



# Gene conservation in the Nordic area - status and future perspectives

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NordGen Forest thematic day, 11 april 2018

# Genetic diversity



# International obligations

- Convention on Biological Diversity
- Global Plan of Action for Conservation, Sustainable Use and Development of Forest Genetic Resources:
  - Information on forest genetic resources (FGR)
  - Conservation of FGR
  - Sustainable use, development and management
  - Policies, institutions and capacity-building



# EUFORGEN

European Forest Genetic Resources Programme (from 1994)



- «20 years of collaboration in Europe»
- EUFGIS – Information system on FGR conservation in Europe





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# Dynamic gene conservation



- Genotypes are not conserved as such (cf varieties)
- Target for conservation is genetic diversity and the processes that maintain the diversity
  - Abundant flowering,
  - Many trees participating in the next generation
  - Successful regeneration
  - Effective gene flow
- Genotypes are exposed to natural selection (even if it eliminates variation)
- (reproductive) biology of the species to be considered



# Pan-European minimum requirements



## Basic requirements for the gene conservation units

- Designated status
- Management plan targeting genetic conservation
  - Maintain genetic diversity in large populations
  - Conserve specific adaptive traits (marg & scattered)
  - Conserve rare / endangered species in small pops

## Management and monitoring

### Population size, minimum no of reproductive trees

- >500
- >50
- >15



# Examples of dynamic gene conservation (Norway)

- Database of all tree species in all protected forest areas in Norway
- 23 designated units already in place – in nature reserves:
  - 10 tree species (Broad leaves, holly/yew and Norway spruce)
- In progress:
  - Norway spruce (*Picea abies*)
  - Wild apple (*Malus sylvestris*)



# *Picea abies*

## - Reference material *and* plus trees for the future

1. Natural large population as reference to the breeding population
2. Plus trees for potential use through advanced breeding techniques in the future:
  - Cooperation and contracts with forest owners
  - Established stands will be dedicated for gene conservation
  - Silviculture as normal
  - Regeneration: Stand seeds for next generation



Foto: Dan Aamlid/NIBIO



Photo: Per Arvid Åsen

# *Malus sylvestris*

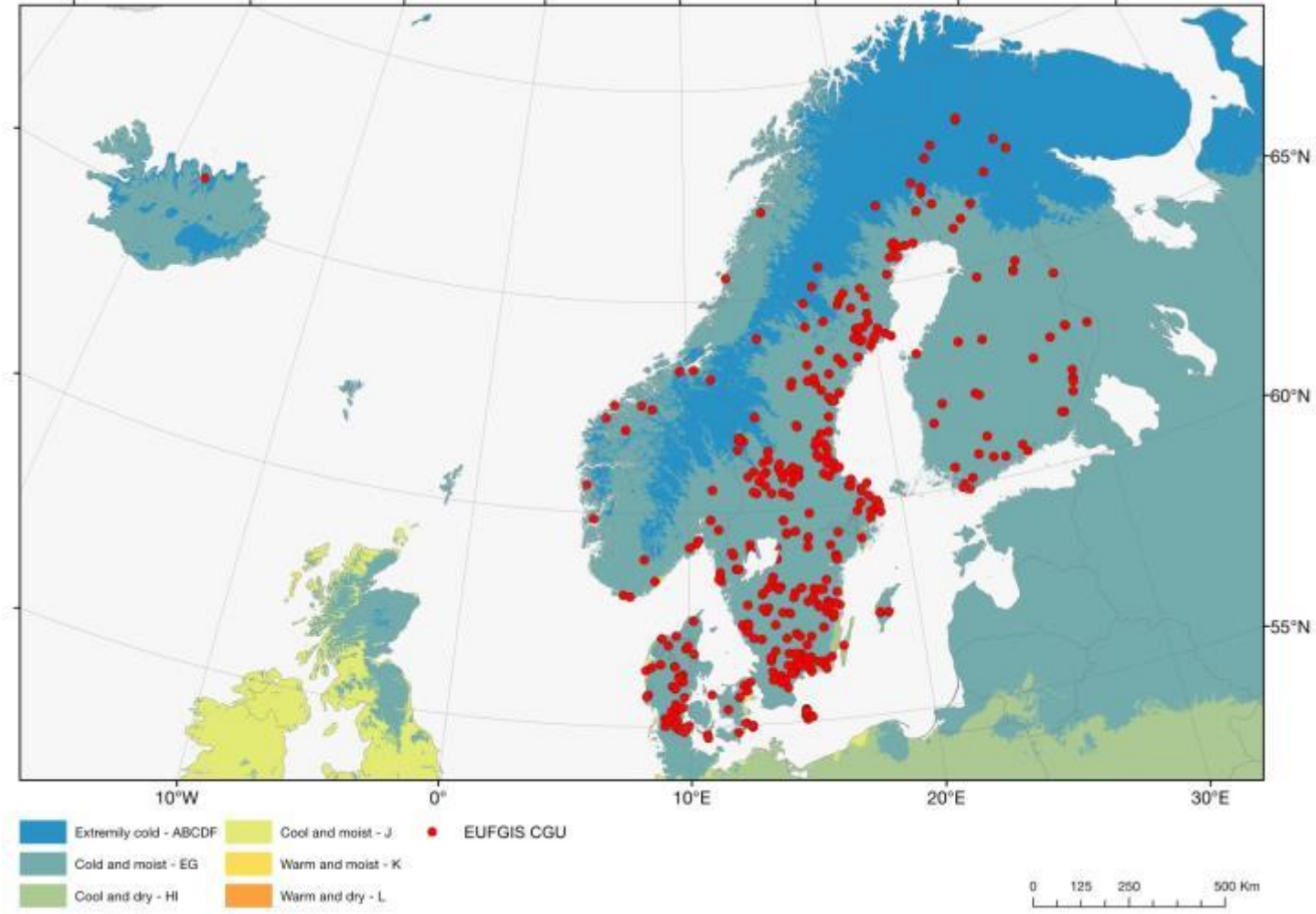
## - threatened and scattered genetic resources

- Wild apple is very well documented in Norway
- Threatened by landscape changes and extensive hybridization with the domesticated apple
- Dynamic in situ conservation in progress



# Genetic conservation units in the Nordic countries

430 conservation units,  
30 tree species



# Nordic gene conservation; how is it done?

	Denmark	Finland	Iceland	Norway	Sweden
<b>Which species</b>	Common species of trees and shrubs	Common species	Common (birch)	Rare species and Norway spruce	Common and rare native species
<b>What kind of units</b>	Specific and protected nature areas	Specific	Specific (Skuggabjargarskogur)	Nature reserves	In habitat protection areas
<b>Management</b>	Depends on the specific area.	Similar to commercial	Similar to commercial	Only in accordance with the nature reserves	Silviculture to support natural regeneration
<b>Regeneration</b>	Natural	With the stand's own origin		Natural	Natural
<b>Monitoring</b>	Every 10th year (visit). Plans are renewed every 15th year.	Every 5 years (visit + forest planning systems)		Every 10 years (true monitoring)	Visit every 8 years to assess if management is required
<b>Ownership</b>	The state	The state and commercial companies	State	Private and state	Private and state
<b>Legal</b>	Administrative protection (in some cases also stricter nature protection)	Voluntary agreements		The areas are protected by nature reserve law	Eternal agreement between state and forest owner

# Nordic perspective

- Differences among Nordic countries
  - Vegetation, climatic zone
  - History
  - Trends in policies (although tend to circulate)
- Quite a lot in common
  - Role of forests in national economy
  - Role of agriculture
  - Tradition of using wood
- Implementation of conservation strategies
  - national responsibility!
- A Nordic report on gene conservation underway



# Work ongoing

- Still a need for more conservation units in the Nordic region
  - In accordance with the European strategy
  - To prepare for climatic changes
  - To ensure genetic diversity in the future
- How do we deal with pests and diseases?





# Iceland as refugium for FGR?

Just a nice idea, or...

- Environmental conditions on Iceland are limiting for many species
  - may change with climate change?
- Risk of introducing invasive species
- Clonal conservation of some tree species
- According to dynamic conservation;
  - the population(s) become better adapted to *Icelandic conditions* than to the original habitat?

...still a nice idea, but at least it is important to look for solutions together.

# Thank you!

