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Fig. 1. Location of project pilot areas
(Author: D.Prižavoite)

Restoration sites include:

- 6120* Xeric sand calcareous grasslands
- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates
- 6270* Fennoscandian lowland species-rich dry to mesic grasslands
- 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils
- 6450 Northern Boreal alluvial meadows
- 6510 Lowland hay meadows



Fig. 2 25 ha of 6210 Semi-natural dry grassland and scrubland facies on calcareous substrates before restoration in Ludza municipality (Author: B.Strazdiņa)

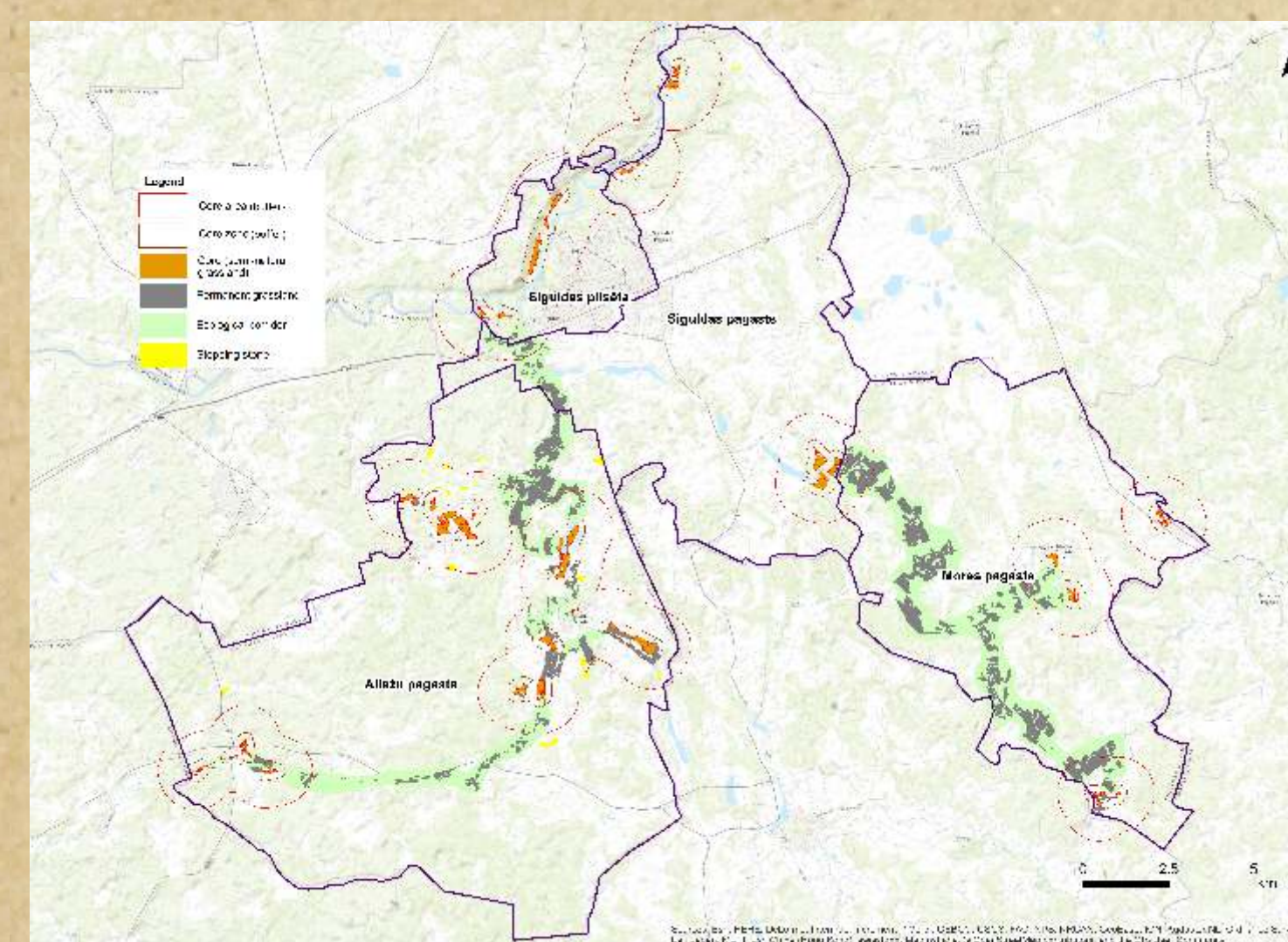


Fig. 3 Semi-natural grassland ecological network in Sigulda municipality (Author: D.Prižavoite)

Applied restoration methods:

- Tree and shrub removal
- Root and stump grinding/ pulling
- Prescribed burning
- Leveling of undulate microrelief with harrowing and rolling
- Grassland mowing
- Green hay/ dry hay spreading
- Grassland cultivation
- Additional grassland seeding with species-rich material

Results

Restoration results show differences in vegetation regeneration between areas where roots of trees and shrubs were grinded or soil was disked/harrowed. Vegetation development is slower in places where roots are grinded. In both cases, weed species are appearing more rapidly than perennial grasses and herbs. However, the grinding of roots proves to be effective restoration method to reduce distribution of *Solidago canadensis*, *Rubus caesius*, *Rosa rugosa* and *Rubus idaeus*. After prescribed burning in early spring and soil leveling, vegetation is regenerating with several semi-natural indicator species - *Primula veris*, *Fragaria viridis*, *Agrimonia eupatoria*, *Plantago media*, *Galium boreale*. Additional grassland seeding with species-rich material increase biological value of grasslands where quality is far away from EU habitats and ensure more qualitative biomass for intensive livestock farming.



Fig. 4. Machinery for root grinding
(Author: D.Prižavoite)



Fig. 5 Stump pulling
(Author: A.Štrassers)



Fig. 6 6120* Xeric sand calcareous grassland after prescribed burning with grinding safety belts
(Author: D.Prižavoite)



Fig. 7 Semi-natural indicator species development (*Primula veris*) after prescribed burning and microrelief leveling (Author: D.Prižavoite)



Fig. 8 Stone removal from grasslands
(Author: I.Igovena)



Fig. 9 Grassland mowing
(Author: I.Igovena)



Fig. 10 Dry hay spreading on bare soil
(Author: I.Igovena)



Fig. 11 Machinery for grassland additional seeding
(Author: A.Štrassers)

Conclusion

- Grassland restoration is quite difficult, time consuming and expensive process, therefore the maintenance of still existing species-rich grasslands is very important.
- Weather conditions have an important role in selection of restoration technique and methods. Particularly, a late spring with delaying vegetation development and longer high soil humidity period may seriously alter restoration activities.
- Modifications of the applied technologies sometimes have to be applied during the process of restoration works in order to adjust to weather conditions, available machinery and human resources, etc. Therefore, certain flexibility and several alternatives have to be envisaged during planning of the restoration works.
- There is lack of practical experience in applying various seed spreading techniques, as well collecting natural seed material.
- The applied grassland restoration methods reveals to have good potential in regeneration of semi-natural grassland vegetation.

