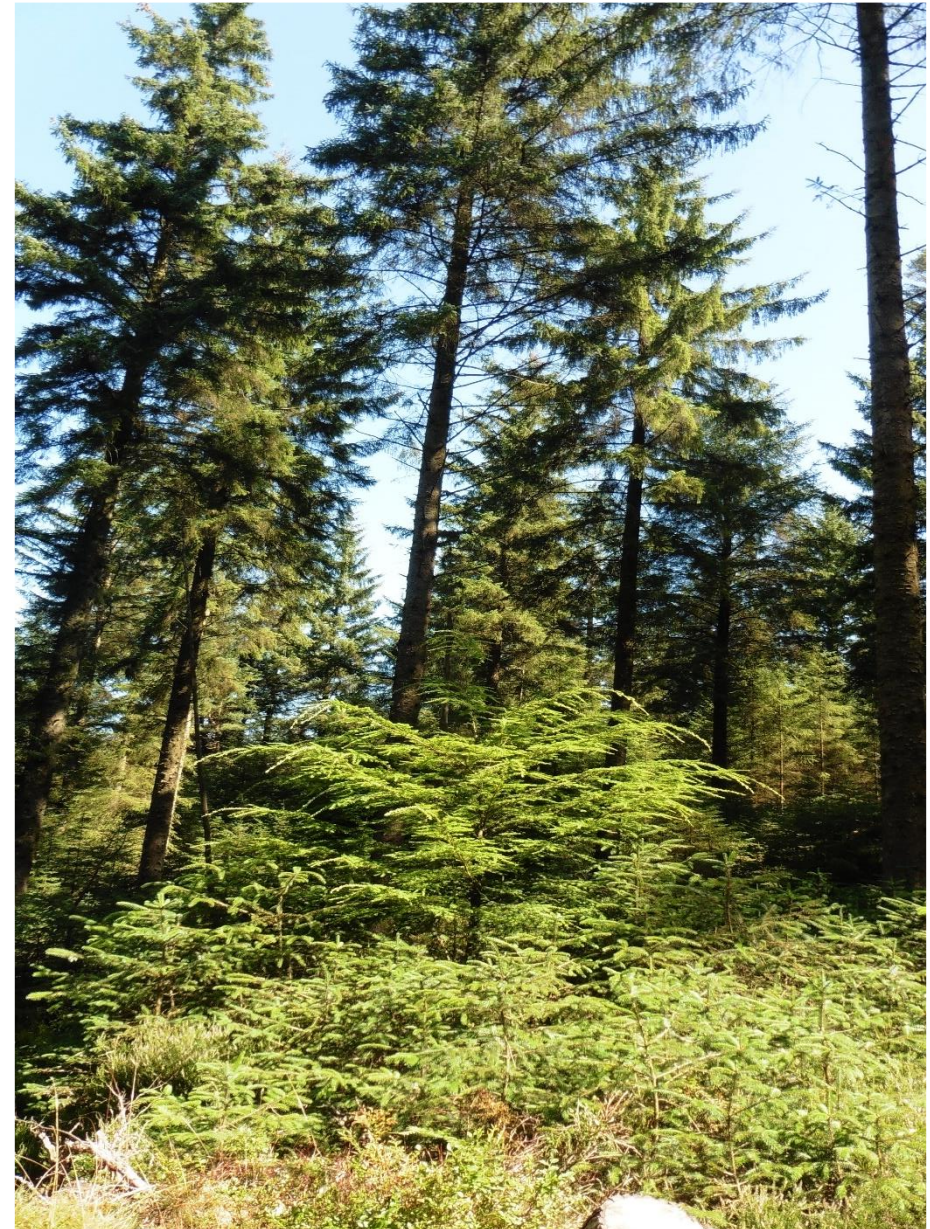
40 highly/partially associated

12 Birds	}	49 species – conservation protection
147 Bryophytes		
28 Fungi*		
123 Invertebrates		
243 Lichens		
11 Mammals		

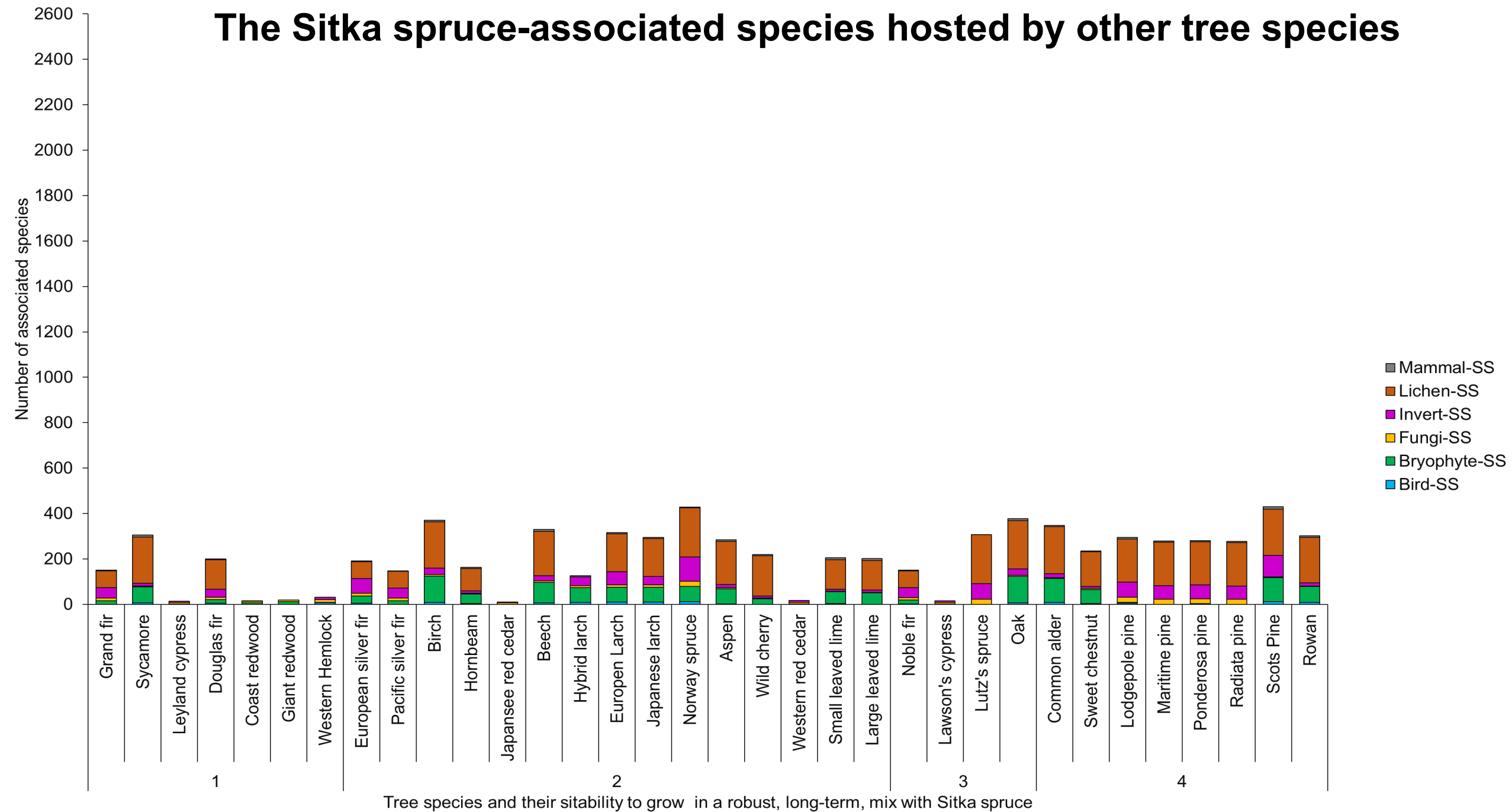
*Fungi an under-estimate, only obligate, high, and partially associated species recorded

Caveats:

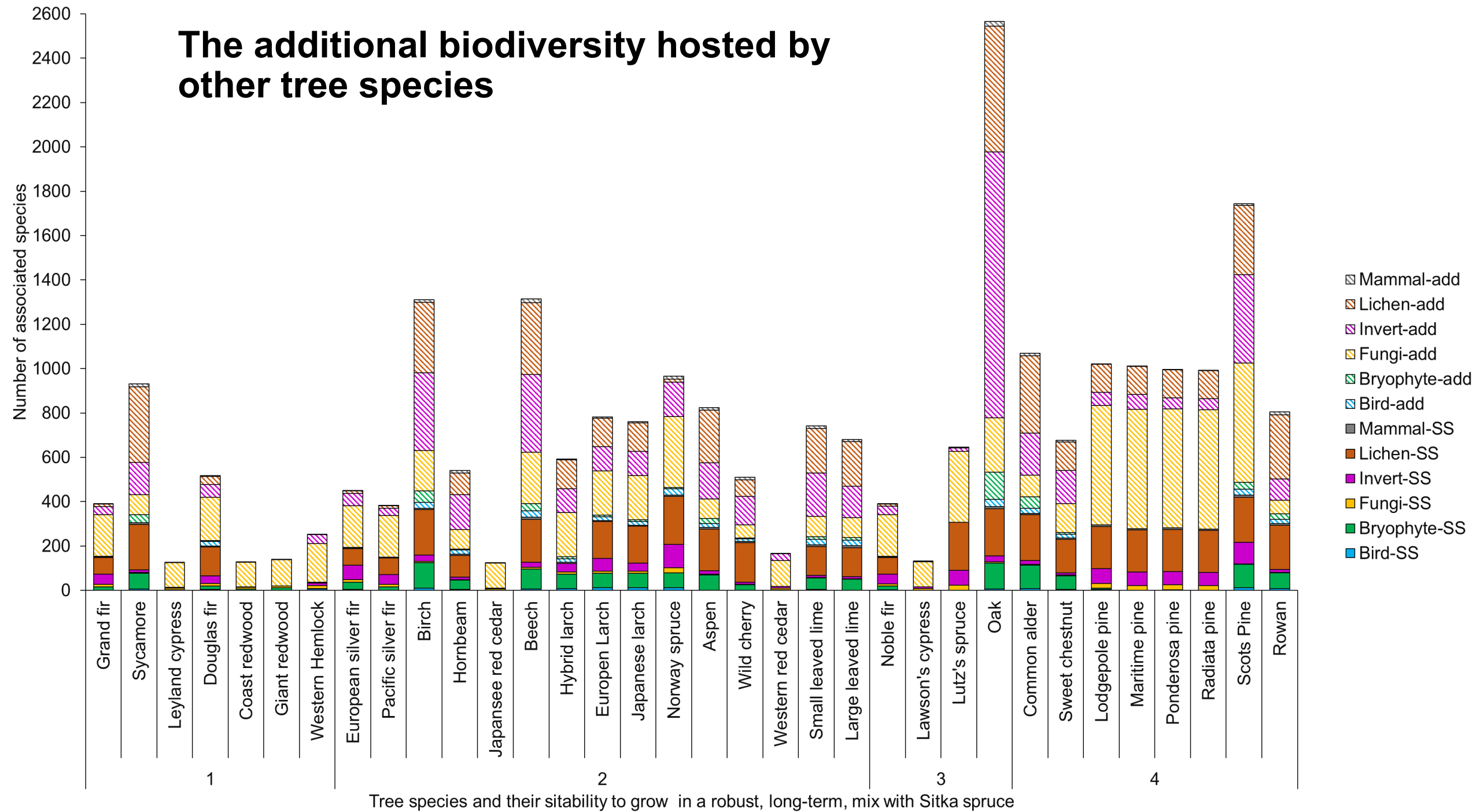
- Not all species will be hosted on any one tree, or found in any one forest
- Forest structure and tree age will also influence species hosted
- Species are those that use the tree, not those found in the wider forest environment



The Sitka spruce-associated species hosted by other tree species



The additional biodiversity hosted by other tree species



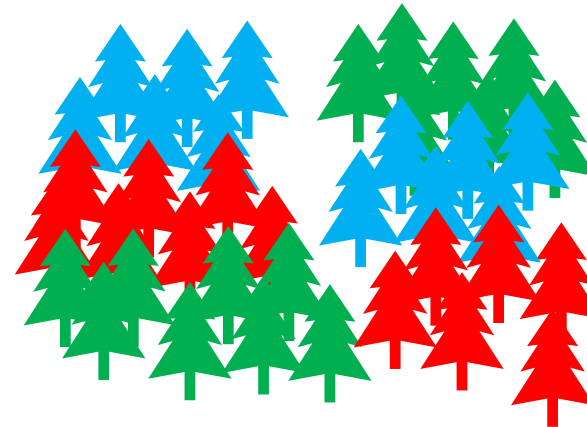
Planting diverse mixtures with Sitka spruce

Intimate mixtures



- Few tree species will grow in intimate mixes with Sitka spruces in the long-term
- Therefore, only short-term benefits for biodiversity
- Hard to manage

Blocky mixes



- Biodiversity benefits, while supporting timber production
- Size and special arrange of blocks critical
- Smaller blocks better for biodiversity?
- Larger blocks better for production?

Key messages

- Different tree species support different biodiversity
- Greater confidence that biodiversity will be supported by native trees than non-native trees
- Which tree species are planted for timber will influence:
 - What biodiversity supported
 - Resilience provided
- Planting pattern will also influence biodiversity supported
- Structure and age also important – even aged, young stands = less biodiversity
- Greater biodiversity with Continuous Cover Forestry (CCF)?

Thank you
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