

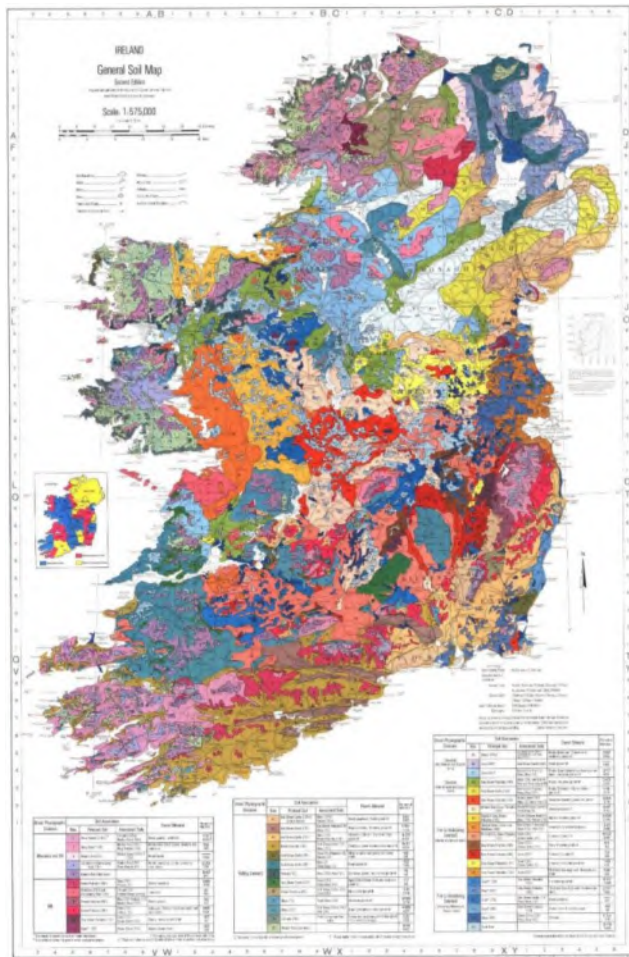
Species choice considerations

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Soil types governing species choice



Soil Type	Ha	%
Grey Brown Podzolic	1,647,296	24%
Gley soils	1,490,775	21%
Brown Podzolic	823,873	12%
Acid Brown Earths	673,488	10%
Podzols	549,547	8%
Shallow Brown Earths	222,585	3%
Basin Peat	394,626	6%
Blanket Peat	755,747	11%
Lithosols	308,755	4%
Other	122,900	2%
Total	6,989,593	100%

Grey Brown Podzolics



Gleys



What Species? Hardwood Options

Native species.

Quercus petraea

Quercus robur

Fraxinus excelsior

Ulmus glabra

Betula pendula

Betula pubescens

Alnus glutinosa

Populus tremula

Prunus avium

Crataegus monogyna

Corylus avellana

Ilex aquifolium

Introduced species

Fagus sylvatica

Acer pseudoplatanus

Castanea sativa

Juglans regia

Tilia cordata

Carpinus betulus

Acer campestre

Aesculus hippo.

Eucalyptus spp

Nothofagus spp

Ash - Avondale



Beech - Avondale



Spanish Chestnut - Avondale



Oak - Avondale



What Species? Conifer Options

Native species

Pinus sylvestris –native?

Taxus baccata

Juniperus communis

Introduced species

Picea abies

Larix decidua

Abies alba

Pinus nigra/ var maritima

Picea sitchensis

Pinus contorta

Pseudotsuga menz.

Tsuga heterophylla

Thuja plicata

Abies grandis

Abies procera

Larix kaempferi/ x eurolepis

Sequoia/Sequoiadendron gig.

Chamaecyp. laws.

Western red cedar



Mean DBH (cm)	35.2
SPH	925
BA/Ha (m ² /ha)	89.8
Top Ht (m)	25.2
Mean Vol (m ³)	0.93
Standing Vol/Ha	860
Thinnings (m ³ /Ha)	253
Total Vol (m ³ /Ha)	1113
P/Year	1967
Age (yrs)	51
MAI (m ³ /Ha ⁻¹ ann ⁻¹)	21.8
CAI	26.8

Western hemlock



Mean DBH (cm)	35.1
SPH	775
BA/Ha (m ² /ha)	75.1
Top Ht (m)	27.6
Mean Vol (m ³)	1.16
Standing Vol/Ha	899
Thinnings (m ³ /Ha)	251
Total Vol (m ³ /Ha)	1150
P/Year	1966
Age (yrs)	52
MAI (m ³ /Ha ⁻¹ ann ⁻¹)	22.1
CAI	29.6

Monterrey Cypress



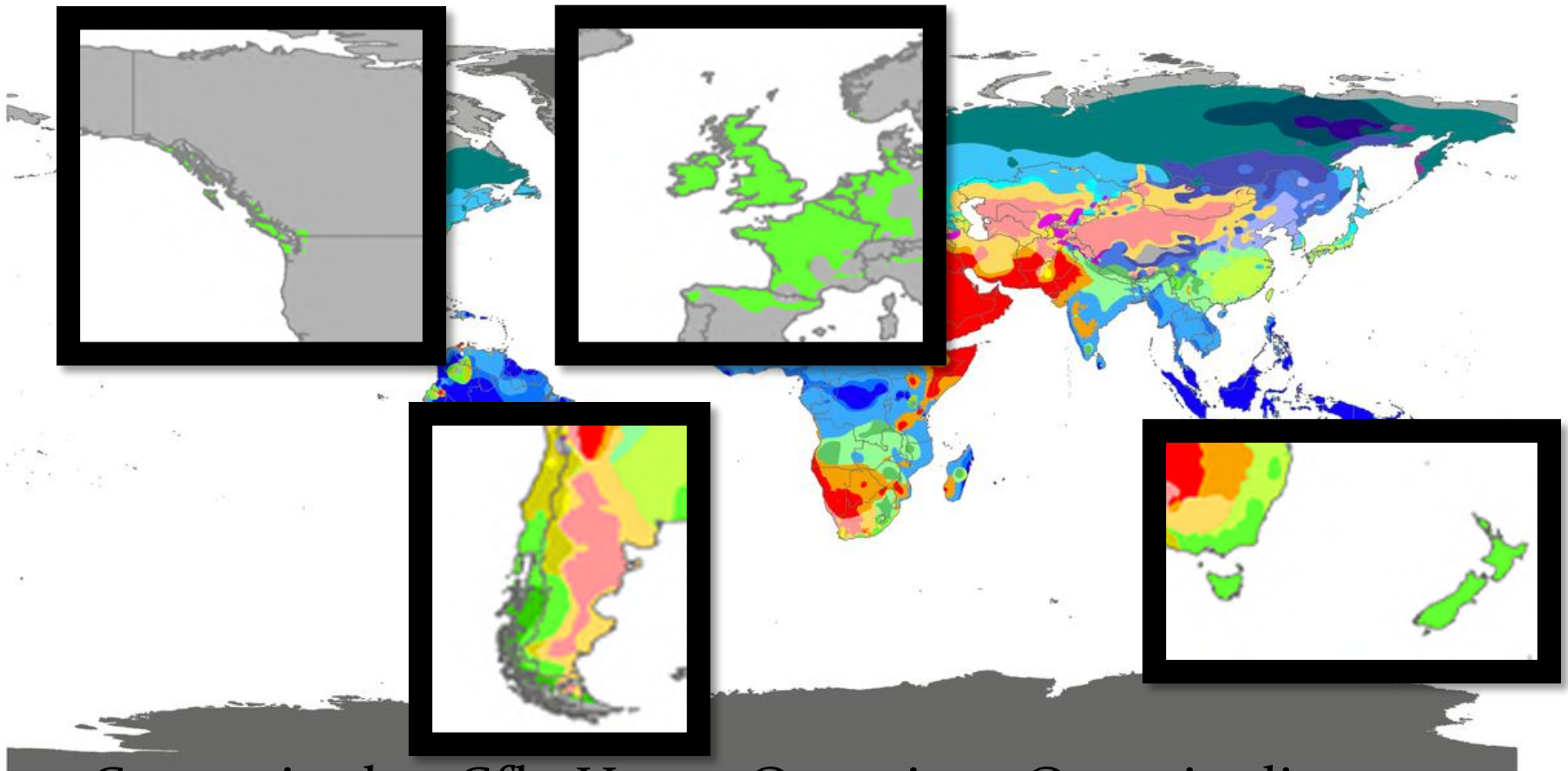
Mean DBH (cm)	50.3
SPH	550
	109.
BA/Ha (m ² /ha)	3
Top Ht (m)	28.4
Mean Vol (m ³)	2.12
Standing Vol/Ha	1166
	300.
Thinnings (m ³ /Ha)	5
Total Vol (m ³ /Ha)	1467
P/Year	1967
Age (yrs)	51
MAI (m ³ /Ha ⁻¹ ann ⁻¹)	28.8
CAI	35.2

Practical implications of climate change to Irish forests



Climate matching – likely adaptation approach

World map of Köppen-Geiger climate classification



Categorised as Cfb: Hyper-Oceanic to Oceanic climate

Af	BWh	Csa	Cwa	Cfa	Dsa	Dwa	Dfa	ET
Am	BWk	Csb	Cwb	Cfb	Dsb	Dwb	Dfb	EF
Aw	BSh		Cwc	Cfc	Dsc	Dwc	Dfc	
	BSk				Dsd	Dwd	Dfd	

DATA SOURCE : GHCN v2.0 station data
Temperature (N = 4,844) and
Precipitation (N = 12,396)

PERIOD OF RECORD : All available

MIN LENGTH : ≥30 for each month.

RESOLUTION : 0.1 degree lat/long

Conifers with Moist Mid-latitude Climates with Mild Winters

- Cfb (Warm Summer) (13 spp., including *Abies amabilis*, *Picea sitchensis*, *Thuja plicata*, *Pinus contorta* var. *contorta*, *P. Menziesii*),

to

- Csb (Dry Warm Summer) (22 spp including *Abies grandis* , *Abies procera*, *Sequoia semprevirens*, *Pinus ponderosa* , *Pinus radiata*)

to

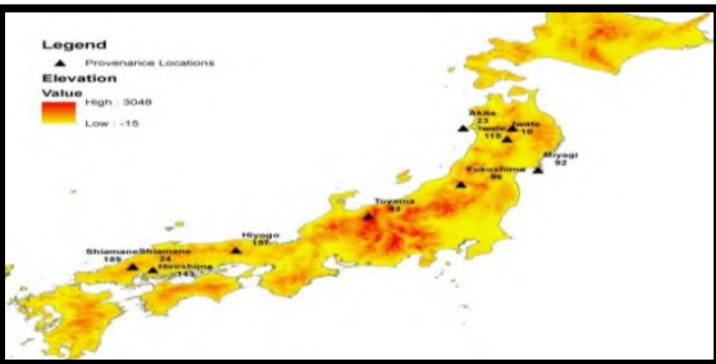
- Cfa (*Hot summer*) (25 spp. Including *Abies fraseri*, *Cryptomeria japonica*, *Larix kaempferi*, *Pinus peuce*)

Coast Redwood



Mean DBH (cm)	38.2
SPH	950
BA/Ha (m ² /ha)	109.1
Top Ht (m)	25.1
Mean Vol (m ³)	1.12
Standing Vol/Ha	1064
Thinnings (m ³ /Ha)	69
Total Vol (m ³ /Ha)	1133
P/Year	1972
Age (yrs)	46
MAI (m ³ /Ha ⁻¹ ann ⁻¹)	24.6
CAI	43.9

Japanese red cedar (*Cryptomeria japonica*)



Planting year: 1972 (46 years)
Plot size: 0.10 ha
Spacing: 1.67
Yield class: 20 m³ ha⁻¹ yr⁻¹
Provenance: (Eichenberg) Germany
Thinned in 90, 95, 04

Alternative broadleaved species



Oriental Beech
Southern Beech
Wingnut
Oak
Hickory

FitForest – Are we using the correct provenances?



Updated French guidelines on FRM deployment in the context of climate change



Sessile Oak (*Quercus petraea*)

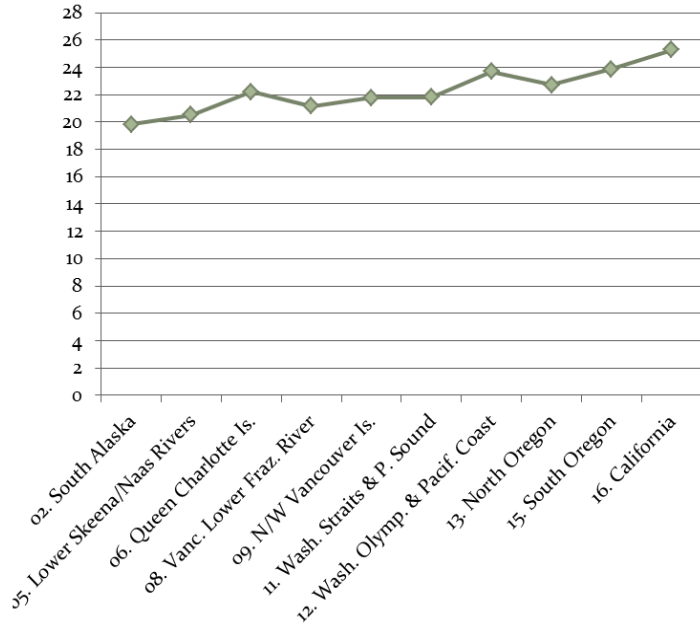


Areas of use		Recommended materials		Other usable materials	
Seed zones					
Code	Name	Name	Cat.	Name	Cat.
QPE101	Bordure Manche	QPE101	S	QPE102, QPE103*, QPE104*, QPE105*, QPE106*	S
QPE102	Picardie	QPE102	S	QPE101, QPE103*, QPE104*, QPE105*, QPE106*	S
QPE103	Massif armoricain	QPE103	S	QPE102, QPE103*, QPE104*, QPE105*, QPE106*	S
QPE104	Perche	QPE104	S	QPE102, QPE103*, QPE104*, QPE105*, QPE106*	S
QPE105	Sud Bassin parisien	QPE105	S	QPE102, QPE103*, QPE104*, QPE105*, QPE106*	S
QPE106	Secteur ligérien	QPE106	S	QPE102, QPE103*, QPE104*, QPE105*, QPE106*	S

<http://agriculture.gouv.fr/graines-et-plants-forestiers>

Match genotypes to future site conditions

Migrate provenances - northwards



Select more southerly provenances which are adapted to future conditions

Adaptive forest management - Interprovenance mixtures of Sitka spruce



AdaptForRes - Are breeding populations adaptive and resilient?

- Are populations sufficiently genetic diverse?
- Assess if natural genetic resistance exists within populations (Ash, Chalara disease)
- Are resilience traits present in breeding populations (e.g. insect resistance, drought)
- Assess if commercial seed from improvement programmes offers potential adaptive potential to Irish conditions.



Thank you

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